

Financial Transmission Rights: California & PJM

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*Workshop on Physical and Financial Capacity Rights for Cross-Border Trade
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Questions:

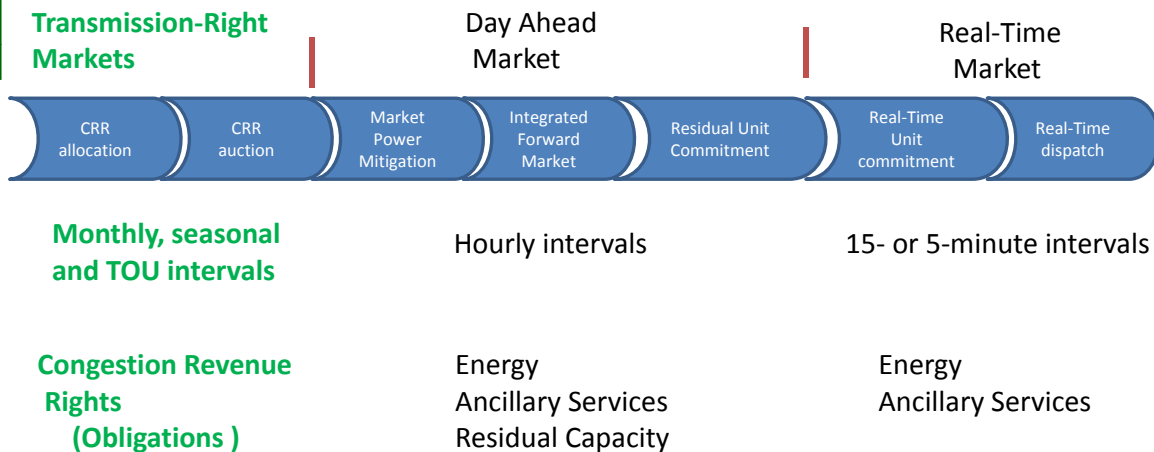
- **Structure?**
 - What's covered?
 - Allocation & trade?
- **Performance?**
 - Activity?
 - Congestion hedging?
 - Convergence of FTR prices vs. payoffs?
 - Revenue adequacy & other credit risks?
 - Market power?

In a Nutshell:

	PJM Interconnection (FTRs)	CAISO (CRRs)
LMP Since:	1998	2009
LMP Includes:	<i>Congestion & Losses</i>	
Rights:	Point-to-Point Obligation & Options	PTP Obligation (+Options if construct new line) (+Multiple PTP Obligation)
Rights Cover:	<i>Congestion Only</i>	
Hours:	All Hours; On & Off Peak	On & Off Peak
Duration:	1 & 3 months; 3 yrs	1 & 3 months; 10 yrs
What's Allocated:	Auction Revenue Rights	CRRs
Auction:	Buy & Sell monthly, annual	Buy (& Sell de facto) monthly, annual
Revenue Adequacy Test:	<i>Linearized DC Network Model</i>	
If Revenue Inadequate:	Pro-rate payment (monthly)	Fully funded (draw from auction revenues)
Bilateral Trading	Yes, active	Yes, inactive

CAISO

CAISO Market Overview



Types of CRRs

- **2 time of use**
 - ON- and OFF-Peak
- **Seasonal CRRs**
 - Calendar quarterly basis
- **Monthly CRRs**
 - Calendar months
- **Long Term CRRs extend 9 years after annual term (10 yrs total)**
- **Merchant Transmission CRRs: terms of up to 30 yrs**

Source: A. Isemonger, CAISO

Allocation → Auction → Trade

CRRs can be obtained through

- **Allocations; participants can nominate if they are either:**
 - Load Serving Entity (LSE)
 - “Out of Balancing Authority Area Load Serving Entity”
 - Project sponsors of Merchant Transmission
- **Monthly Auctions; participants can bid if**
 - They have qualified as (candidate) CRR holders
 - Collateral is posted 7 business days prior to the auction
- **Also, existing CRRs may be obtained through**
 - Bilateral trades – at will
 - Load migration –not at will
- **Merchant transmission**

Source: A. Isemonger, CAISO

Overview – Annual Allocation

- **75% of network capacity released**
 - Minus any previously allocated Long Term CRRs and pre-existing rights (TORs, ETCs and CVRs)
- **Run as 3 seasonal tiers and 1 long term tier**
 - In each: 8 markets (season/time of use combinations)
 - Sequence: Tier 1 → Tier LT → Tier 2 → Tier 3

