

# Actual Reserve Scenarios

## WSPP & WECC Reserves Workshop

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# Disclaimer

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- The following scenarios represent one person's understanding and are presented for discussion purposes only.
- I make no guarantee regarding the accuracy of the information presented. Some apparent "mistakes" may be intentional in order to stimulate discussion & see if you're awake!
- Any actual errors or obvious stupidity is mine alone, and should not be attributed to my employer, the WSPP, the WECC, my fellow task force members, co-workers, family or friends!!

# Before We Begin ~

## Please remember:

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- Most Balancing Authorities (BAs) in the WECC are also members of a Reserve Sharing Group (RSG), e.g.:
  - Northwest Power Pool
  - Southwest Reserve Sharing Group
  - Rocky Mountain Reserve Sharing Group
  - CAISO
- Any reference to a BA in this presentation generally also refers to RSGs.
- There is a difference between carrying contingency reserves and deploying them.
- BAL002 doesn't define how RSGs allocate contingency reserve responsibilities among their members or how the RSG deploys reserves.
- Deployment of reserves is generally based on NERC disturbance control standards (e.g., maintaining ACE) and RSG/BA business practices.
- Deployment is not typically based on individual transactions.
- Restoration period after deployment may vary by RSG/BA, e.g.:
  - 105 minutes in BAL002
  - 60 minutes (currently) in SWRG

# BAL002 Base Case:

## MSSC Driven vs. Load/Gen Driven BA

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### BA 1

Generation = 5000 MW  
Load = 5000 MW  
MSSC = 500 MW

**Contingency Reserves = 500 MW**

The GREATER of MSSC OR:  
3% of Load: 150 MW +  
3% of Generation: 150 MW = 300 MW

### BA 2

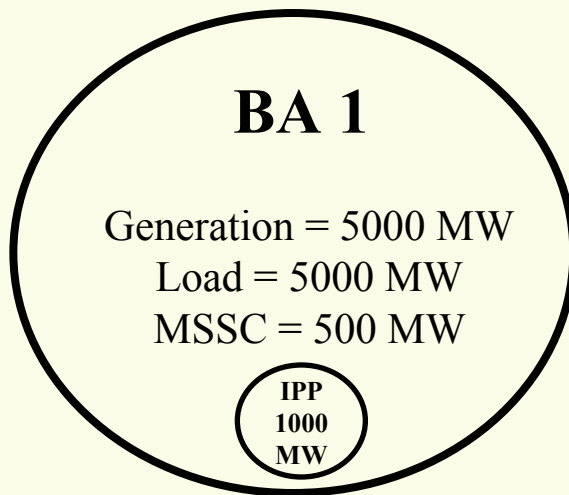
Generation = 5000 MW  
Load = 5000 MW  
MSSC = 250 MW

**Contingency Reserves = 300 MW**

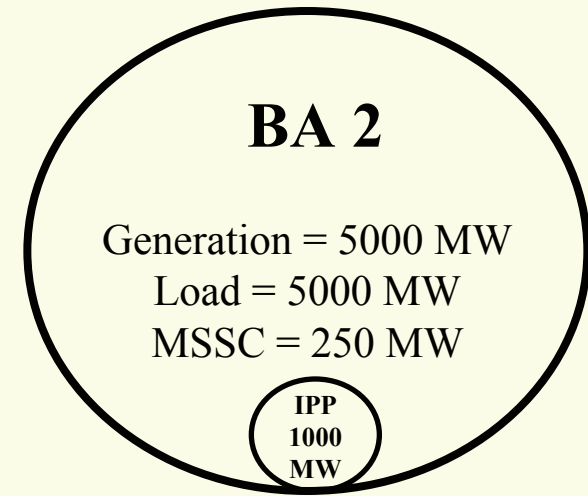
The GREATER of MSSC OR:  
3% of Load: 150 MW +  
3% of Generation: 150 MW = 300 MW

# Modified BAL002 Base Case:

Does Generation Ownership Within the BA Matter? (No)



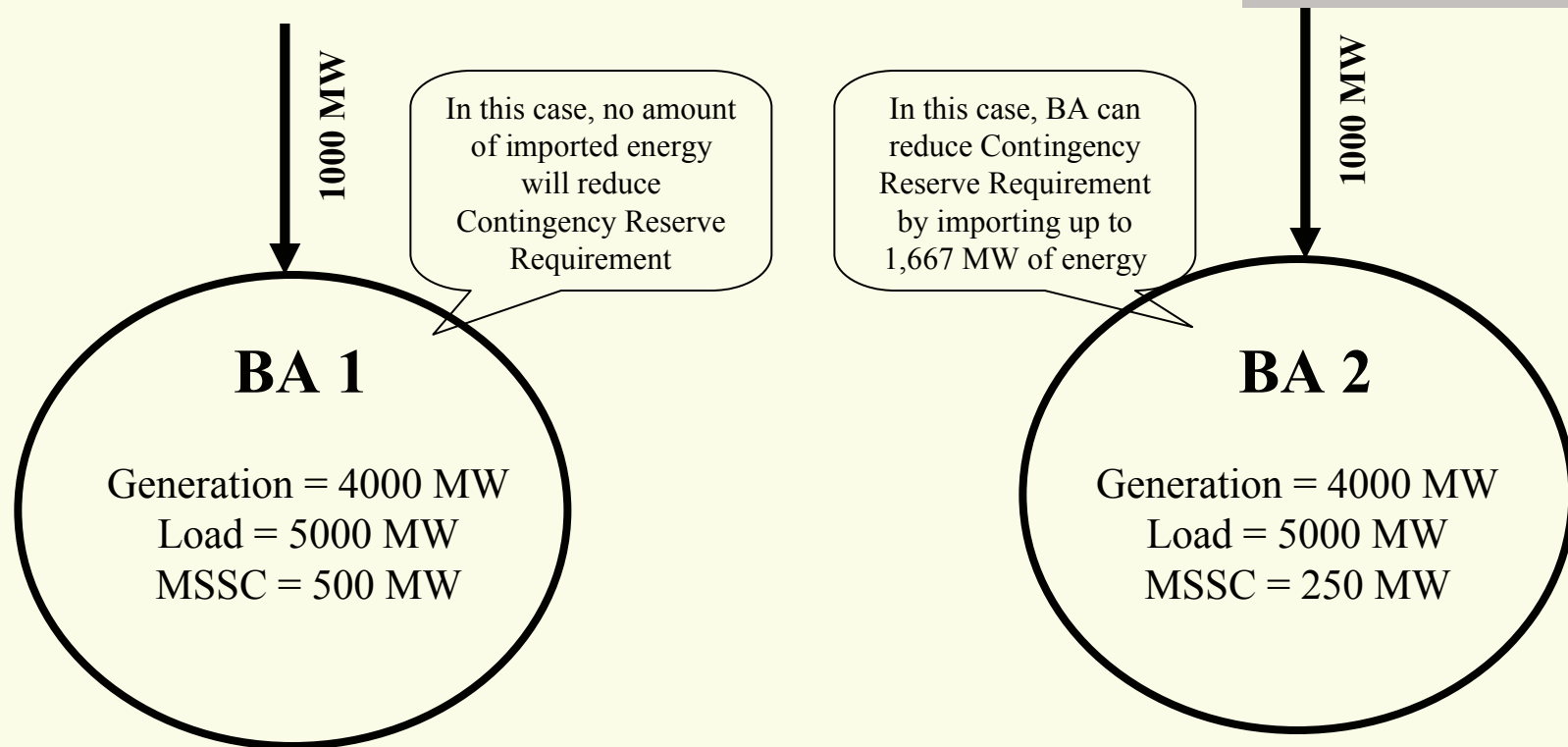
**Contingency Reserves = 500 MW**  
The GREATER of MSSC OR:  
3% of Load: 150 MW +  
3% of Generation: 150 MW = 300 MW



