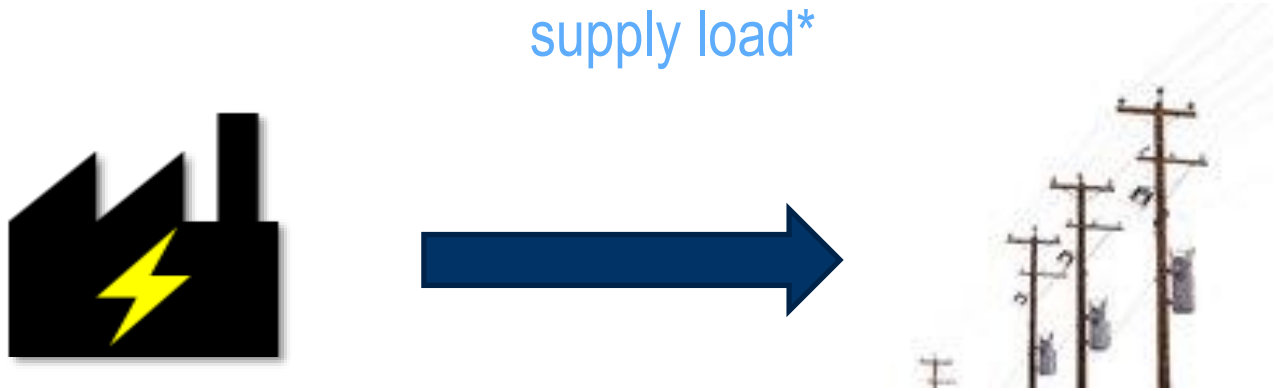
FTR Point-to-Point Construct

Recap: Fundamental FTR Purpose

- The primary purpose of the FTR product is to provide a hedging mechanism against locational price differences, thereby providing the financial equivalent of Firm transmission service
- Point-to-Point FTR definition is paramount because the bulk of load in PJM is served through self-supply or bilateral point-to-point contracts
- Returning 100% of congestion revenues to load is not the purpose of the FTR construct; why?
  - Removing the point-to-point construct degrades the ability for the bulk of load to hedge their forward contracts
  - Decreases incentive to enhance transmission system and remove congestion inefficiencies that are unhedged

Self-supply and Bilateral Transactions

Key Takeaway: Majority of load uses self-supply or bilateral transactions to supply load*



ARR/FTR point-to-point mechanism provides financial hedge equivalent to physical delivery

*Method for Supplying Load**

	Spot market	Self-Supply and Bilateral
2018	27.7%	72.3%
2017	26.7%	73.3%
2016	23.9%	76.1%
2015	29.3%	70.7%
2014	26.7%	73.3%
2013	25.0%	75.0%
2012	23.2%	76.8%
2011	26.6%	73.4%
2010	20.2%	79.8%
2009	17.0%	83.0%
2008	20.2%	79.8%
Average	24.2%	75.8%

*Data from Monitoring Analytics SOM Reports

SEC. 217. NATIVE LOAD SERVICE OBLIGATION.

.....

(b) MEETING SERVICE OBLIGATIONS.—

(1) Paragraph (2) applies to any load-serving entity that, as of the date of enactment of this section—

(A) owns generation facilities, markets the output of Federal generation facilities, or holds rights under one or more wholesale contracts to purchase electric energy, for the purpose of meeting a service obligation; and

(B) by reason of ownership of transmission facilities, or one or more contracts or service agreements for firm transmission service, holds firm transmission rights for delivery of the output of the generation facilities or the purchased energy to meet the service obligation.

(2) Any load-serving entity described in paragraph (1) is entitled to use the firm transmission rights, or, equivalent tradable or financial transmission rights, in order to deliver the output or purchased energy, or the output of other generating facilities or purchased energy to the extent deliverable using the rights, to the extent required to meet the service obligation of the load-serving entity.

……

(4) The Commission shall exercise the authority of the Commission under this Act in a manner that facilitates the planning and expansion of transmission facilities to meet the reasonable needs of load-serving entities to satisfy the service obligations of the load-serving entities, and enables load-serving entities to secure firm transmission rights (or equivalent tradable or financial rights) on a long-term basis for long-term power supply arrangements made, or planned, to meet such needs.

