Application of the PJM FTR Forfeiture Rule to Virtual Transactions (INCs, DECs and UTCs)

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Initial Implementation of FTR Forfeiture Rule

- In response to market participant behavior, on December 22, 2000 PJM filed with the FERC amendments to its Tariff as Section 5.2.1(b).
- The particular behavior consisted of:
  - Obtaining FTRs on never-congested radial paths
  - Then using INCs and DECs to cause congestion on the path in the day-ahead market
  - Path never congested in real-time
  - Participant had the ability to control its profits
  - Behavior did not enhance market efficiency

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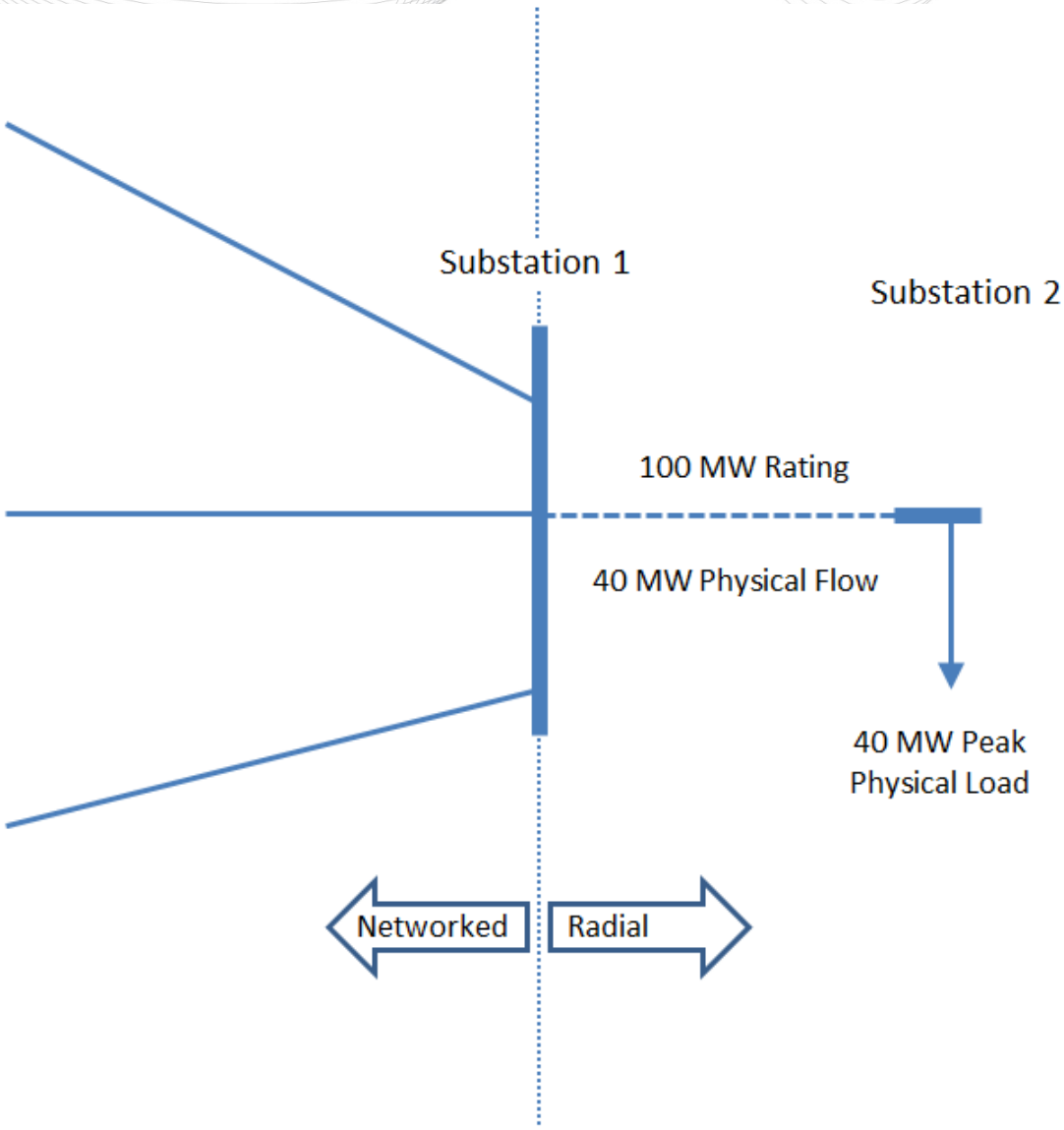
Representative Example