**Contingency Reserves = 300 MW**  
The GREATER of MSSC OR:  
3% of Load: 150 MW +  
3% of Generation: 150 MW = 300 MW

# Modified BAL002 Base Case:

## Do Imports Matter? (Depends)



**Contingency Reserves = 500 MW**

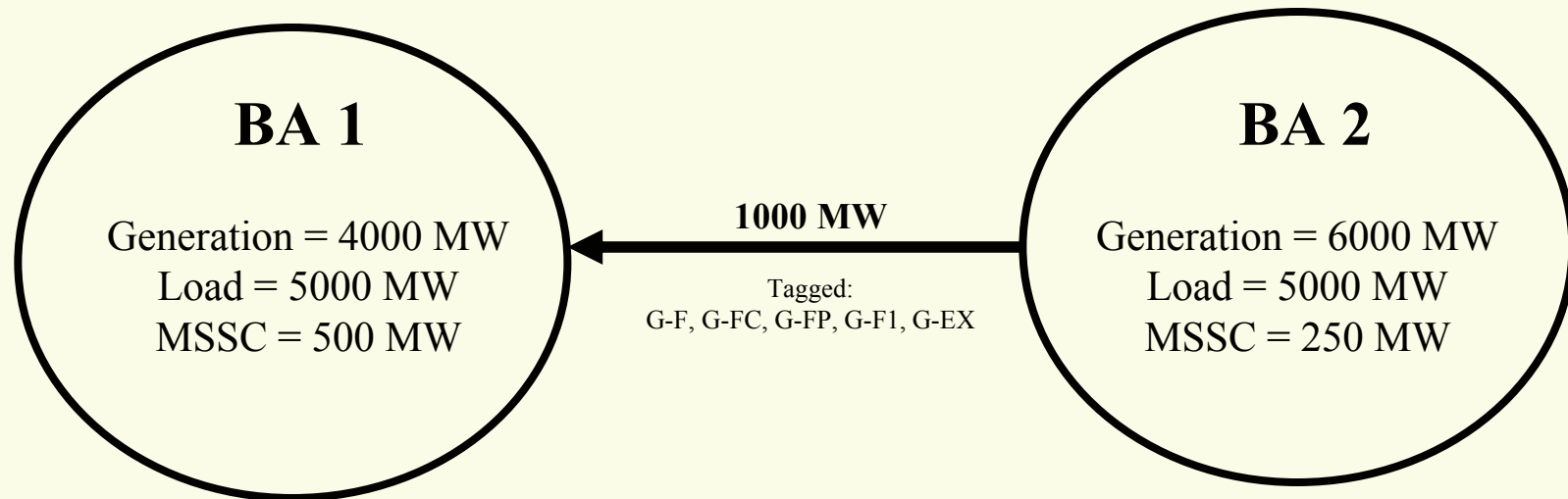
The GREATER of MSSC OR:  
3% of Load: 150 MW +  
3% of Generation: 120 MW = 270 MW

**Contingency Reserves = 270 MW**

The GREATER of MSSC OR:  
3% of Load: 150 MW +  
3% of Generation: 120 MW = 270 MW