Key Takeaway: The Federal Power Act recognized the need for financial rights to support self-supply and bilateral contracts

FERC Long Term FTR Guidelines and PJM ARR/FTR Construct

FERC Guideline 1:
Long Term right should specify a source, sink and a MW quantity.

FERC Guideline 5:
LSEs must have priority over non-LSEs in the allocation of long-term firm transmission rights that are supported by existing capacity.

FERC Conclusion

"The primary objective of guideline (1), consistent with section 217(b)(4), is to allow a load serving entity to obtain a long-term firm transmission right for purposes of hedging congestion charges associated with delivery of power from a long-term power supply arrangement to its load."

ARR/FTR Construct

Key Takeaway: FERC guidelines recognize importance of point-to-point nature of FTR and supports Federal Power Act

FERC Guideline 4:
Long Term rights must be made available with term lengths(minimum 10 years) for LSEs to hedge long-term power supply arrangements.

FERC Guideline 6: *A long-term transmission right held by a LSE to support a service obligation should be re-assignable to another entity that acquires that service obligation.*

FTR Point-to-Point Construct Importance

“An important goal in implementing FTRs was to allow market participants entering into long-term bilateral contracts to hedge themselves against congestion risk in the much the same way as they did with firm transmission rights.”
“FTRs were developed primarily to replace physical firm transmission rights in markets based on economic dispatch and LMP pricing, thereby enabling load serving entities and generators to continue enter into long term contracts for power from resources located remote from load under the new market design.”

Scott M. Harvey, Background on FTR Development, August 27, 2014, PJM FTR/ARR Senior Task Force Meeting, slides 2 and 6.

"If they choose, holders of FTRs could schedule bilateral transactions that match their FTRs. In this sense, the dispatch would be affected by the schedule, not by ownership, of the FTR. However, the FTRs, coupled with locational pricing, provide an economic incentive to avoid such inflexible schedules, since the FTR owner can realize the value of its transmission rights whether it actually schedules its generation or its loads are met by the SO's coordinated scheduling at lower cost."

William W. Hogan, Report on PJM Market Structure and Pricing Rules, December 31, 1996, Docket OA97-261-000 p. 55.

FTR Point to Point Construct Importance

"Market participants needed a hedge for the locational price difference. And there needed to be some consistent way to account for the capacity of the transmission grid to support power transactions and long-term contracts. The direct solution was to create a financial contract that would be administered by the system operator. (Hogan 1992) The new contract would include a MW amount and a direction of flow between two points on the grid. The contract, an FTR, provides payment of the price difference for the designated MW amount. If a party scheduled 100 MW between the two points, it would pay the price differential of the price between the point of withdrawal and the point of injection. If the same party also held an FTR for 100 MW between these two locations, it would receive the same payment. Hence, the spot price is perfectly hedged."

William W. Hogan, Handbook on the Economics of Electricity, November 26, 2019, Chapter 7, p. 11.

Why do we need FTRs?

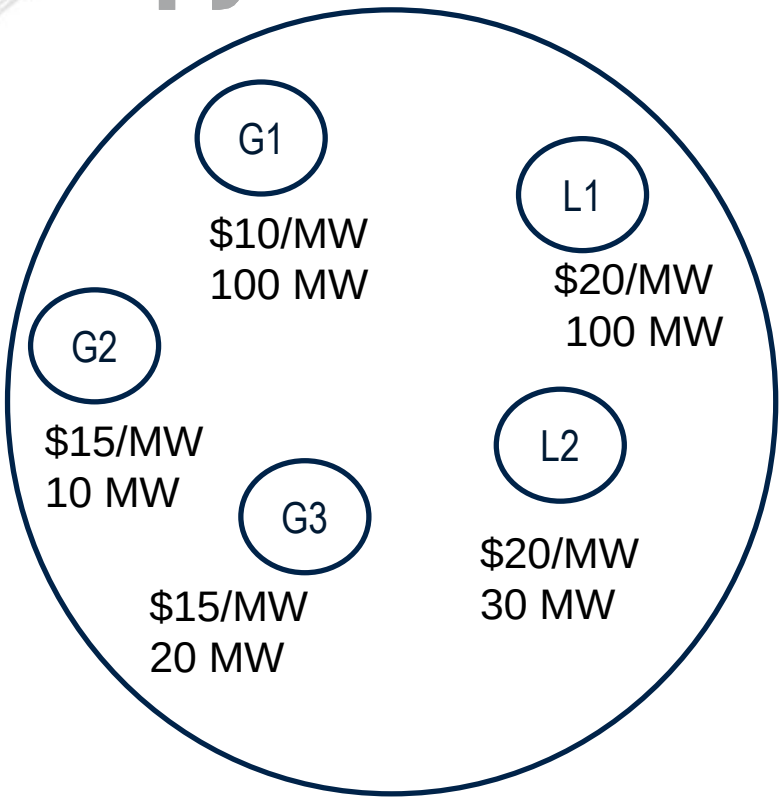
- Challenge:
  - LMP exposes PJM Market Participants to price uncertainty for congestion cost charges
  - During constrained conditions, PJM Market collects more from loads than it pays generators