Source: A. Isemonger, CAISO

Overview – Annual Allocation

- **Tier 1 – Priority Nomination Process**
 - LSEs eligible to nominate from the “Pot” of CRRs that was allocated to them in the previous annual process
 - Eligibility based on prior year’s load
- **Tier LT – Allocates Long Term CRRs**
 - LSEs eligible to nominate from the “Pot” of CRRs that was allocated to them in the Priority Nomination Process
 - Allocated CRRs good for 9 Years
 - 60% percent of the capacity of the network released
- **Tier 2 & 3 – Open Tiers**
 - LSEs can nominate from any valid CRR Source

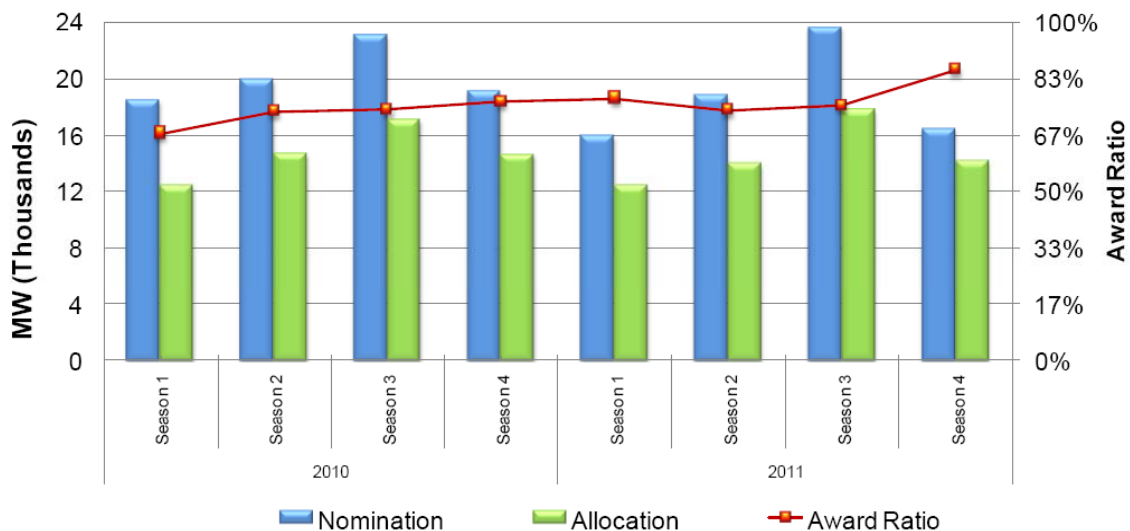
Source: A. Isemonger, CAISO

Overview – Monthly Process

- Allocation runs as 2 tiers
 - One market for ON and OFF
 - LSEs can nominate from any resource
 - Eligibility based on forecasted load
 - 100% (minus 'derate') of the network capacity released
- Auction runs as 1 tier
 - Run 2 markets, ON and OFF

Source: A. Isemonger, CAISO

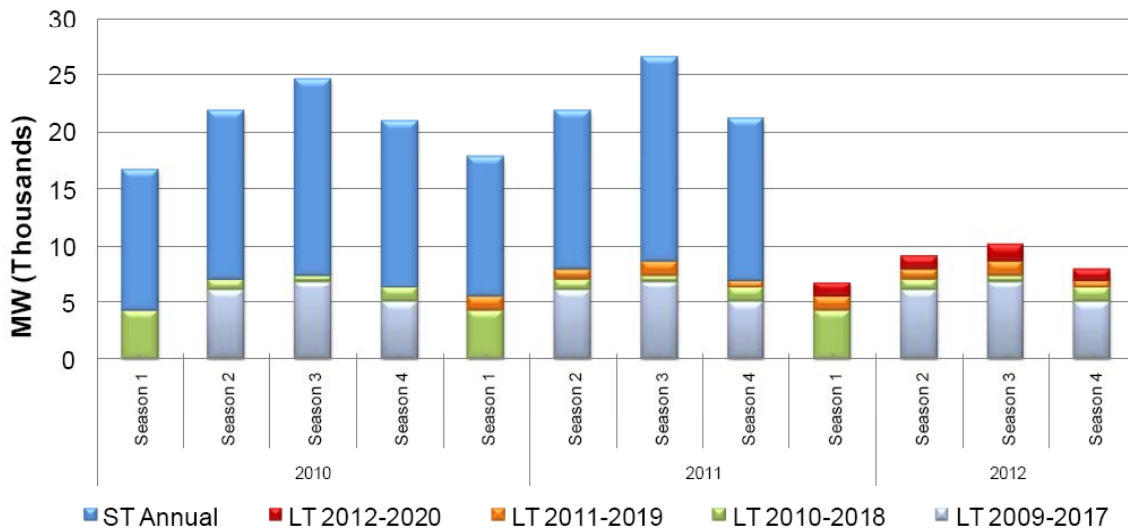
Volume of Awards: Annual CRR Allocations On-Peak