# Energy Interchange Transaction:

From Load/Gen Driven BA to MSSC Driven BA



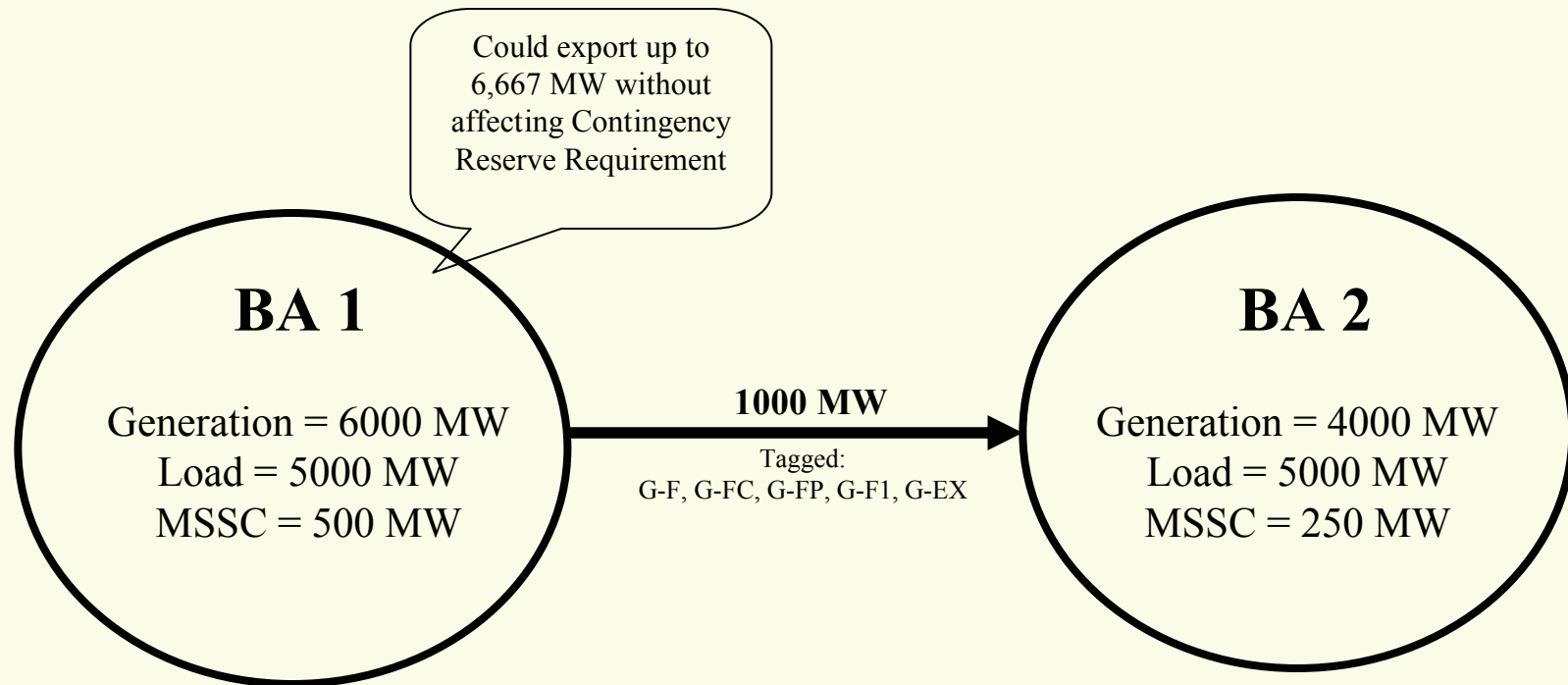
**Contingency Reserves = 500 MW**

The GREATER of MSSC OR:  
3% of Load: 150 MW +  
3% of Generation: 120 MW = 270 MW

**Contingency Reserves = 330 MW**

The GREATER of MSSC OR:  
3% of Load: 150 MW +  
3% of Generation: 180 MW = 330 MW

# Energy Interchange Transaction: From MSSC Driven BA to Load/Gen Driven BA



**Contingency Reserves = 500 MW**

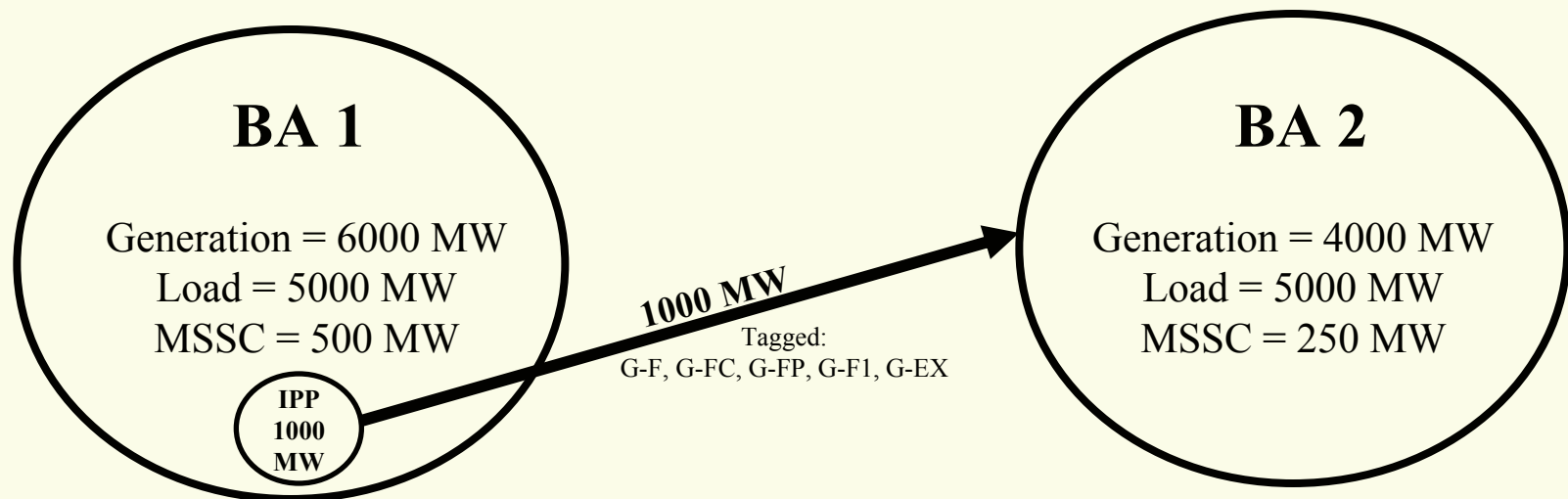
The GREATER of MSSC OR:  
3% of Load: 150 MW +  
3% of Generation: 180 MW = 330 MW

**Contingency Reserves = 270 MW**

The GREATER of MSSC OR:  
3% of Load: 150 MW +  
3% of Generation: 120 MW = 270 MW

# Energy Interchange Transaction:

From MSSC Driven BA to Load/Gen Driven BA (Export by IPP)



**Contingency Reserves = 500 MW**

The GREATER of MSSC OR:

3% of Load: 150 MW +

3% of Generation: 180 MW = 360 MW

**Contingency Reserves = 270 MW**

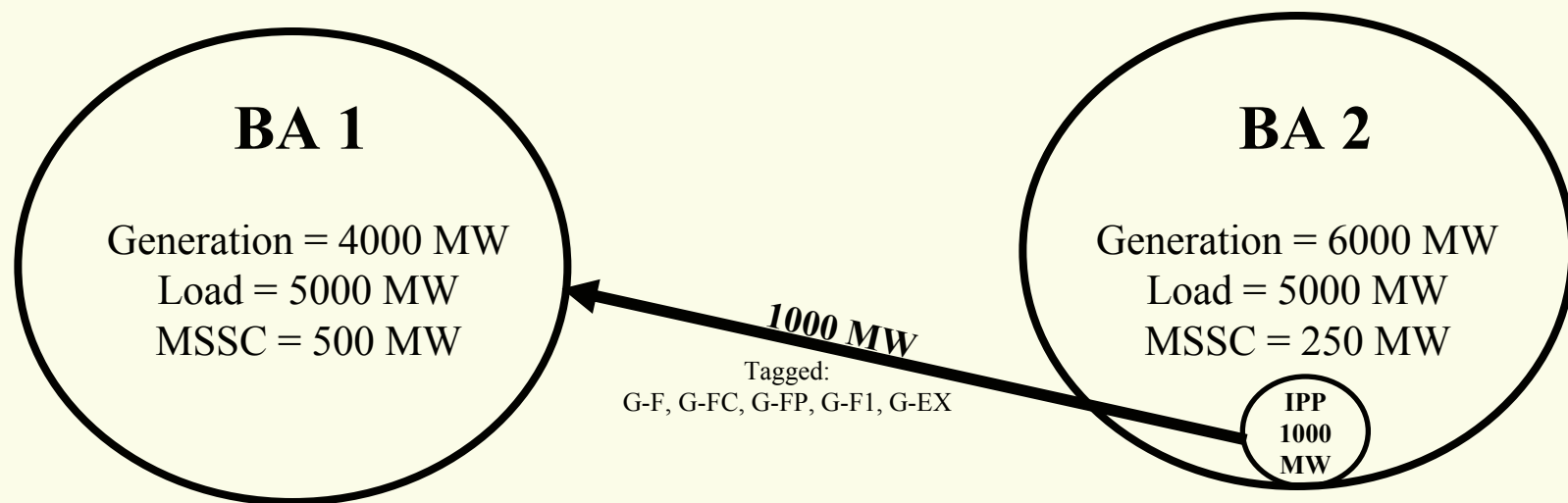
The GREATER of MSSC OR:

3% of Load: 150 MW +

3% of Generation: 120 MW = 270 MW

# Energy Interchange Transaction:

From Load/Gen Driven BA to MSSC Driven BA (Export by IPP)



**Contingency Reserves = 500 MW**

The GREATER of MSSC OR:

3% of Load: 150 MW +

3% of Generation: 120 MW = 270 MW

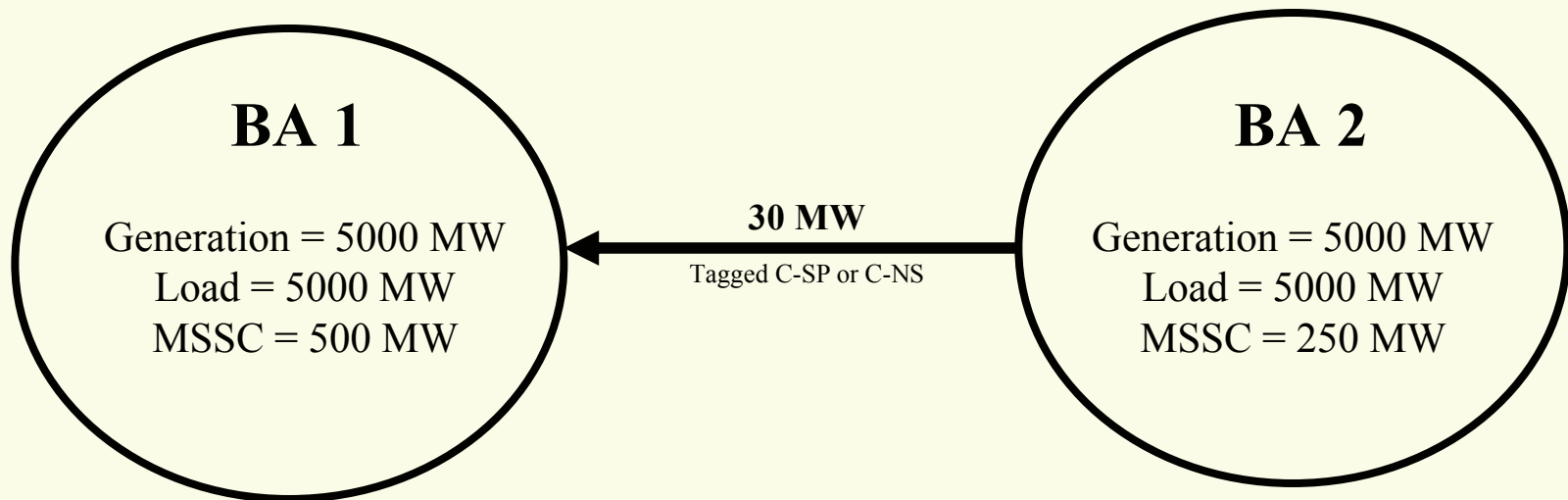
**Contingency Reserves = 330 MW**

The GREATER of MSSC OR:

3% of Load: 150 MW +

3% of Generation: 180 MW = 330 MW

# Contingency Reserve Interchange Transaction: From Load/Gen Driven BA to MSSC Driven BA



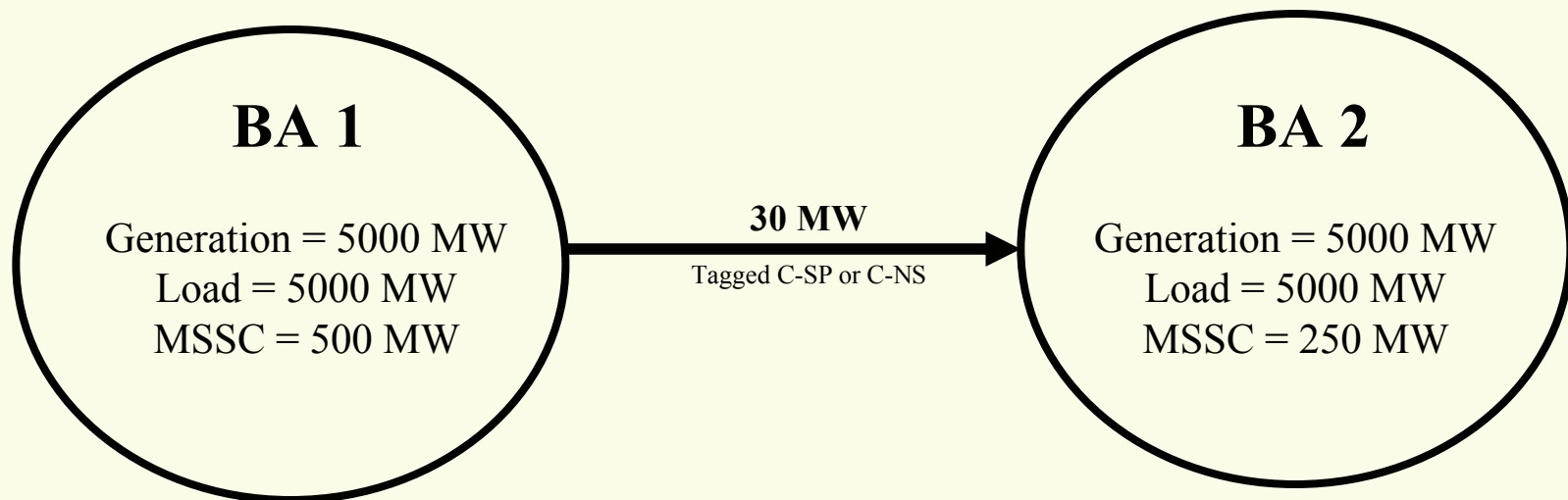
## Contingency Reserves = 470 MW

The GREATER of a) MSSC OR  
b) 3% of Load: 150 MW +  
3% of Generation: 150 MW  
= 300 MW  
MINUS CR Transaction: 30 MW

## Contingency Reserves = 330 MW

The GREATER of a) MSSC OR  
b) 3% of Load: 150 MW +  
3% of Generation: 150 MW  
= 300 MW  
PLUS CR Transaction: 30 MW

# Contingency Reserve Interchange Transaction: From MSSC Driven BA to Load/Gen Driven BA



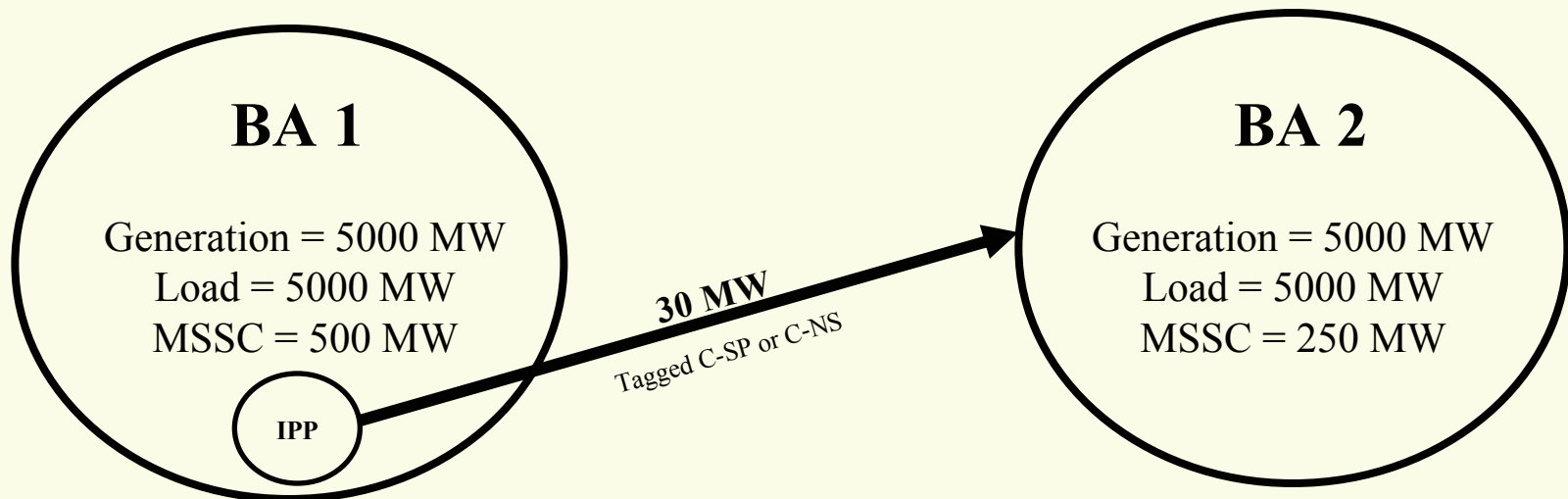
## **Contingency Reserves = 530 MW**

The GREATER of a) MSSC OR  
b) 3% of Load: 150 MW +  
3% of Generation: 150 MW  
= 300 MW  
PLUS CR Transaction: 30 MW

## **Contingency Reserves = 270 MW**

The GREATER of a) MSSC OR  
b) 3% of Load: 150 MW +  
3% of Generation: 150 MW  
= 300 MW  
MINUS CR Transaction: 30 MW

