PJM
Regional Transmission Organization

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Market Services
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6,038 substations

KEY STATISTICS

PJM member companies	530+
millions of people served	51
peak load in megawatts	144,644
MWs of generating capacity	164,905
miles of transmission lines	56,250
GWh of annual energy	729,000
generation sources	1,271
square miles of territory	164,260
area served	13 states + DC
Internal/external tie lines	250

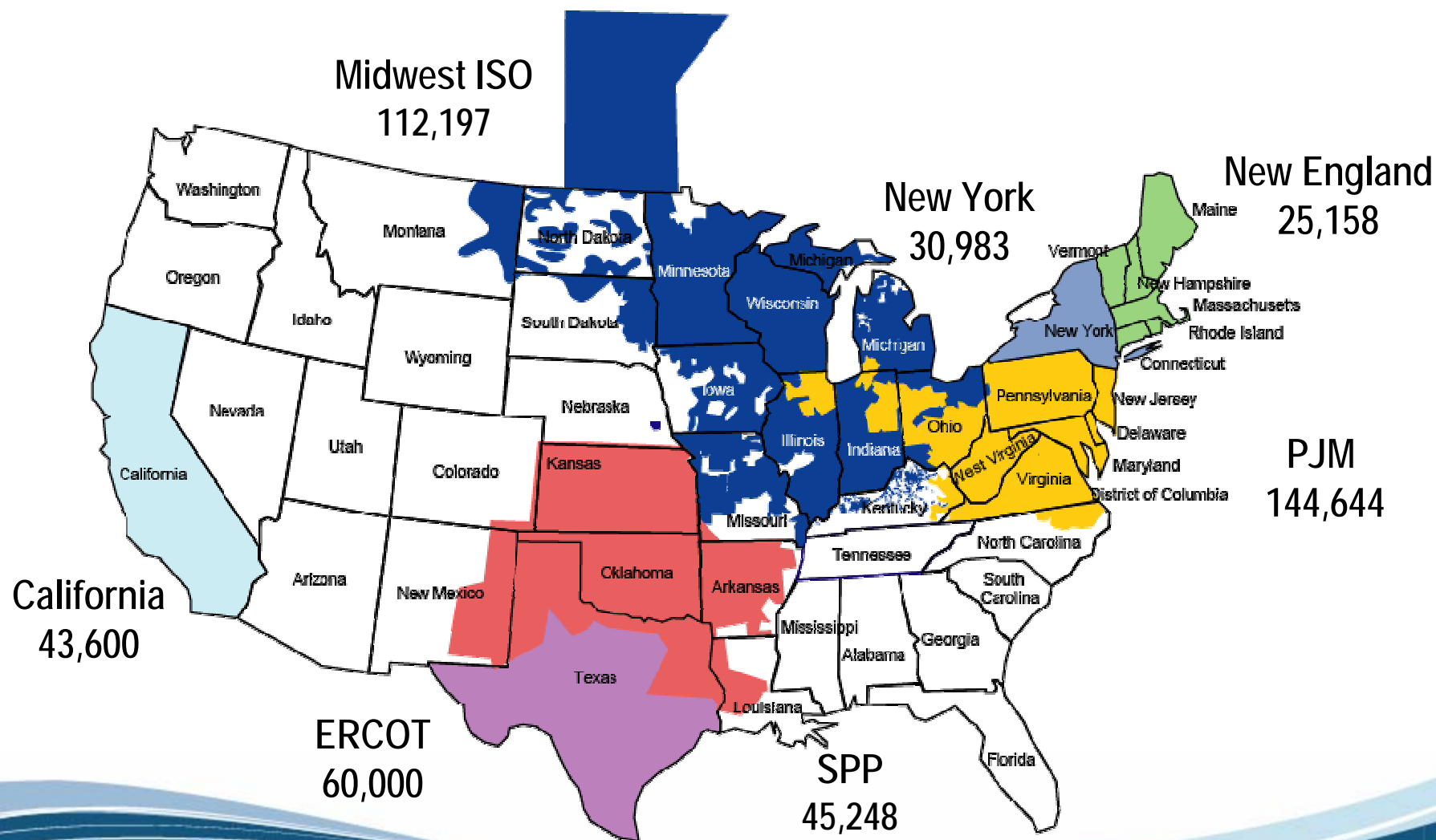United States

Eastern Interconnection

PJM

26% of generation in
Eastern Interconnection

23% of load in
Eastern Interconnection

19% of transmission assets
in Eastern Interconnection

19% of U.S. GDP produced in PJM

Legend

ZONE

Allegheny Power Systems

American Electric Power Co., Inc.