- Radial path built to serve load years into the future
- Flow << Capability so never congested



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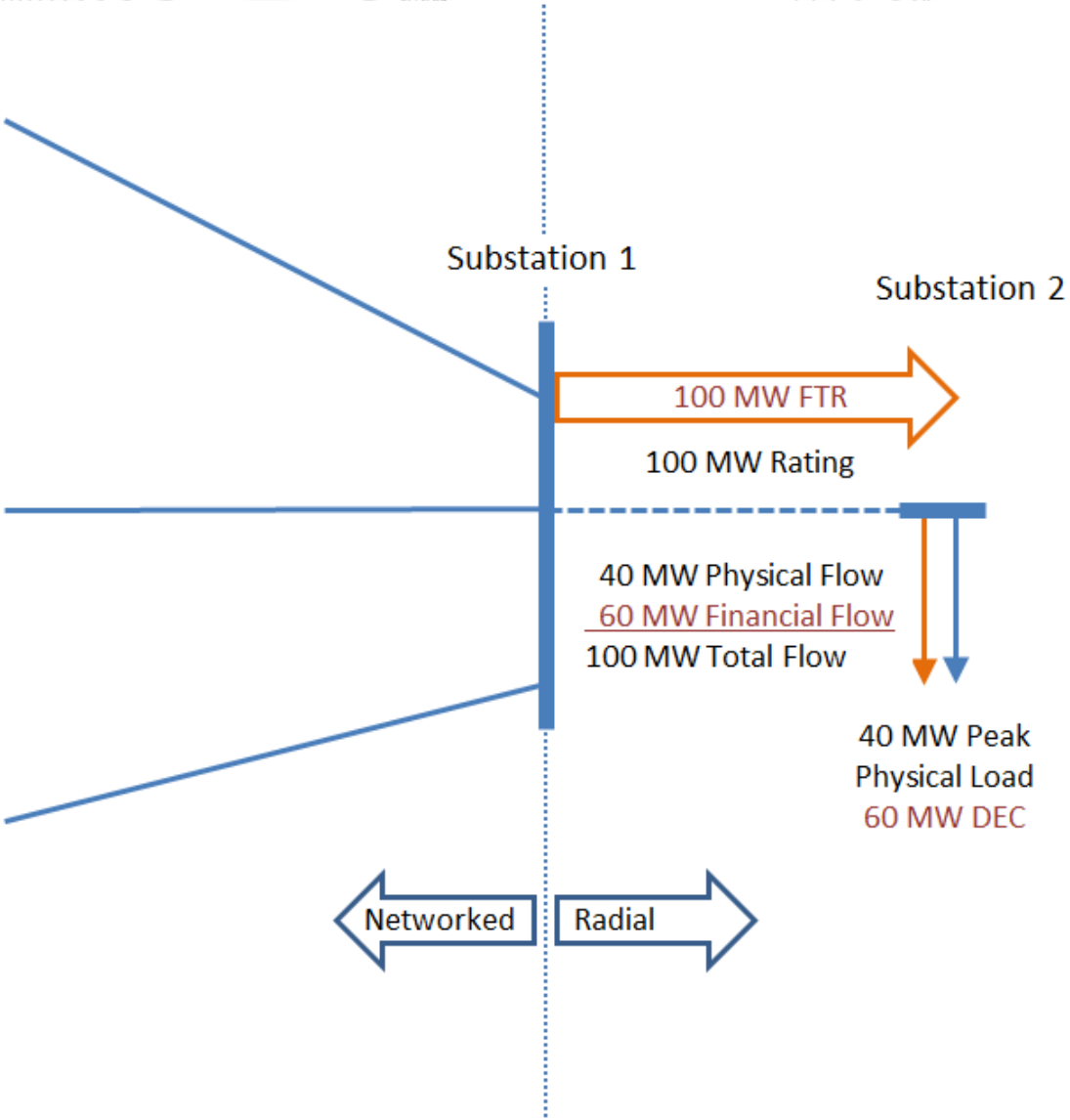
Representative Example (cont'd)

