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

EDAM Participating Capacity:
1,000 MW

EDAM Participating Capacity:
1,000 MW

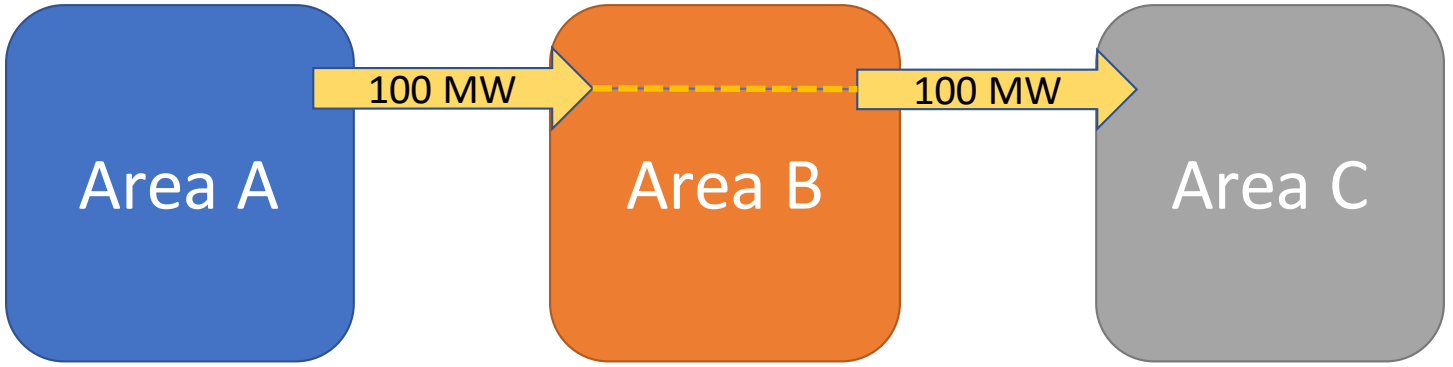
Example 1: Real-Time Loss of Generation

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

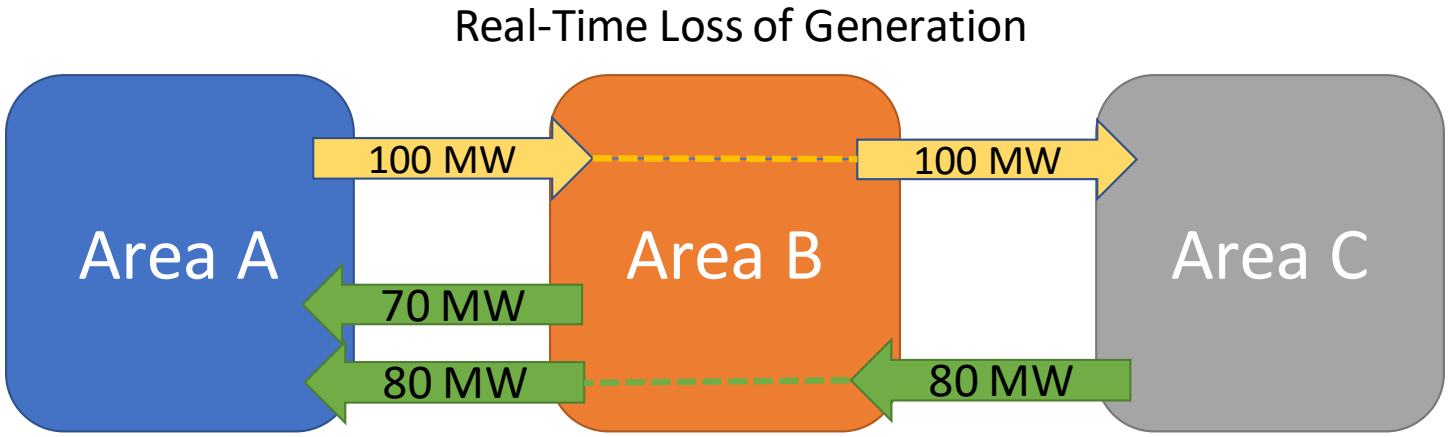
Example 1: Real-Time Loss of Generation (Cont'd)

EDAM Optimized



				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
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	+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

