



# PJM ARR FTR Markets Overview

PJM Market Simulation Department

April 1, 2025



Auction Revenue Rights Overview



Financial Transmission Rights Overview



Additional Topics

# ARR Overview



Auction Revenue Right



Entitlements to Firm Transmission Service Customers



ARR holders can

- Receive an allocation of the revenues from the annual FTR Auction
- Self-Schedule ARR in annual FTR auction to obtain FTR on same path
- Participate in any FTR auction

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Preservation of historical rights

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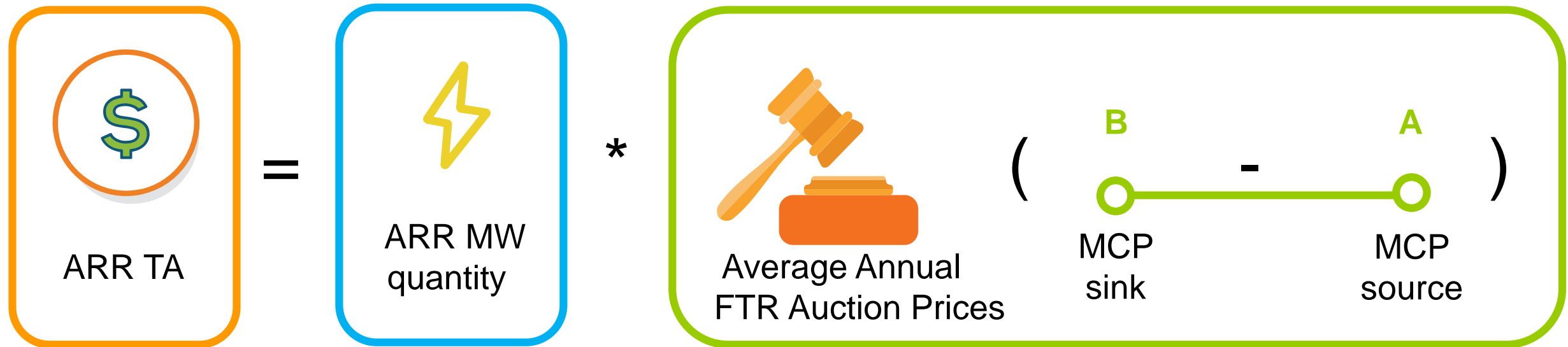
LSEs pay for added transmission capability/embedded costs

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Alternative to FTRs for LSEs

ARR Target Allocation (ARR TA) =

ARR MW \* (Average Annual FTR Auction MCP Sink – Average Annual FTR Auction MCP Source)



