

# A BASIC ELECTRICITY PRIMER

Presented by

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# Outline

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- I. The History of Competitive Reform: Motive Matters
- II. The Essential Elements of Wholesale Market Design:  
Excruciating Detail with a Purpose
- III. The Forces Driving Market Results: Mandates, Money,  
Innovation

# I. The History of Competitive Reform: Motive Matters

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## A. Early Mileposts

1. PURPA (1978)
2. Competitive Bidding (1984 and thereafter)
3. Combined Cycle Innovation
4. Case-by-case open access
5. EPAct (1992)

# I. The History of Competitive Reform: Motive Matters

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## B. More Recent Mileposts

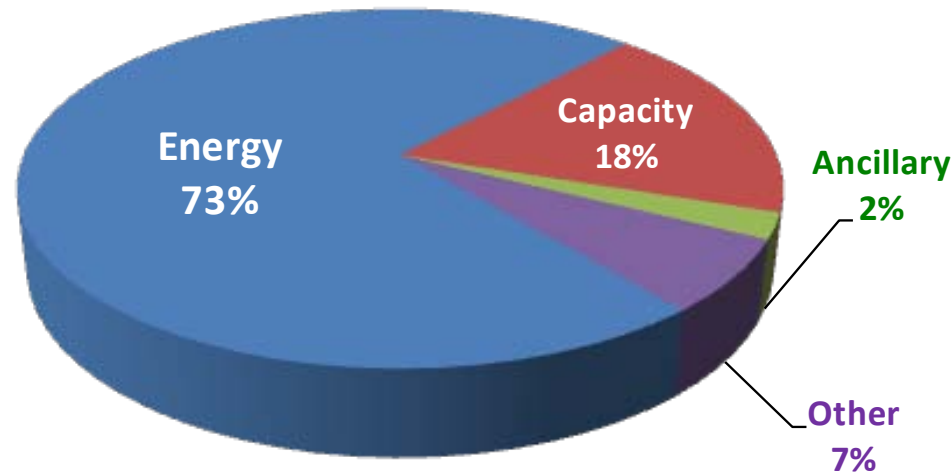
1. Open Access: Order No. 888 (1996)
2. RTO Order No. 2000
3. California Crisis (2000 to 2001)
4. EPAct 2005
5. Orders No. 890 (2007 to 2009)

## II. The Essential Elements of Wholesale Market Design: Excruciating Detail with a Purpose

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### A. Three Markets (% of Wholesale Power Cost in PJM)

**Components of PJM Wholesale Power Cost in 2010**



Source: PJM, 2010 PJM Market Highlights (May 13, 2011)

Note: "Other" is comprised of transmission costs and PJM administrative charges.

# II. The Essential Elements of Wholesale Market Design: Excruciating Detail with a Purpose

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## B. Essential Elements of Energy Markets

1. Day Ahead Market
2. Reliability Unit Commitment (RUC)
3. Real Time Balancing Market
4. Settlement: Getting Paid
5. Transmission Congestion Rights (TCRs)/Auction Revenue Rights (ARRs)
6. Virtual Bidding
7. Combined Cycle Modeling

## II. The Essential Elements of Wholesale Market Design: Excruciating Detail with a Purpose

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### C. Day Ahead Market

1. Purpose: Centralized Unit Commitment
2. How it works: Demand and supply bids/clear at DA LMP/Financial Market
3. One Controversy: Must Offer Requirement

## II. The Essential Elements of Wholesale Market Design: Excruciating Detail with a Purpose

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### D. RUC

1. Purpose: Short-term reliability
2. How It Works: Physical/Forecast
3. One Controversy: Make whole payments



## II. The Essential Elements of Wholesale Market Design: Excruciating Detail with a Purpose

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### E. Real Time Balancing Market

1. Purpose: Dispatch to minimize costs
2. How It Works: Demand and supply bids/clear at RT LMP
3. One Controversy: Timing (hourly vs. 5-minute)

## II. The Essential Elements of Wholesale Market Design: Excruciating Detail with a Purpose

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### F. Settlement: Getting Paid

1. Purpose: Pay, be paid
2. How It Works: DA LMP/RT LMP for Actual vs. Day Ahead
3. One Controversy: Uplift

## II. The Essential Elements of Wholesale Market Design: Excruciating Detail with a Purpose

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### G. TCRs/ARRs

1. Purpose: Hedge transmission congestion cost
2. How It Works: Assign ARR/Auction  
TCRs/paid difference of DA LMPs
3. One Controversy: Allocation and re-allocation  
of ARRs

## II. The Essential Elements of Wholesale Market Design: Excruciating Detail with a Purpose

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### H. Virtual Bidding

1. Purpose: Risk management
2. How It Works: Bid DA/Reverse in RT
3. One Controversy: Financial Participants

## II. The Essential Elements of Wholesale Market Design: Excruciating Detail with a Purpose

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- I. Combined Cycle Modeling
  1. Purpose: Fully utilize technology
  2. How It Works: Choose from mutually exclusive configurations
  3. One Controversy: Complexity

## II. The Essential Elements of Wholesale Market Design: Excruciating Detail with a Purpose

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### J. Capacity Markets

#### 1. One Controversy: NJ's LCAPP Issue

- a. NJ's concern with in-state generation
- b. Capacity RFP, swap agreement
- c. Some generators concerned about subsidized new entry
- d. PJM tightened Minimum Offer Price Rule
- e. FERC Accepts

## II. The Essential Elements of Wholesale Market Design: Excruciating Detail with a Purpose

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### K. Ancillary Services Market

1. Purpose: Reliability
2. How It Works: Bid opportunity cost/Co-optimized
3. One Controversy: Wind Integration Study

# III. The Forces Driving Market Results: Mandates, Money, Innovation

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- A. State Mandates, Federal Money, Private Innovation
  - 1. Renewable Portfolio Standards
  - 2. Production Tax Credit
  - 3. Merchant Transmission Lines
  - 4. State Competitive Procurements
  - 5. Shale Gas Revolution



# References

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- I. Boston Pacific's "Review of the Southwest Power Pool's Integrated Marketplace Proposal"
- II. Boston Pacific's "2011 Annual Looking Forward Report" Prepared for Southwest Power Pool Board
- III. "America's Energy and Climate Change Policy" By Craig Roach, Ph.D, Published in *The Electricity Journal*, Volume 24, Issue 2, March 2011.