



S&P 500	2,171	+25	+1.06%
GlobalDow	1,104	+13	+1.14%
Gold	1,965	+30	+1.53%
Oil	1,165	+18	+1.56%
	77.56	0.09	0.12%

POWER SUPPLY | GENERATION | FINANCIAL | MEMBER SERVICES | RISK MANAGEMENT | SUSTAINABILITY

Expanding Markets, Rising Concerns: The Impact of RTO Market Expansion on Joint Action

American Municipal Power

January 7, 2019



AMP Overview

- Non-profit wholesale power supplier and services provider for 135 member municipal electric systems; members are units of local government
- Members located in 9 states – Ohio, Kentucky, Pennsylvania, Michigan, Virginia, Maryland, Delaware, West Virginia, and Indiana – and represent more than 650,000 customers
- Operate in 2 RTOs as well as non-market areas
- Total assets of more than \$6.7 billion with a mix of generation technologies; diverse resource portfolio
 - 3400 MW peak load

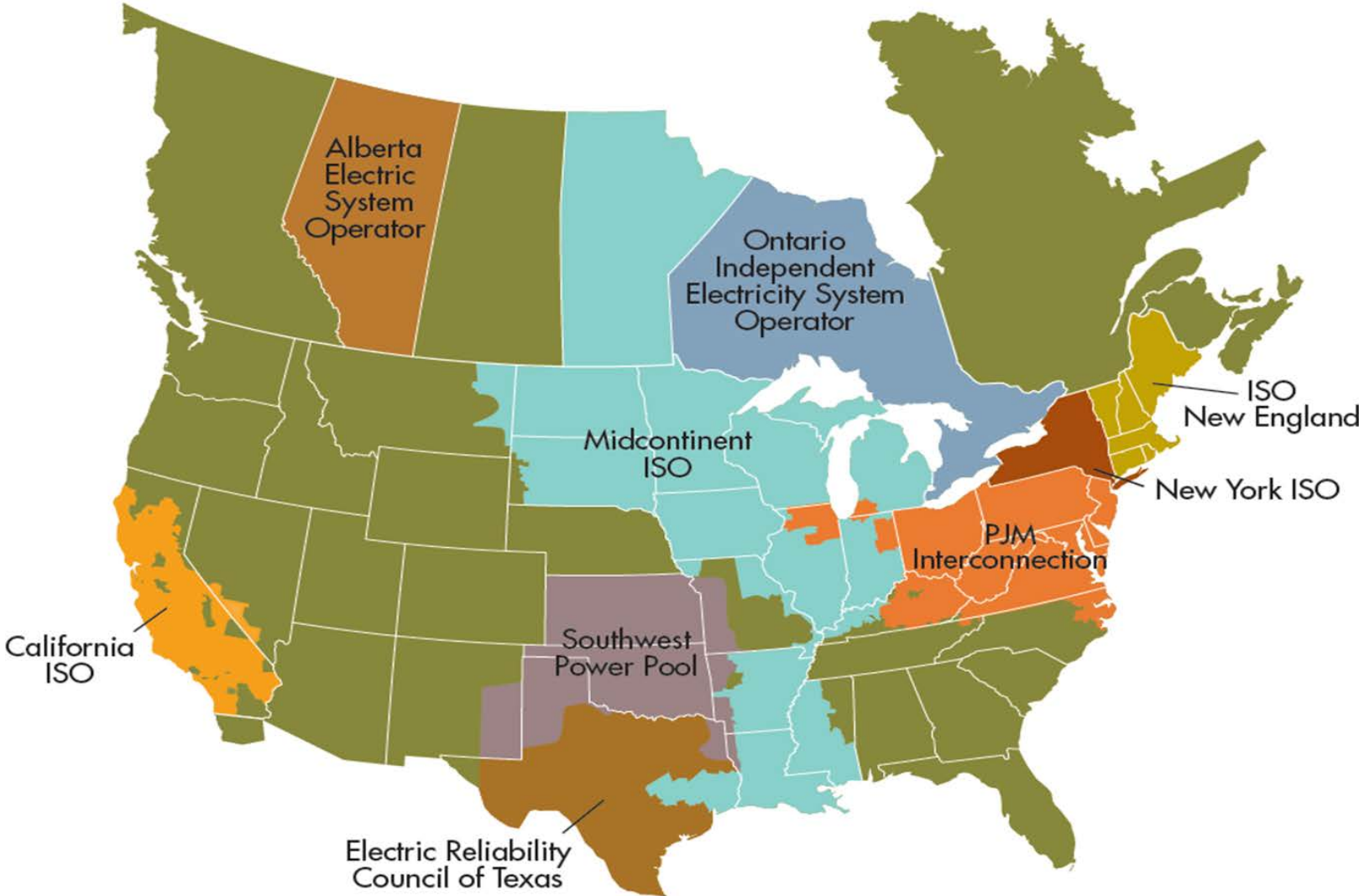
In the Old Days...

- Each IOU Operated Independently
 - Matched Generation and Load (Real Time)
 - Responsible for Transmission Grid in their Island
 - Responsible for Maintaining Reliability
 - Effectively Individual Islands
- Idea to Combine Islands and Operate Giant Pools
- Independently and efficiently operate and dispatch the generation system.

Regional Transmission Organizations (RTOs)

- In FERC Orders 888/889, FERC suggested the concept of an Independent System Operator as one way for existing tight power pools to satisfy the requirement of providing non-discriminatory access to transmission.
- In Order No. 2000, FERC encouraged the voluntary formation of Regional Transmission Organizations to administer the transmission grid on a regional basis.

