Interconnecting Renewables to the Grid

SWANA

New Jersey Chapter

2011 Annual Spring Conference

April 11, 2011

Who we are

PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia.

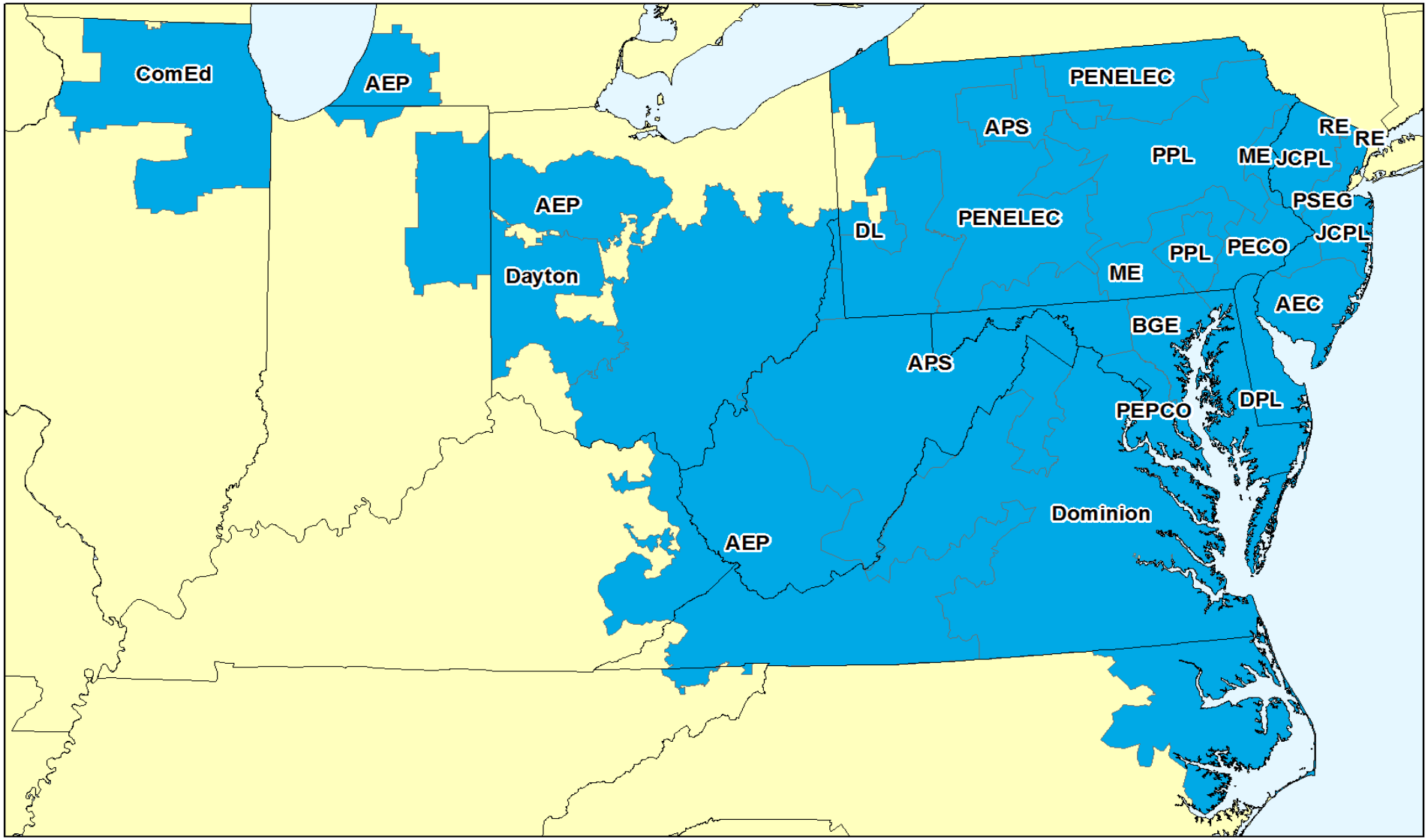
What we do

Operations
Monitor the high-voltage transmission grid 24 hours a day, seven days a week.