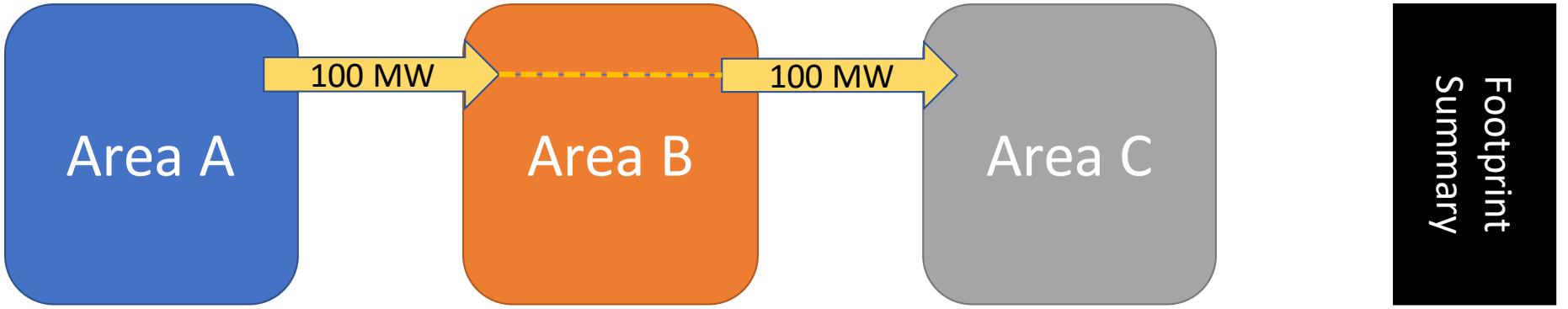
Example 2: Real-Time Loss of Generation – Insufficient Capacity across Footprint

Pre-EDAM Plan

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)

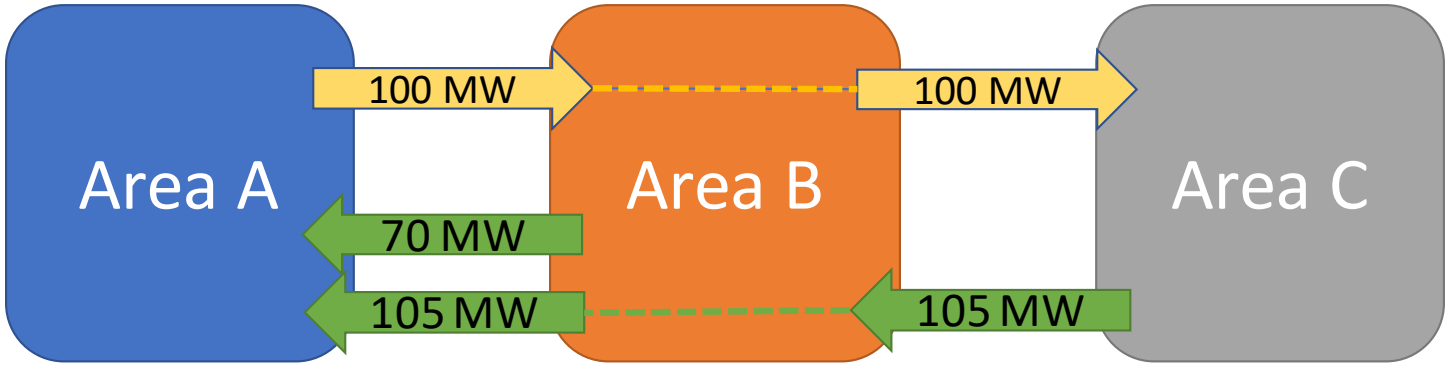
EDAM Optimized



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)