RTOs Continued



RTOs Continued

PJM is responsible for maintaining reliability through (Day 1 Functions):

- Long Term Transmission Planning: Regional Transmission Expansion Plan (RTEP) looks ahead 15 years to identify transmission issues, develops plans to resolve issues, and results in one recommended plan.
- Generation Control/Balancing: PJM has to ensure sufficient generation is available or running to satisfy the demand at any hour of the day including maintaining adequate reserves.
- Transmission Control: PJM monitors, operates and controls the high voltage transmission system in a reliable manner.
- These are the “traffic cop” functions.

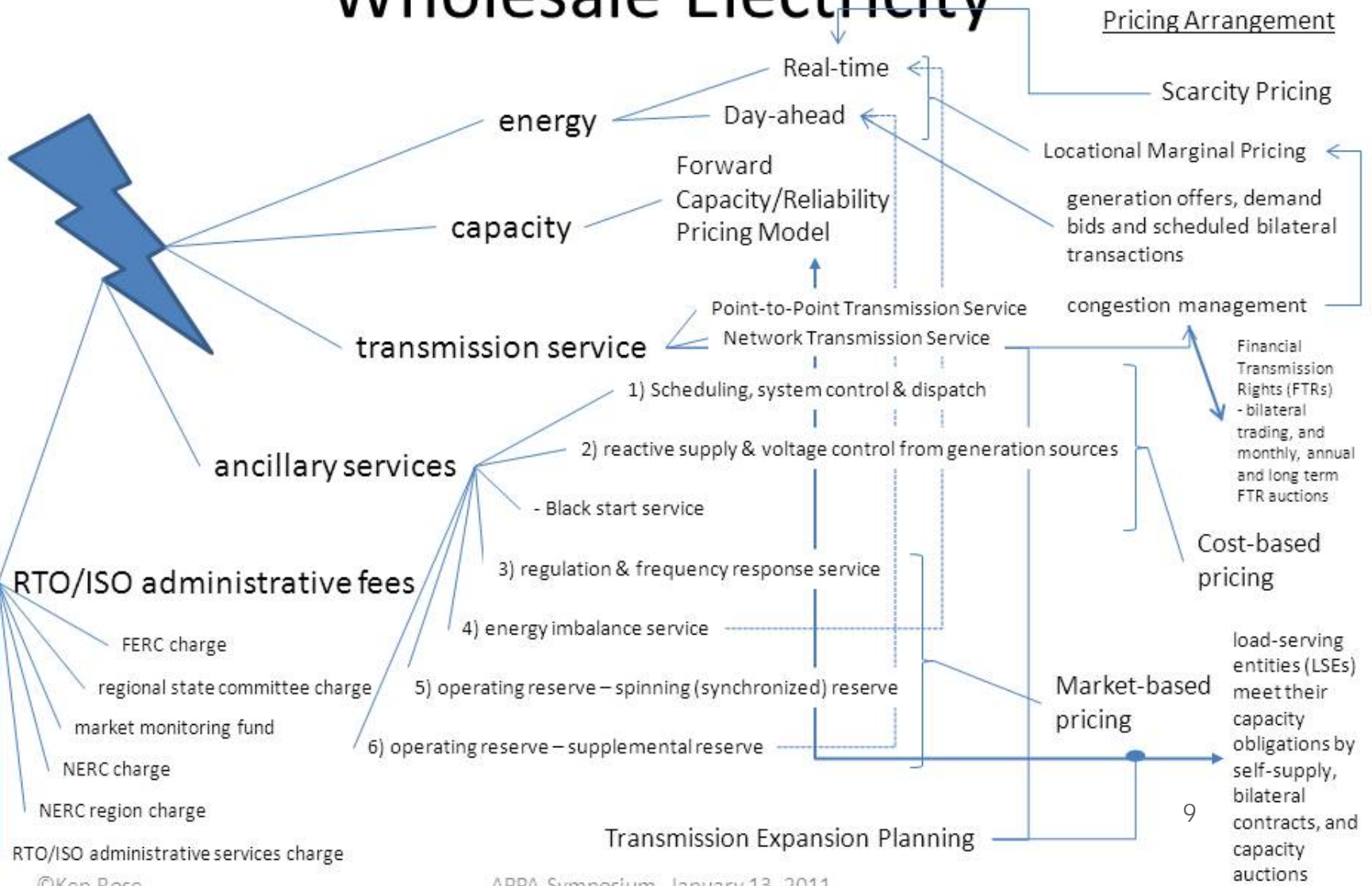
Energy and Capacity Markets

- To further maintain grid reliability, RTOs added energy and capacity markets (Day 2 Functions)
 - Energy Markets: Energy is sold or purchased to ensure there is enough generation to satisfy load in the most economical way.
 - Capacity Markets: Installed capacity is sold or purchased to ensure there is enough generation to satisfy the peak load plus a reserve margin.

RTOs Continued

- Day One Functions: Highly effective, economies of scale, non-discriminatory
- Day Two Functions: Mixed results
 - Added complexity
 - Constant rules churn
 - Active engagement/oversight required

Summary of How We Have Unbundled Wholesale Electricity



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APPA Symposium, January 13, 2011

American Municipal Power, Inc.