→ This challenge did not exist pre-markets because self-supply or bilateral contracts not exposed to congestion

- Solution:
  - Provides ability to have price certainty
  - Provides load a priority right to the transmission system and congestion revenues because they pay the embedded costs
  - FTRs provide hedging mechanism that can be traded separately from transmission service

→ This ensures that Load is indifferent to congestion and the point-to-point nature of FTR can guarantee a perfect hedge to avoid exposure from spot market

Example 1: How is Congestion Calculated and Settled?



*LMPs represent Congestion LMPs
*Assumes single constraint with same impact on L1 and L2

Total System Congestion

Total Congestion= CLMP Load - CLMP Generator

Total Congestion = [($20*100)+($20*30)] – [($10*100)+($15*10)+($15*20)]

Total Congestion=$1,150

Theoretical Network Congestion for each LSE

- Alta (L1): $1150 * 100/(100+30) = $884.6
- Vola (L2): $1150 * 30/(100+30) = $265.4

→ Total= $1,150

Actual Settlements

Participant	Ownership/ Obligation	Congestion Load Payment	Congestion Generator Revenue	Net
Alta	G1, L1	$2,000	$1,000	$1000
Vola	L2	$600	$0	$600
Sundance	G2	$0	$150	-$150
Parkplace	G3	$0	$300	-$300
Total		$2,600	$1,450	$1,150

Example 1: FTR Allocation Comparison

If Network FTR
- Alta FTR value: $884.6
- Alta Actual Costs: $1000
- Net Hedge= 92%

- Vola FTR Value:$265.4
- Vola Actual Costs: $600
- Net Hedge= 44.2%

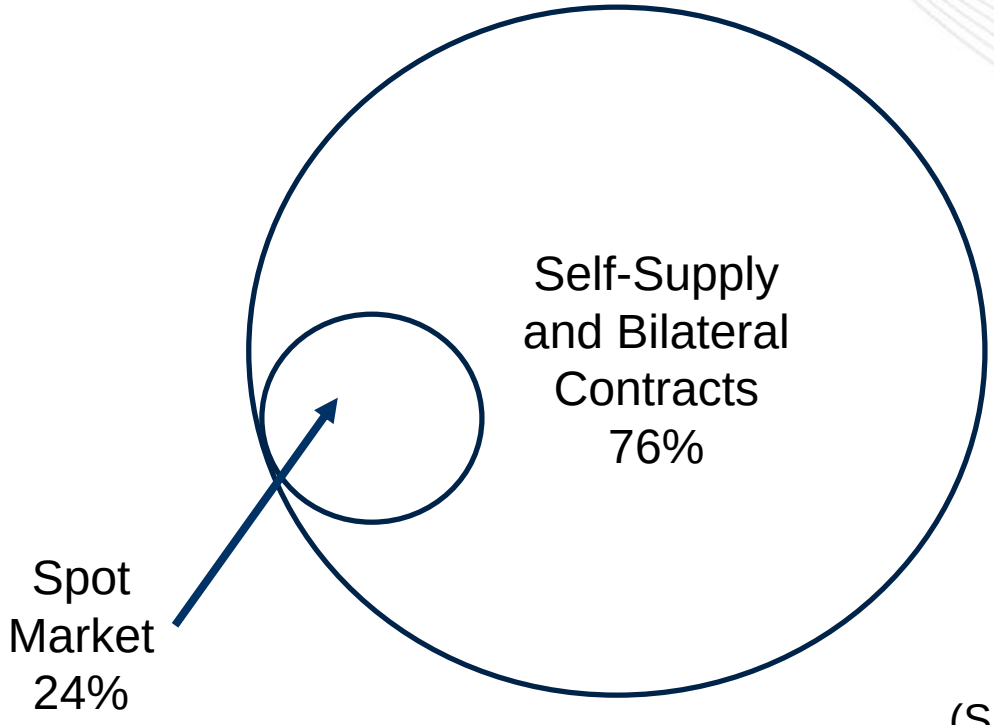
If Point-to-Point FTR (Existing construct)
- Alta FTR value: $1000
- Alta Actual Costs: $1000
- Net Hedge= 100%