# Contingency Reserve Interchange Transaction: From MSSC Driven BA to Load/Gen Driven BA (Export by IPP)



## Contingency Reserves = 530 MW

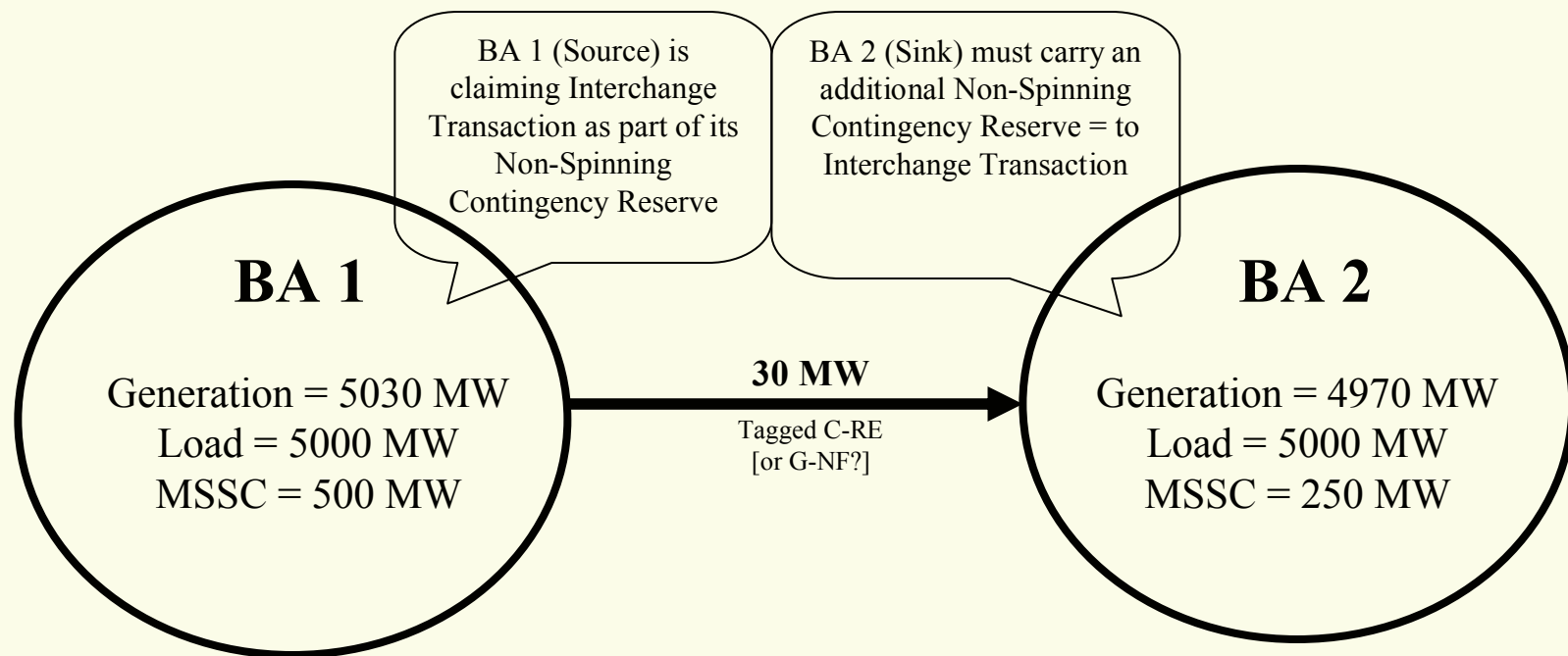
The GREATER of a) MSSC OR  
b) 3% of Load: 150 MW +  
3% of Generation: 150 MW  
= 300 MW  
PLUS CR Transaction: 30 MW

## Contingency Reserves = 270 MW

The GREATER of a) MSSC OR  
b) 3% of Load: 150 MW +  
3% of Generation: 150 MW  
= 300 MW  
MINUS CR Transaction: 30 MW

# Contingency Reserve Interchange Transaction:

Recallable Energy From MSSC Driven BA to Load/Gen Driven BA



**Contingency Reserves = 500 MW**

The GREATER of a) MSSC OR  
b) 3% of Load: 150 MW +  
3% of Generation: 151 MW  
= 301 MW

**Contingency Reserves = 329 MW**

The GREATER of a) MSSC OR  
b) 3% of Load: 150 MW +  
3% of Generation: 149 MW  
= 299 MW  
PLUS CR Transaction: 30 MW

# Questions/Discussion

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# The Market for Contingency Reserves

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- The Products
  - Spin
    - AGC
      - Reg Up
      - Reg Down
    - Non-Spin
    - Recallable Energy
- The Buyers – Generally, BAs
- The Sellers
  - Some BAs, plus Generators/IPP
    - Authorization to Sell Contingency Reserves at Market Based Rates
    - Technical Requirements/Certifying Resources
- Scheduling Contingency Reserves
- Existing vs. New WSPP Product Schedules?

# Who Receives Contingency Reserve Service & Who Pays

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- What is Contingency Reserve service?
  - Who receives it?
  - Who provides it?
- How do those who receive service pay?
  - Is cost shared equally by all customers of a BA?
  - Load?
  - Transmission Customers?
- Do generators bear a portion of the cost?
  - What is in the Transmission Provider's Tariff?
  - What changes to existing Tariffs can be expected?

# Appendix

Additional Reference Information

# INT-BPS-018-0 (E-Tag Energy Product Codes Specific to the WECC)

## ■ **NERC product codes for energy transactions:**

- G-F: Firm Energy.
  - This product may be curtailed only in the event of a reliability condition or to meet Seller's public utility or statutory obligations for reliability of service to native load. A G-F product cannot be interrupted for economic reasons.
- G-NF: Non-firm energy.
  - This product may be interrupted for any reason or no reason, without liability on the part of either the buyer or seller.