Atlantic Electric Company

Baltimore Gas and Electric Company

ComEd

Dayton Power and Light Co.

Delmarva Power and Light Company

Dominion

Duquesne Light

Jersey Central Power and Light Company

Metropolitan Edison Company

PPL Electric Utilities

PECO Energy

Pennsylvania Electric Company

Potomac Electric Power Company

Public Service Electric and Gas Company

Rockland Electric Company

Midwest ISO
112,197

New York
30,983

New England
25,158

PJM
144,644

California
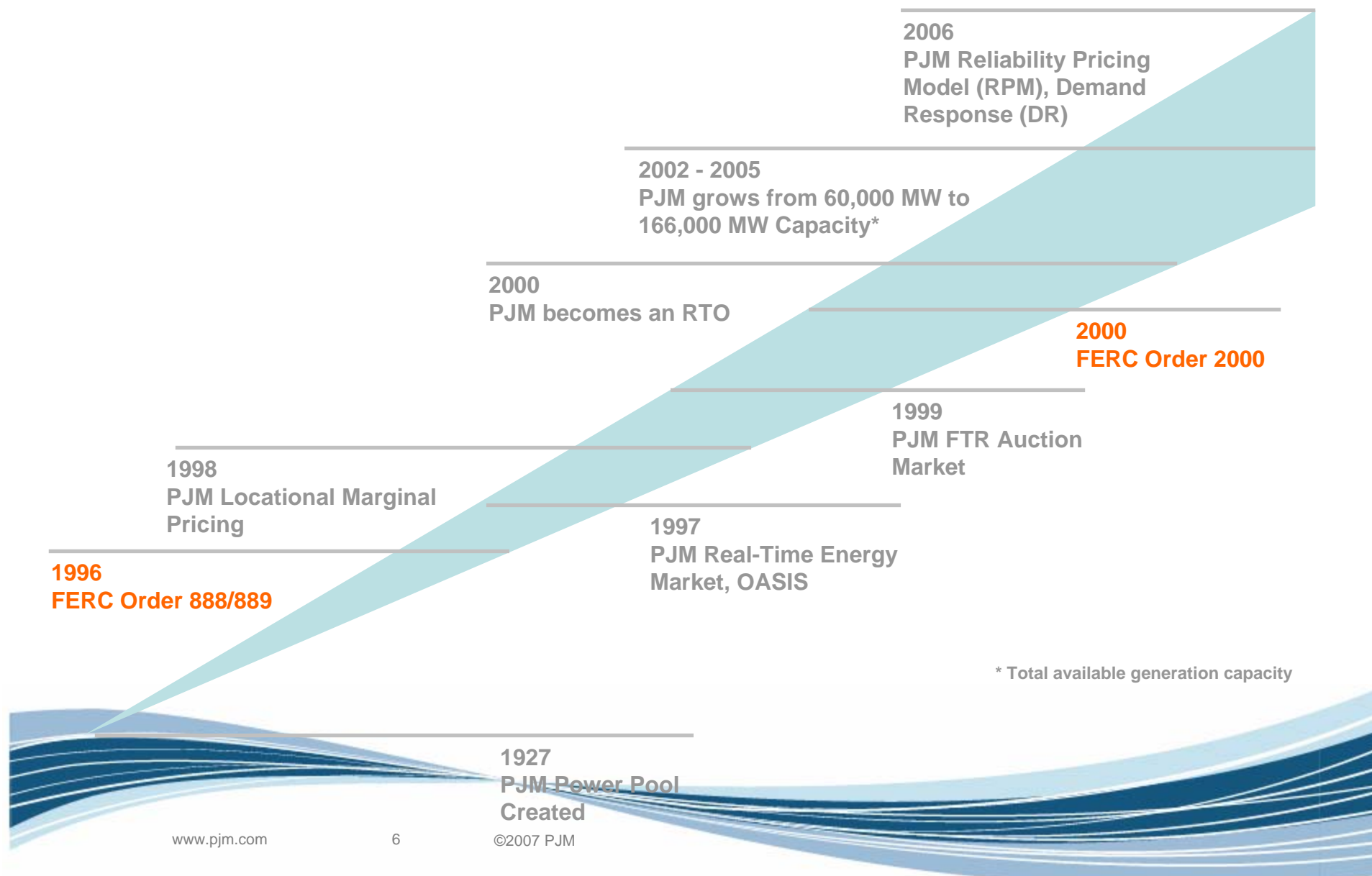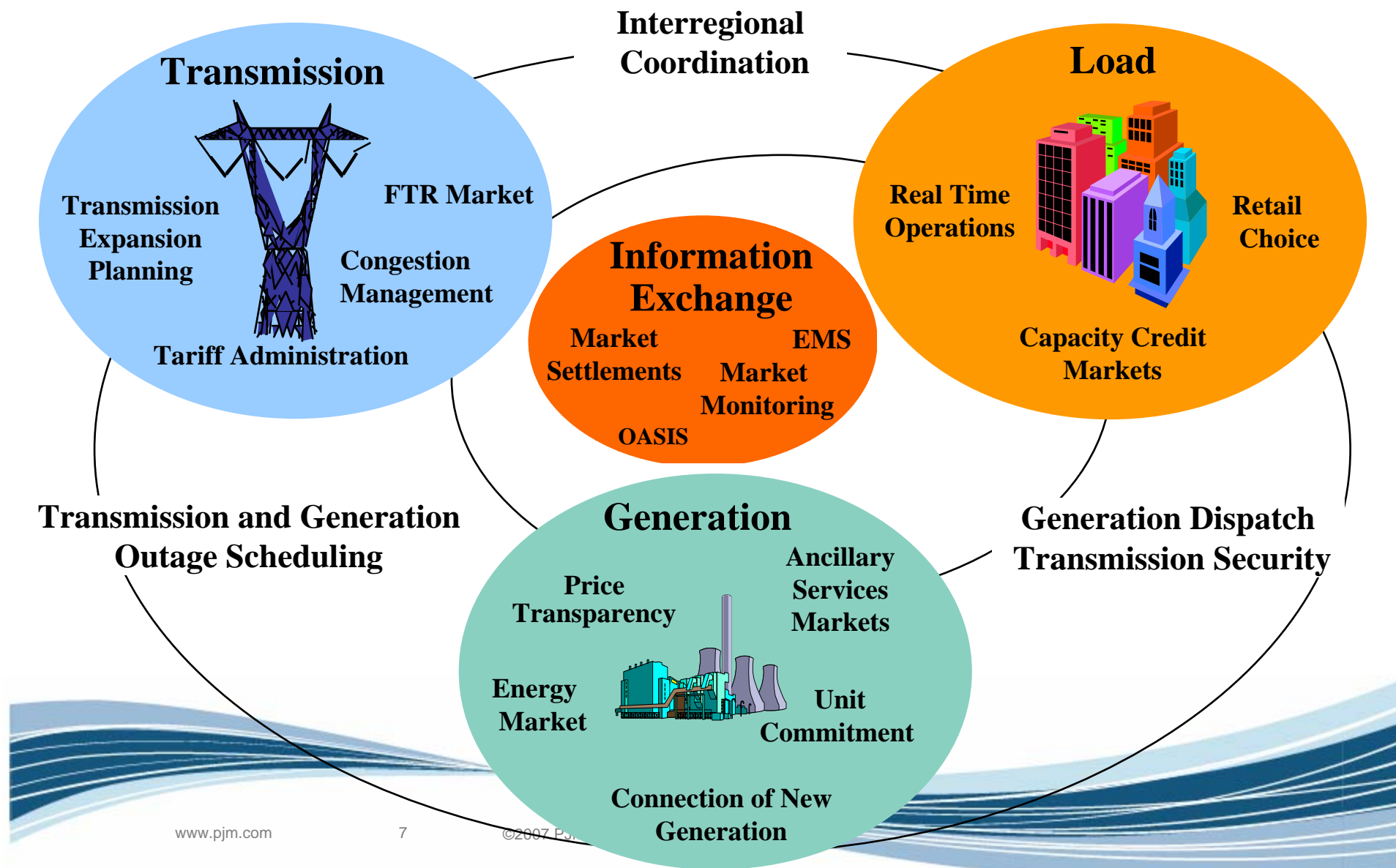43,600