Markets
Coordinate the continuous buying, selling and delivery of wholesale electricity.

Planning
Manage a regional planning process for generation and transmission expansion to ensure the continued reliability of the electric system.

PJM Footprint

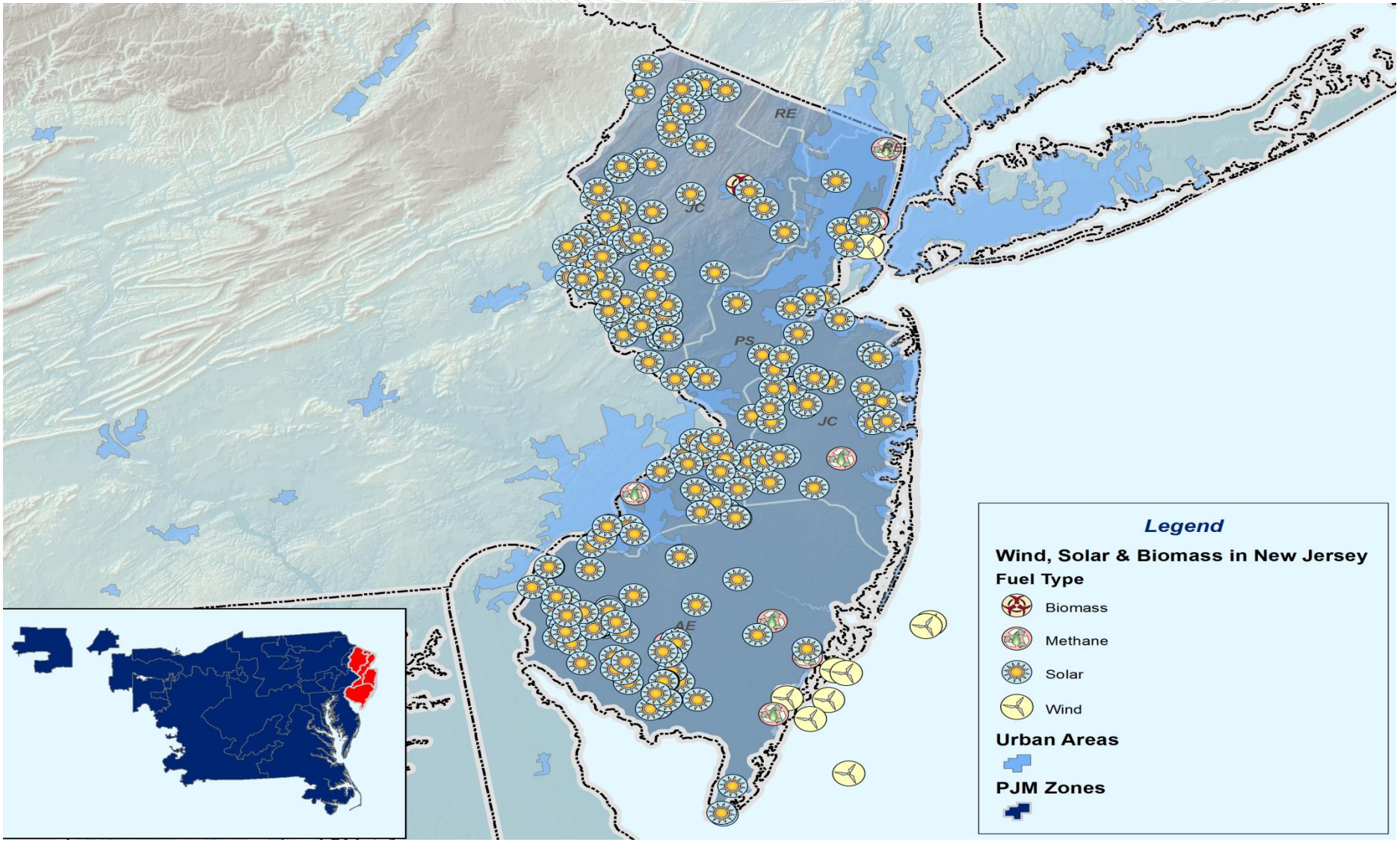


Active Renewable Projects in the PJM Queue

(solar, wind, landfill gas or biomass)

