



PC Special Session: Merchant Transmission & Offshore Wind

Education
May 3, 2019

Item 03: Review of PJM New Service Request Process

Anupama Janapareddy

Interconnection Analysis

Lisa Krizenoskas

Interconnection Projects

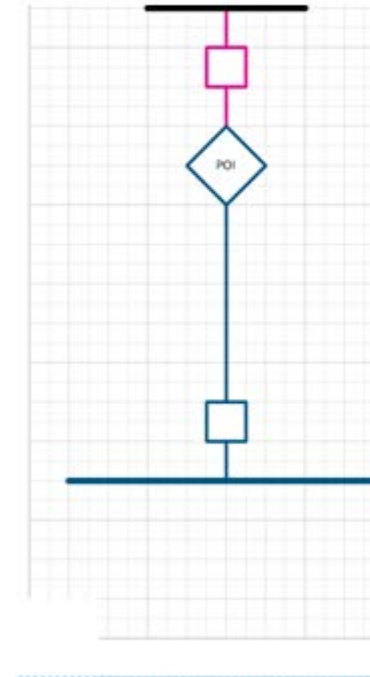
Stakeholders' Request:

Acquire capacity rights (or equivalent) for Non-Controllable Merchant AC Transmission Facility for future Offshore Generating Facilities (radial)

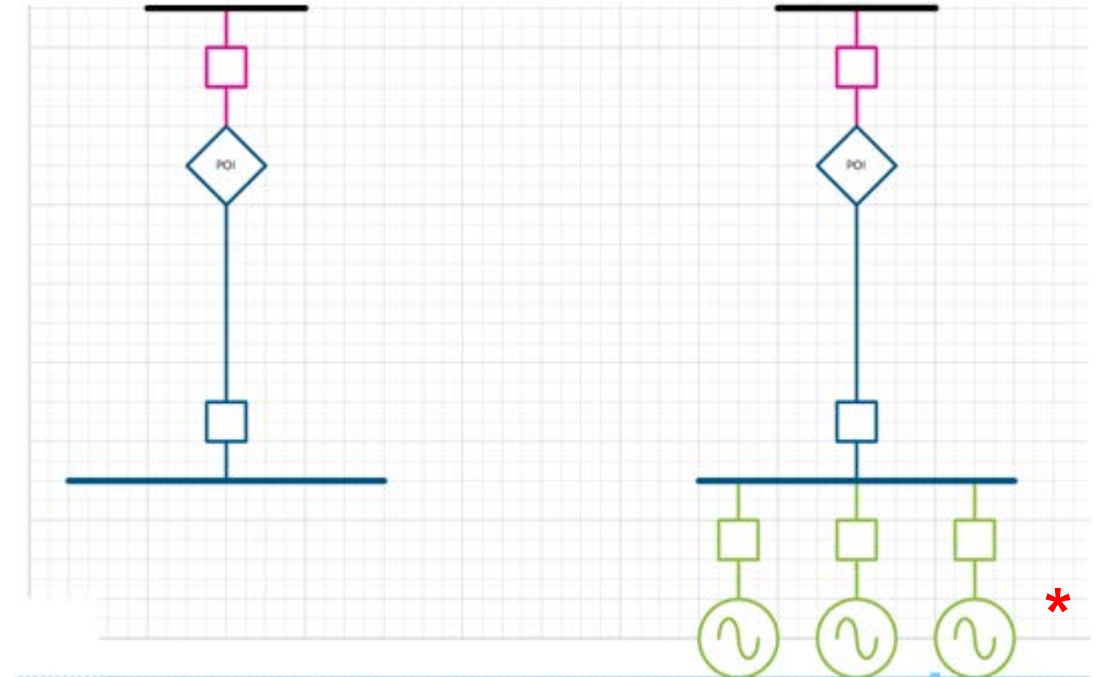
Current Tariff does not allow for:

Radial Non-Controllable Merchant AC Transmission facilities to receive rights for future generation connections

Non-Controllable AC Merchant Transmission (radial, no generation)



Future Generation Interconnection



* Future generation. Original request does not include generation.

Generator Interconnection	Merchant Transmission	Merchant Transmission for Future Generator
<ul style="list-style-type: none"> Generator Data 	<ul style="list-style-type: none"> Must be Controllable/ Specify Equipment Control Area to Control Area 	<ul style="list-style-type: none"> Non-controllable AC radial line Not connecting to another Control Area No specified generator



Capacity Interconnection Rights (CIRs)



Transmission Injection/Withdrawal Rights (TIRs/TWRs)



?

Item 04: Impact of Withdrawn Queue Position on Network Upgrades & Lower Queue Positions

Anupama Janapareddy
Interconnection Analysis

Impact of Withdrawn Queue Position on Network Upgrades & Lower Queue Positions

- If a higher order queue withdraws and is a driver for a network upgrade, a re-tool will be performed to see if the upgrade is still needed for a lower queue priority.
- If the upgrade is still needed, the lower queue priority will be the driver and/or their cost allocations would change towards the upgrade.
- Cost responsibility of the network upgrade stays within the New Services queue and doesn't shift to the load.

Item 05: Rights Retention and Transferability

Anupama Janapareddy
Interconnection Analysis

	ICTR (years)	IARR (years)	IDR (years)	IATCRR (years)	Capacity Interconnection Rights (CIRs)	Energy Rights	Capacity and/or Energy Transmission Injection Rights/ Firm and/or Non-Firm Transmission Withdrawal Rights (TIRs/TWRs)
Retention	30	30	1	30	For life of the unit as long as they demonstrate the capability on a 3 year basis	For life of the unit	For life of the facilities
Transferability	None	None	Can be converted to CIRs	None	Can be transferred to other units up to one year after the unit is deactivated	None	None

Item 06: Economic Value of Rights

Nicolae Dumitriu

Market Simulation

Anupama Janapareddy

Interconnection Analysis

May 3, 2019

- Capacity Interconnection Rights (CIRs) – “Capacity Interconnection Rights” shall mean the rights to input generation as a Generation Capacity Resource into the Transmission System at the Point of Interconnection where the generating facilities connect to the Transmission System.
- Analysis – Planning
- Retention (Term) : Life of the facility as long as they demonstrate on a rolling 3 year basis.
- Transferability : Can be transferred to other unit up to 1 year after the actual deactivation
- **Economic Value:** Have to bid into Base Residual Auction (capacity market)

- “Capacity Transmission Injection Rights” shall mean the rights to schedule energy and capacity deliveries at a Point of Interconnection of a Merchant Transmission Facility with the Transmission System.
- “Energy Transmission Injection Rights” shall mean the rights to schedule energy deliveries at a specified point on the Transmission System
- “Firm and/or Non-Firm Transmission Withdrawal Rights” shall mean the rights to schedule energy and capacity withdrawals from a Point of Interconnection of a Merchant Transmission Facility with the Transmission System.
- Analysis – Planning
- Retention (Term) : Life of the facility
- Transferability : None
- **Economic Value:** Transmission Service on merchant tie lines is subject to applicable schedules in PJM Tariff and filed allocation process for use of the capability. The charges for the allocation of rights are negotiated and not included in the PJM Tariff. Use of line and any released capability are subject to OATT schedule for transmission service for the tie line. (e.g. Schedule 16 - Linden VFT)

- “Incremental Capacity Transfer Right” shall mean a Capacity Transfer Right allocated to a Generation Interconnection Customer or Transmission Interconnection Customer obligated to fund a transmission facility or upgrade, to the extent such upgrade or facility increases the transmission import capability into a Locational Deliverability Area, or a Capacity Transfer Right allocated to a Responsible Customer in accordance with Tariff, Schedule 12A.

- Analysis – Planning

- Retention (Term) : 30 Years

- Transferability : None

- **Economic Value:**
 - Economic value of ICTRs based on RPM Auction results.
 - ICTRs MW may be adjusted down (to zero) as Total ICTRs awarded may not exceed CTRs calculated for such LDA.

- “Incremental Auction Revenue Rights” shall mean the additional Auction Revenue Rights, not previously feasible, created by the addition of Incremental Rights-Eligible Required Transmission Enhancements, Merchant Transmission Facilities, or of one or more Customer Funded Upgrades.
- Analysis: Markets
- Retention (Term): 30 Years
- Transferability: None
- **Economic Value:**
 - Economic value of IARRs based on Annual FTR Auction results.
 - The economic value of an Auction Revenue Right can either be positive (a benefit) or negative (a liability).