ERCOT
60,000

SPP
45,248

- Independent Governance Structure
- Administers regional wholesale electric markets
- Responsible for Short Term Reliability of the region
- Provides market Independent monitoring coordinated with States and the FERC
- Provides for comprehensive regional transmission expansion planning
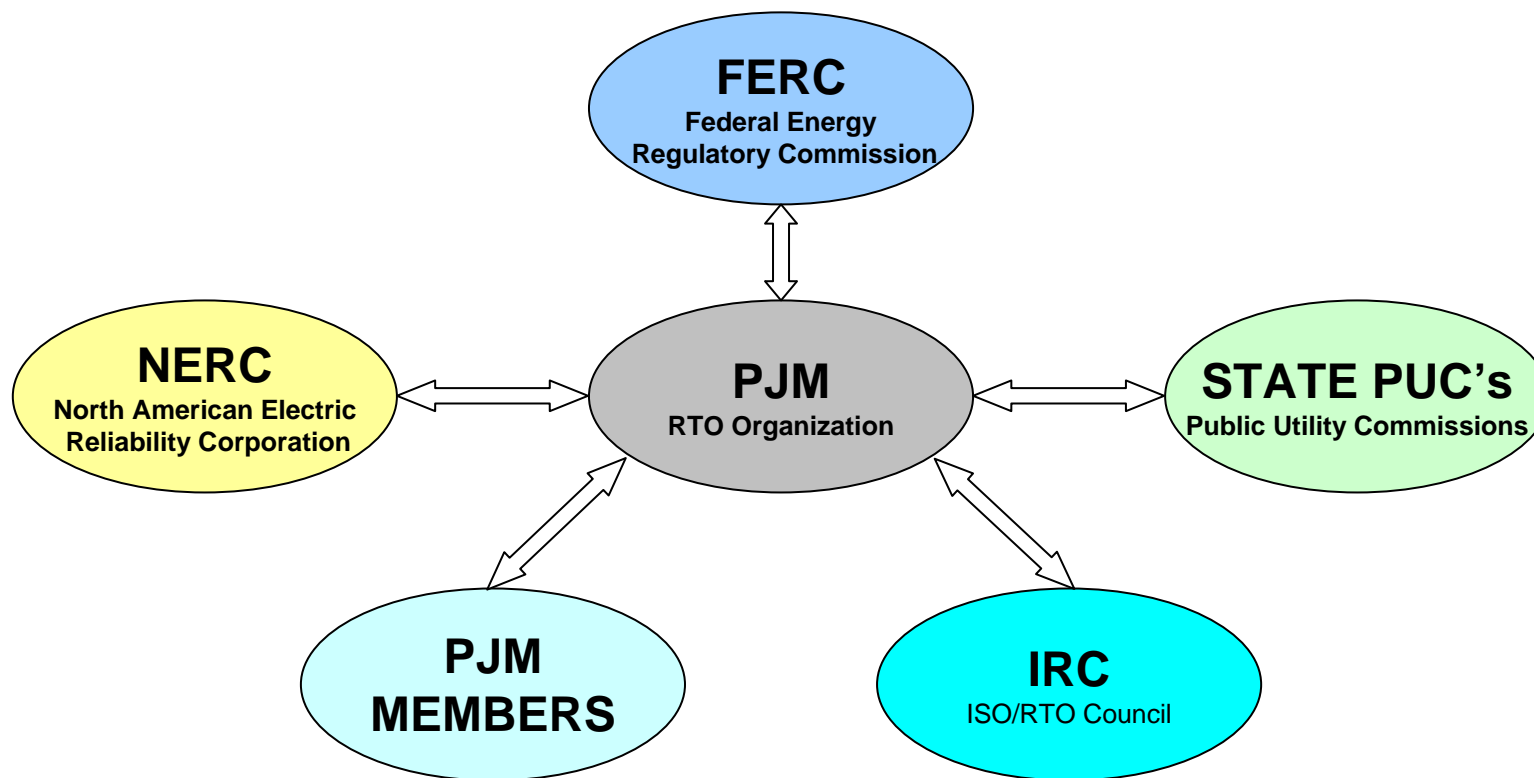- Provides an information resource for Market Participants and Regulators