Capacity Markets Generally

Capacity markets in the eastern RTOs are not markets. They are complex, rules-driven administrative mechanisms for pricing and procuring capacity that rely on non-market features like:

- artificial demand curves
- price caps
- minimum offer price requirements
- obstacles to competition from certain types of resources

As originally structured, capacity constructs were designed to:

- be residual;
- address the “missing money” from the embryonic energy and ancillary service markets;
- be an interim measure while market designs transitioned; and,
- include “guaranteed clearing” provisions for self-supply.

Capacity Markets Generally

Over time, capacity constructs in the eastern RTOs:

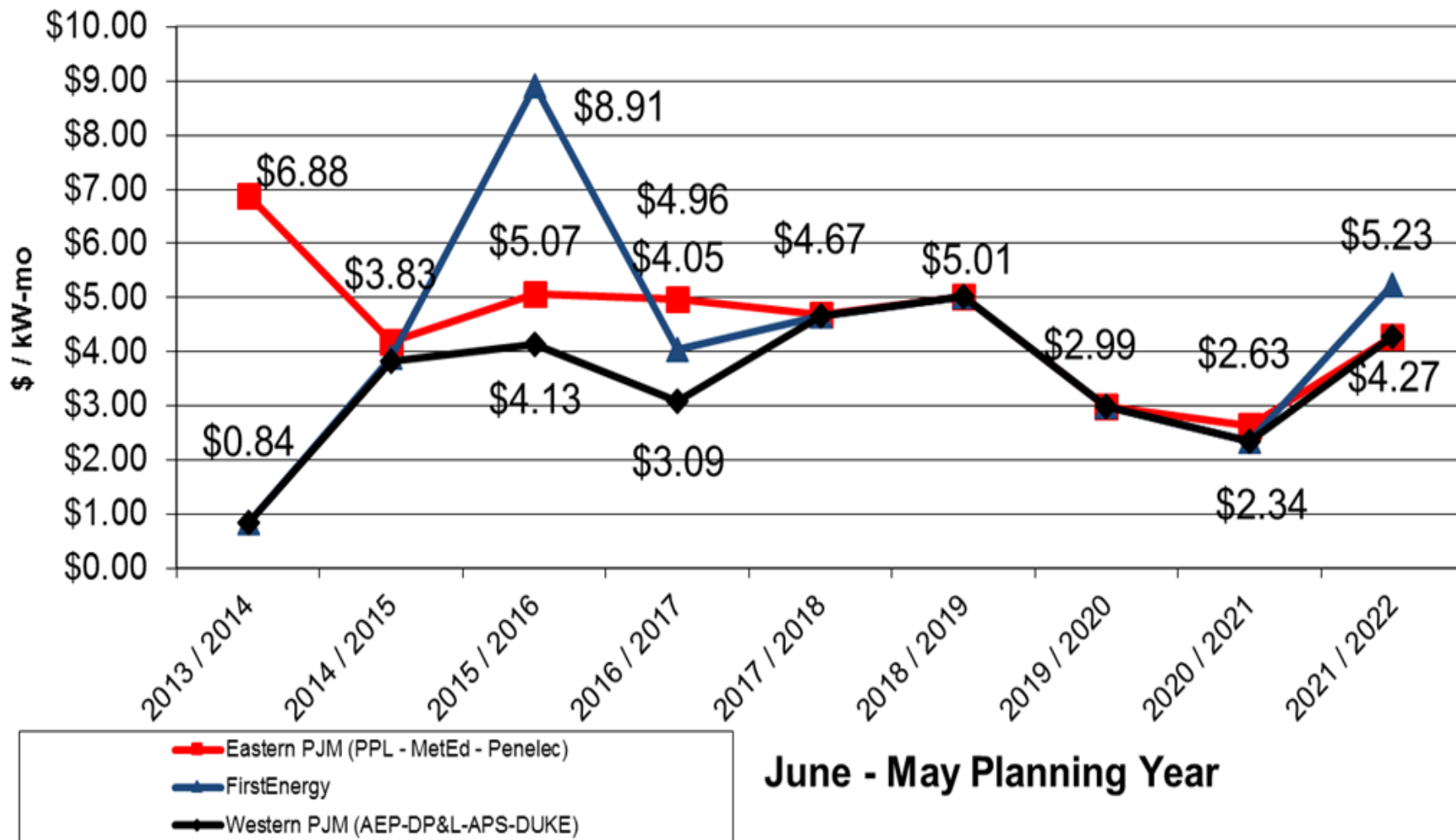
- Have become more complex;
- Play a larger revenue role;
- Constantly restate both the purpose of and rules governing the construct, often in a manner that maximizes merchant generators' earnings;
- Eliminate the “guaranteed clearing” for self-supply;
- Add varying levels of “buyer side market power” mitigation rules commonly referred to as Minimum Offer Price Rules (or “MOPRs”); and,
- Imposed restrictions on imports and Demand Response.