- Incremental Deliverability Rights (IDRs): “Incremental Deliverability Rights” or “IDRs” shall mean the rights to the incremental ability, resulting from the addition of Merchant Transmission Facilities, to inject energy and capacity at a point on the Transmission System, such that the injection satisfies the deliverability requirements of a Capacity Resource. Incremental Deliverability Rights may be obtained by a generator or a Generation Interconnection Customer, pursuant to an IDR Transfer Agreement, to satisfy, in part, the deliverability requirements necessary to obtain Capacity Interconnection Rights.
- Analysis: Planning
- Retention (Term): One year after commencement
- Transferability: Converted to CIRs for a generator request.
- Economic Value: Can be converted to satisfy, in part, the deliverability requirements necessary to obtain CIRs

- Incremental Available Transfer Capability Revenue Rights: “Incremental Available Transfer Capability Revenue Rights” shall mean the rights to revenues that are derived from incremental Available Transfer Capability created by the addition of Merchant Transmission Facilities or of one of more Customer-Funded Upgrades.
- Analysis: Transmission Service Department
- Retention (Term): 30 years
- Transferability: None
- **Economic Value:** Potential to earn percentage of transmission service revenues (interregional transactions)



State Agreement Approach

Suzanne Glatz

Director, Infrastructure Planning

May 3, 2019

State Agreement Approach

- Facilitates state's ability to make decisions
- PJM can support development of solutions to meet public policy goals

State Agreement Approach

(not in scope of special PC meetings)

- RTEP Planning Process
- Baseline project
- Subject to state's commitment for cost responsibility
- Transmission Investment is recovered through cost of service rates

Merchant Transmission Development

(in scope of special PC meetings)

- Interconnection Queue Process
- Merchant assumes cost responsibility to develop the project and incur all costs to interconnect
- Transmission revenues is recovered through filed market rates

Operating Agreement Schedule 6, Section 1.5.9

- States, either individually or jointly, may agree to voluntarily be responsible for cost responsibility for transmission to address state public policy requirements
- As determined by the authorized state, projects may be included in the RTEP either as a Supplemental Project or a state public policy project
- States may submit to PJM the Designation Entity(ies) from list of pre-qualified entities to construct a public policy project under the State Agreement Approach

Appendix: Previous Education



Meeting 1 Education: PJM New Service Request Process

Anupama Janapareddy

Interconnection Analysis

Lisa Krizenoskas

Interconnection Projects

April 16, 2019

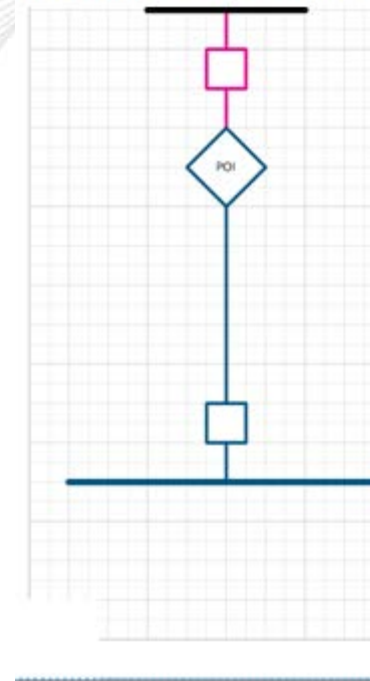
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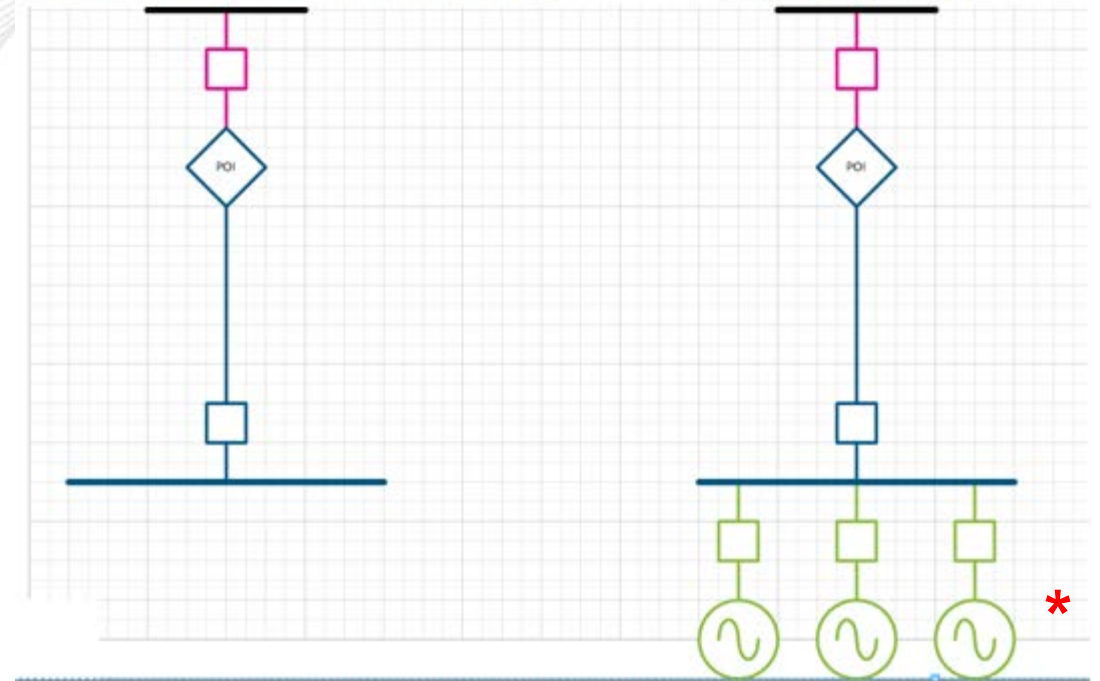
Current Tariff does not allow for:

Radial Non-Controllable Merchant AC Transmission facilities to receive rights for future generation connections

Non-Controllable AC Merchant Transmission (radial, no generation)



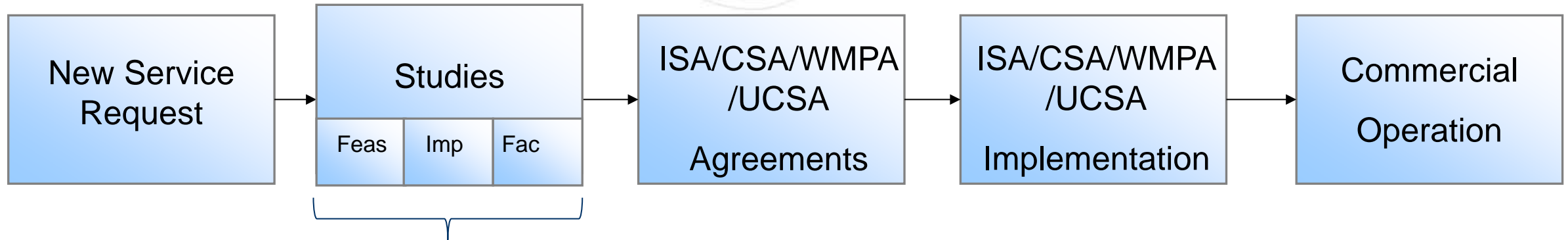
Future Generation Interconnection



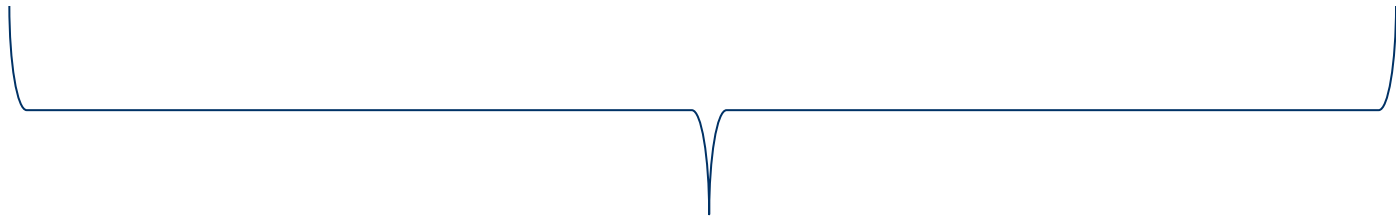
* Future generation. Original request does not include generation.