- Radial path built to serve load years into the future
- Flow << Capability so never congested
- Path price consistently nil so 100 MW FTRs obtained for little or no cost
- 60 MW DEC bid caused path congestion
- For every FTR MW above cleared DEC MW, participant nets path-price difference as profit



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Representative Example Accounting

- Radial path
- No RT congestion

Case 1: Pure Physical

	Prices			Quantities	Settlement
	Substation 1	Substation 2	$Path_{1-2}$	Load 2	Load 2
DA	$30	$30	$0		
RT/BAL	$30	$30	$0	40	-$1,200
TOTAL					-$1,200

Case 2: Observed Behavior; $1/MWH Price-movement

	Prices			Quantities			Settlement		
	Substation 1	Substation 2	$Path_{1-2}$	Load 2	DEC	FTR_{1-2}	Load 2	DEC	FTR_{1-2}
DA	$30	$31	$1		60	100		-$1,860	$100
RT/BAL	$30	$30	$0	40	-60		-$1,200	$1,800	
TOTAL							-$1,200	-$60	$100

Physical Load: -$1,200
Net Financials: **$40**

Case 3: Observed Behavior; $100/MWH Price-movement

	Prices			Quantities			Settlement		
	Substation 1	Substation 2	$Path_{1-2}$	Load 2	DEC	FTR_{1-2}	Load 2	DEC	FTR_{1-2}
DA	$30	$130	$100		60	100		-$7,800	$10,000
RT/BAL	$30	$30	$0	40	-60		-$1,200	$1,800	
TOTAL							-$1,200	-$6,000	$10,000

Physical Load: -$1,200
Net Financials: **$4,000**

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- The observed behavior did not:
  - Enhance market efficiency/provide convergence
    - Moved day-ahead away from real-time, yet was rewarded
    - No liquidity at isolated points on the system, so no competition to mitigate impacts
  - Provide incentive to bid efficiently
    - The higher the DEC bid, the more net profit!
- Behavior first observed early/mid-December 2000 and Tariff changes filed December 22

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FTR Forfeiture: Determination of Forfeiture Candidates

- FTR selection criteria
  - FTRs sourcing or sinking at Zones, Hubs, or Interfaces are excluded
  - FTRs where Day-Ahead Sink LMP<Day-ahead Source LMP are excluded
  - Include only FTRs where difference in price between FTR source and FTR sink point is greater in day-ahead market vs. real-time market
  - Include only where constraint impacts FTR path > 10%
  - Company and Affiliates are treated as a single organization

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Determination of Forfeiture Candidates and Settlement

- Constraint and Day-ahead Selection Criteria
  - Increment or Decrement bids in which 75% or more of the energy injected or withdrawn is reflected in constrained path between FTR source and sink points
  - UTC bids in which 75% or more of MW is reflected in constrained path between FTR source and sink points
  - Bids relieving congestion are excluded
  - Regional Interface Constraints are excluded
  - INC, DEC, or UTC Bids at Zones, Hubs, or Interfaces are excluded.
  - Company and Affiliates are treated as a single organization
- Settlement
  - FTR Forfeiture = FTR target allocation $_{\text{hourly}}$ - FTR auction clearing price $_{\text{hourly}}$ where the FTR auction clearing price can't be less than zero

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Reference Used to Test Impact of Virtual Transactions

- INCs and DECs are an individual injection or withdrawal
- Impact on a constraint cannot be determined without making an assumption about where the injected energy is withdrawn, or the withdrawn energy is injected
- Current implementation of the rule assumes that the energy injected by an INC is withdrawn at the location of the cleared DEC that results in the greatest impact on each constraint. Similarly, the current implementation assumes that the energy withdrawn by a DEC is injected at the location of the cleared INC with the greatest impact on the constraint
- This is REGARDLESS of whether the “worst case” INC or DEC was submitted by the same participant as the INC or DEC being tested
- PJM believes that instead, the load-weighted reference should be used for INCs, and a generation weighted reference should be used for DECs
- UTCs are currently analyzed correctly because by definition, all energy injected at the UTC source is withdrawn at the UTC sink