PJM's Reliability Pricing Model ("RPM")

- Since 2010, there have been at least 27 filed revisions to PJM's Reliability Pricing Model
 - MOPR modified – eliminates guaranteed clearing for self-supply
 - Capacity Performance – post-polar vortex, re-defined capacity resource to mean 24/7 availability with “no excuses,” penalties can exceed revenue, increased capacity purchased by PJM
- Producing volatile results

Capacity Auction Results

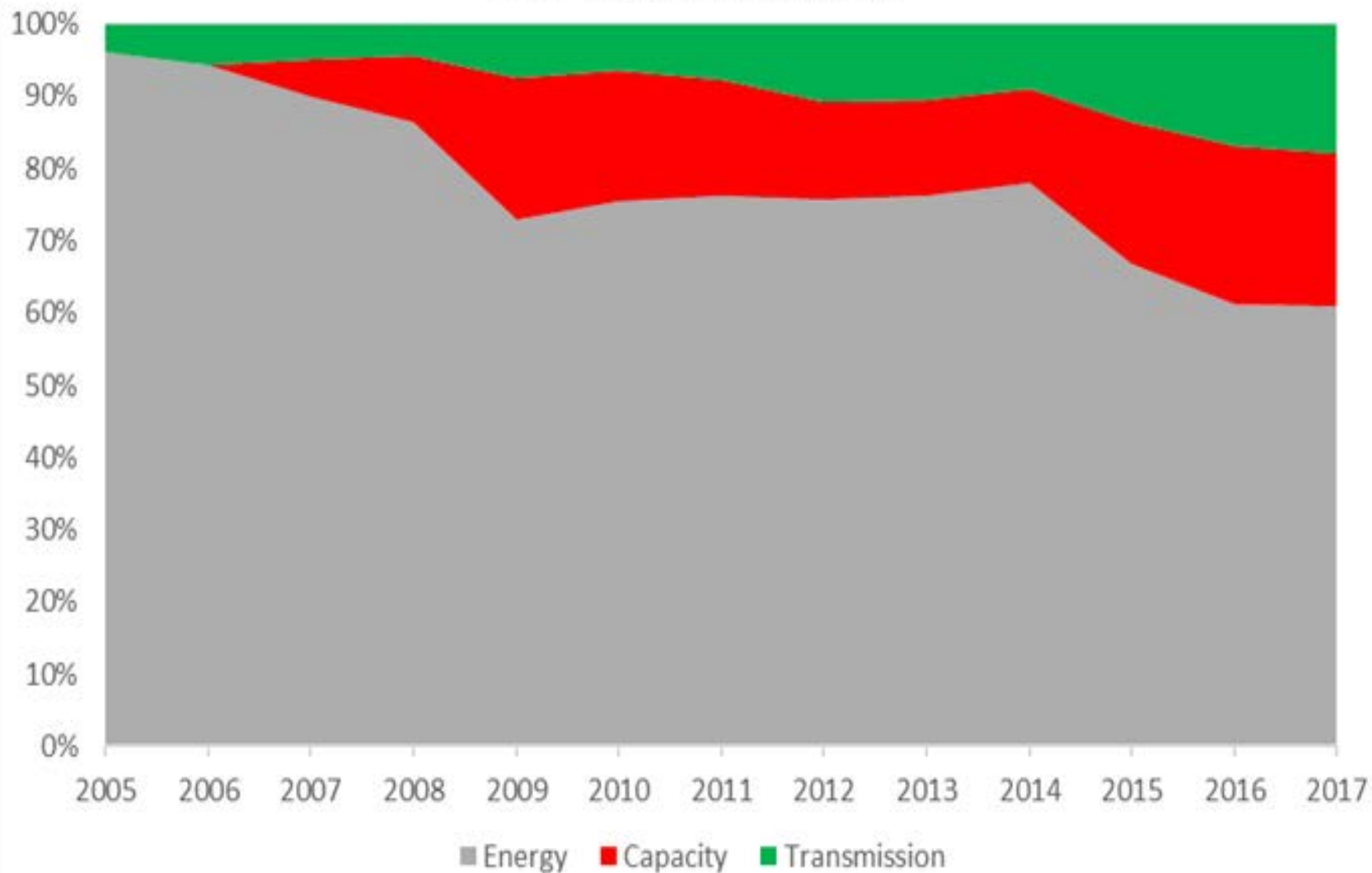
PJM RPM Base Auction Clearing Prices (Load)



Energy Markets

- Energy markets have worked well.
- However, PJM turning attention to Energy Markets, making proposals to do things like:
 - Allow inflexible resources to set LMPs (Contrary to 20 years of incenting flexible units as the marginal unit)
 - Inflexible units operate when they are not needed because they are inflexible
 - While good to reduce uplift, inflexible units still getting paid and load appropriately pays only the cost of uplift for that unit, not an overall increase for all units
 - Does not distort overall market