Tariff allows for these types of New Service Requests:

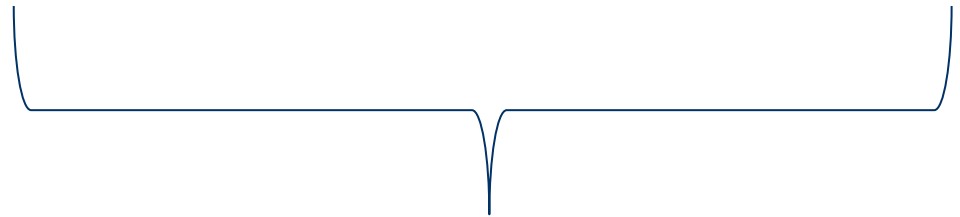
- **Generation Interconnection**
- **Merchant Transmission Interconnection**
- **Long-term Firm Transmission Service**
- **Upgrade Requests / Auction Revenue Rights**



Interconnection Analysis



Interconnection Projects



Infrastructure Coordination

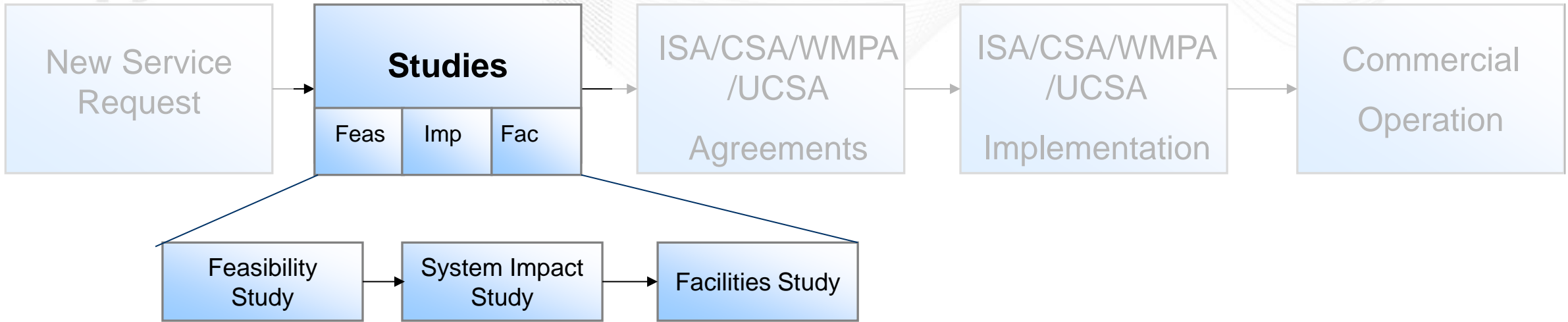


- New Service Requests are submitted in two queue windows



- Deficiency Review
- Kickoff Call

- *Projects can drop out at any time
- *Project cannot increase in size



	2017												2018												2019											
Queue	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
AD1				█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█												
AD2										█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
AE1																█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
AE2																																				

- PJM Receives Queue Requests
- PJM Model Build
- Feasibility Study Period
- 30 Day Review and Agreement Return by Customer
- System Impact Study Period

Rule of Thumb for Study Issue Dates		
	FEAS	SIS
Queue Ends with 1	JAN	AUG
Queue Ends with 2	JUL	FEB



OATT Attachment N, Y, BB, S, EE *

- N – Generation
- Y – Generation (≤ 2 MW synchronous, ≤ 5 MW inverter based, and energy-only)
- BB – Generation (≤ 10 kW inverter based, and energy-only)
- S – Merchant Transmission
- EE – Upgrade Request

Required Information

- Location
- Project Size
- Ownership (site control for interconnection requests)
- Equipment Configuration
- Planned In-Service Date
- Deposit
- Data

*** NOTE:**
Transmission service requests are received through OASIS and are then communicated to System Planning for inclusion in the New Services Queue with remainder of the New Service Requests.



New Services Queue Application Requirements

Requirements

- Tariff Application
- Feasibility Study Deposit
- System Impact Study Deposit
- Facilities Study Deposit
- Facility Type
- Project Location
- Project Data
- Point of Interconnection
- Requested Rights
- Planned In-Service Date

Generator Interconnection

- N
- Dependent on Submittal Month, MW value and TO zone
 - Dependent on MW value and TO zone
 - Dependent on Project Size
 - Natural Gas, Solar, Battery, etc.
 - Address/Grid Coordinates
 - Site Plan
 - Maximum Facility Output
 - Summer and Winter Energy
 - Capacity Requested
 - Site Control Documentation
 - One Line Diagram
 - Generator data
 - Transformer data
 - Attachment Line Data
 - Stability Models
 - Primary POI
 - Secondary POI
 - Capacity Rights
 - Energy Rights
 - ICTR's
- Required

Merchant Transmission

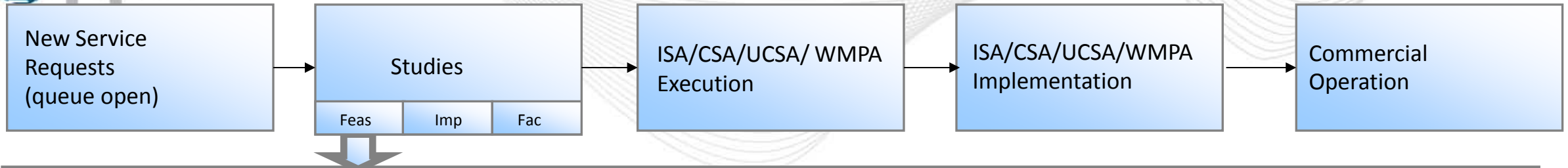
- S
- Dependent on Submittal Month and MW of new Facility
 - Dependent on MW value and TO zone
 - Dependent on Project Size
 - DC, Controllable AC, Non-Controllable AC
 - Address/Grid Coordinates
 - Substation(s) where IC proposes to interconnect or add its facilities
 - Description of Proposed Facilities and Equipment
 - Proposed Voltage and nominal capability of new facilities
 - Customer specifies location on Transmission System where they propose to receive any rights
 - Capacity TIRs/FTWRs
 - Energy TIRs/NFTWRs
 - Or ICTRs, IDRs, IARRs and IATCRRs
- Required

ICTR
IARR
IDR
IATCR

Incremental Capacity Transfer Rights
Incremental Auction Revenue Rights
Incremental Deliverability Rights
Incremental Available Transfer Capability Rights

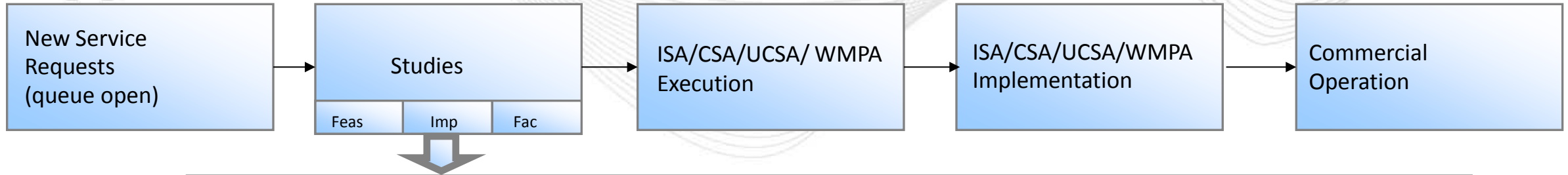
FTIR
FTWR
NFTIR
NFTWR

Capacity Transmission Injection Rights
Firm Transmission Withdrawal Rights
Energy Transmission Injection Rights
Non-Firm Transmission Withdrawal Rights



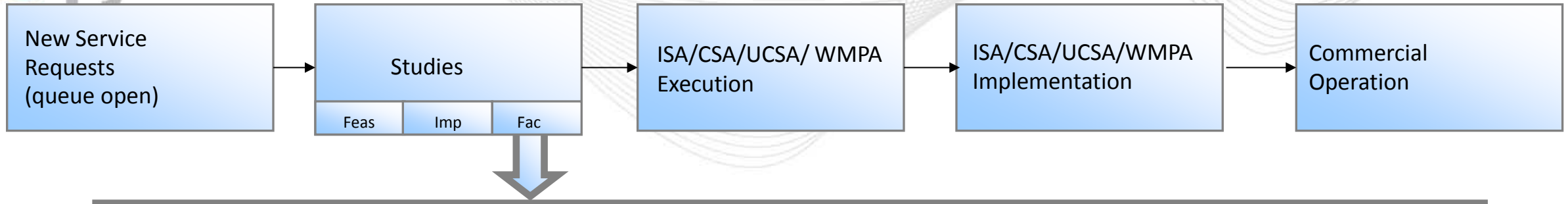
Feasibility Study

- Required
 - Deposit for Interconnection Requests based on request receipt timing and MW size
 - Site control for generation requests
 - In-service date within 7 years of entering queue (exceptions allowed)
- Customer can select a primary and secondary Point of Interconnection (POI)
- Study Completion: Target approximately 120 Days after close of queue
- Study participants: PJM and TO (Contractor under direction of TO)
- Results
 - Attachment Facilities Needed for Interconnection
 - Powerflow Analysis - Identify thermal overloads and Required Upgrades (Costs and Construction Schedule Estimates for primary POI)
 - Powerflow Analysis - Identify thermal overloads associated with secondary POI (no cost or schedule estimates)
 - Short Circuit Analysis
- Customers receive a Feasibility Study Report and have 30 days to sign a System Impact Study Agreement (SISA)