Source: CAISO, Annual Market Performance CRR Report, 3/2011

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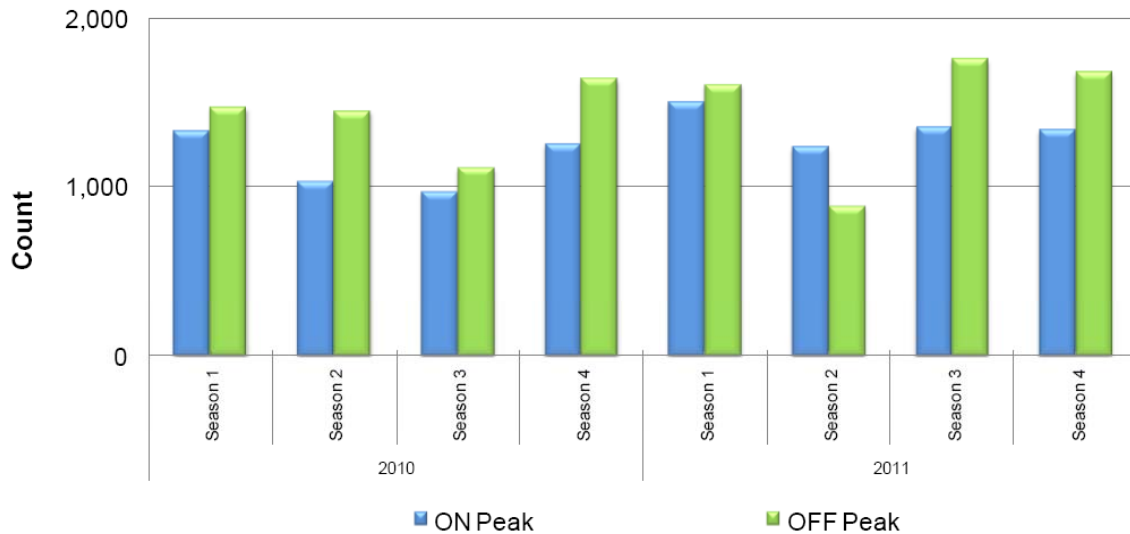
Volumes of On-Peak CRRs Released in Annual Allocation



Source: CAISO, Annual Market Performance CRR Report, 3/2011

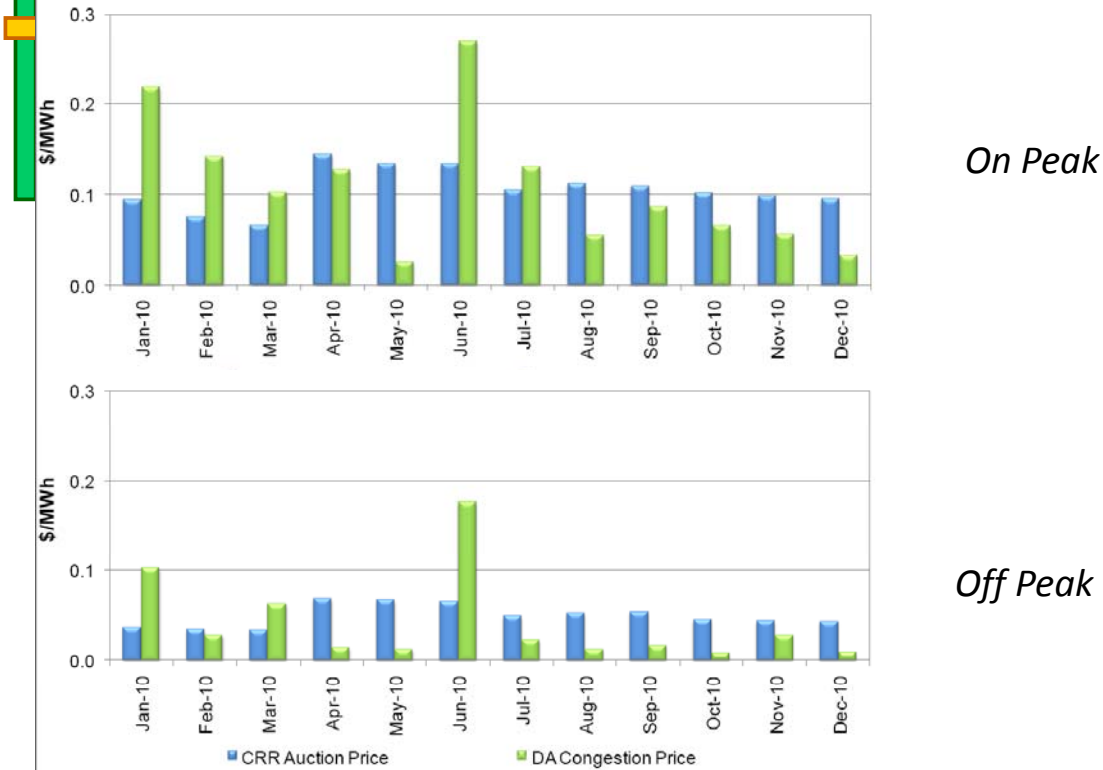
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of Distinct Paths: Annual CRR Allocation