- Vola FTR Value: $150
- Vola Actual Costs: $600
- Net Hedge= 25%

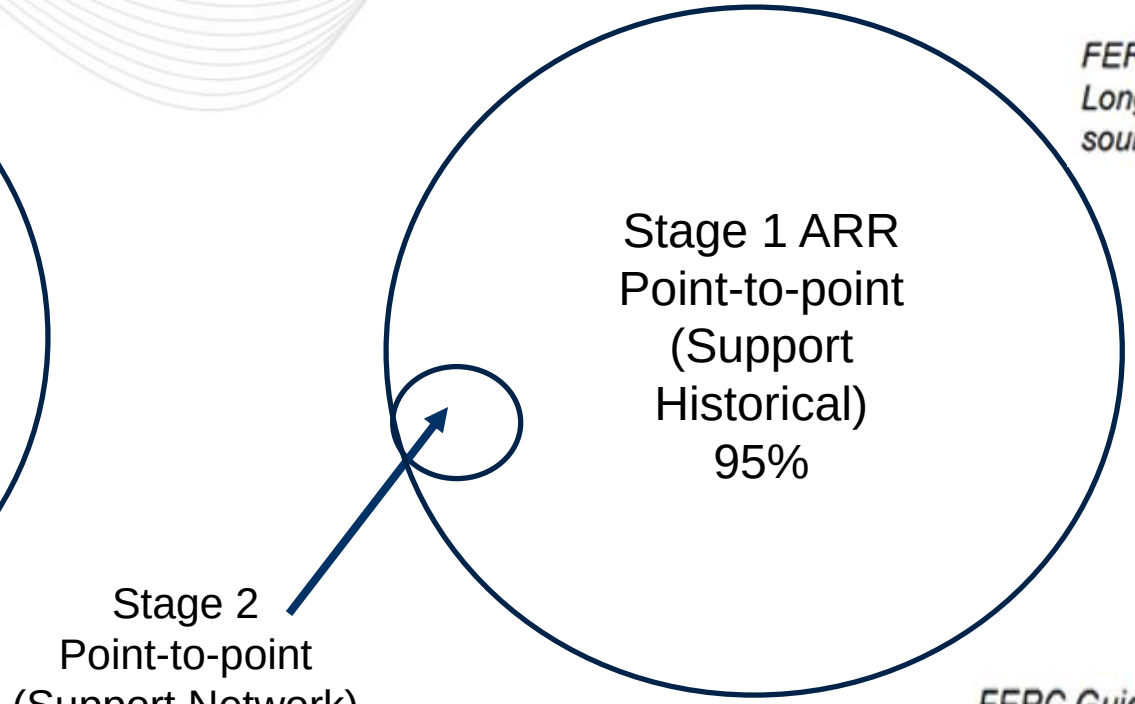
Summary
- Point-to-Point FTR guarantees Alta 100% hedge and price certainty
  - Aligns with self-supply
  - Network FTR does not guarantee perfect hedge

- Vola serves load using spot market
  - Not 100% hedged via spot market purchase
  - If Vola owned generation could self-supply to guarantee 100% hedge
  - Spot market unhedged congestion can be an incentive for transmission build

How is PJM Load Served?



How does PJM allocate ARR?



FERC Guideline 1:
Long Term right should specify a source, sink and a MW quantity.

Stage 1 supports FERC Guideline 4

FERC Guideline 4:
Long Term rights must be made available with term lengths(minimum 10 years) for LSEs to hedge long-term power supply arrangements.