Impact Study

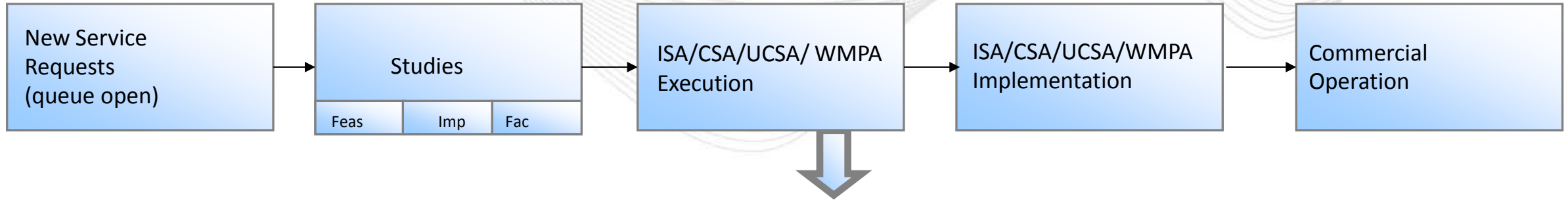
- Required
 - Deposit based on MW size
 - Initial Air Permit Application (N/A for solar/wind projects)
 - Ownership (site control for Transmission Interconnection Requests)
- Customer must select a single POI (if 2 were evaluated in the Feasibility Study)
- Study Completion
 - Target 120 days after start of queue study or execution of Impact Study Agreement
- Study participants
 - PJM and TO (Contractor under direction of TO)
 - Affected Systems
- Results
 - Summer Peak Powerflow Analysis (PJM Generator Deliverability Test)
 - Light Load Powerflow Analysis (if applicable)
 - Short Circuit Analysis
 - Stability Analysis
 - Other Powerflow Analyses as applicable
 - Cost Estimates and Allocations
- Customers receive an Impact Study Report and have 30 days to sign a Facility Study Agreement (FSA)



Facilities Study (Initial Engineering Review)

- Conduct governed by procedures as set forth in Attachment D of Manual M-14A
- Required
 - Deposit based on MW size
- Completion
 - 6 Months (estimated)
- Study By
 - TO (or Contractor under direction of TO)
 - Affected System study
- Potential for Impact Study re-tool analysis
- Additional studies as required by type of technology being connected
- Facility Study Report
 - Conceptual Design (Detailed Design as appropriate) for:
 - Attachment Facilities
 - Network Upgrades
 - Cost Estimates
 - Preliminary Engineering and Construction Schedule

- Interconnection Customer may reduce the MFO or CIRs in a project at any time:
 - Up to 60% of electrical output prior to the start of the Feasibility Study
 - Up to 15% after the Feasibility Study starts and prior to executing the SISA
 - Up to the greater of 10 MW or 5% after the execution of the SISA and prior to the execution of the ISA or WMPA
 - Any change greater than the limits specified above, and deemed to be a material modification, results in the project sliding to the next queue (6 month delay on all studies)
- Project may never increase the MFO or CIR without an additional new service request
- Any other changes (ex: equipment change) must be evaluated whether it is a Material Modification
 - Material Modification is a change that has a material adverse impact/effect to any later subsequently queued project in relation to scope, cost, or time
 - Changes that result in a Material Modification will not be accepted by PJM for current queue position held.
- Changes to POI or increases to output are considered material. Project must be withdrawn and a new Interconnection Request submitted for the modification. (Tariff Section 36.2A.3)



Service Agreement Execution

- Based on FERC jurisdictional determination
- **Interconnection Services Agreement (ISA)** used for any generator interconnection or merchant transmission interconnection project connecting to a FERC jurisdictional facility.
- **Wholesale Market Participant Agreement (WMPA)** used for any generation project connecting to a state-jurisdictional facility. Requires additional two-party Interconnection Agreement between Developer and TO as part of entering the state queue process.
- **Interconnection Construction Service Agreement (CSA)** identifies terms, conditions, and coordinates construction activities for Attachment Facilities and Network Upgrades.
- **Upgrade Construction Service Agreement (UCSA)** used for Upgrade Service Requests and upgrades required for Transmission Service Requests.

New Service Request

Studies

Feas

Imp

Fac

Agreements

Implementation

Commercial Operation

Agreements

FERC Jurisdictional Facilities

- Any facility that is part of the Transmission System
- Any distribution facility where there has been a prior wholesale sale
- Any facility that self certified to FERC as a Qualified Facility.

- **Interconnection Service Agreement**

- Grants rights to interconnect and inject and/or withdraw power
- Defines project milestones
- Describes the project's point of interconnection
- Describes system upgrades and costs
- Outlines metering requirements
- Security requirement
- Insurance Obligations
- Persists after construction

- **Construction Service Agreement**

- Outlines construction responsibility
- Contains upgrade construction schedule
- Contains notification and insurance obligations
- Terminates after construction

- **Wholesale Market Participant Agreement** *(Strictly for Generators)*
 - Connects to distribution line
 - No prior wholesale sales
 - Requires customer to pursue a two party Interconnection Agreement with TO
 - Grants rights to participate in PJM's market
 - Persists after construction



ISA/CSA Implementation

- Construction Milestone Tracking
 - Generation Facilities
 - Attachment Facilities
 - Network Upgrades
- Billing Approval / Cost Tracking
- Coordination of
 - EMS modeling
 - Metering & telemetry
- Outage Coordination
- Coordination of Test Energy Injection (*no way for non-controllable AC Merchant Transmission radial line to test the rights*)

Customer Types

Generator Interconnection Customer

Tariff Application

N

Studies Performed

Feasibility System Impact Facilities

Analysis Performed

Summer Peak Load Flow Summer Peak & Light Load Flow Eng. Level scope & cost
Short Ckt Network Upgrades
Short Ckt Stability Interconnection work
Affected Systems

Agreement

ISA
ICSA
WMPA
-

Potential Rights

CIRs
Energy Rights
ICTRs
-
-
-

Rights for Generation Facilities
Additional Rights with Network Upgrades
Rights for Transmission Facilities

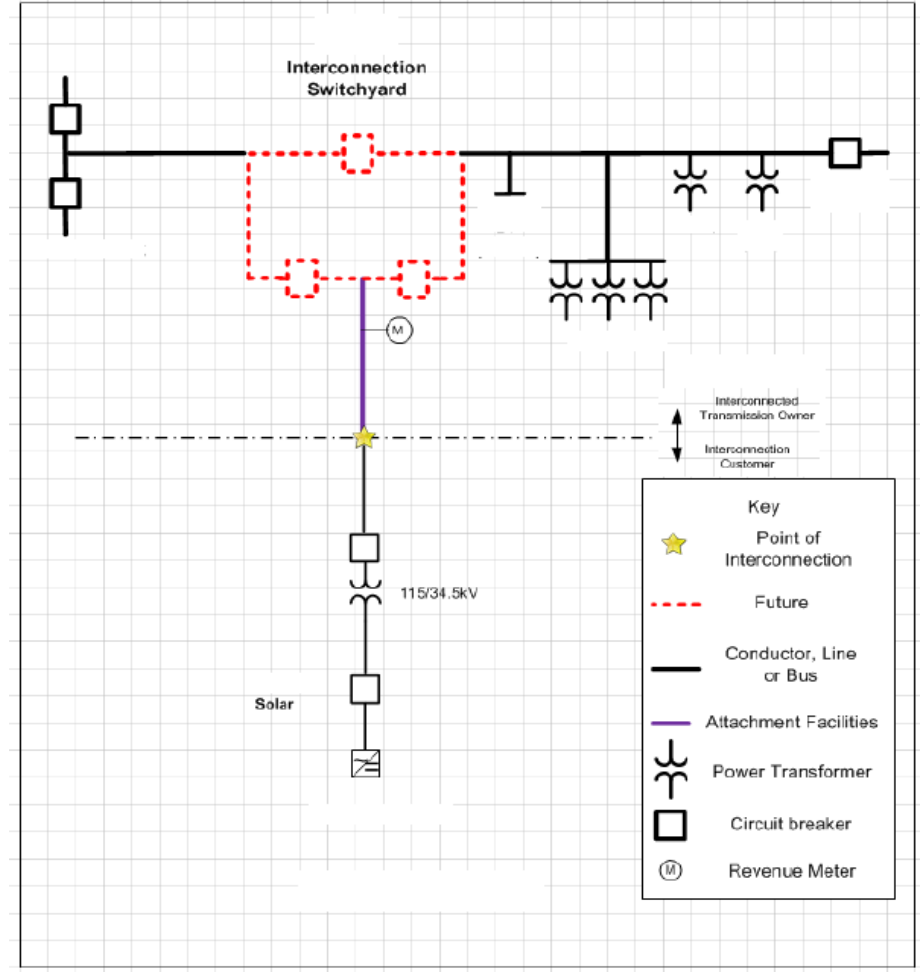
ICTR Incremental Capacity Transfer Rights
IARR Incremental Auction Revenue Rights
IDR Incremental Deliverability Rights
IATCR Incremental Available Transfer Capability Revenue Rights

FTIR Capacity Transmission Injection Rights
FTWR Firm Transmission Withdrawal Rights
NFTIR Energy Transmission Injection Rights
NFTWR Non-Firm Transmission Withdrawal Rights

Generation Interconnection Customer (Att N)

New Services Customer:
Generator Customer

Request: Interconnect generation into existing transmission system.