Real-Time Loss of Generation



				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

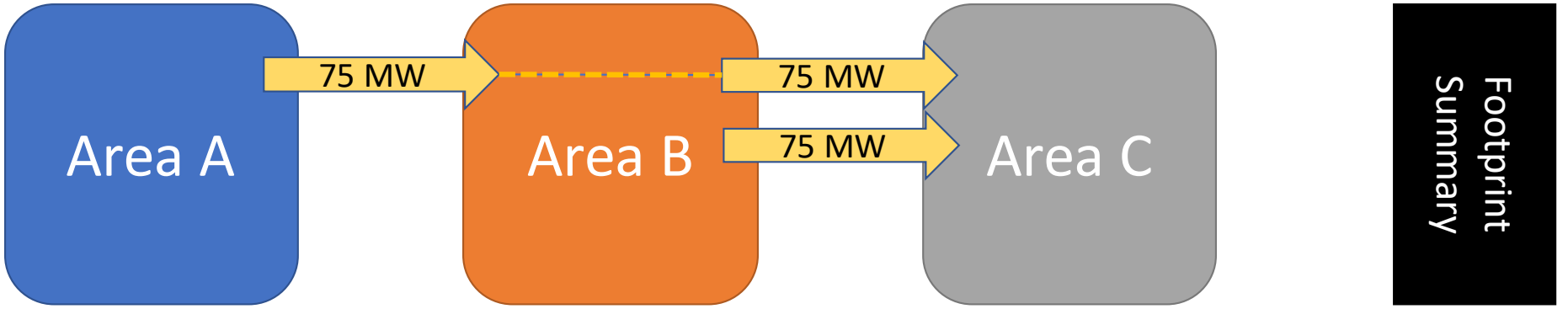
Example 3: Long-Lead Decommit by EDAM, Real-Time Loss of Generation – Insufficient Capacity across Footprint

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)

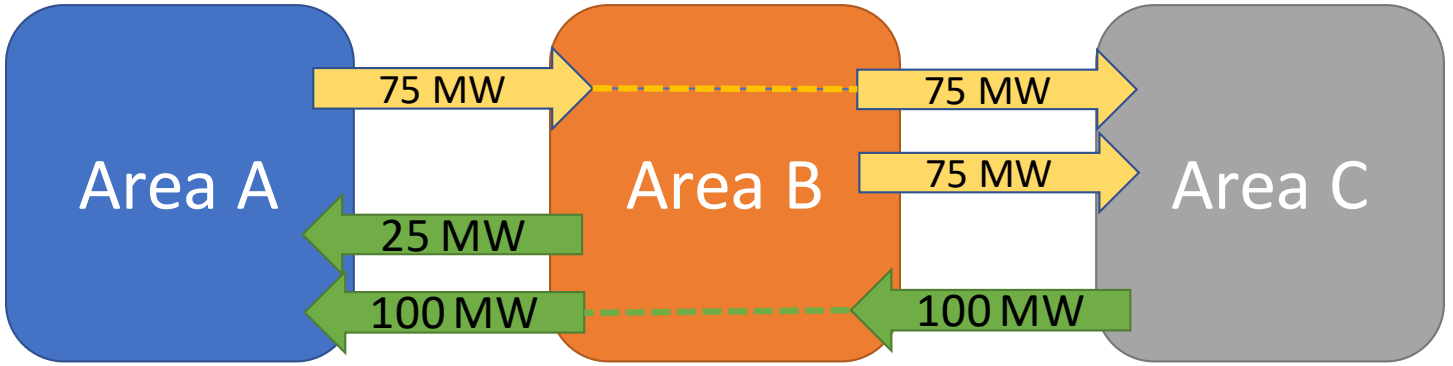
EDAM Optimized



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?

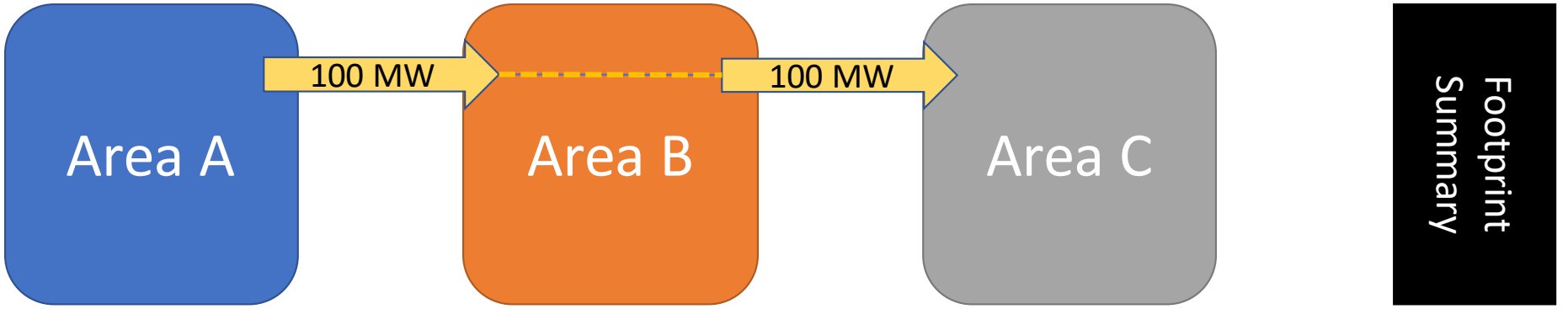
Example 4 (2a): Real-Time Loss of Generation – Insufficient Capacity across Footprint – Bilateral in DA and RT