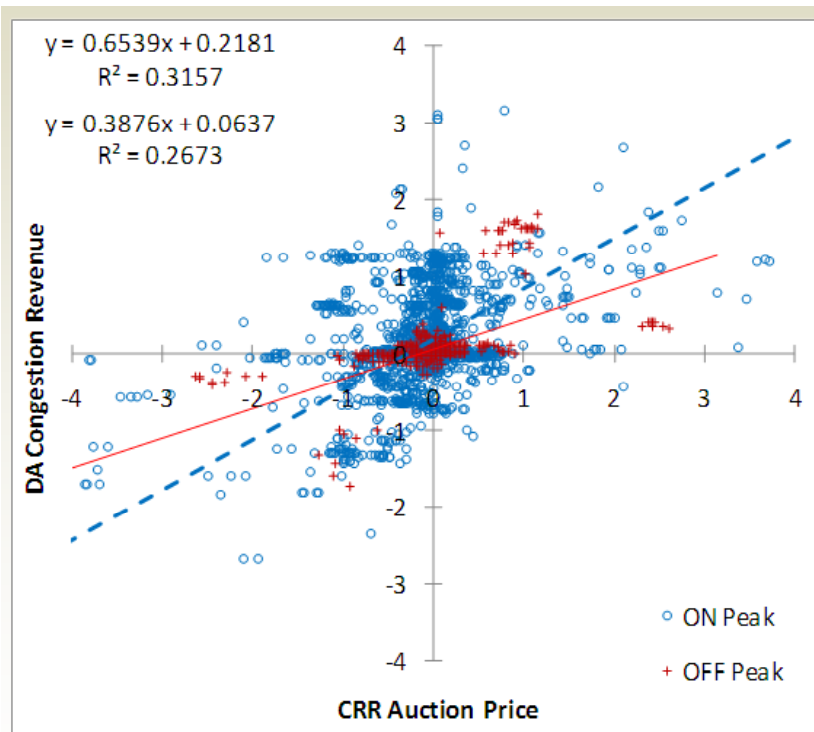
Source: CAISO, Annual Market Performance CRR Report, 3/2011

Convergence of CRR Prices & Payoffs: Average



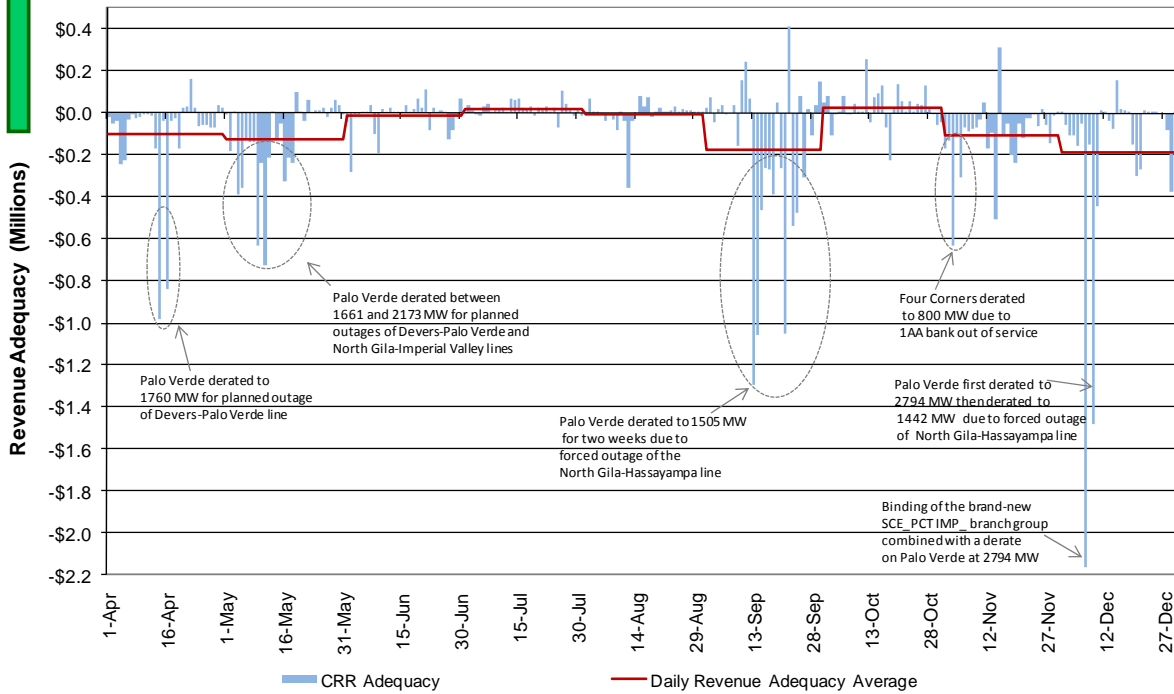
Source: CAISO, Annual Market Performance CRR Report, 3/2011