Customer Types

Tariff Application

Studies Performed

Analysis Performed

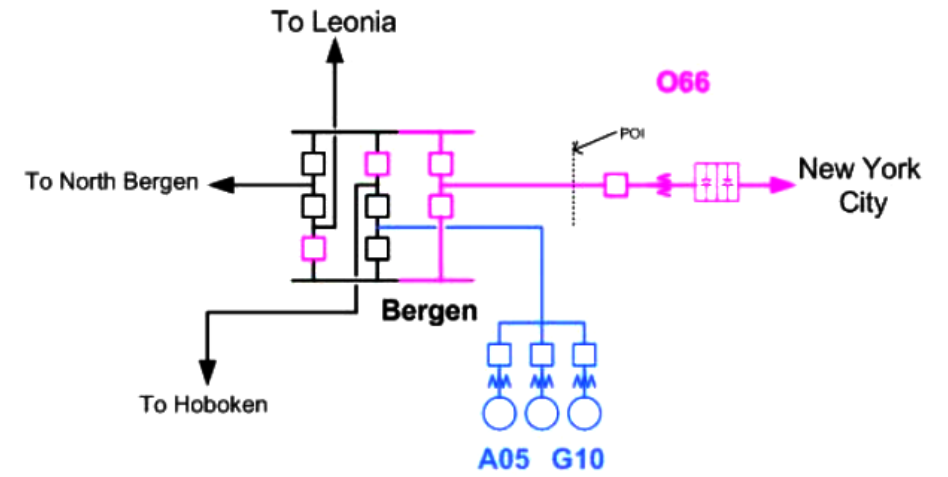
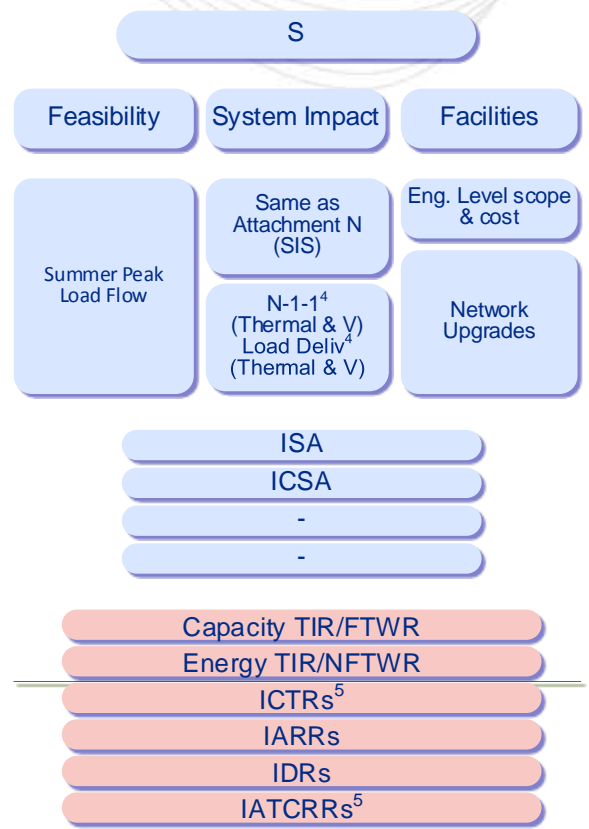
Agreement

Potential Rights

Merchant Transmission Customer (Att S):

New Services Customer: Merchant Transmission Customer
 Request: Merchant transmission customer to build and own HVDC line, Controllable AC facility, Non-Controllable AC facility.

Merchant Transmission (MTX) Customer



Rights for Generation Facilities	ICTR	Incremental Capacity Transfer Rights	FTIR	Capacity Transmission Injection Rights
Additional Rights with Network Upgrades	IARR	Incremental Auction Revenue Rights	FTWR	Firm Transmission Withdrawal Rights
Rights for Transmission Facilities	IDR	Incremental Deliverability Rights	NFTIR	Energy Transmission Injection Rights
	IATCR	Incremental Available Transfer Capability Revenue Rights	NFTWR	Non-Firm Transmission Withdrawal Rights

1 Customer Selects 3 LDAs for PJM to evaluate how CETL is improved into those LDAs with the proposed upgrade.
 2 Customer requests three (3) Source/Sink and MW. Markets determines what facilities need upgrades to get the requested MW from source to sink on top of existing base network. PJM models required network upgrades and works with TO for scope/cost.

3 For Injection and Withdrawal Rights.
 4 For Firm Withdrawal Rights.
 5 Not applicable if one terminus is outside PJM and the other is within PJM
 6 Other rights for facilities that the customer upgraded.

Customer Types

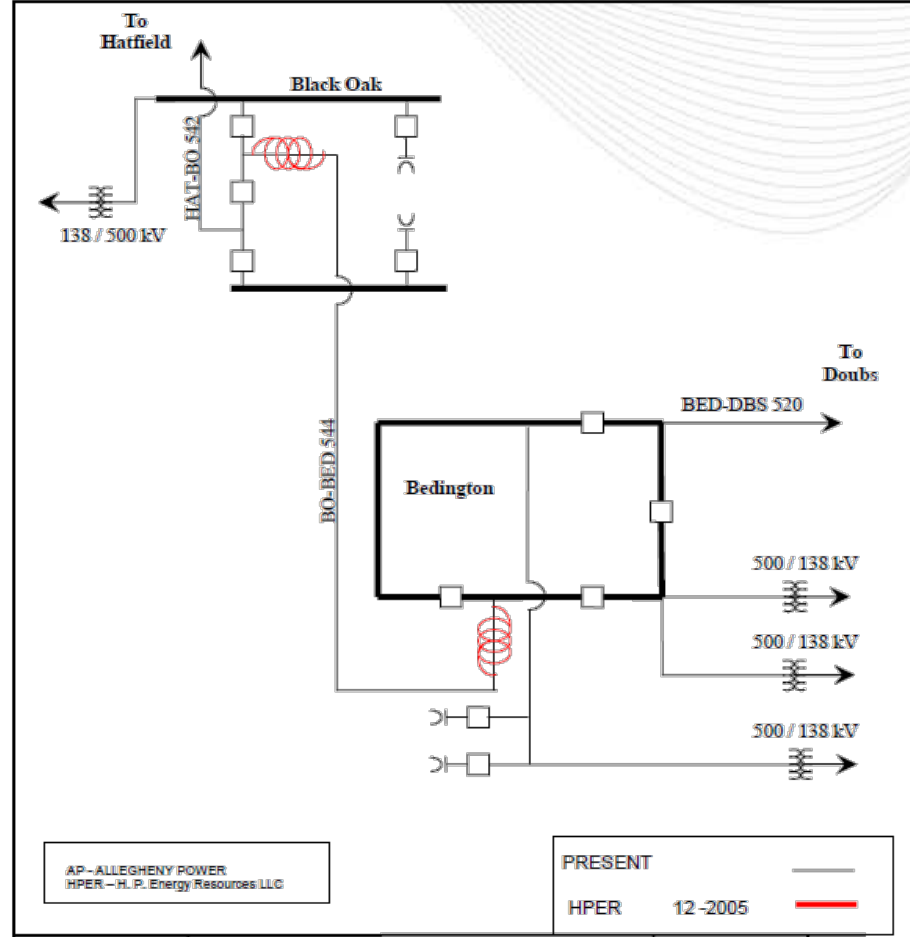
Tariff Application

Studies Performed

Analysis Performed

Agreement

Potential Rights



Upgrade Customer

Merchant Network Upgrade Customer or Advance Baseline for MVA Increase¹

EE

System Impact	Facilities
Summer Peak Load Flow Upgrade Scope and Cost	Eng. Level scope & cost
	Network Upgrades
-	-
-	-
-	-
UCSA	
-	
-	
ICTRs	
IARRs	
IDRs	
IATCRs	

Upgrade Customer (Att EE):

New Services
 Customer: Upgrade Customer
 Request: Upgrade customer to increase the rating of the transmission facility by a certain MVA.