## ■ **WECC product codes for energy transactions:**

- G-FC: Firm Contingent.
  - The energy is from a designated generating unit or source. This product may be interrupted only to the extent the output capability of the designated unit or source has been reduced due to a deration or outage of the designated unit or source. A G-FC product cannot be interrupted for economic reasons.
- G-FP: Firm Provisional Energy.
  - This product may be interrupted only if the interruption is within the recall time and for conditions allowed by applicable provisions governing interruption of service, as mutually agreed to by the parties. A G-FP product cannot be interrupted for economic reasons.
- G-F1: Hourly firm energy.
  - This product may be interrupted, consistent with the provisions of the transaction, provided the PSE or LSE receives notification of the interruption 40 minutes or more prior to the start of the operating hour. A G-F1 product cannot be interrupted for economic reasons.
- G-EX: Exchange of Firm Energy.
  - An exchange of firm energy where by one entity delivers energy to another entity at one point on the grid and receives an agreed upon amount of energy from that entity at another point on the grid.

## ■ **WECC product codes for reserve transactions:**

- C-SP: Capacity for spinning reserve.
  - On-Demand spinning reserve obligation/resource is a spinning reserve product that can be activated through the adjustment of a capacity e-tag.
- C-NS: Capacity for non-spinning reserve.
  - On-Demand non-spinning reserve obligation/resource is a non-spinning reserve product that can be activated through the adjustment of a capacity e-tag.
- C-RE: Capacity associated with energy recallable for reserves.
  - This product is energy which is recallable within ten minutes of activation of reserves and has been included in the Source Balancing Authorities reserve resources.

# Existing Standard

## WECC Standard BAL-STD-002-0 – Operating Reserves

**Minimum Operating Reserve. Each Balancing Authority shall maintain minimum Operating Reserve which is the sum of the following:**

- (i) Regulating reserve. Sufficient Spinning Reserve, immediately responsive to Automatic Generation Control (AGC) to provide sufficient regulating margin to allow the Balancing Authority to meet NERC's Control Performance Criteria (see BAL-001-0).
- (ii) Contingency reserve. An amount of Spinning Reserve and Nonspinning Reserve (at least half of which must be Spinning Reserve), sufficient to meet the NERC Disturbance Control Standard BAL-002-0, equal to the greater of:
  - (a) The loss of generating capacity due to forced outages of generation or transmission equipment that would result from the most severe single contingency; or
  - (b) The sum of five percent of the load responsibility served by hydro generation and seven percent of the load responsibility served by thermal generation.
  - The combined unit ramp rate of each Balancing Authority's on-line, unloaded generating capacity must be capable of responding to the Spinning Reserve requirement of that Balancing Authority within ten minutes
- (iii) Additional reserve for interruptible imports. An amount of reserve, which can be made effective within ten minutes, equal to interruptible imports.
- (iv) Additional reserve for on-demand obligations. An amount of reserve, which can be made effective within ten minutes, equal to on-demand obligations to other entities or Balancing Authorities.

**Load Responsibility** is defined as: *A control area's firm load demand plus those firm sales minus those firm purchases for which reserve capacity is provided by the supplier.*

# Load Responsibility Interpretation

## Approved by WECC Board 9/7/07

### Interpretation:

- A Balancing Authority's (BA) Load Responsibility is the algebraic sum of the BA Area's:
  - Net Generation
  - Minus (-) Net Actual Interchange (NAI) (- or +)
    - NAI Exports are positive (+), NAI Imports are negative (-)
  - Minus (-) loads that can be interrupted in 10 minutes or less by contractual agreement.
  - Plus (+) Interchange Schedule exports where the BA is identified as retaining Contingency Reserve responsibility through the e-Tag process.
    - Contingency Reserve responsibility is identified as required by INT-BPS-014-0 Identification of Contingency Reserve Responsibilities in the e-Tag
  - Minus (-) Interchange Schedule imports where another BA is identified as having Contingency Reserve responsibility through the e-Tag process.
    - Contingency Reserve responsibility is identified as required by INT-BPS-014-0 Identification of Contingency Reserve Responsibilities in the e-Tag
- Energy product definitions are determined by the entities that are parties to the transaction.
  - It is up to Purchasing Selling Entities to determine their level of acceptable deliverability risk and determine who has contingency reserve responsibility.
- The current WECC Contingency Reserve requirement represents a holistic approach to carrying Contingency Reserves for the entire Western Interconnection. The Load Responsibility calculation is used to "transfer" Contingency Reserve responsibility between BAs.
  - Energy with associated Contingency Reserve can be exported and imported between Balancing Authority Areas. However, if Contingency Reserve is associated by agreement with the energy transaction, the responsibility for the Contingency Reserve obligation will remain with the Source BA. In other words, the BA exporting energy that has associated Contingency Reserve would increase its "Load Responsibility" by the amount of the energy being exported. The BA importing the energy has the ability to reduce its "Load Responsibility" by the same amount. This has the effect of maintaining the appropriate amount of Contingency Reserve on a Western Interconnection wide basis.
- No WECC Minimum Operating Reliability Criteria or NERC Standard requires that energy imports be delivered over FERC defined "Firm" transmission.
  - The only exception is the delivery of operating reserve energy between Balancing Authorities. (MORC Section I.A.6.)
- All energy imports into a BA are in effect "contingent" based on the availability of the transmission path or paths used to deliver the energy. The importing BA must be prepared to compensate for the loss of the imported energy resource just as they must be prepared to compensate for the loss of energy from a generating unit internal to the Balancing Authority.
  - This concept eliminates the need for a "Unit Contingent" product definition for reliability purposes.
- Transactions between BAs that are contingent upon specific generating units output may be treated the same as transactions of generating units output residing inside the sink BA for contingency reserve purposes.