PJM Total Power Cost



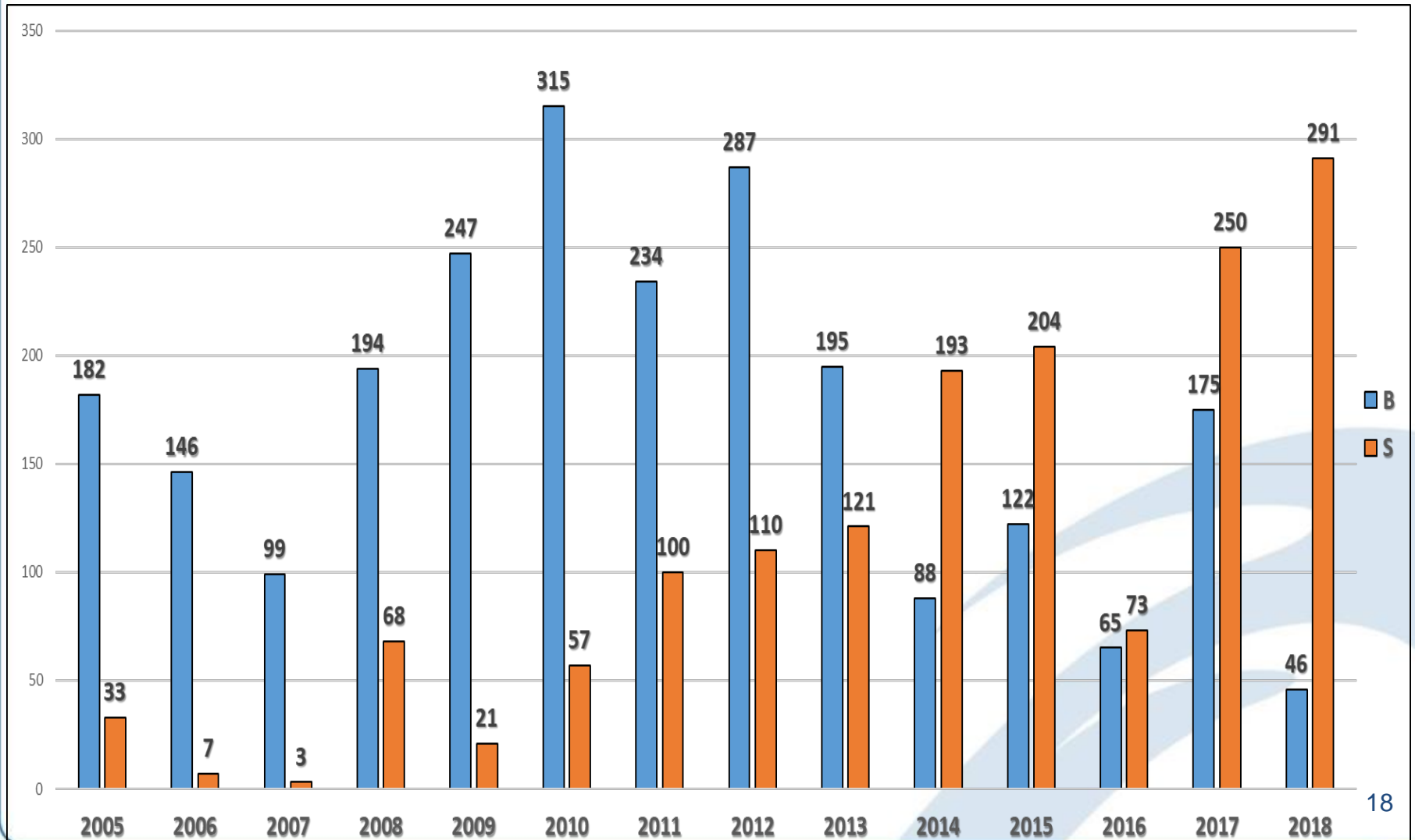
PJM Transmission Issues

- Transmission Rates are increasing considerably in a short amount of time
- From 2009 to 2017
 - 12 TOs had a 20% or more increase in revenue requirement
 - 11 TOs had better than 20% increases in Network Integration Transmission (NIT) Rate
 - Not all TOs in PJM had such increases—several had modest or no change in NIT rate
- Charges Supplemental Projects (not needed for reliability) for some TOs have also increased during that same time period
 - Total Annual Revenue Requirement for transmission enhancement increased by 294.5% from 2011 to 2017