Rights for Generation Facilities	ICTR	Incremental Capacity Transfer Rights	FTIR	Capacity Transmission Injection Rights
Additional Rights with Network Upgrades	IARR	Incremental Auction Revenue Rights	FTWR	Firm Transmission Withdrawal Rights
Rights for Transmission Facilities	IDR	Incremental Deliverability Rights	NFTIR	Energy Transmission Injection Rights
	IATCR	Incremental Available Transfer Capability Revenue Rights	NFTWR	Non-Firm Transmission Withdrawal Rights

¹ Customer Selects 3 LDAs for PJM to evaluate how CETL is improved into those LDAs with the proposed upgrade.
² Customer requests three (3) Source/Sink and MW. Markets determines what facilities need upgrades to get the requested MW from source to sink on top of existing base network. PJM models required network upgrades and works with TO for scope/cost.

³ For Injection and Withdrawal Rights.
⁴ For Firm Withdrawal Rights.
⁵ Not applicable if one terminus is outside PJM and the other is within PJM
⁶ Other rights for facilities that the customer upgraded.

Customer Types

Tariff Application

Studies Performed

Analysis Performed

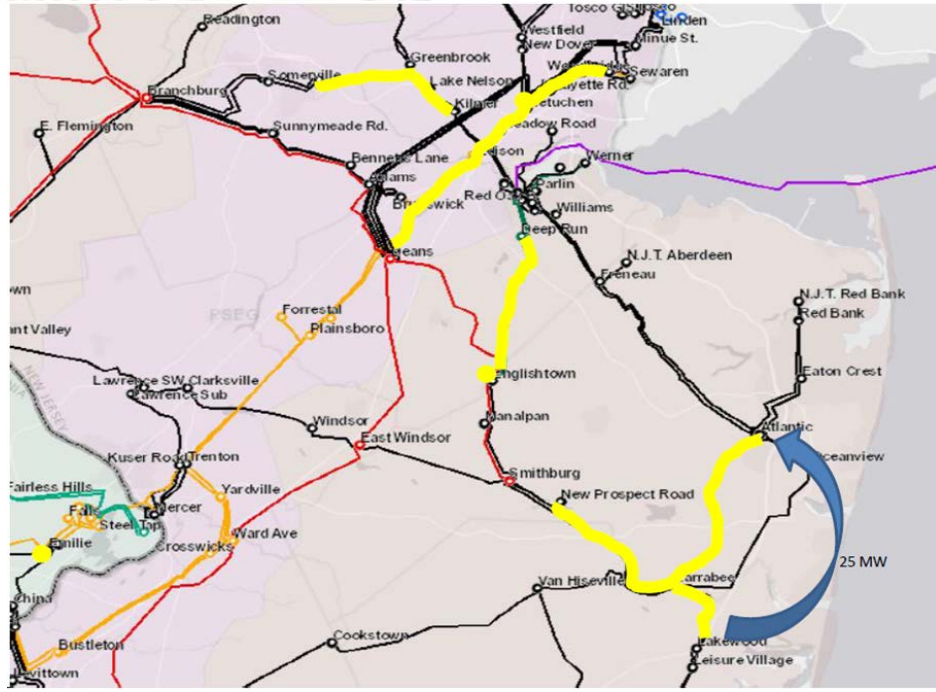
Agreement

Potential Rights

IARR Customer (Att EE):

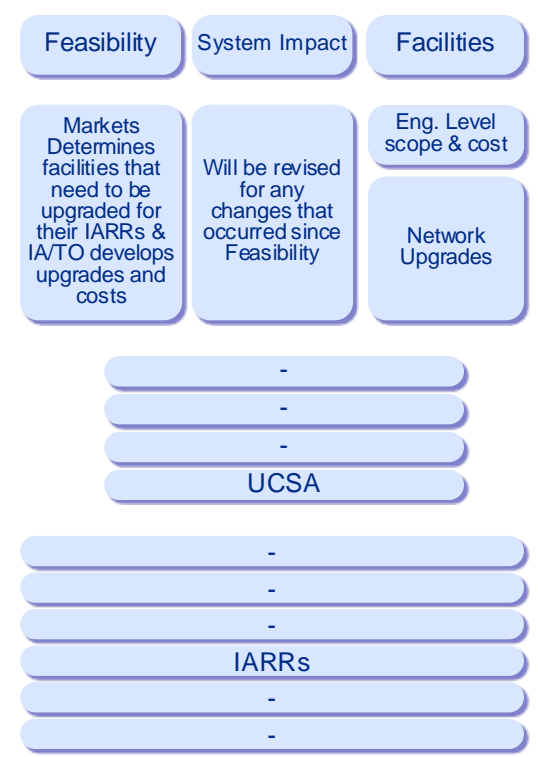
New Services Customer:
IARR Customer

Request: IARR customer to request certain IARRs from Generation (Source) to load (Sink) area.



Upgrade Customer

Customer Request for IARRs²



Rights for Generation Facilities	ICTR	Incremental Capacity Transfer Rights	FTIR	Capacity Transmission Injection Rights
Additional Rights with Network Upgrades	IARR	Incremental Auction Revenue Rights	FTWR	Firm Transmission Withdrawal Rights
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 6 Other rights for facilities that the customer upgraded.

Customer Types	Generator Interconnection Customer			Merchant Transmission (MTX) Customer			Upgrade Customer					
Tariff Application	N			S			EE			EE		
Studies Performed	Feasibility	System Impact	Facilities	Feasibility	System Impact	Facilities	System Impact	Facilities	Feasibility	System Impact	Facilities	
Analysis Performed	Summer Peak Load Flow	Summer Peak & Light Load Flow Short Ckt	Eng. Level scope & cost Network Upgrades	Summer Peak Load Flow	Same as Attachment N (SIS) N-1-1 ⁴ (Thermal & V) Load Deliv ⁴ (Thermal & V)	Eng. Level scope & cost Network Upgrades	Summer Peak Load Flow Upgrade Scope and Cost	Eng. Level scope & cost Network Upgrades	Markets Determines facilities that need to be upgraded for their IARRs & IA/TO develops upgrades and costs	Will be revised for any changes that occurred since Feasibility	Eng. Level scope & cost Network Upgrades	
Agreement	ISA ICSA WMPA -			ISA ICSA - -			- - - UCSA			- - - UCSA		
Potential Rights	CIRs Energy Rights ICTRs - - -			Capacity TIR/FTWR Energy TIR/NFTWR ICTRs ⁵ IARRs IDRs IATCRRs ⁵			- - ICTRs IARRs IDRs IATCRRs			- - - IARRs - -		
	Rights for Generation Facilities			ICTR	Incremental Capacity Transfer Rights			FTIR	Capacity Transmission Injection Rights			
	Additional Rights with Network Upgrades			IARR	Incremental Auction Revenue Rights			FTWR	Firm Transmission Withdrawal Rights			
	Rights for Transmission Facilities			IDR	Incremental Deliverability Rights			NFTIR	Energy Transmission Injection Rights			
				IATCR	Incremental Available Transfer Capability Revenue Rights			NFTWR	Non-Firm Transmission Withdrawal Rights			

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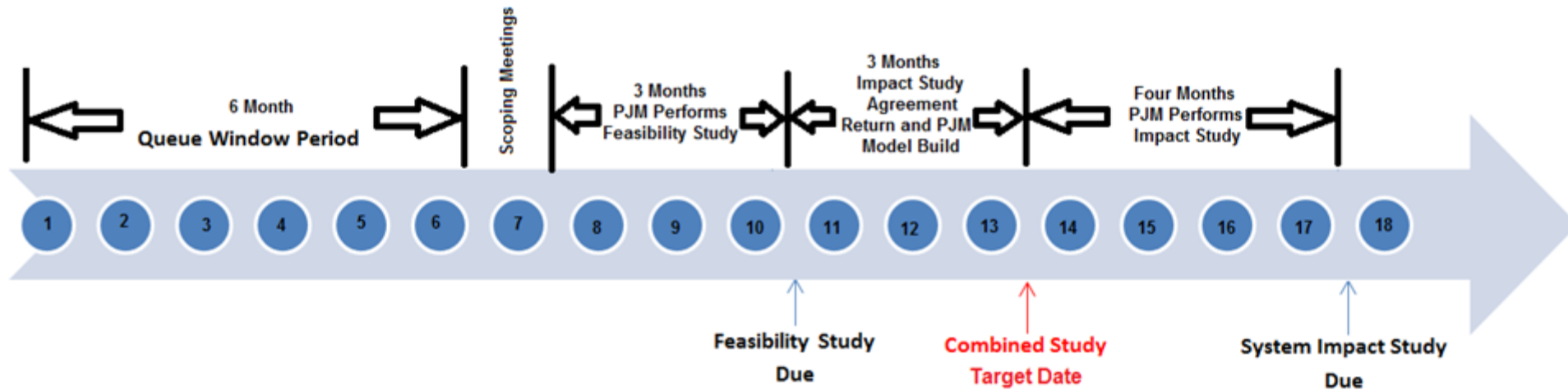
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 4 For Firm Withdrawal Rights.
 5 Not applicable if one terminus is outside PJM and the other is within PJM
 6 Other rights for facilities that the customer upgraded.