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)

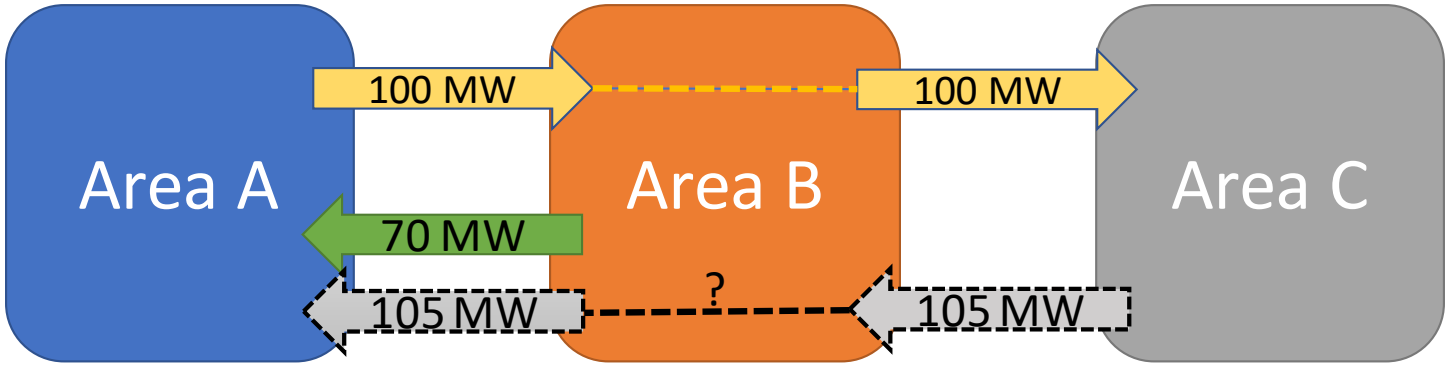
Bilateral Plan



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



	Area A	Area B	Area C	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
Bilateral Transfer	*+100 MW*	*+100/-100 MW*	*-100 MW*	
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	