Convergence of CRR Prices & Payoffs: Individual CRRs



Source: G. Bautista, IEEE PES

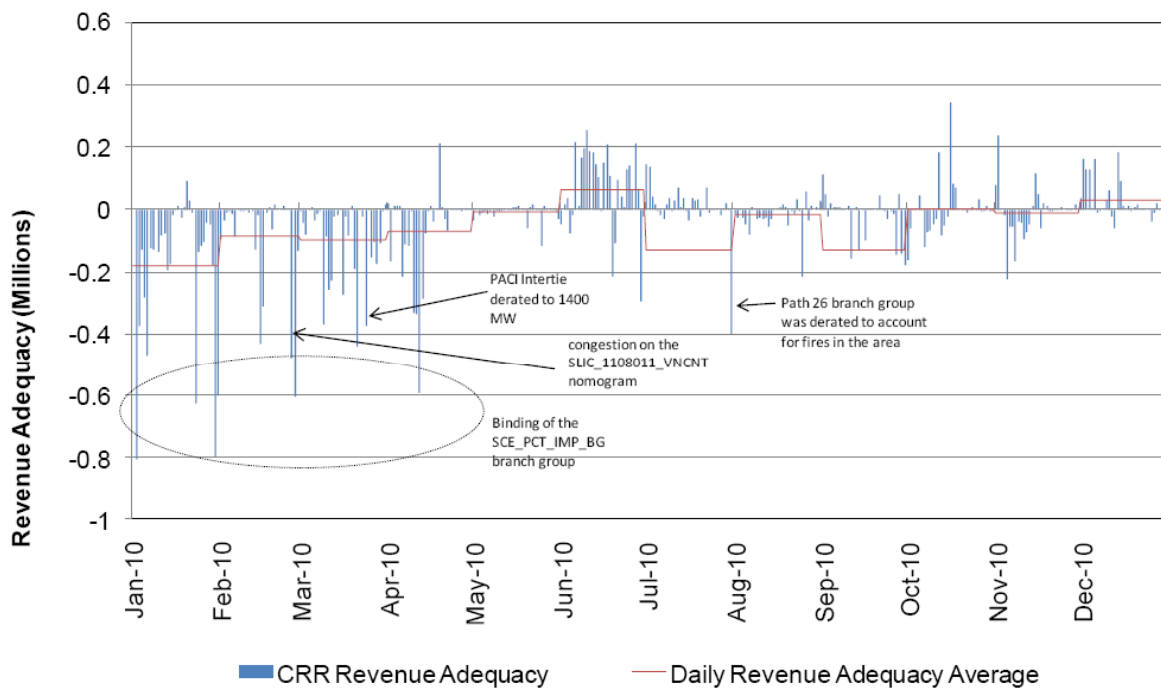
CRR Revenue (In)Adequacy 2009



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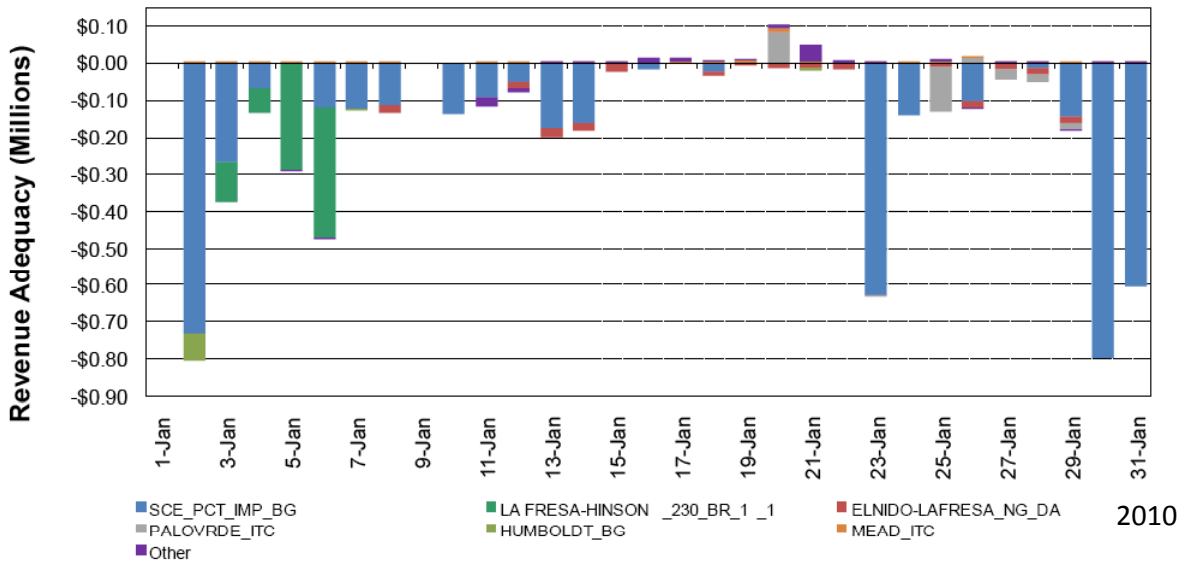
Source: G. Bautista