Appendix

- ✓ Small Projects (≤ 20 MW)
- ✓ If Customer requests acceleration
- ✓ Are not permitted when the project:
 - causes or contributes to a system constraint; or
 - requires stability analysis, light load analysis; or
 - requests secondary Point of Interconnection be studied.
- ✓ Perform AC analysis for combined study.
- ✓ Issue report and associated agreement by a target date of 3 months after the Feasibility after Study Tariff due date.



- ❖ Small Generator 20 MW or Less
- ❖ Only possible if no network upgrades needed, no stability analysis required and no light load analysis needed.
- ❖ Target delivery 3 months after Tariff Feasibility Study due date



New Services Queue Application Fee Structure

Feasibility Study Application Deposit Fee Structure

Table 5.1.2-1: Large New Services Request Process deposit requirements

Month of New Services Queue	Deposit Requirement		Portion held as non-refundable	Maximum deposit
	fixed deposit	Per MW portion of deposit		
1 st - 4 th	\$10,000	\$100	10%	\$110,000
5 th	\$20,000	\$150	10%	\$120,000
6 th	\$30,000	\$200	10%	\$130,000

Note:

The per MW value is the maximum of the Capacity or Maximum Facility Output requested.

*10% of deposit is non-refundable

Table 5.1.2-2: Large New Services Request Process expected costs

Transmission Owner Zone	Expected Costs
AEP	26K
BGE	15K
ComEd	15K
Dayton	13K
Dominion	12K
Duquesne	19K
FirstEnergy	23K
AEC/DPL/Pepco	12K
PPL	20K
PSEG	17K

Queue Month	Deposit Calculation*	Max Deposit
1-4	\$10,000 + \$100 per MW	\$110,000
5	\$20,000 + \$150 per MW	\$120,000
6	\$30,000 + \$200 per MW	\$130,000

*10% of deposit is non-refundable

Flat Deposit

\$50,000

*Merchant Network Upgrade Skips Feasibility and goes right to System Impact

**IARR Request requires both Feasibility and System Impact Study

System Impact Study Application Deposit Fee Structure

Table 5.2.1-1: System Impact Study costs

Project size	Required deposit		Portion of deposit that is non-refundable	Maximum deposit
	Fixed portion	Per MW Portion		
>20MW	None	\$500/MW	10%	\$300,000
>2MW and ≤20MW	\$10,000	None	10%	\$10,000
≤2MW	\$5000	None	10%	\$5,000

*10% of deposit is non-refundable

Table 5.2.1-2 System Impact Study PJM Expected Costs

TO Zone	Expected Cost (\$) Requests > 20 MW	Expected Cost (\$) Requests ≤ 20 MW
AEP	46K	16K
BGE	50K	Bounded
ComEd	99K	32K
Dayton	25K	Bounded
DL	23K	Bounded
Dominion	26K	15K
FE	42K	16K
PECO	17K	Bounded
PHI	28K	15K
PPL	31K	Bounded
PSEG	38K	Bounded

Project Type	Flat Deposit
Merchant Upgrade*	\$50,000
IARR Request**	\$20,000

*Merchant Network Upgrade Skips Feasibility and goes right to System Impact

**IARR Request requires both Feasibility and System Impact Study

Facilities Study Application Deposit Fee Structure

Table 5.3.3-1: Facilities Study costs

Project size	Required deposit
>20MW	The greater of: \$100,000 OR estimated amount of Facilities Study cost for the first three months
>2MW and ≤20MW	\$50,000
≤2MW	\$15,000

Relevant Tariff Sections

231.1 Right of New Service Customer to Incremental Auction Revenue Rights:

A New Service Customer that (a) pursuant to Section 212.1, reimburses the Transmission Provider for the costs of, or (b) pursuant to its Construction Service Agreement undertakes responsibility for, constructing or completing Network Upgrades and/or Local Upgrades required to accommodate its New Service Request shall be entitled to receive the Incremental Auction Revenue Rights associated with such facilities and upgrades as determined in accordance with this Section 231. In addition, an Interconnection Customer that executes an Upgrade Construction Service Agreement for Merchant Network Upgrades shall be entitled to receive the Incremental Auction Revenue Rights as determined in accordance with this Section 231. However, a Transmission Interconnection Customer that interconnects Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities with the Transmission System shall be entitled to Incremental Auction Revenue Rights associated with such Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities only if the Interconnection Customer has elected, pursuant to Section 36.1.03 of Part IV of the Tariff, to receive Incremental Auction Revenue Rights, Incremental Deliverability Rights, Incremental Capacity Transfer Rights, and Incremental Available Transfer Capability Revenue Rights in lieu of Transmission Injection Rights and/or Transmission Withdrawal Rights.

232.1 Purpose:

Transmission Injection Rights shall entitle the holder, as provided in this Section 232, to schedule energy transmitted on the associated Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities for injection into the Transmission System at a Point of Interconnection of the Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities with the Transmission System. Transmission Withdrawal Rights shall entitle the holder, as provided in this Section 232, to schedule for transmission on the associated Merchant Transmission Facilities energy to be withdrawn from the Transmission System at a Point of Interconnection of the Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities with the Transmission System.

233.1 Right of Transmission Interconnection Customer to Incremental Available Transfer Capability Revenue Rights:

An Interconnection Customer that interconnects a Customer Facility with the Transmission System shall be entitled to receive any Incremental Available Transfer Capability Revenue Rights that are associated with the interconnection of such facility as determined in accordance with this section. In addition, a New Service Customer that (a) reimburses the Transmission Provider for the costs of, or (b) pursuant to its Construction Service Agreement undertakes responsibility for, constructing or completing required Customer-Funded Upgrades to accommodate its New Service Request shall be entitled to receive any Incremental Available Transfer Capability Revenue Rights associated with such required facilities and upgrades as determined in accordance with this section.

233.1.1 Certain Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities:

An Interconnection Customer (a) that interconnects Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities with the Transmission System, one terminus of which is located outside the PJM Region and the other terminus of which is located within the PJM Region, and (b) that will be a Merchant Transmission Provider, shall not receive any Incremental Available Transfer Capability Revenue Rights with respect to its Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities. Transmission Provider shall not include available transfer capability at the interface(s) associated with such Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities in its calculations of Available Transfer Capability under Attachment C to the Tariff.

234.1 Right of New Service Customers to Incremental Capacity Transfer Rights:

A Transmission Interconnection Customer that interconnects Merchant Transmission Facilities with the Transmission System shall be entitled to receive any Incremental Capacity Transfer Rights that are associated with the interconnection of such Merchant Transmission Facilities as determined in accordance with this section. In addition, a New Service Customer that (a) reimburses the Transmission Provider for the costs of, or (b) pursuant to its Construction Service Agreement, undertakes responsibility for, constructing or completing Customer-Funded Upgrades shall be entitled to receive any Incremental Capacity Transfer Rights associated with such required facilities and upgrades as determined in accordance with this section.

234.1.1 Certain Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities:

An Interconnection Customer (a) that interconnects Merchant D.C. transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities with the Transmission System, one terminus of which is located outside the PJM Region and the other terminus of which is located within the PJM Region, and (b) that will be a Merchant Transmission Provider, shall not receive any Incremental Capacity Transfer Rights with respect to its Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities. Transmission Provider shall not include available transfer capability at the interface(s) associated with such Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities in its calculations of Available Transfer Capability under Attachment C to the Tariff.

235.1 Right of Transmission Interconnection Customer to Incremental Deliverability Rights:

A Transmission Interconnection Customer shall be entitled to receive the Incremental Deliverability Rights associated with its Merchant Transmission Facilities as determined in accordance with this section, provided, however, that a Transmission Interconnection Customer that proposes to interconnect Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities that connect the Transmission System with another control area shall be entitled to Incremental Deliverability Rights associated with such Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities only if the Interconnection Customer has elected, pursuant to Section 36.1.03 of the Tariff, to receive Incremental Deliverability Rights, Incremental Auction Revenue Rights, Incremental Capacity Transfer Rights, and Incremental Available Transfer Capability Revenue Rights in lieu of Transmission Injection Rights and/or Transmission Withdrawal Rights.