Key Point: Existing Allocation of ARRs was designed to support the method by which Load is served

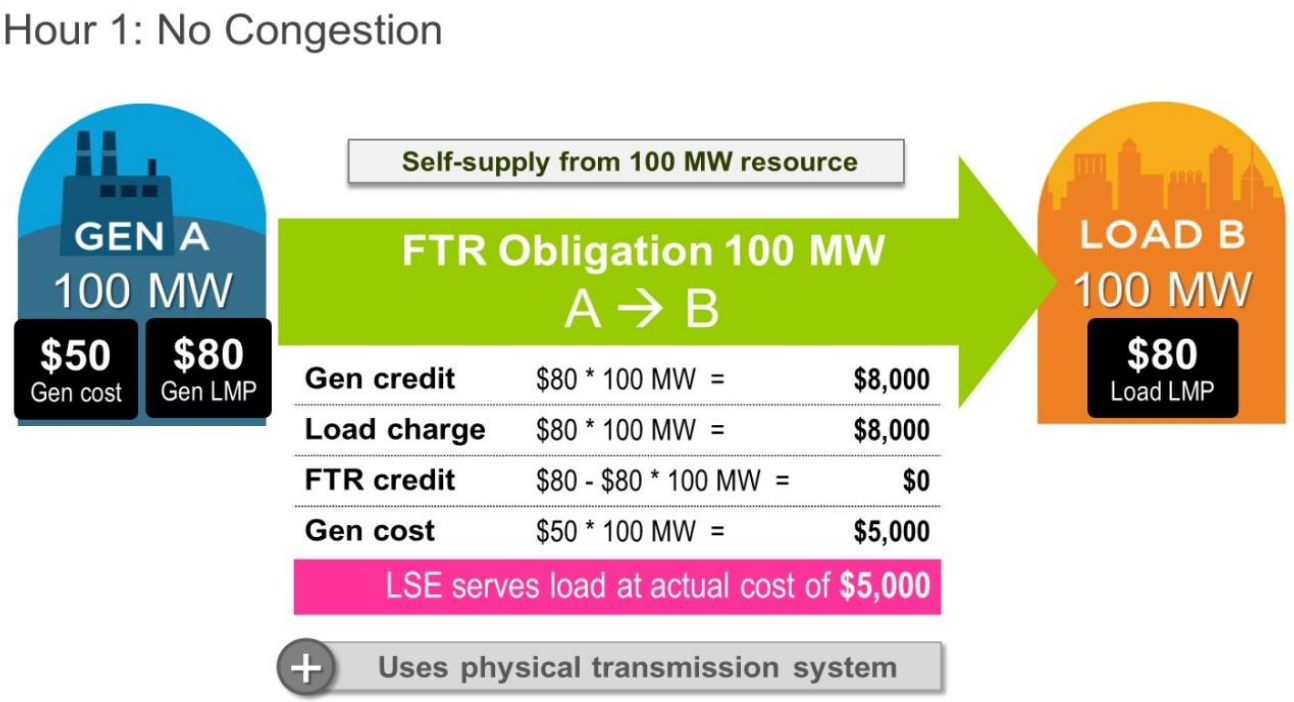
Stage 2 allows for source at any generator on the system (can support spot market purchases)

Example 2: Self-supply and Point-to-Point FTR

The point-to-point nature of FTRs provides ability to hedge costs and supports incentives to follow dispatch for those market participants who self-supply their own load*.

Hour 1: No Congestion

- Customer pays the marginal LMP to serve its load
- Customer gets paid the marginal LMP for producing power
- Net impact is the customer is indifferent due to the system LMPs