- 258 solar projects totaling 3,247 MWs
- 256 wind projects totaling 41,869 MWs
- 102 landfill gas/biomass projects totaling 1,463 MWs

- PJM peak demand is 144,644 MWs


RE
JC
PS
JC
AE
Legend
Wind, Solar & Biomass in New Jersey
Fuel Type
Biomass
Methane
Solar
Wind
Urban Areas
PJM Zones

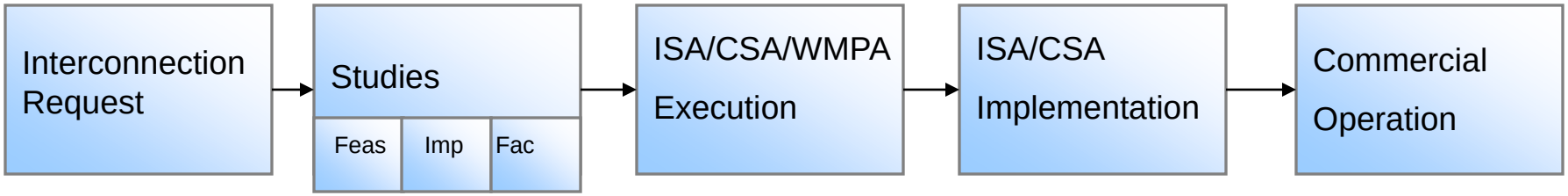
- Queues are “open” for a 3 month period
  - Generation, Merchant Transmission, and Long-Term Firm Transmission requests are accepted during this time

- Developers enter the queue to request interconnection of their project to the grid and to participate in PJM Markets
  - Request is assigned to a PJM PM based on project location
  - Kick off call is held between PJM/TO/Developer
  - Developer chooses the interconnection point

- Analysis performed by PJM then provided to the Transmission Owner (TO) for review and concurrence

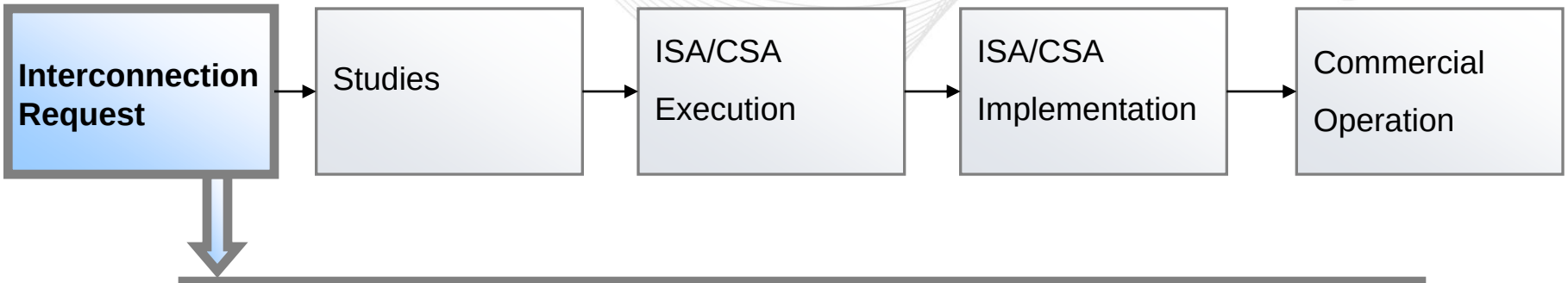
- Study Reports along with Agreements are provided to Developer
- Injection Rights are Awarded to a Project Based on Satisfactory Completion of Milestones and Requirements contained in Interconnection Agreements
- Costs for Required Transmission Upgrades and Attachment Facility work are the responsibility of the Developer(s)