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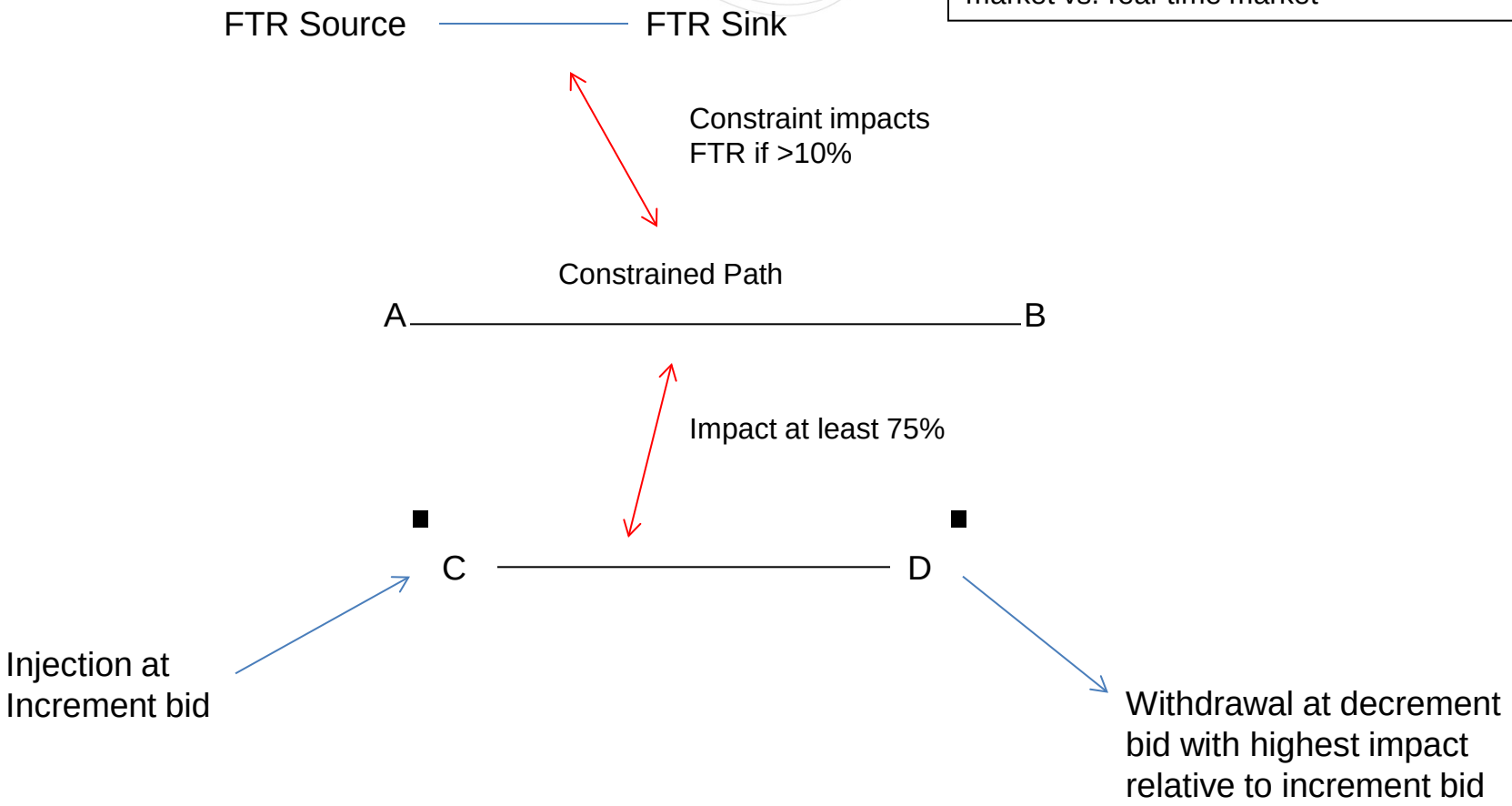
FTR Forfeiture for Increment Bid

Day-ahead LMP= $5
Real-time LMP=$4

Day-ahead LMP= $10
Real-time LMP=$7

The difference in price between FTR source and FTR sink point is greater in day-ahead market vs. real-time market