## 4 main events per year

Annual  
ARR  
Allocation

Stg  
1A

Stg2  
Rnd1

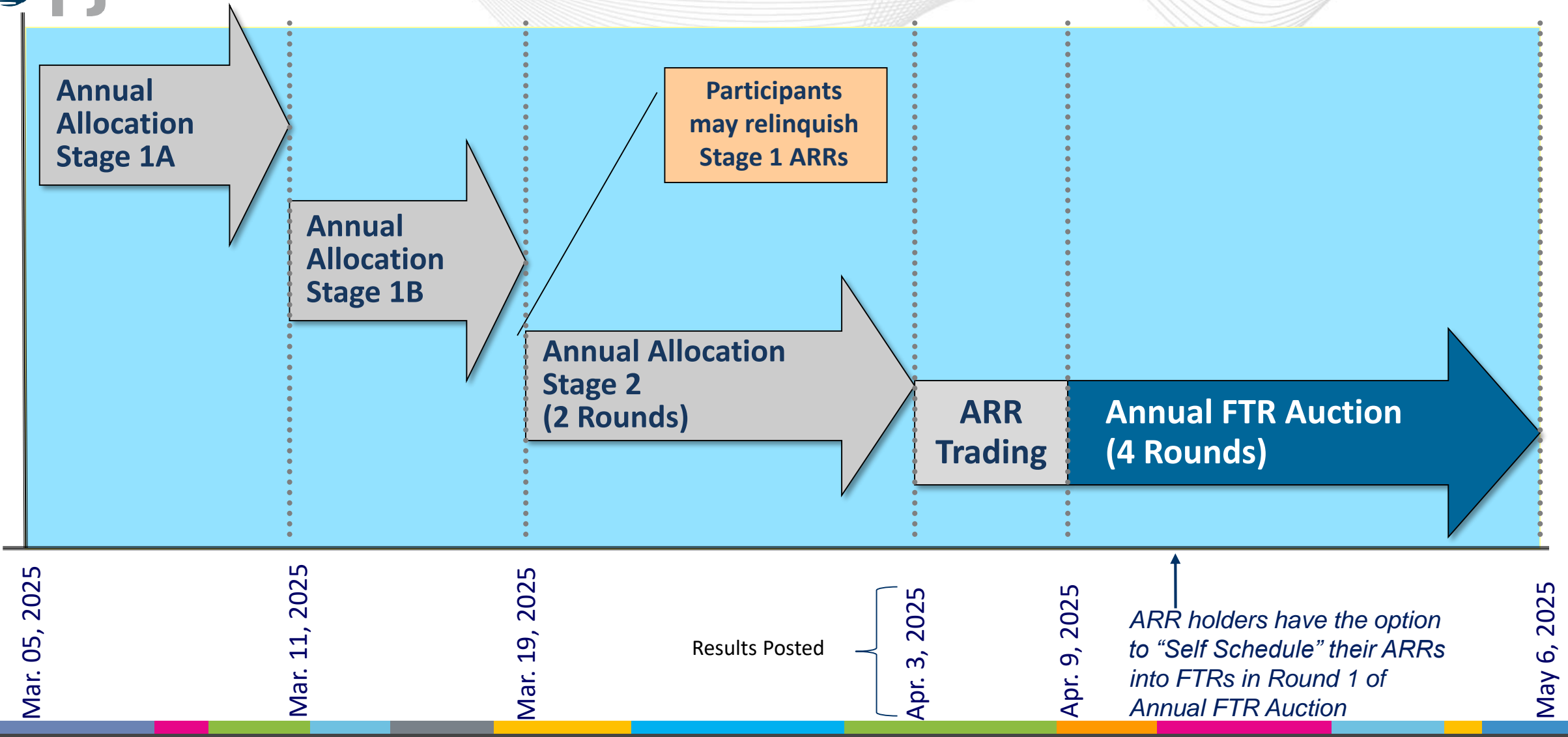
Stg  
1B

Stg2  
Rnd2

ARR Round	Source Pnode	Sink Pnode	Capability (MW)
Stage1A	Active historical resources or Qualified Replacement Resources	Aggregate Network Customer Load in the Transmission Zone or other designated Load Aggregation Zone	Guarantee 60% of Network Service Peak Load (NSPL)
Stage1B	Same as stage1A, <b>plus Hub, Zone and Interface</b>	Same as stage1A	Up to Network Service Peak Load (NSPL) (subject to proration)
Stage2 Round1	Any available generator, interface, hub, zone	Same as stage1A, <b>and any available generator, interface, hub, zone</b>	Up to Network Service Peak Load (NSPL) (subject to proration)
Stage2 Round2	Same as Round1	Same as round1	Up to Network Service Peak Load (NSPL) (subject to proration)