Customer-Funded Project Incremental Capacity Transfer Rights (ICTRs)



234.1 Right of New Service Customers to Incremental Capacity Transfer Rights:

A Transmission Interconnection Customer that interconnects Merchant Transmission Facilities with the Transmission System shall be entitled to receive any Incremental Capacity Transfer Rights that are associated with the interconnection of such Merchant Transmission Facilities as determined in accordance with this section. In addition, a New Service Customer that (a) reimburses the Transmission Provider for the costs of, or (b) pursuant to its Construction Service Agreement, undertakes responsibility for, constructing or completing Customer-Funded Upgrades shall be entitled to receive any Incremental Capacity Transfer Rights associated with such required facilities and upgrades as determined in accordance with this section.

234.1.1 Certain Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities:

An Interconnection Customer (a) that interconnects Merchant D.C. transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities with the Transmission System, one terminus of which is located outside the PJM Region and the other terminus of which is located within the PJM Region, and (b) that will be a Merchant Transmission Provider, shall not receive any Incremental Capacity Transfer Rights with respect to its Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities. Transmission Provider shall not include available transfer capability at the interface(s) associated with such Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities in its calculations of Available Transfer Capability under Attachment C to the Tariff.

Incremental Capacity Transfer Rights ...

PJM Tariff: Section 234;
Attachment DD, Sec. 5.15,
5.16;
Manual 14E-Attachment F

are allocated in MWs to a New Service Customer obligated to fund a transmission facility or upgrade through a rate or charge specific to such facility or upgrade, to the extent such upgrade or facility increases import capability into an LDA.

Participants must provide PJM with advance notification of their intent to request Incremental CTRs by the date posted on RPM Schedule of Activities. Incremental CTRs will be certified by PJM at least 45 days prior to BRA.

- Customer-Funded Incremental CTRs are effective for thirty years or the life of the facility or upgrade, whichever is less.
- However, if a customer funds advancement of a network transmission upgrade, the customer will receive Incremental CTRs for the years the upgrade is advanced based on the incremental CETL into a constrained LDA as certified by PJM.
- Total ICTRs awarded may not exceed CTRs calculated for such LDA
- Economic value of ICTRs in an RPM Auction are based on the LDA Locational Price Adders

- **LDA UCAP Obligation:**
 - Total RTO Obligation is allocated to zones pro rata based on zonal peak load.
 - LDA UCAP obligation is the obligations of one or more zones contained in the LDA.
- **Total CTRs:** Are basically Capacity Imported into a constrained LDA
 - Total CTRs = LDA UCAP Obligation - resources (UCAP) cleared in LDA.
- **QTU (Qualified Transmission Upgrade)**
 - A QTU is a proposed project that if constructed would produce ICTRs.
 - A QTU allows to determine in the BRA if the proposed project will provide a revenue stream prior to committing to construct the upgrade.
 - Once constructed and placed into service, the QTU will be awarded ICTRs.
- **CTRs available for LSEs**
 - $\text{CTRs Available} = \text{Total CTRs} - \text{QTU MW} - \text{Total Customer-Funded ICTRs} - \text{RTEP ICTRs}$.
- **ICTRs Adjustments**
 - ICTRs may be adjusted down if Total Customer-Funded ICTRs limited by CTR Available.

- **LDA with positive average weighted Locational Price Adder**
 - For LDAs in which the RPM Auctions for such Delivery Year result in a positive average weighted Locational Price Adder with respect to the immediate higher level LDA, the holder of Participant-Funded ICTRs into such LDA receives a payment equal to (i) average weighted Locational Price Adder for the LDA into which the associated facility or upgrade increased import capability, multiplied by (ii) MW amount of ICTRs allocated to holder.
- **LDA with zero or negative average weighted Locational Price Adder**
 - No payment will be made when the LDA has a zero or negative average weighted Locational Price Adder with respect to the immediate higher level LDA.
- **ICTRs MW Adjustments if limited CTRs**
 - Under conditions when the internal resources cleared in the LDA are high, the total amount of Capacity Transfer Rights (CTRs) is limited and the ICTRs will be adjusted so that the sum of various ICTR amounts do not to exceed the total amount of CTRs.



Examples: Customer-Funded ICTR Credits in Recent Auctions

- **2018/2019:**
 - MAAC ICTRs of 892 MW were adjusted down to 184 MW due to insufficient CTRs. Weighted Locational Price Adder was zero so there were no ICTR credits.
 - DPLSOUTH had ICTRs but no CTRs.
- **2019/2020:**
 - MAAC ICTRs of 892 MW were adjusted down to 292 MW due to insufficient CTRs. Weighted Locational Price Adder was zero so there were no ICTR credits.
 - BGE ICTRs of 65.7 MW were adjusted down to zero as Weighted Locational Price Adder was negative so there were no ICTR credits.
- **2020/2021-1st IA (not final):**
 - MAAC ICTRs of 1557 MW were adjusted down to zero due to no CTRs.
 - EMAAC ICTRs Credits: $\$1,481,310 = 40 \text{ MW ICTRs} * \$101.46 \text{ Weight. Loc. Price Adder} * 365$
 - DEOK ICTRs Credits: $\$3,004,911 = 155 \text{ MW ICTRs} * \$53.11 \text{ Weight. Loc. Price Adder} * 365$



2021/2022 BRA: Customer-Funded ICTR Credits [\$/year]			
LDA	ICTRs, MW	Locational Price Adder, \$/MW-day	Customer-Funded ICTR Credits [\$/year]
EMAAC	40.0	\$25.73	\$375,658
PS	41.0	\$38.56	\$577,050
BGE	65.7	\$60.30	\$1,446,024
COMED	1097.0	\$55.55	\$22,242,498
			\$24,641,230

Customer-Funded Project Incremental Auction Revenue Rights (IAARs)



231.1 Right of New Service Customer to Incremental Auction Revenue Rights:

A New Service Customer that (a) pursuant to Section 212.1, reimburses the Transmission Provider for the costs of, or (b) pursuant to its Construction Service Agreement undertakes responsibility for, constructing or completing Network Upgrades and/or Local Upgrades required to accommodate its New Service Request shall be entitled to receive the Incremental Auction Revenue Rights associated with such facilities and upgrades as determined in accordance with this Section 231. In addition, an Interconnection Customer that executes an Upgrade Construction Service Agreement for Merchant Network Upgrades shall be entitled to receive the Incremental Auction Revenue Rights as determined in accordance with this Section 231. However, a Transmission Interconnection Customer that interconnects Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities with the Transmission System shall be entitled to Incremental Auction Revenue Rights associated with such Merchant D.C. Transmission Facilities and/or Controllable A.C. Merchant Transmission Facilities only if the Interconnection Customer has elected, pursuant to Section 36.1.03 of Part IV of the Tariff, to receive Incremental Auction Revenue Rights, Incremental Deliverability Rights, Incremental Capacity Transfer Rights, and Incremental Available Transfer Capability Revenue Rights in lieu of Transmission Injection Rights and/or Transmission Withdrawal Rights.

- The Customer Funded (Elective Upgrade Auction Revenue Rights) made through Attachment EE in the PJM Tariff, permits any party to request and obtain IARRs by agreeing to fund upgrades necessary to support the requested rights (Defined in Section 7.8 of Schedule 1 of the Operating Agreement and Tariff).
- Requests will specify a source, sink, and MW amount.
- PJM will assess the simultaneous feasibility of the requested IARRs against the Incremental ARR Model capability and 10-year Stage 1A ARR Model.

- Holders of IARR may retain allocated ARR, and receive associated allocations of revenues from the Annual FTR Auction
 - The economic value of each IARR is based on the MW amount and on the Locational Price differences between the source and sink node for FTR Obligations resulting from the Annual FTR Auction. The economic value of an Auction Revenue Right can either be positive (a benefit) or negative (a liability).
 - The settlements for Auction Revenue Rights will be based on the clearing prices from each round of the Annual FTR Auction.

$$ARR \text{ Target Allocation} = (ARR \text{ MW} / \# \text{ of rounds}) * (LMP_{Sink} - LMP_{Source})$$

- IARR holders may also utilize the revenues from allocated ARRs to purchase FTRs by “self-scheduling” an ARR into an FTR in the first round of the Annual FTR Auction.
 - When “self-scheduled”, an FTR must have the same path as the associated ARR.
 - Stream of revenues (or charges) are based on the hourly Day Ahead congestion price differences across the path.
- Additionally, holders of IARRs may bid into the Annual FTR Auction to acquire an FTR on an alternative path or for an alternative product.

- May 1, 2019 – initial posting
- May 2, 2019 – Minor edits to descriptions on Slides 8-15