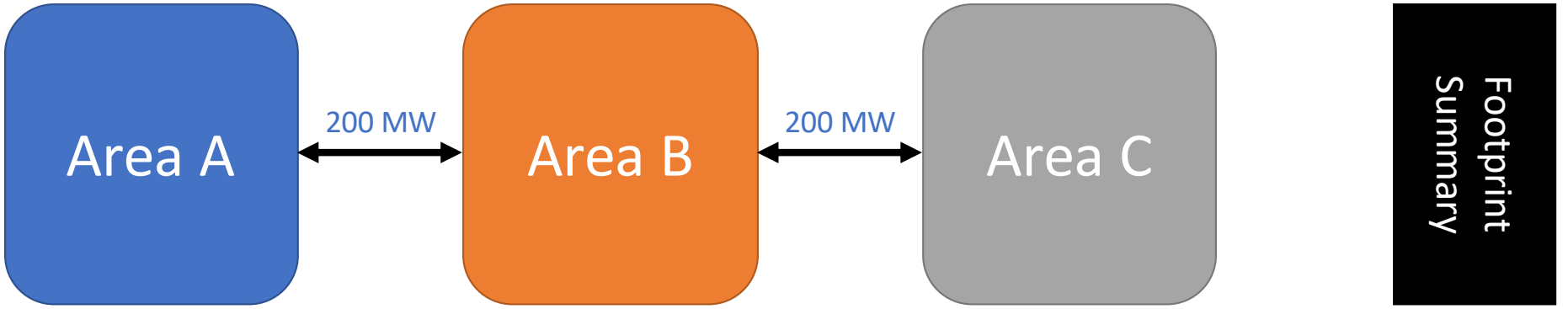
Example 4 (2a): Key Questions

- 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

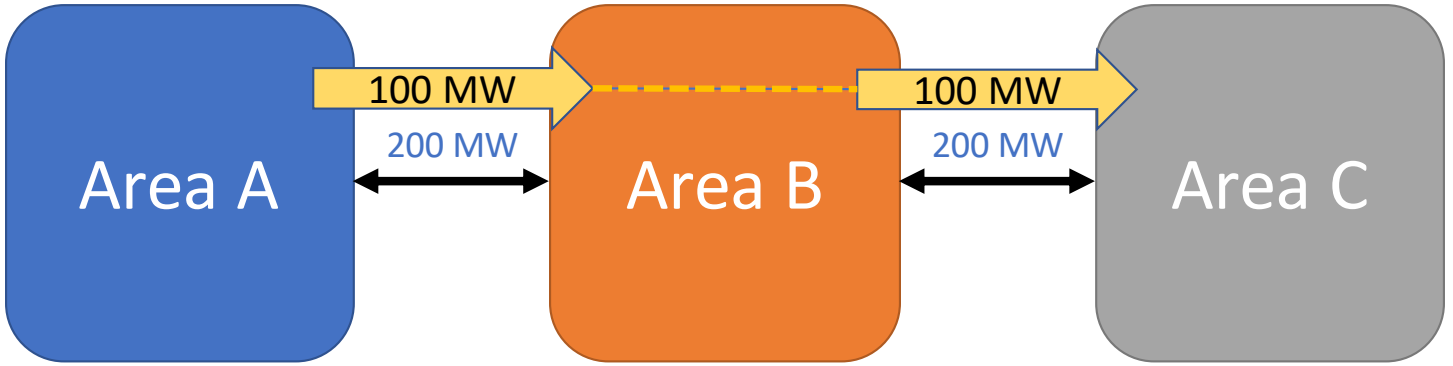
Pre-EDAM Plan



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

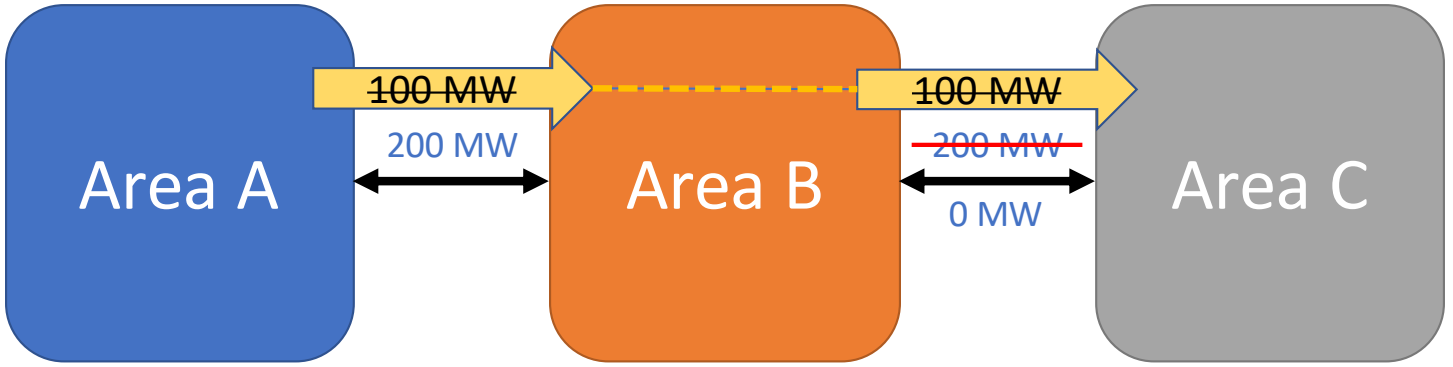
EDAM Optimized



				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)