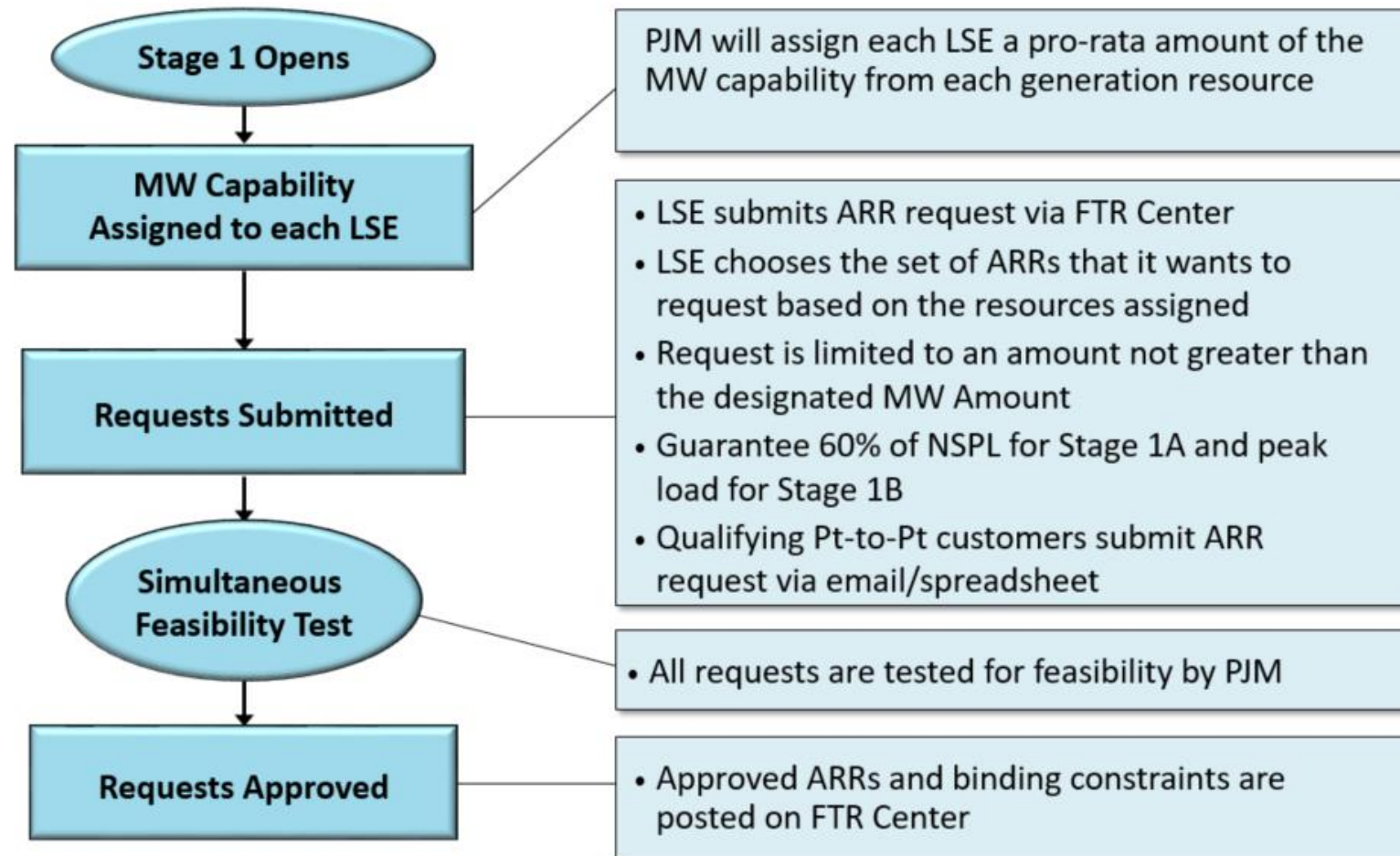


# Annual ARR/FTR Market Timeline

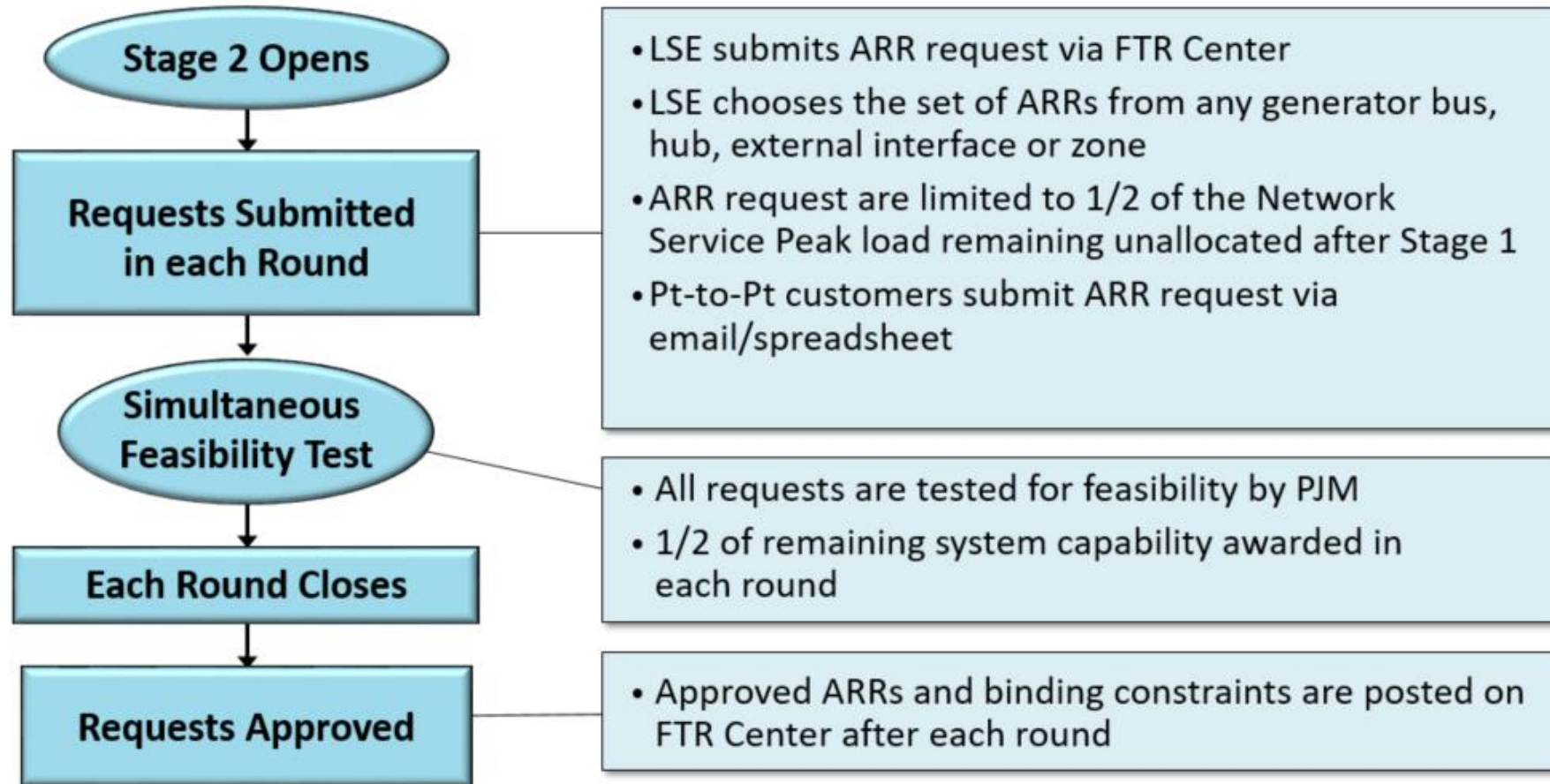




# Stage 1 - Annual Allocation Process



## Stage 2 - Annual Allocation Process



Stage 2 is an iterative allocation process that consists of two sequential rounds, with 1/2 of the remaining system ARR capability allocated in each round

Test to ensure that all subscribed transmission entitlements are within the capability of the existing transmission system

Test to ensure the PJM Energy Market is revenue adequate under normal system conditions

***NOT*** a system reliability test

***NOT*** intended to model actual system conditions



Daily ARR Reassignment: as load MWs change after allocation



Residual ARRs: monthly product



Incremental ARR products

- RTEP IARR: initiated by PJM
- Interconnection IARR: initiated by members
- Attachment EE IARR: initiated by members

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# FTR Overview

A solid green circle.