2006
PJM Reliability Pricing
Model (RPM), Demand
Response (DR)

2002 - 2005
PJM grows from 60,000 MW to
166,000 MW Capacity*

2000
PJM becomes an RTO

2000
FERC Order 2000

1999
PJM FTR Auction
Market

1998
PJM Locational Marginal
Pricing

1997
PJM Real-Time Energy
Market, OASIS

1996
FERC Order 888/889

* Total available generation capacity

1927
PJM Power Pool
Created

- 2 Energy Markets
  - Day Ahead
  - Real Time
- Reliability Pricing Model (RPM) Auction - Capacity
- Financial Transmission Rights Auction
- Ancillary Services
  - Regulation Market
  - Spinning Reserve Market
  - Blackstart Service
  - Reactive Services

- PJM market supports reliability because *generation is* *incented to* *follow real-time dispatch instructions*:
  - If generation is following real-time dispatch instructions then it is *eligible to set LMP*, otherwise it become a price taker.
  - If generation is scheduled by PJM and is following real-time dispatch instructions then it receives a *revenue guarantee* of at least its specified offer data, otherwise there is not revenue guarantee.

- As a result of the incentives, no penalties need to be imposed for over or under generation

- **Reliability Pricing Model (RPM)** is PJM's new resource adequacy construct effective June 1, 2007
- The purpose of RPM is to develop a <u>long term pricing signal for</u>:
  - **Capacity Resources**
  - **LSE Obligations**
- Pricing developed will be:
  - Consistent with the PJM Regional Transmission Expansion Planning Process (RTEPP)
  - More stable and locational nature
- Providing sufficient resources ensures the reliability of the PJM region for future years.

FIGURE 2.5: PJM Installed Capacity by Fuel Type (12/31/06)

Hydro - 7,523 MW, 5%
Natural Gas - 42,936 MW, 26%
Nuclear - 30,776 MW, 19%
Coal - 67,058 MW, 41%
Wind - 208 MW, 0.1%
Other - 2,423 MW, 1.5%
Oil - 14,154 MW, 8.6%

FIGURE 2.6: PJM Energy Output by Fuel Type (GWh through 12/31/06)

Solid Waste - 4,801, 1%
Hydro - 14,684 MW, 2%
Coal - 411,581, 57%
Nuclear - 250,995, 35%
Wind - 788, 0.1%
Gas - 40,044, 6%
Oil - 2,029, 0.3%

Bilateral Transactions

Self-schedule own resources

PJM Spot Market

Load Serving Entities
Obtain energy
to serve customers

Industrial

Commercial

Residential

Tool	Purpose	Users
eData	Instantaneous prices and system conditions	Universal
eMKT	Submit bids and offers to the day-ahead market	Generators, Load Servers
EES	Schedule energy imports and exports	Generators, Load Servers, Traders
OASIS	Reserve transmission service	Generators, Load Servers, Traders
eSchedules	Record internal bilateral transactions	Generators, Load Servers, Traders

Tool	Purpose	Users
eRPM	View and purchase capacity	Load Servers, Generators, Demand Response
eDART	Request equipment maintenance and reporting Emergency Operations data	Generators, Transmission
eGADS	Submit generator performance data	Owners Generators
eFTR	Buy and sell FTRs to hedge congestion	Universal
eMTR	Collect revenue meter data	Generators, EDCs
eFuel	Reporting fossil and nuclear fuel data	Generators

EMERGENCY

Designed to provide a method by which end-use customers may be compensated by PJM for voluntarily reducing load during an emergency event.