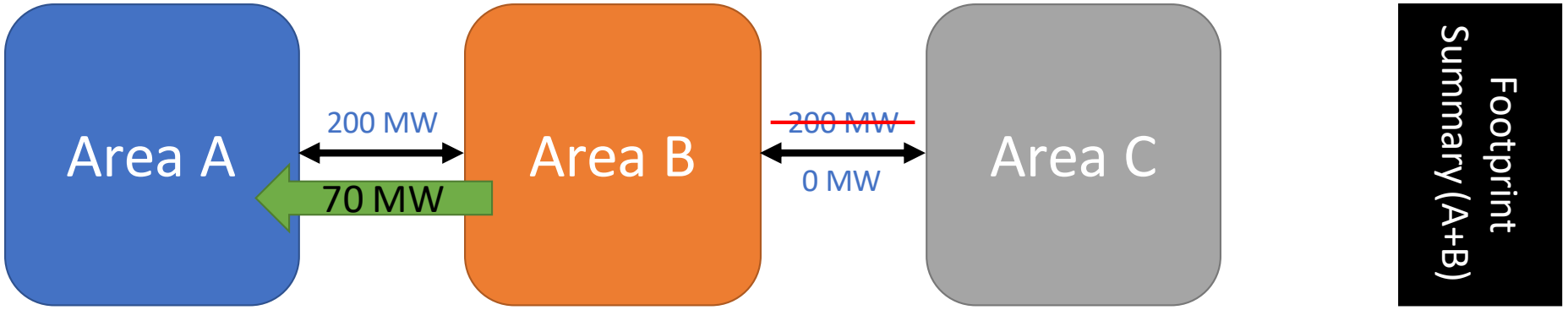
Real-Time Loss of Transmission



	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
EDAM Transfer	*+100 MW*	*+100/-100 MW*	*-100 MW*	
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)

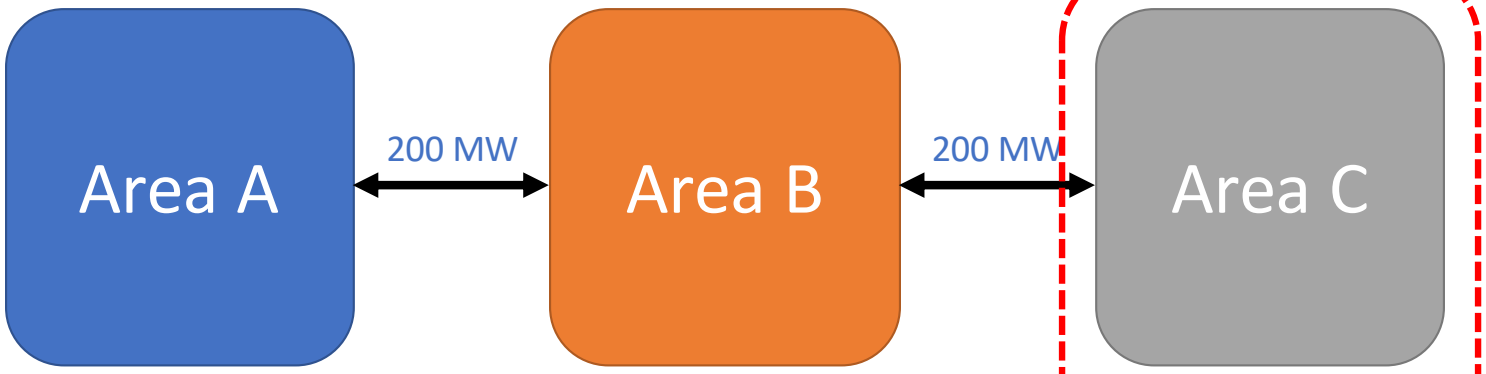
Real-Time Loss of Generation



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/ 100MW*~~	*-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

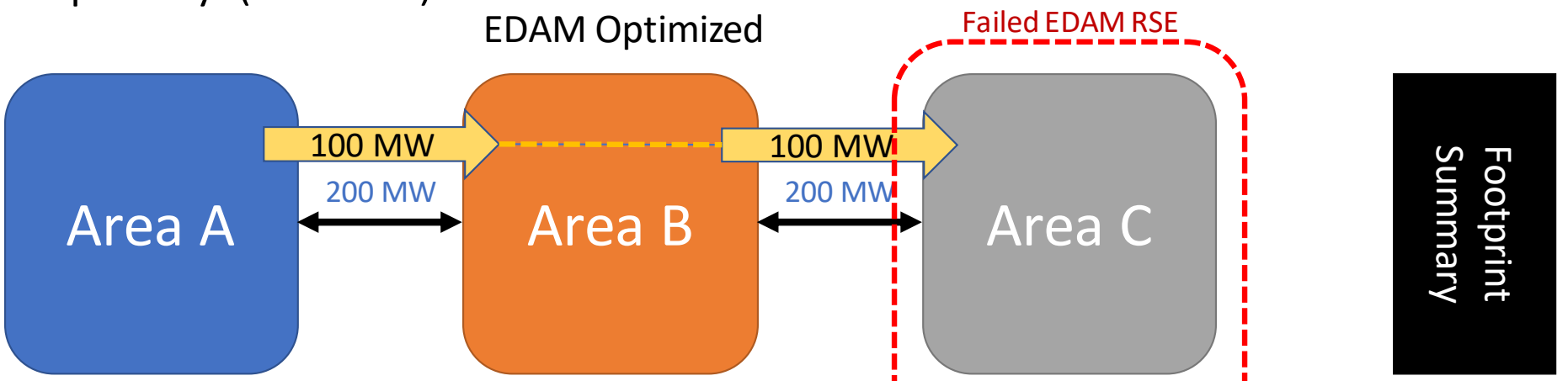
BA Does not Pass RSE, but allowed to Participate in EDAM