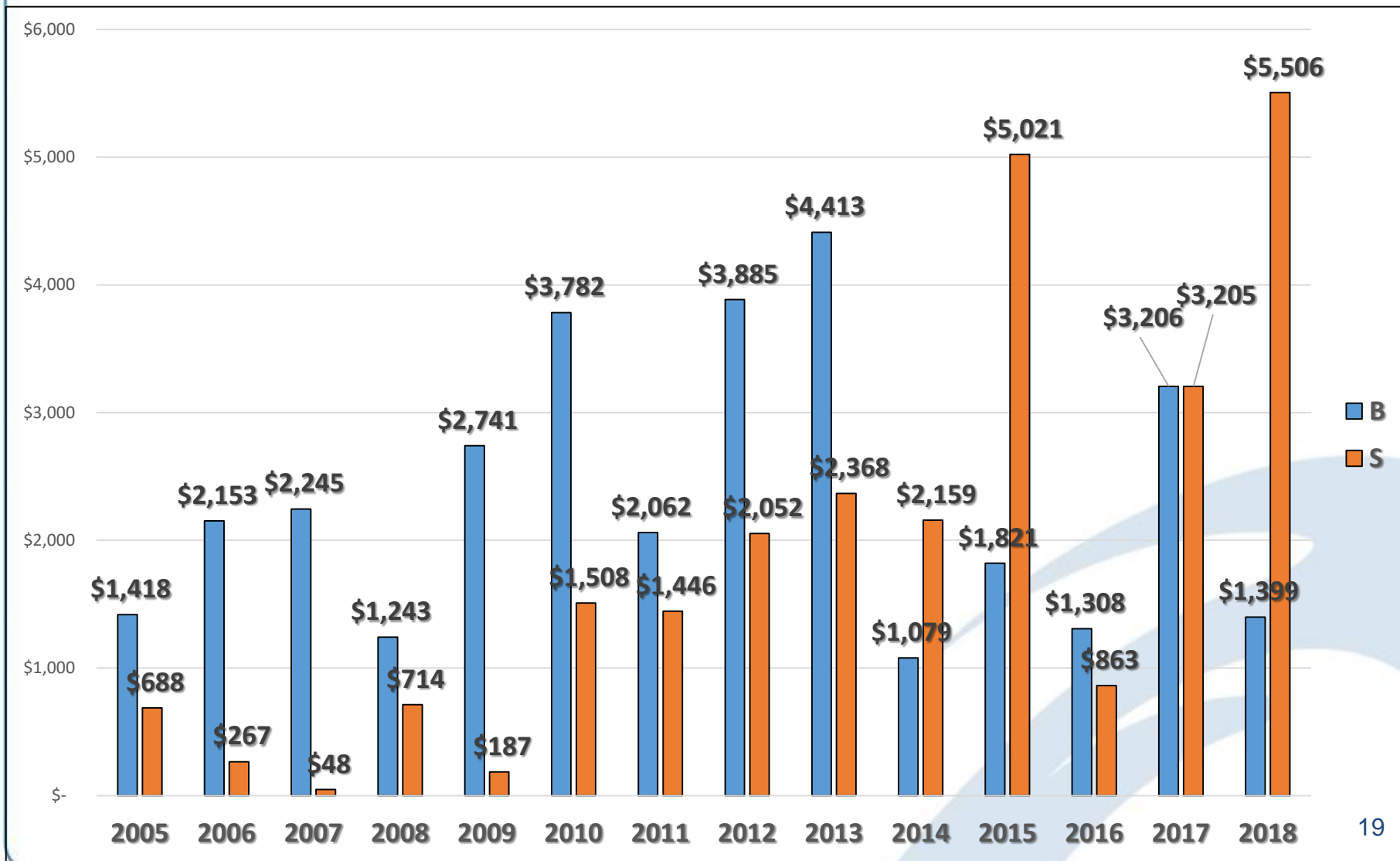
PJM Transmission Issues

- Little to no regulatory oversight
- Fighting for 3 years now for more transparency in the planning process
- In FERC Show Cause Order, FERC Found:
 - “the PJM Transmission Owners are implementing the transmission planning process for Supplemental Projects in a manner that is inconsistent with Order No. 890’s transparency principle. *The record indicates that, in practice, the PJM Transmission Owners are providing transmission planning information, including models, criteria, and assumptions, that is inadequate to allow stakeholders to replicate their planning studies, as Order No. 890 requires.* In addition, we find that this information is often provided too late in the transmission planning process for stakeholders to participate before the PJM Transmission Owners have taken significant steps toward developing Supplemental Projects.

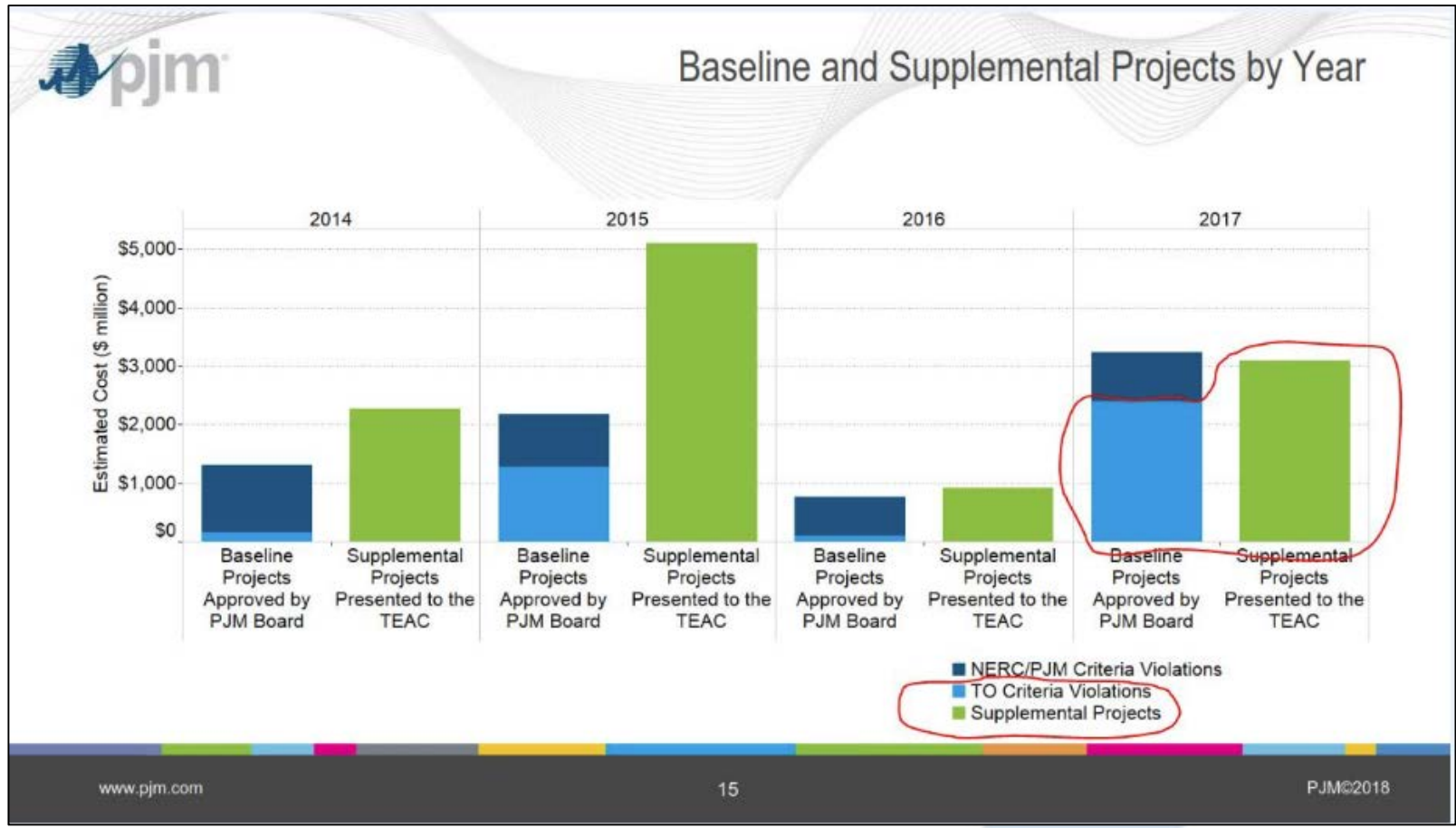
No. of PJM TO's Baseline Vs Supplement Transmission Projects