ECONOMIC

Designed to provide an incentive to customers or curtailment service providers to reduce consumption when PJM LMP prices are high
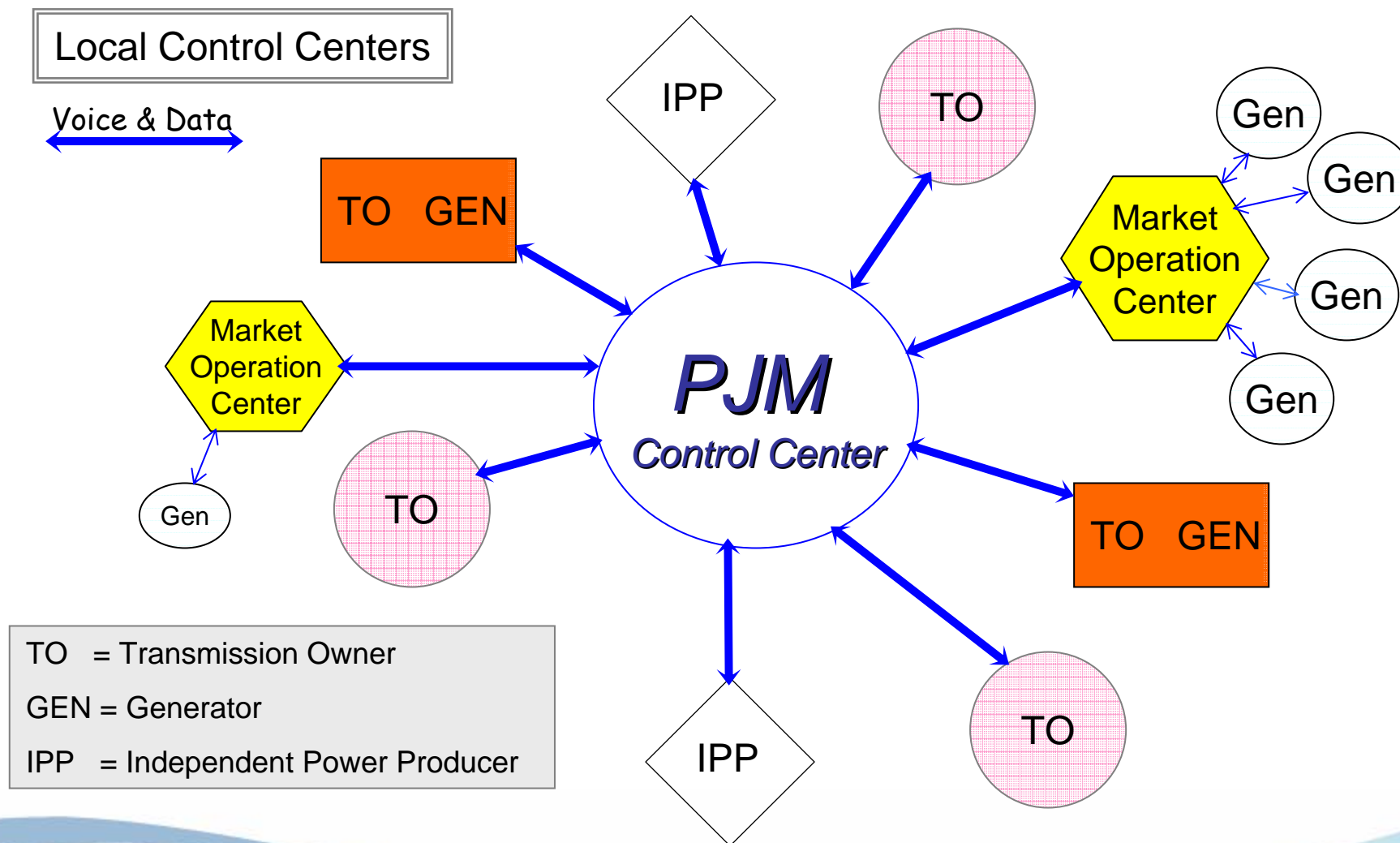
Two options:
Day-Ahead Option

Real-Time Option

Operations

Voluntary Curtailment
PJM calls Emergency event
PJM sends notification

Day-Ahead Option
Submit Day-Ahead Bid
Obligated in Real-Time if Bid clears

Real-Time Option
Voluntary Curtailment
Customer notifies PJM via e-mail one hour prior
Customer may choose to be dispatched by PJM

Local Control Centers

Voice & Data

IPP

TO

Gen
Gen
Gen
Gen

Market Operation Center

TO   GEN

Market Operation Center

PJM
Control Center

Gen

TO

TO   GEN

IPP

TO

TO   = Transmission Owner

GEN = Generator

IPP   = Independent Power Producer

PJM Customer Service	(610) 666-8980

PJM Customer Service Toll Free	(866) 400-8980

PJM Internet Site	www.pjm.com

e-Mail Customer Service	http://www.pjm.com/about/contact/form-contact.html

Subscribe to PJM e-Mail	http://www.pjm.com/about/contact/form-majordomo.html