Financial Transmission Right

A solid blue circle.

Financial instruments awarded to bidders

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Entitles the holder to a stream of revenues (or charges) based on the hourly Day Ahead congestion price differences across the path



Protect load serving entities (LSEs) from congestion price uncertainty in DA

Mechanism for allocation of DA excess congestion charges

FTRs provide hedging mechanism that can be traded separately from transmission services

Means of congestion price discovery/ARR valuation in advance of DA

Any PJM Member meeting market entry and credit requirements, mostly:



## Load Serving Entities (LSEs)

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Hedge/protect against congestion price volatility in Day-ahead



## Financial Participants

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Price arbitrage and assumption of congestion risk for potential profit



## Generators

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Hedging



Source Pnode Name	Sink Pnode Name	Cleared MW	Cleared Price	Class Type	Hedge Type	Trade Type	Period Type	Start Day	End Day
Source 1	Sink 1	25.5	954.09	WkndOnPeak	Obligation	Buy	AUG	8/1/2023 4:00	8/31/2023 4:00
Source 2	Sink 2	200	1805.02	24H	Obligation	Buy	AUG	8/1/2023 4:00	8/31/2023 4:00
Source 3	Sink 3	18	1.94	WkndOnPeak	Option	Buy	MAR	3/1/2024 5:00	3/31/2024 4:00
Source 4	Sink 4	10.2	-18.67	OnPeak	Obligation	Sell	DEC	12/1/2023 5:00	12/31/2023 5:00
Source 5	Sink 5	1.4	1	DailyOffPeak	Option	Buy	AUG	8/1/2023 4:00	8/31/2023 4:00

Source

Sink

MW

Price

Hedge type

Class type

Trade type

Period type/Term

An **on-peak** FTR product is valid for hours ending 0800 to 2300 weekdays, except NERC holidays.

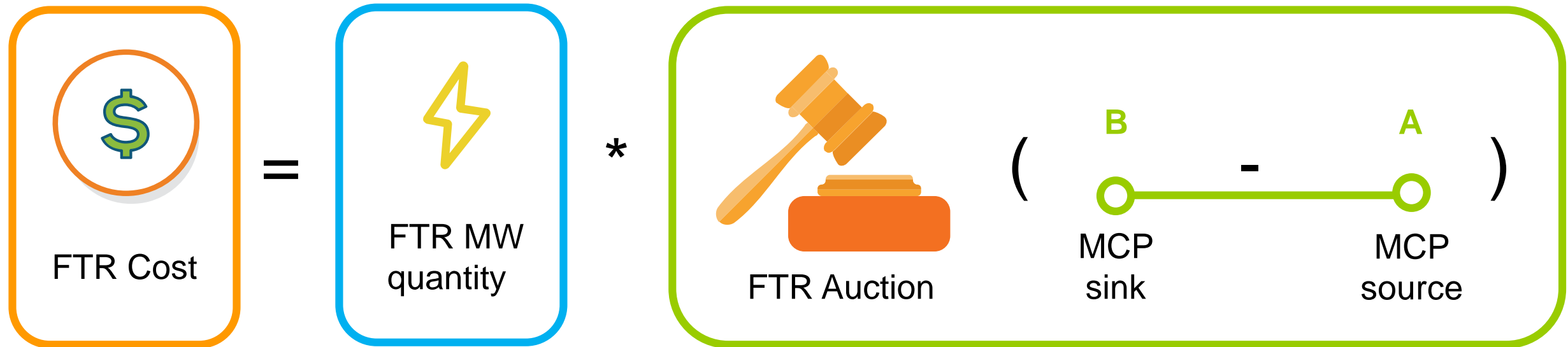
A daily **off-peak** FTR product is valid for hours ending 2400 to 0700 on all days, inclusive of weekends and holidays.

A **weekend/holiday on-peak** FTR product is valid for hours ending 0800 to 2300 on weekends and NERC holidays.