CRR Revenue (In)Adequacy 2010

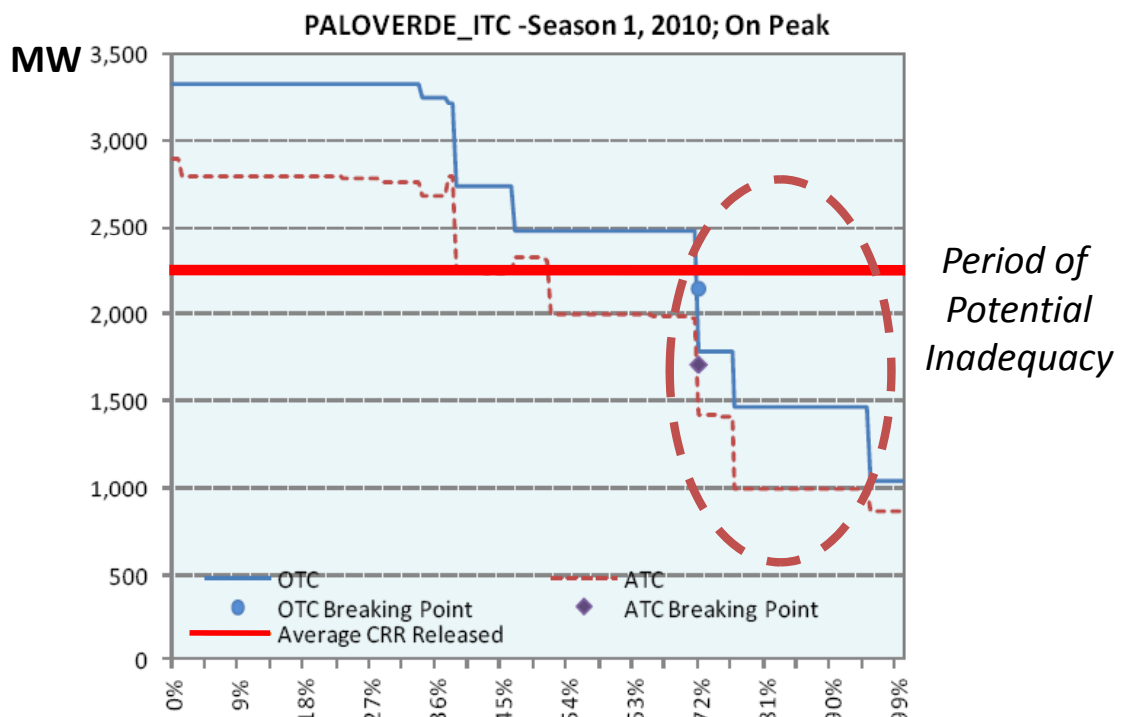


Source: CAISO, Annual Market Performance CRR Report, 3/2011

Example: Daily (In)Adequacy by Transmission Element

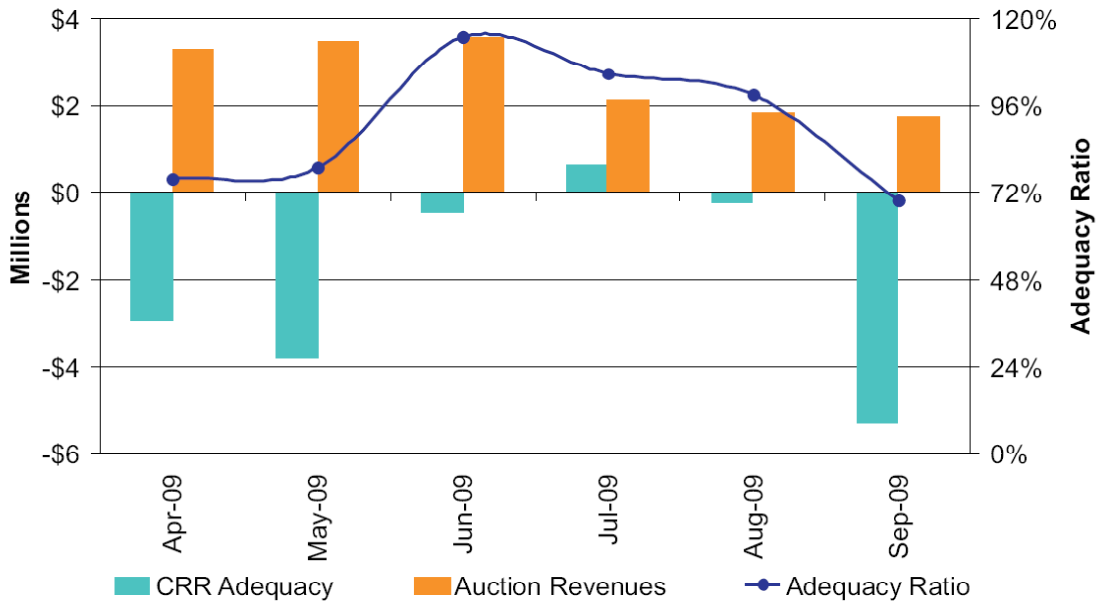