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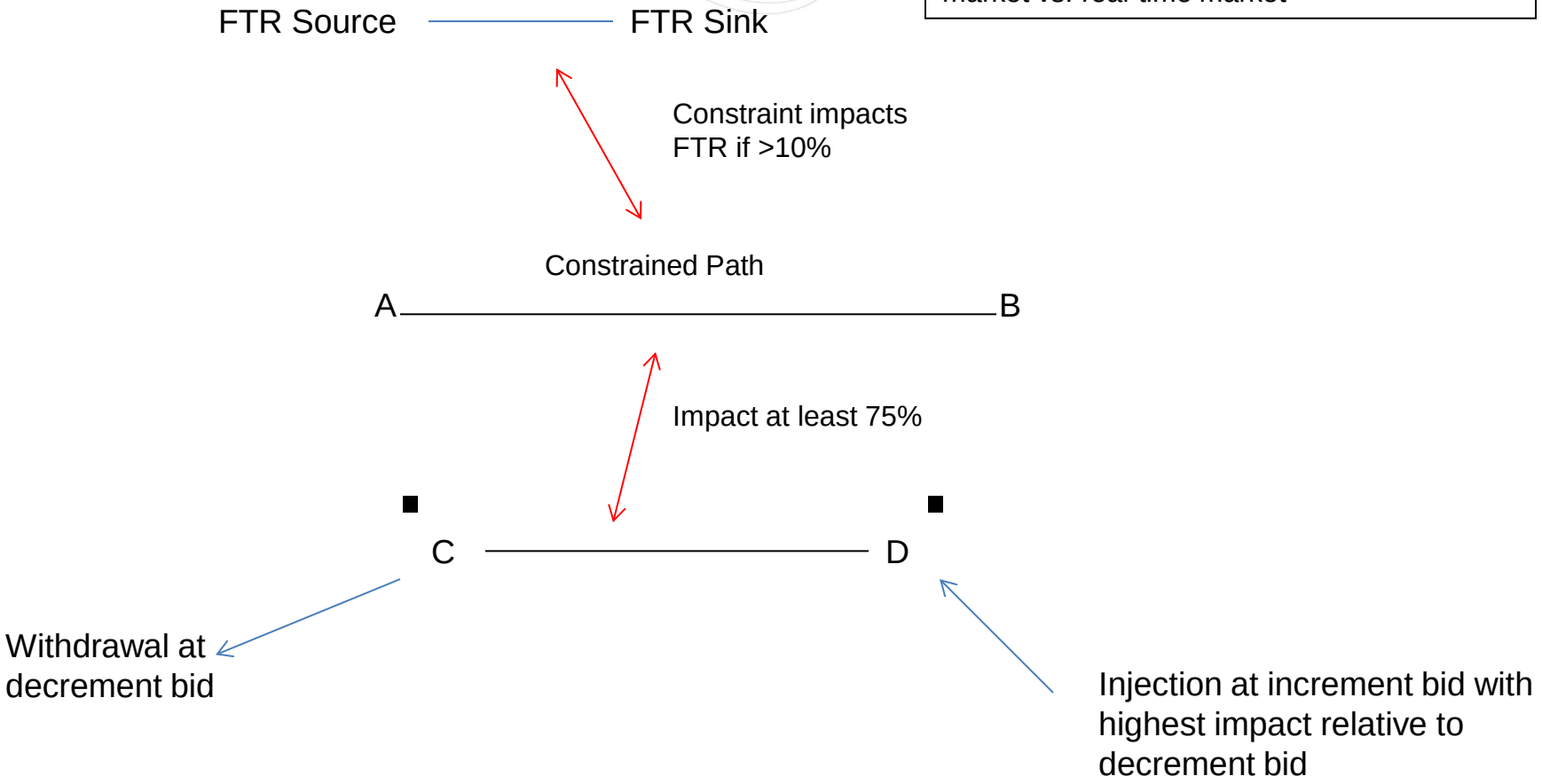
FTR Forfeiture for Decrement Bid

Day-ahead LMP= $5
Real-time LMP=$4

Day-ahead LMP= $10
Real-time LMP=$7

The difference in price between FTR source and FTR sink point is greater in day-ahead market vs. real-time market