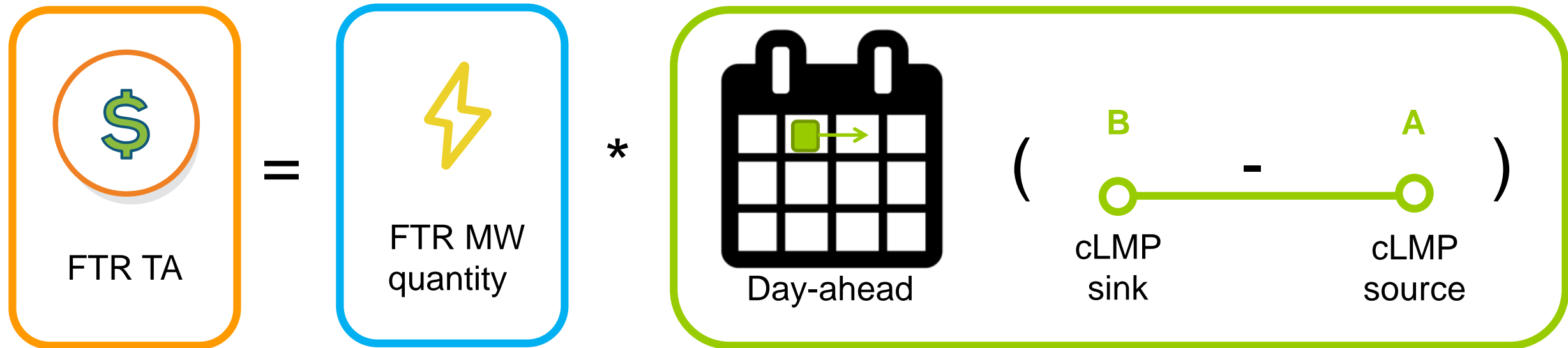
A **24-hour** FTR product is valid for hours ending 0100 to 2400 on all days.

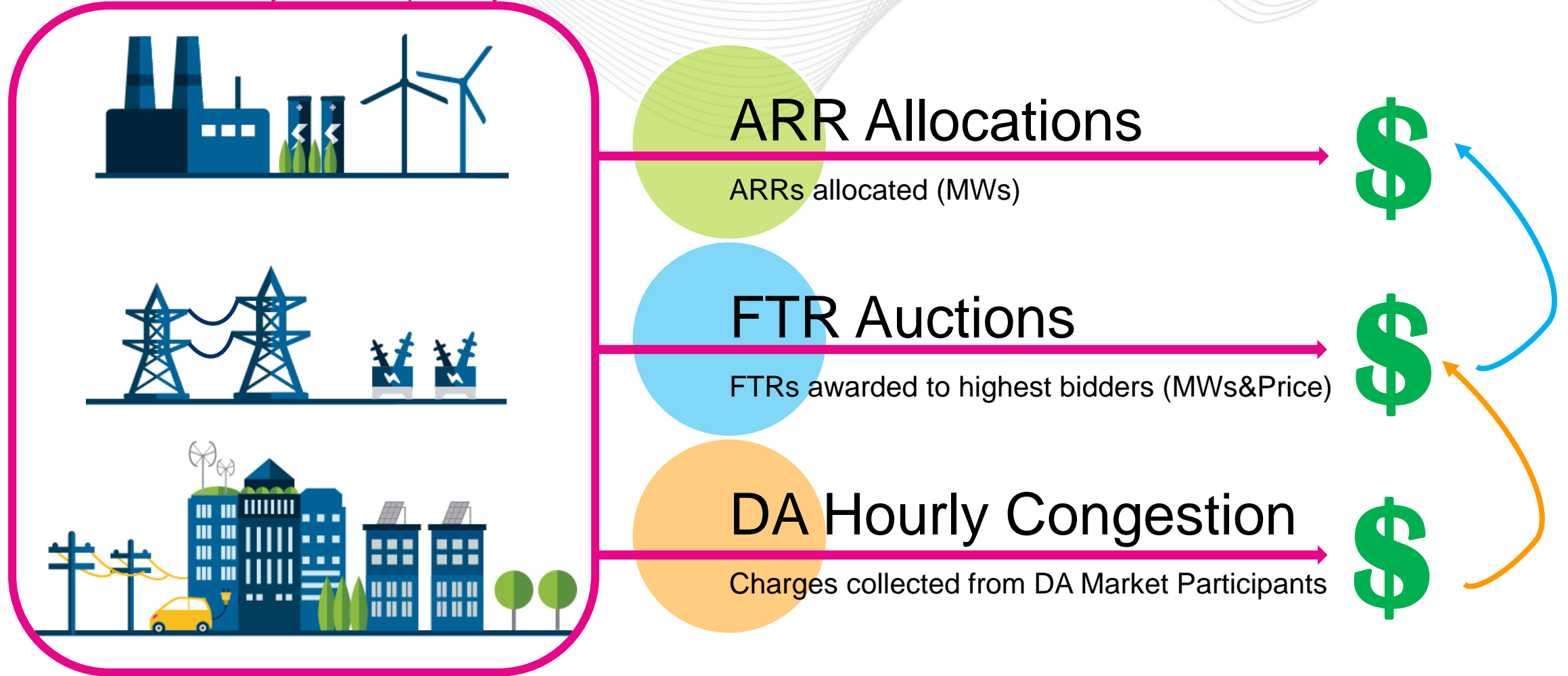
FTR Cost =

FTR MW \* (FTR Auction Market Clearing Price (MCP) Sink – FTR Auction MCP Source)



$$\text{FTR Target Allocation (FTR TA)} = \text{FTR MW} * (\text{DA cLMP Sink} - \text{DA cLMP Source})$$





## FTRs can be acquired in two forms

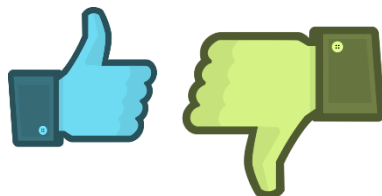
### What are FTR Obligations Worth?