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



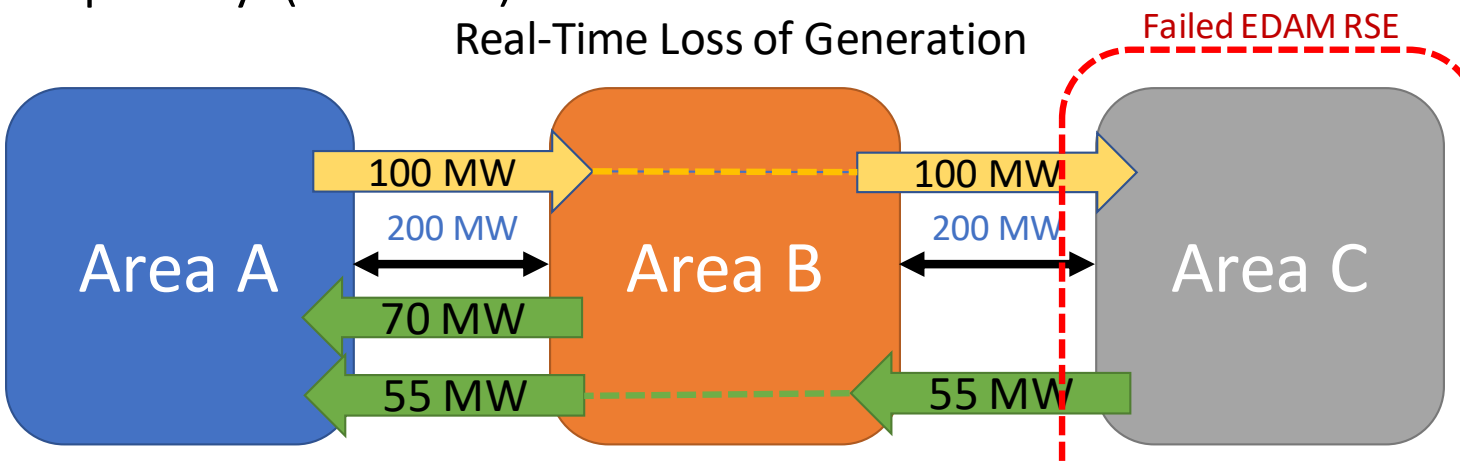
Avail. Capacity	1,000 MW	1,000 MW	950 MW	2,950 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
Remaining	150 MW	70 MW	-45 MW	175 MW