Interconnection Request Process



- **Projects may drop out of the queue at any time**
- **Project size may be reduced but not increased**

Interconnection Request Process



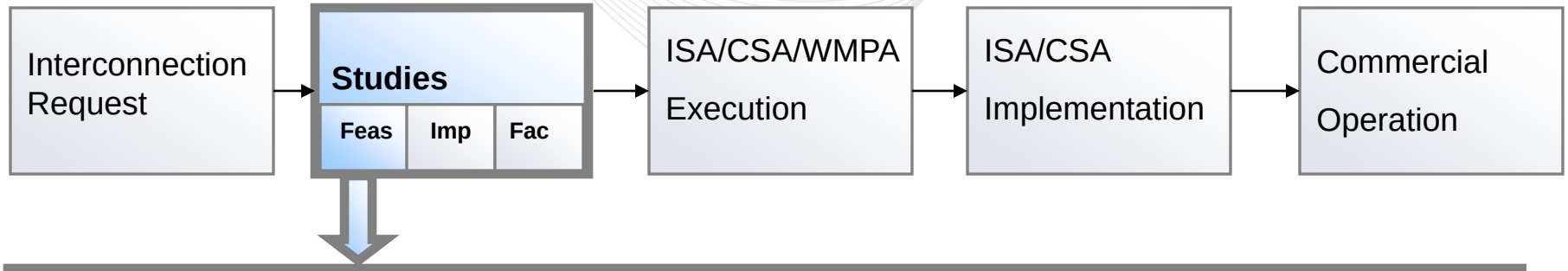
Tariff Attachments

- "N" – for Generation Projects > 2MWs or Requesting Capacity
- "Y" – for Generation Projects < 2MWs Requesting Energy Only

Required Information

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

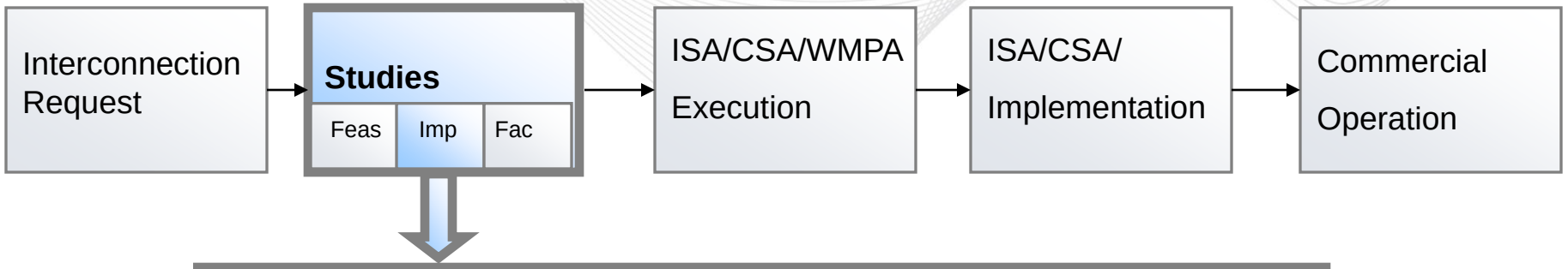
Interconnection Request Process



Feasibility Study

- Required
  - Deposit based on request receipt timing and MW size
  - Site control
  - In-service date within 7 years of entering queue
- Study Completion
  - Within 90 Days after close of queue
- Study By
  - PJM and TO
- Results
  - Identify Transmission Overloads and Required Upgrades
  - Attachment Facilities Needed for Interconnection
  - Costs and Construction Schedule Estimates