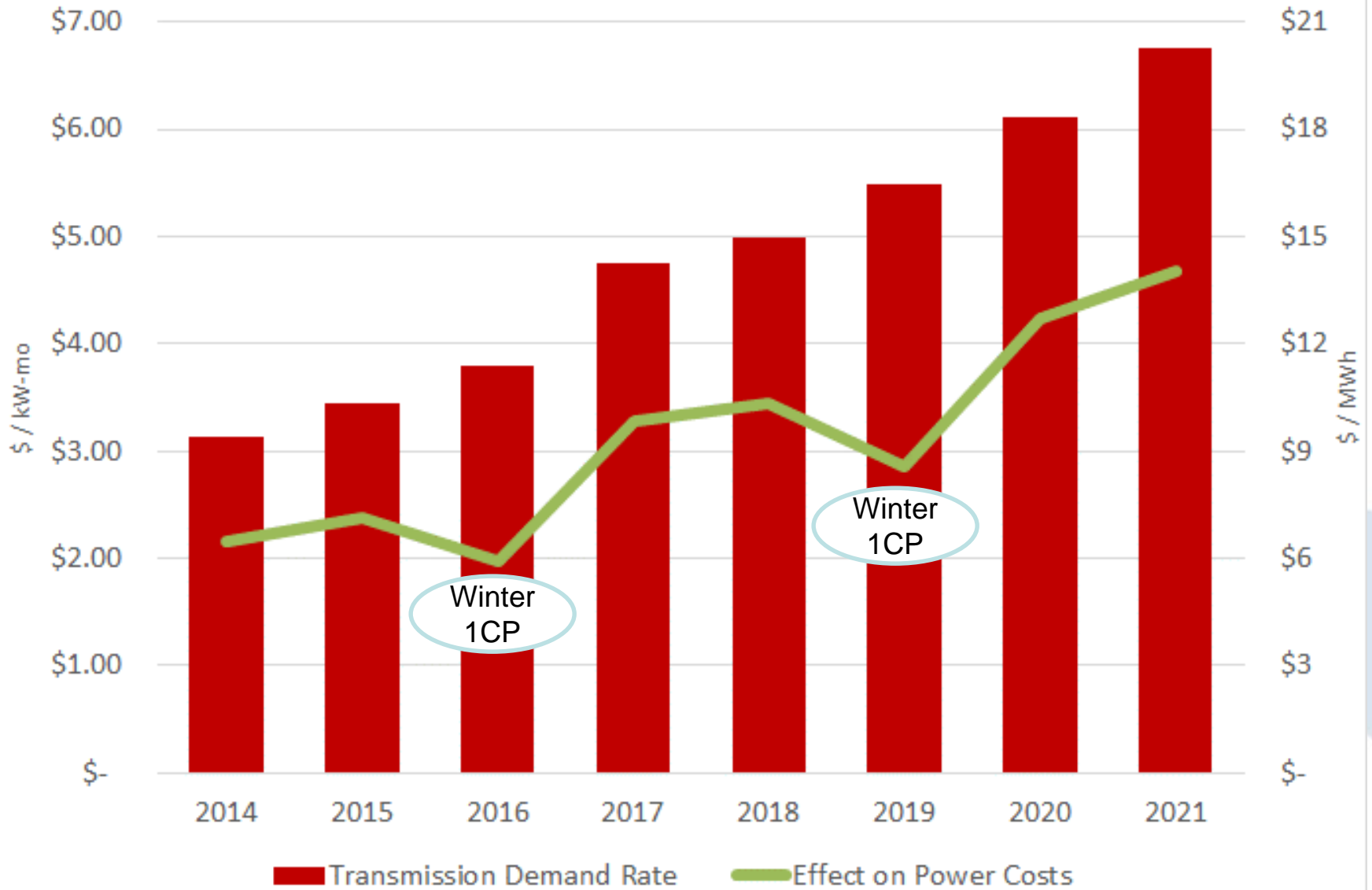
Cost of PJM TO's Baseline Vs Supplement Projects



Approximately 88% of 2017 projects were TO-driven



AEP Network Transmission Rates



PJM Governance

- Stakeholder process is fundamental and key to PJM's success
- Uniquely, PJM stakeholders have Section 205 authority over the Operating Agreement:
 - Energy Market
 - Transmission Planning
- Stakeholder process works well when:
 - PJM doesn't weigh in with a solution that will be filed regardless
 - PJM doesn't start a new initiative with a solution
- Stakeholder process would work better if there was sector weighted voting at all committee levels
- No opportunity to vote on status quo
- PJM culture is shifting away from stakeholder process
 - Non Stakeholder meetings
 - Seeking FERC directive as a compliance filing to circumvent stakeholders' Section 205 rights