Example Transmission Capacity Duration Curve Versus Allocated FTRs



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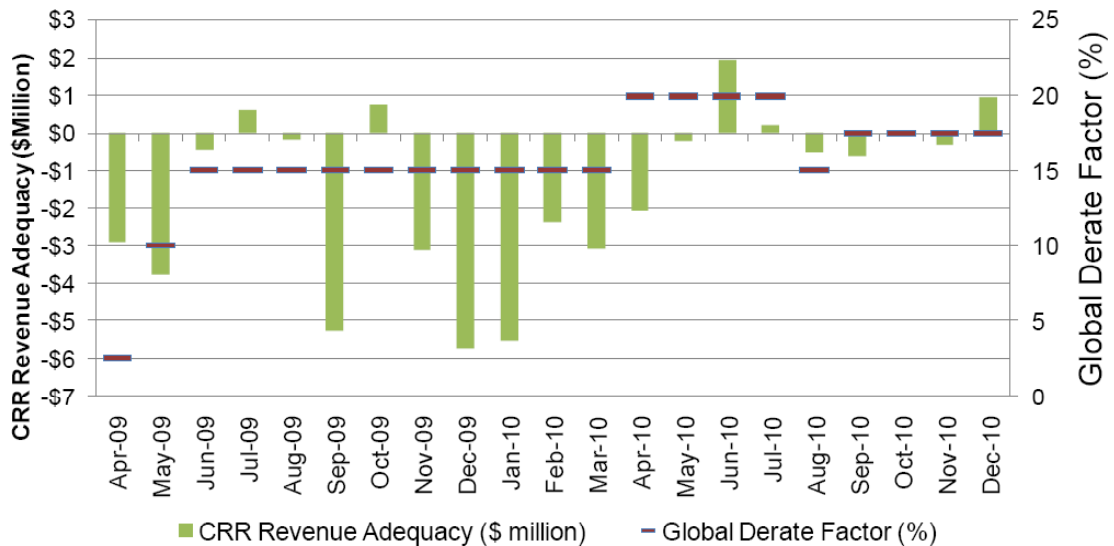
How to Cope with Revenue Inadequacy: Method 1: Draw on Auction Revenues