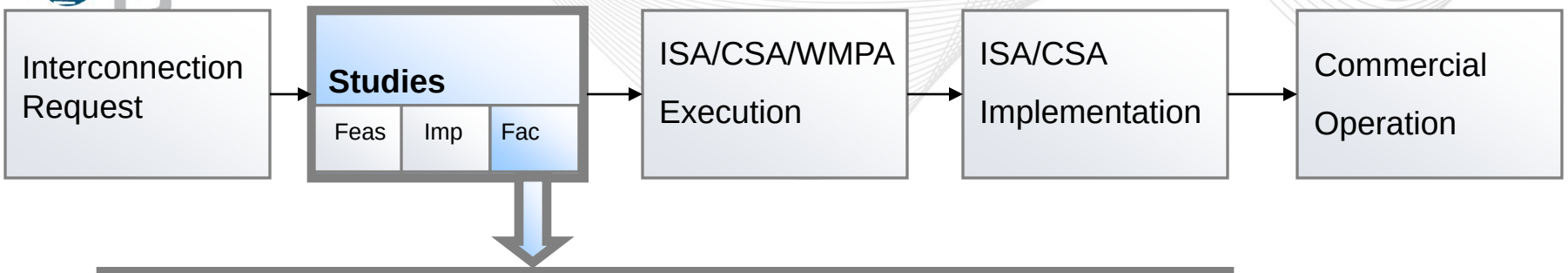
Interconnection Request Process



Impact Study

- Required
  - Deposit based on MWs
  - Initial Air Permit Application (N/A for solar/wind projects)
- Study Completion
  - 120 days after execution of Impact Study Agreement
- Study By
  - TO and PJM
- Results
  - Gen & Load Deliverability Analysis
  - Stability Analysis
  - Short Circuit Analysis
  - Cost Estimates and Allocations

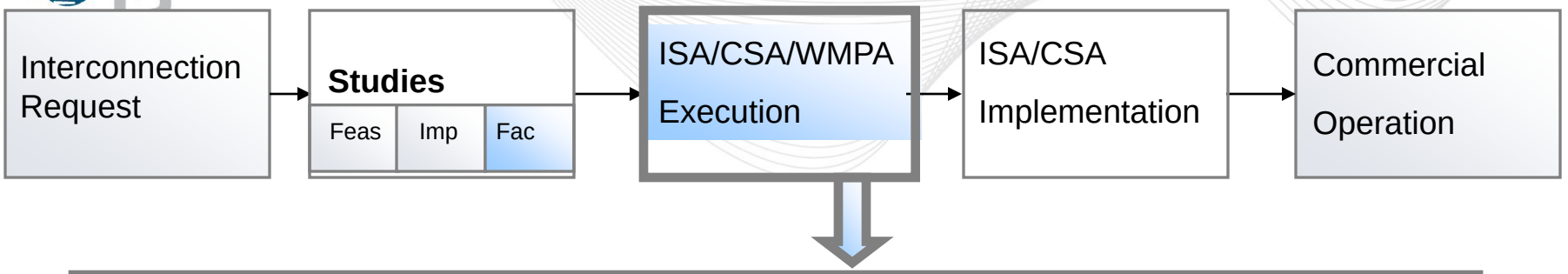
Interconnection Request Process



Facilities Study (Initial Engineering Review)

- Required
  - Deposit based on MWs
- Completion
  - 6 Months (estimated)
- Study By
  - TO or Contractor
- Results
  - Conceptual Design
  - Portions of Detailed Design for:
    - Attachment Facilities
    - Network Upgrades
  - Cost Estimates
  - Engineering and Construction Schedule

Interconnection Request Process



Type of Interconnection Agreement used is based on FERC jurisdictional determination

- Interconnection Services Agreement (ISA) used if project is FERC jurisdictional
- Wholesale Market Participant Agreement (WMPA) used if not FERC jurisdictional
    - Will require additional 2 party Interconnection Agreement between Developer and TO
- Interconnection Construction Services Agreement (CSA) identifies terms, conditions,
  and coordinates construction activities for Attachment Facilities and Network Upgrades

Summary

- Ensure a complete application prior to submittal.
- Overall study/agreement process is 18-20 months long plus TO construction time.
- Costs for Network Upgrades and Attachment Facilities are the responsibility of Developer.
- Net-metering and Behind the Meter projects are not required to enter the PJM queue
- Feel free to contact PJM prior to submittal if you wish to discuss your project.

QUESTIONS ?