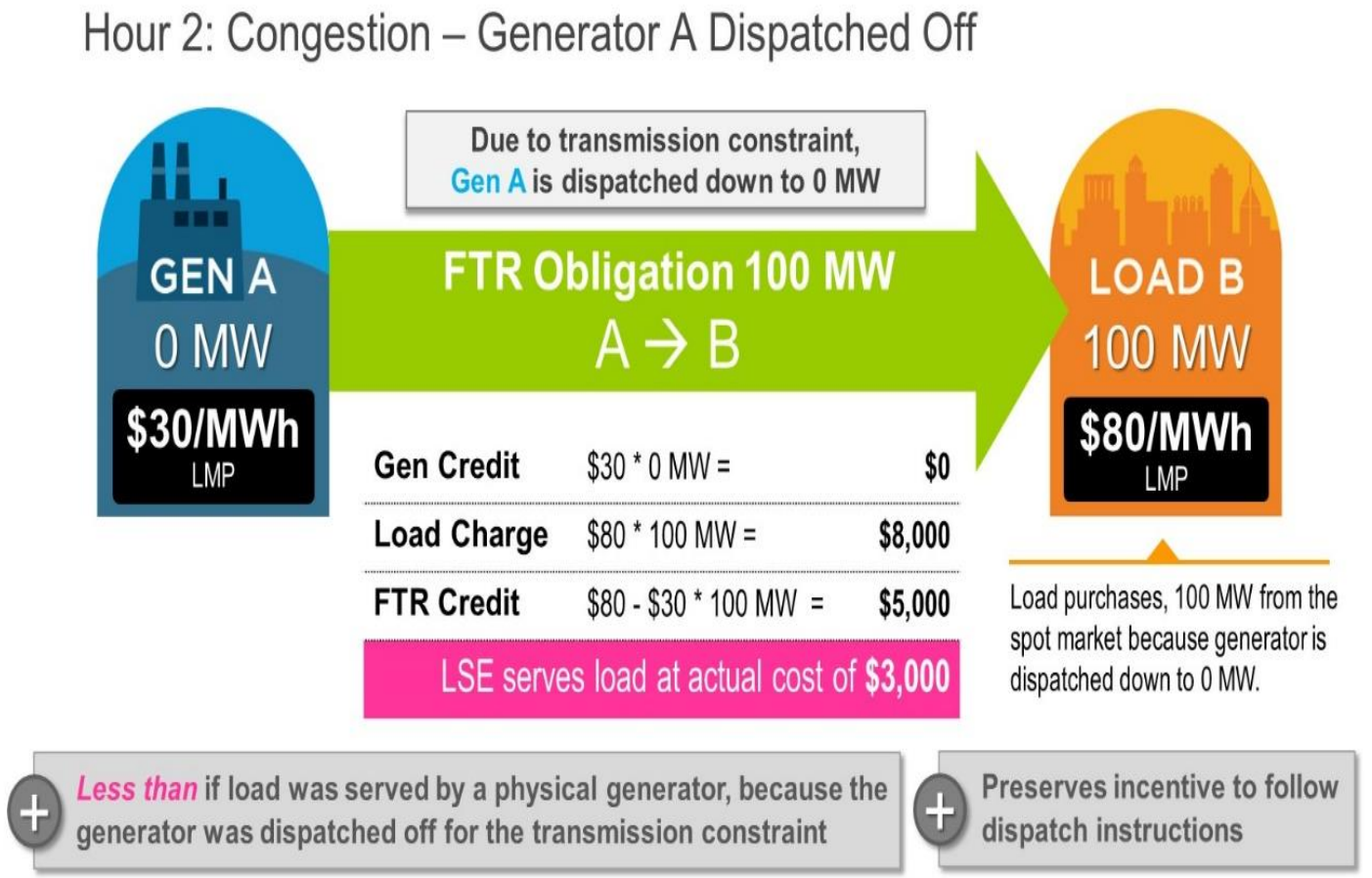


*Self-supply or Bilateral contracts represent over 75% of method of how PJM load is served. Revenue Adequacy is assumed

Example 2: Self-supply and Point-to-Point FTR (cont.)