AMP's Response

AMP's Transmission Strategic Initiatives

- October 2015 Strategic Plan Report to the Board
 - Targeted recruitment of specialized transmission planning and risk analysis expertise
 - Will involve definition of new role(s) and protocols for *how transmission VP supports Member Planning, assessing options for cost control, including generation, load control and project investment*
- Goals
 - Immediate Goal:
 - Control transmission costs
 - Mid- and Long- Term Goals:
 - Control transmission costs, and ensure equitable treatment of Members

AMP's Transmission Strategic Initiatives

Potential Transmission Objectives Initially Identified

- Secure Revenue Requirements from existing AMP-owned facilities
- Evaluate opportunity for AMP Members to secure Revenue Requirements for existing Member-Owned facilities
- Partner with existing transmission developers
- Acquire existing and/or build new transmission
- Control costs via active participation in TO formula rate cases and Annual Transmission Revenue Requirement processes
- Optimize AMP results from Annual ARR and FTR Auctions
- Perform research

Transmission Activities So Far...

- Quantified Transmission Cost Impact by Zone
- Active in RTO and FERC forums
 - Support Legislative and Regulatory efforts
 - Rate Complaint against AEP; annual review of others
- Explored construction/ownership opportunities with 3rd party independent transmission providers
- Secured transmission assessment services with TEA
- Hired Director Transmission Planning
 - Increased presence in PJM Planning and Process meetings and scrutiny over local plans
 - Initiated the development of reinforcement plans for Members' systems

Transmission Activities So Far...

- Formed AMP Transmission, LLC (AMPT) to address NERC Bulk Electric System (BES) obligations for members
 - Not-for-profit subsidiary of AMP
 - Services Agreement between AMP and AMPT
 - Purchased BES assets from City of Napoleon, Ohio
 - Contracted with GridForce to provide transmission operation and NERC compliance services
 - Executed the PJM Consolidated Transmission Owners Agreement
 - Filed FERC formula rate in ATSI
 - Requested implementation date of January 1, 2019

Results...

- AMP has positioned itself to be a knowledgeable and effective participant in regional and local transmission planning forums, RTO process forums, and FERC advocacy and rate cases
- AMP has acquired the ability to perform system planning activities to aid in the optimal transmission planning for its Members' systems
- AMP has researched options to address NERC compliance for Members with recently qualified Bulk Electric System (BES) facilities

New Industry Disruptors

The electric industry is in a period of rapid change that is moving faster than regulation can keep up with and beyond regulatory and traditional utility control.

5 Main Disruptors:

- 1) *Digitalization*:** An increase in digital operation and data
 - Advanced Metering Infrastructure = automated communication between smart meters and smart devices and the utility
 - The internet of things = the network of physical devices that enables digitalization of physical signals – aka, the “smart” component behind the meter that enables smart appliances, thermostats, lights, etc.

New Industry Disruptors

2) **Decentralization**: the transformation of an electrical one way street (from large generator to customers) to a multidirectional highway through the use of:

- Energy Efficiency
- Distributed Generation
- Storage
- Demand response

3) **Decarbonization**: moving toward a cleaner grid without regulatory requirements.

4) **Electrification**: Electrification of transportation is creating changes in electric system usage

5) **Democratization**: Customer expectations and demands are changing:

- 1) No longer just electric consumers – now also producers with self generation, home storage, etc.
- 2) Customer expectations changing: constant connection, modern billing, more control

AMP's Response

- Formed Focus Forward Advisory Council (FFAC) in the spring of 2016.
 - Made up of a cross section of members, rate consultants, attorneys, AMP staff and elected officials from 12 member communities in 3 states.
- Mission
 - The FFAC's mission is to educate and inform AMP members of national trends reshaping the electric industry in order to prepare for a future with Distributed Energy Resources.
- Objectives
 - Help ensure members have good policies, rate structures and technical interconnection requirements in place to appropriately handle customer sited generation requests. Develop a toolkit that includes a rate design guide, interconnection checklist and lessons learned.

AMP's Response

- Formed Innovation Team
 - Made up of group of individuals from all departments and TEA
- Mission
 - The AMP Innovation Team's mission is to research emerging and evolving technologies impacting the electric utility industry over the next ten (10) years and present information to members of the AMP Executive Management Team and AMP Board.
- Objectives
 - Develop potential road maps and outcomes that will assist EMT and AMP Board with both short-term and long-term strategies.

Final thoughts...

- Real benefits to competition and RTOs
- Many challenges as well
- Changes to the capacity construct in PJM:
 - Increased risk to Public Power
 - Under current rules, no excuses for resource non-performance
 - Outside Management Control outages now also apply to EFORd
 - Resources may be called back from maintenance outages
 - CP penalties may exceed revenue
 - More value in avoiding peaks and energy efficiency

Final thoughts...

- Given the volatility of capacity prices and rules churn, combined with increasing transmission rates, mitigating market results is becoming a more attractive option
 - owning generation, particularly that is BTM, for peak shaving
 - energy efficiency
- Reduced value of Demand Response
 - In many cases, DR cannot meet the new definition of capacity resource and stand ready to perform 24/7

Final thoughts...

- Many complex, moving parts
 - Capacity repricing proposals
 - Energy price formation proposals
 - Resilience proposals in both generation and transmission
- Must engage and consider cumulative impact of proposals
- RTOs will be challenged by new industry disruptors