#### Benefit

- The hourly congestion value is positive
- FTR same direction as the congested flow

#### Liability

- The hourly congestion value is negative
- FTR opposite direction to the congested flow



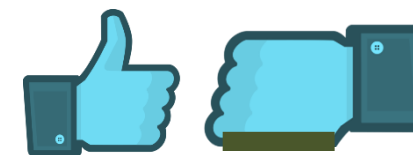
### What are FTR Options Worth?

#### A Benefit

- The hourly congestion value is positive
- FTR same direction as the congested flow

#### Not a Liability

- The hourly congestion value is zero
- FTR opposite direction to the congested flow



*FTR Option cannot  
have negative value*

**Annual Auction**

- Multi-round
- Multi-period
- Multi-product
- Entire system capability minus approved Long-Term FTRs

**Long-Term Auction**

- Multi-round
- Purchase residual system capability, assuming self scheduling of ARR

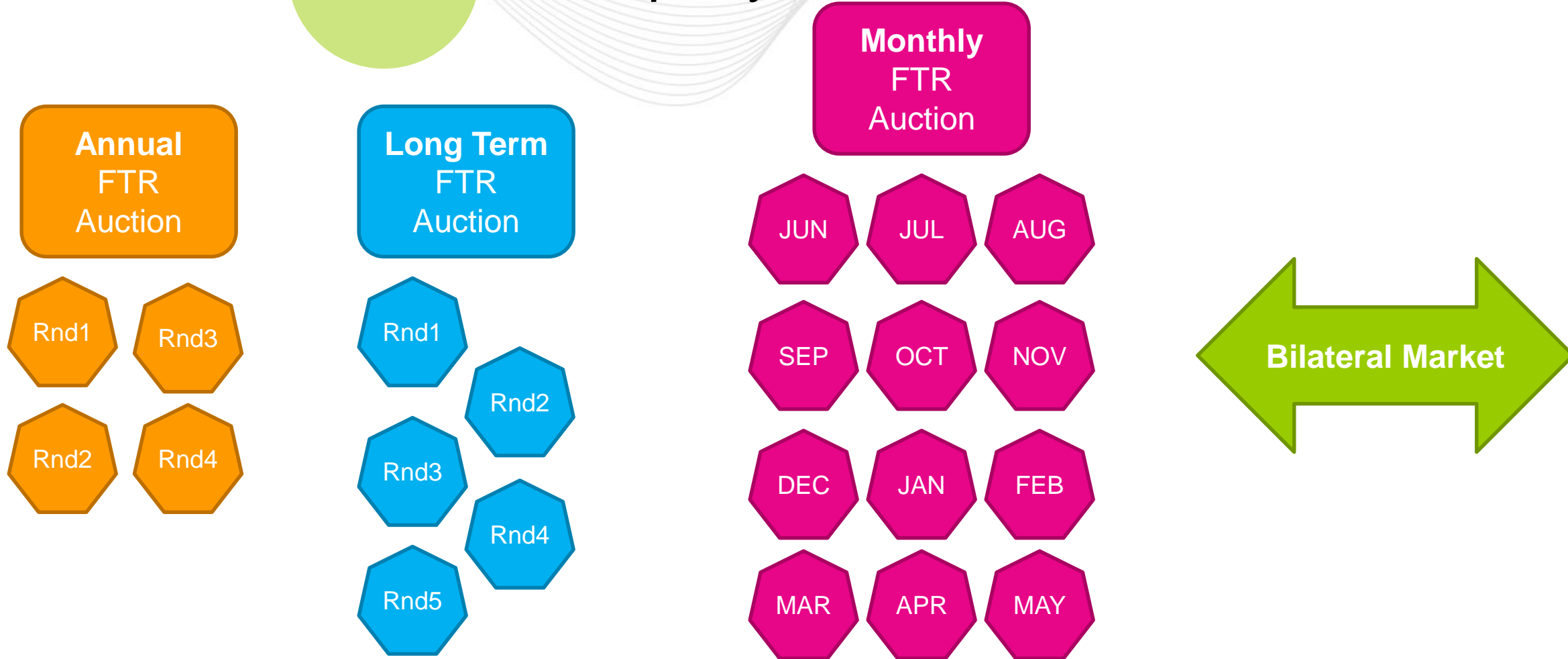
**Monthly Auction**

- Purchase “left over” capability

**Secondary Market**

- Bilateral trading

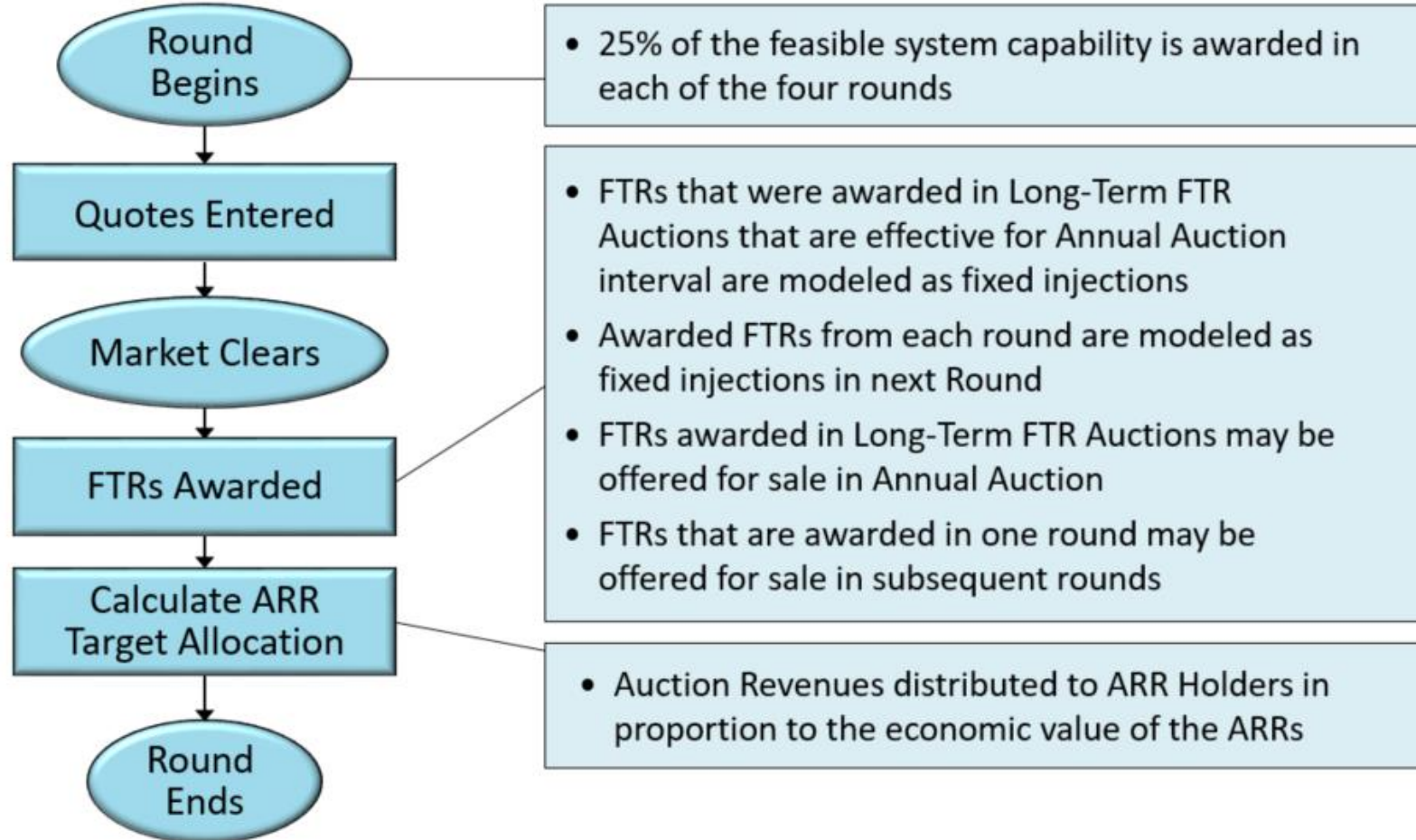
21 events per year





Features	Annual FTR Auction	Long-term FTR Auction	Monthly FTR Auction
<b>Capability Auctioned</b>	Entire FTR capability of the transmission system minus approved Long-term FTRs	Residual FTR capability of the transmission system assuming self-scheduling of current planning period ARRs	Residual FTR capability of the transmission system
<b>Auction Format</b>	Multi-round – 4 rounds each week during April	Multi-round – 5 rounds 2-3 months apart across the planning period	Single round each month