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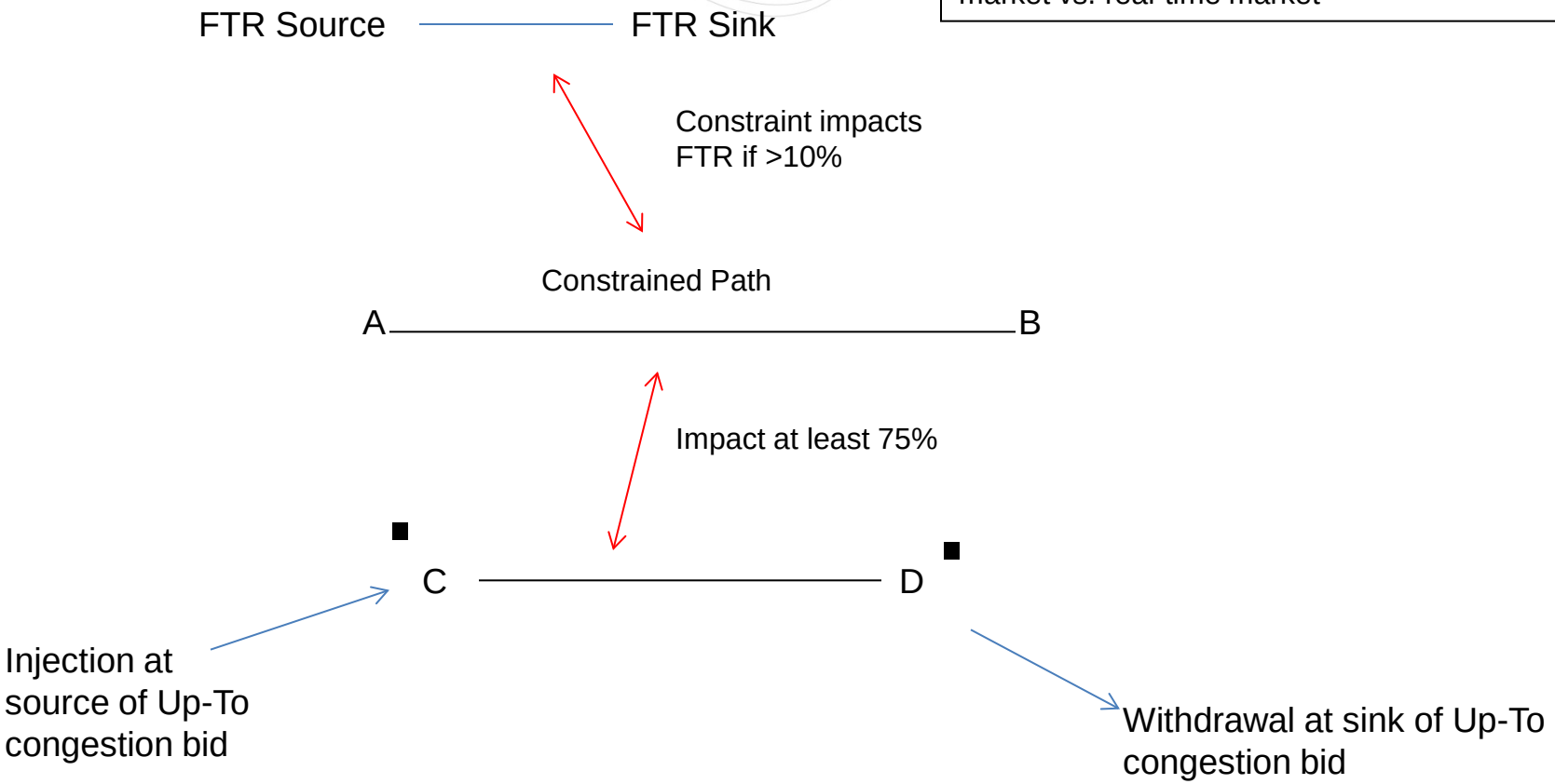
FTR Forfeiture for Up-To Congestion Bid

Day-ahead LMP= $5
Real-time LMP=$4

Day-ahead LMP= $10
Real-time LMP=$7

The difference in price between FTR source and FTR sink point is greater in day-ahead market vs. real-time market



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