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



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

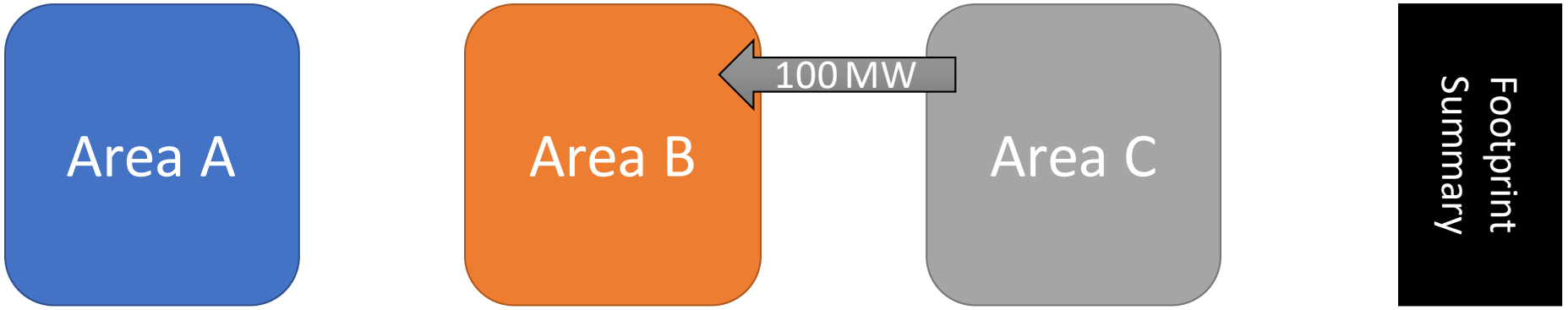
Example 6: Key Questions

- 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

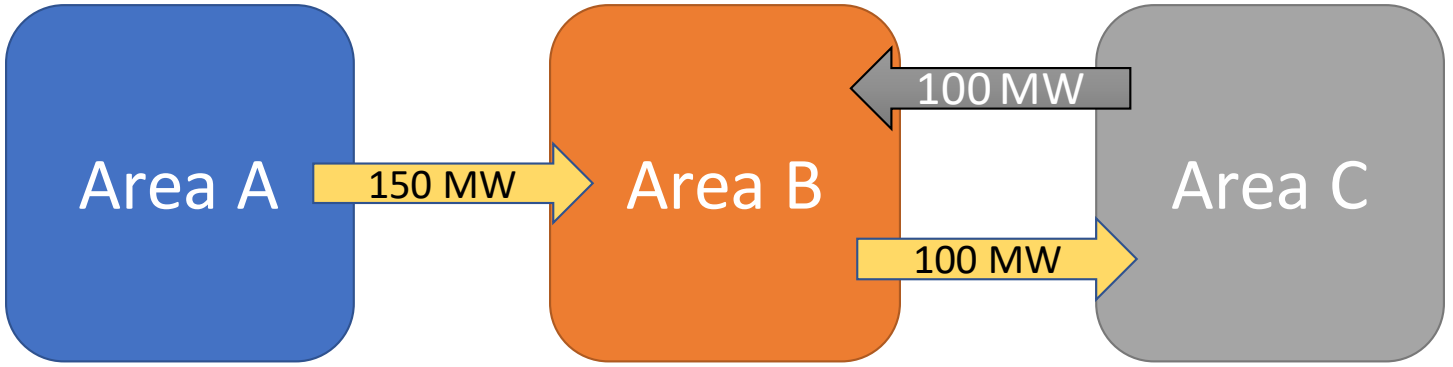
Pre-EDAM Plan



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)

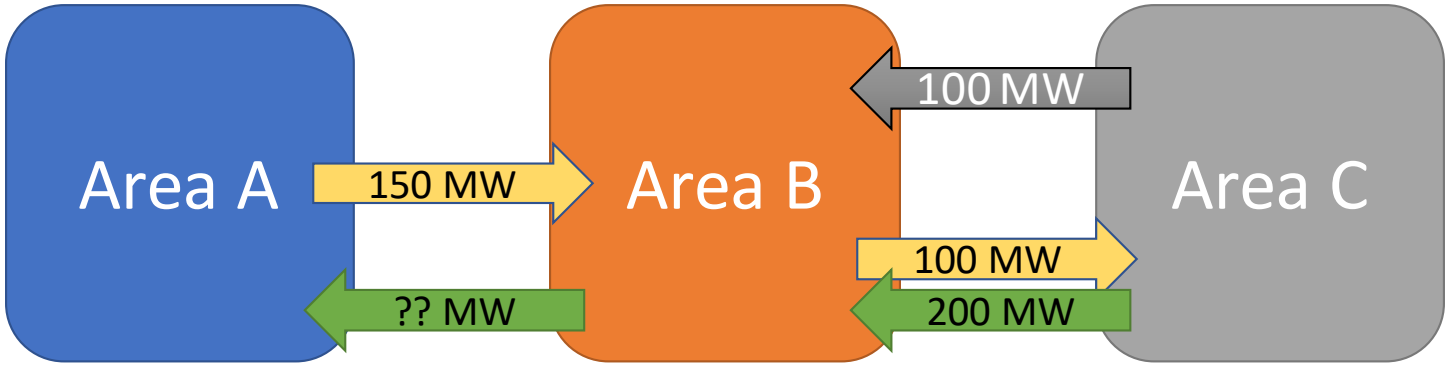
EDAM Optimized



				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)

EDAM Optimized



	Area A	Area B	Area C	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?