<b>FTR Products</b>	Obligations Options	Obligations	Obligations Options
<b>FTR Class Types</b>	OnPeak DailyOffPeak WkndOnPeak 24H	OnPeak DailyOffPeak WkndOnPeak 24H	OnPeak DailyOffPeak WkndOnPeak 24H
<b>FTR Period</b>	All (One planning period)	YR1 (One planning period) YR2 (One planning period) YR3 (One planning period)	Any individual remaining months of the planning period: JUN, JUL, AUG, SEP, OCT, NOV, DEC, JAN, FEB, MAR, APR, MAY

	Annual and Long-Term FTR Auctions	Monthly FTR Auctions Next Calendar Month	Monthly FTR Auctions Remaining Month
FTR Obligations	Valid Sources & Sinks are limited to: <ul style="list-style-type: none"> <li>• Hubs</li> <li>• Zones</li> <li>• Aggregates</li> <li>• Interface Buses</li> <li>• Generator Buses</li> </ul>	Valid Sources & Sinks include any single bus or combination of buses for which a Day-Ahead LMP is calculated & posted: <ul style="list-style-type: none"> <li>• Hubs</li> <li>• Zones</li> <li>• Aggregates</li> <li>• Interface Buses</li> <li>• Generator/Load Buses</li> </ul>	Valid Sources & Sinks are limited to: <ul style="list-style-type: none"> <li>• Hubs</li> <li>• Zones</li> <li>• Aggregates</li> <li>• Interface Buses</li> <li>• Generator Buses</li> </ul>
FTR Options	<ul style="list-style-type: none"> <li>• Only a subset of paths will be eligible for FTR Options in order to prevent potential auction clearing performance issues</li> <li>• Only FTR Options <math>\geq \\$1</math> will clear</li> <li>• Option Product not available in Long-Term FTR Auction</li> </ul>		