# Existing Standard

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Assume Thermal System (no hydro)

## BA 1

“Native” Load = 5000 MW  
Load Responsibility = 5000 MW  
MSSC = 500 MW

**Contingency Reserves = 500 MW**

The GREATER of MSSC OR:  
7% of Load Responsibility: 350 MW

## BA 2

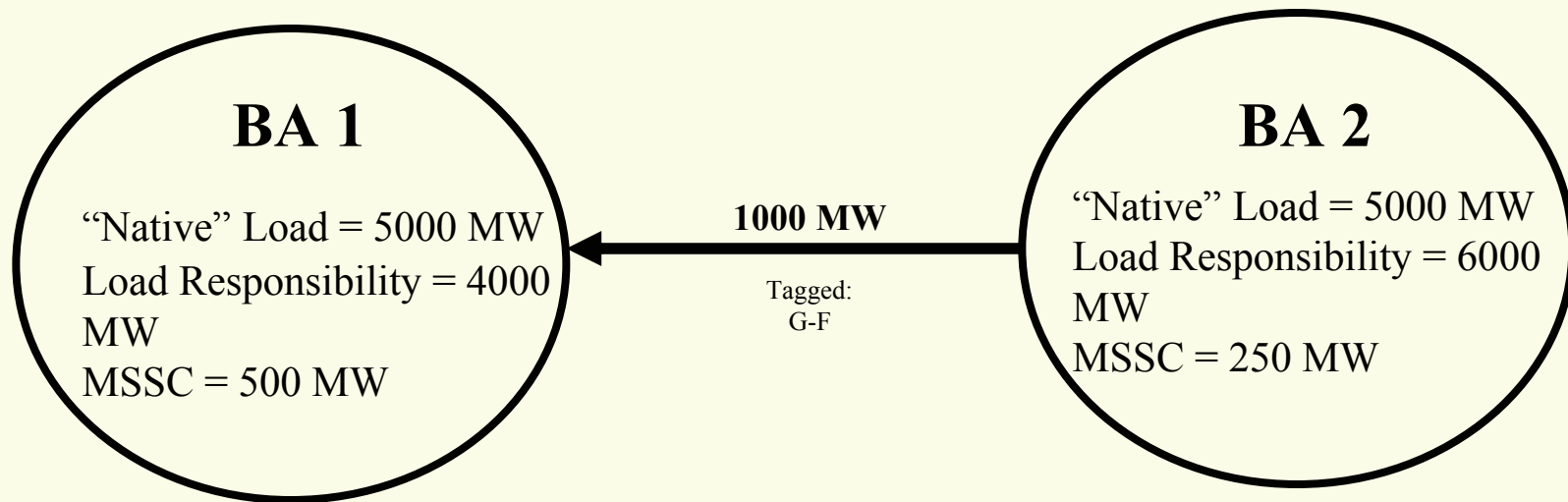
“Native” Load = 5000 MW  
Load Responsibility = 5000 MW  
MSSC = 250 MW

**Contingency Reserves = 350 MW**

The GREATER of MSSC OR:  
7% of Load Responsibility: 350 MW

# One Application of Existing Standard:

Assume Thermal System (no hydro)



**Contingency Reserves = 500 MW**

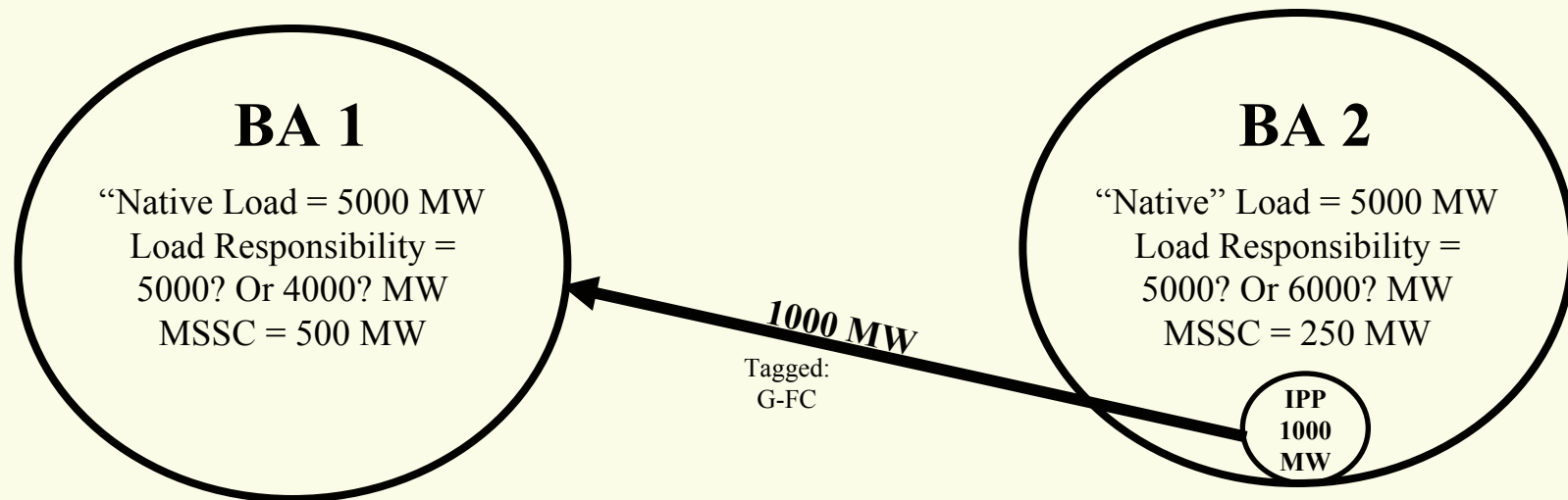
The GREATER of MSSC OR:  
7% of Load Responsibility: 280 MW

**Contingency Reserves = 420 MW**

The GREATER of MSSC OR:  
7% of Load Responsibility: 420 MW

# Another Application of Existing Standard:

Assume Thermal System (no hydro)



**Contingency Reserves = 500 MW**  
The GREATER of MSSC OR:  
7% of Load Responsibility

**Contingency Reserves = 350 or 420 MW?**  
The GREATER of MSSC OR:  
7% of Load Responsibility

# Existing Long-Term WSPP Schedule C Contracts

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Schedule C “is what it is,” so please consider:

- What does it mean to agree that your existing contract is “with Operating Reserves?”
- How would you schedule such a transaction post BAL002?
- How are the Source/Sink reserve responsibility calculations affected?
- How will damages be calculated if a party fails to perform?

# Contact Me:

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