Hour 2: Congestion and follows dispatch

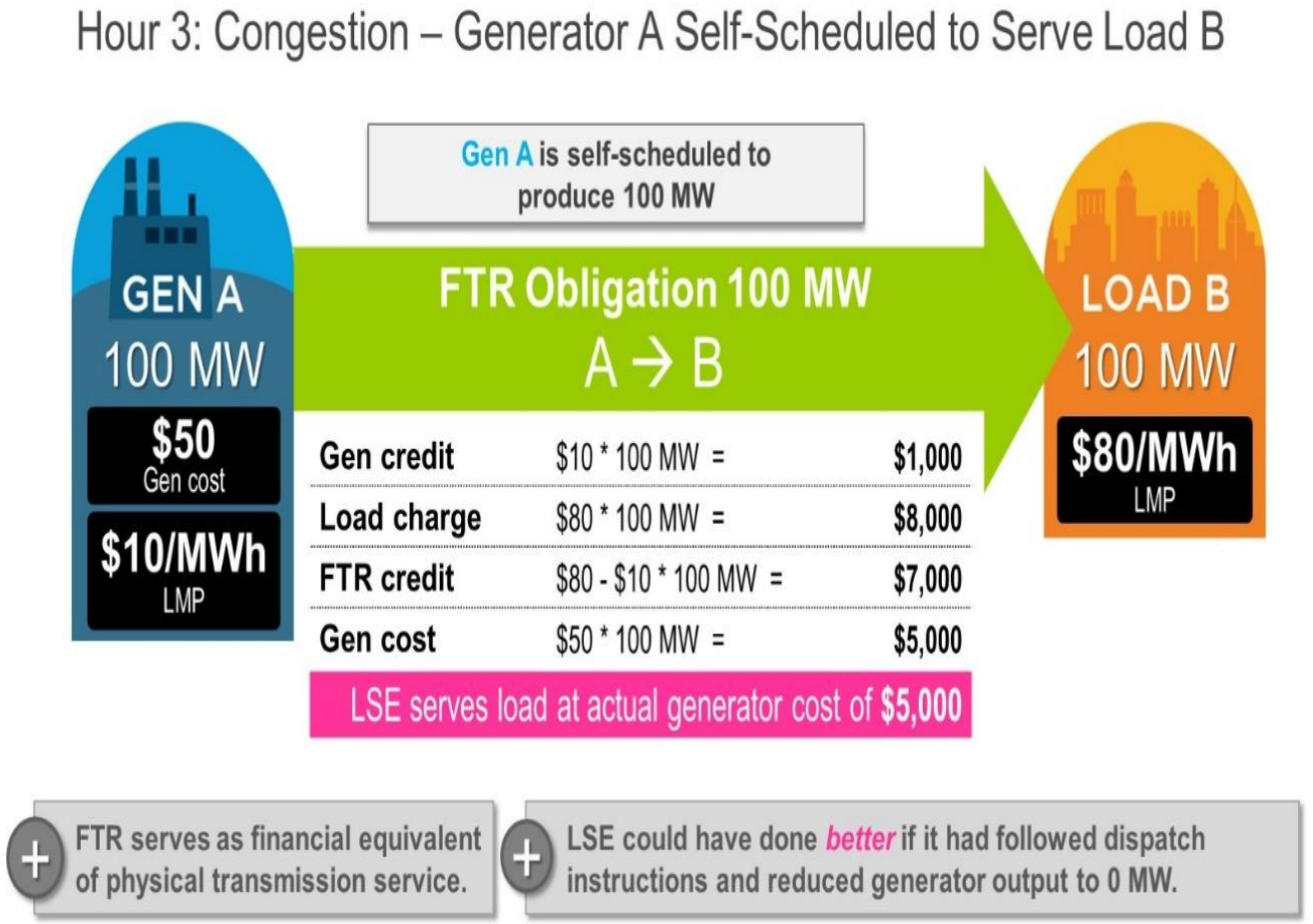
- Customer instructed to turn off generator
  - ➢ Zero generator revenue
- The FTR point-to-point product that aligns with the customer's self-supply contract provides a revenue stream equal to the LMP difference between the source (generator) and the sink (load) locations of the FTR and corresponding self-supply path
- Net Impact = $3000 (Cost to serve load of $8000 minus FTR rebate of $5000)
- The customer continues to have incentive to follow the dispatch instruction because the FTR ensured they would still receive revenues



Example 2: Self-supply and Point-to-Point FTR (cont.)

Hour 3: Congestion and does not follow dispatch

- Customer instructed to turn off generator and does not follow instructions
- Generator revenue = $1000
  - ➢ Below cost of producing actual power ($5000)
  - ➢ Loss of $4000
- Net Impact = $5000 (Cost to serve load of $12,000 minus FTR rebate of $7000)
- Point-to-point nature provides ability to hedge costs and preserves incentive to follow dispatch because can receive revenue beyond costs



Point-to-Point nature of FTR is important for multiple reasons

- Allows market participants entering into bilateral contracts or who self-supply to hedge themselves against congestion risk in the much the same way as they did with physical firm transmission rights
  - Support Federal Power Act and FERC Guidelines (Core design principle)

- Supports the method in which most load is currently being served (Self-supply and bilateral contracts)
  - If Load chooses spot market then risk should be expected

- Preserves incentive for customers who self-supply or have bilateral contracts to follow dispatch because can provide ability to hedge against costs.