## Purpose

- Ensure the transmission system is capable to support the simultaneous feasibility of Stage 1A ARRs up to 60% of Network Service Peak Load inclusive of the projected ten-year load growth

## Challenges

- Some transmission zones are expected high load growth in the next 10 years

## Results

- If any upgrades are anticipated, they will be coordinated with other corresponding teams



Bilateral Trading of existing FTRs only



FTRs can be split into smaller increments (duration/mw/period)



FTRs cannot be reconfigured

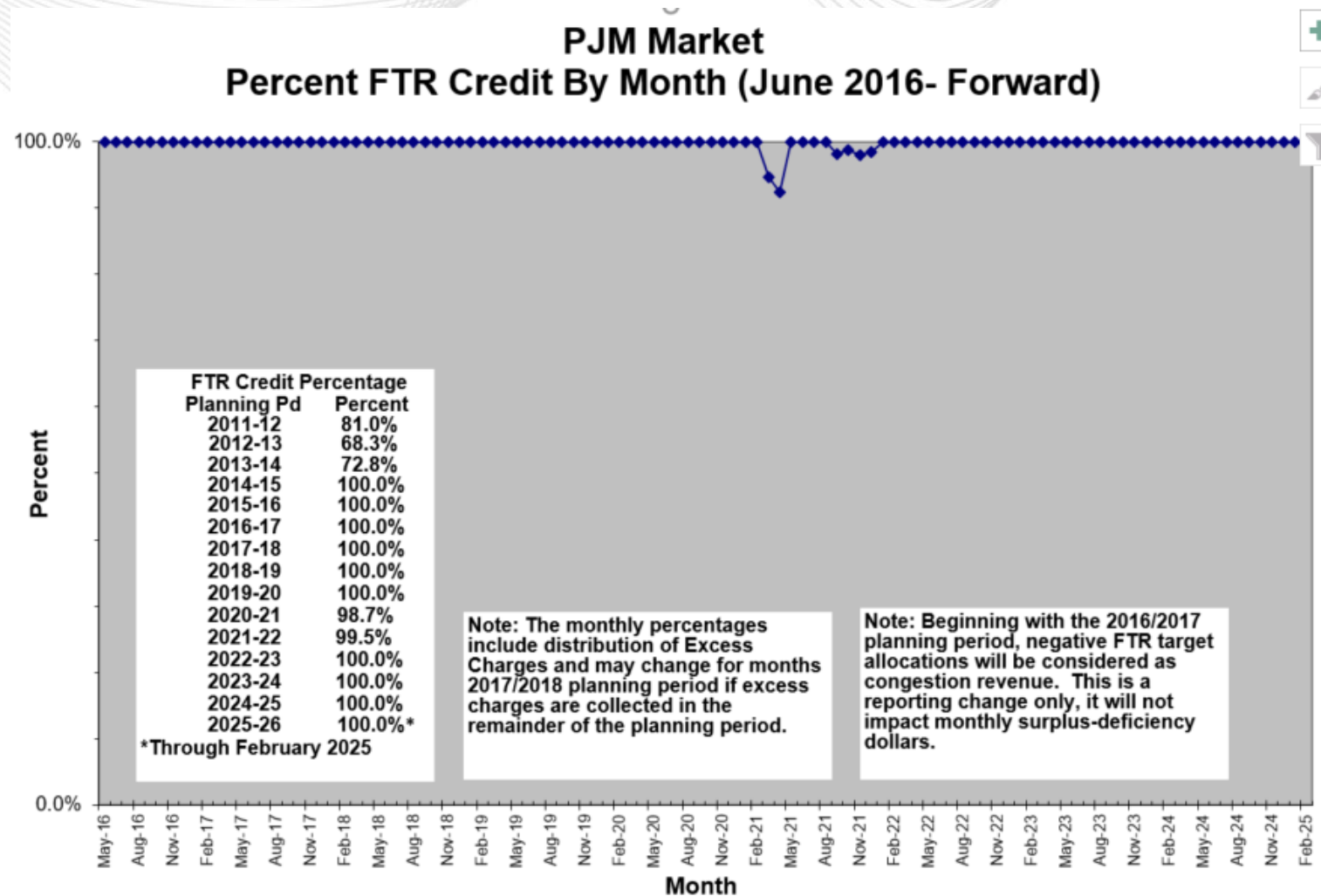
- Path and product type (Option or Obligation) must remain same



New owner takes on cost responsibility of purchased FTR

# Metrics – Revenue Adequacy

[FTR Credit By Month](#) file is published on the [FTR page](#), under the Revenue Adequacy section







## PJM Manual 06: Financial Transmission Rights

– <https://www.pjm.com/-/media/DotCom/documents/manuals/m06>



## PJM Financial Transmission Rights web page

– <https://www.pjm.com/markets-and-operations/ftr.aspx>



Questions to [FTRGroup@pjm.com](mailto:FTRGroup@pjm.com)