Source: G. Bautista

CAISO

How to Cope with Revenue Inadequacy: Method 2: Derate Monthly Auction Qs

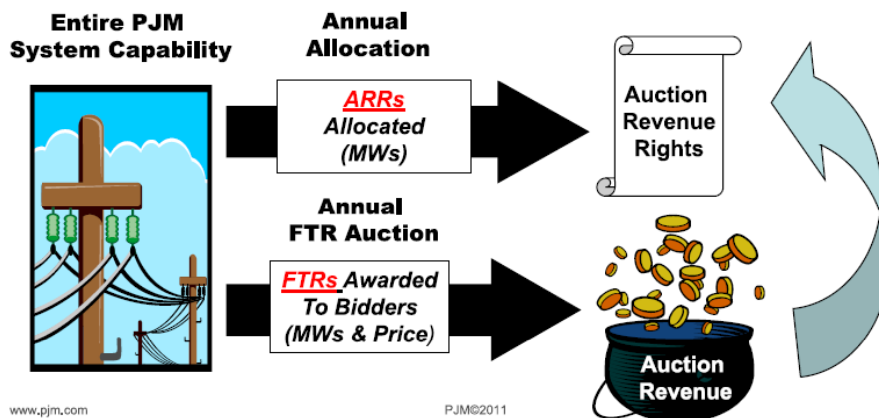


Source: CAISO, Annual Market Performance CRR Report, 3/2011

An Auction Revenue Rights & Financial Transmission Rights System

ARR/FTR Relationship

ARRs provide revenue stream to the firm transmission customer to offset purchase price of FTRs



Source: PJM Workshop on ARR and FTR Market 2011/2012

How to Acquire FTRs?

1. Annual FTR Auction
 - Full system capability minus Long-Term FTRs
2. Long-Term FTR Auction
 - Buy residual system capability assuming self-scheduling of ARRs
3. Monthly FTR auction
 - Buy 'left over' capability
4. Bilateral trading on secondary market

Source: PJM Workshop on ARR and FTR Market 2011/2012

Who Owns FTRs?

Organization Type	FTR Direction		
	Prevailing Flow	Counter Flow	All
Physical	42.7%	27.5%	38.8%
Financial	57.3%	72.5%	61.2%
Total	100.0%	100.0%	100.0%

Source: PJM State of Market Report, 2011

Secondary Bilateral FTR Market Volume

Planning Period	Hedge Type	Class Type	Volume (MW)
2009/2010	Obligation	24-Hour	1,535
		On Peak	3,979
		Off Peak	4,132
		Total	9,646
	Option	24-Hour	30
		On Peak	0
Off Peak		0	
	Total	30	
2010/2011*	Obligation	24-Hour	1,729
		On Peak	10,573
		Off Peak	12,740
		Total	25,042
	Option	24-Hour	20
		On Peak	0
Off Peak		0	
	Total	20	

* Shows ten months ended 31-Mar-2011

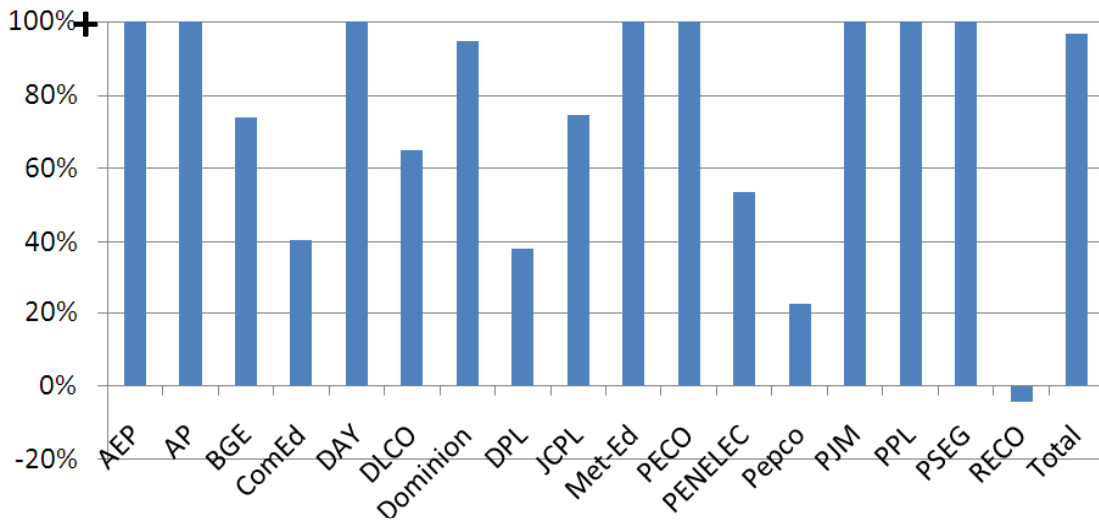
Source: PJM State of Market Report, 2011

PJM

Effectiveness of ARR & FTRs as Congestion Hedge (7/10-3/11)



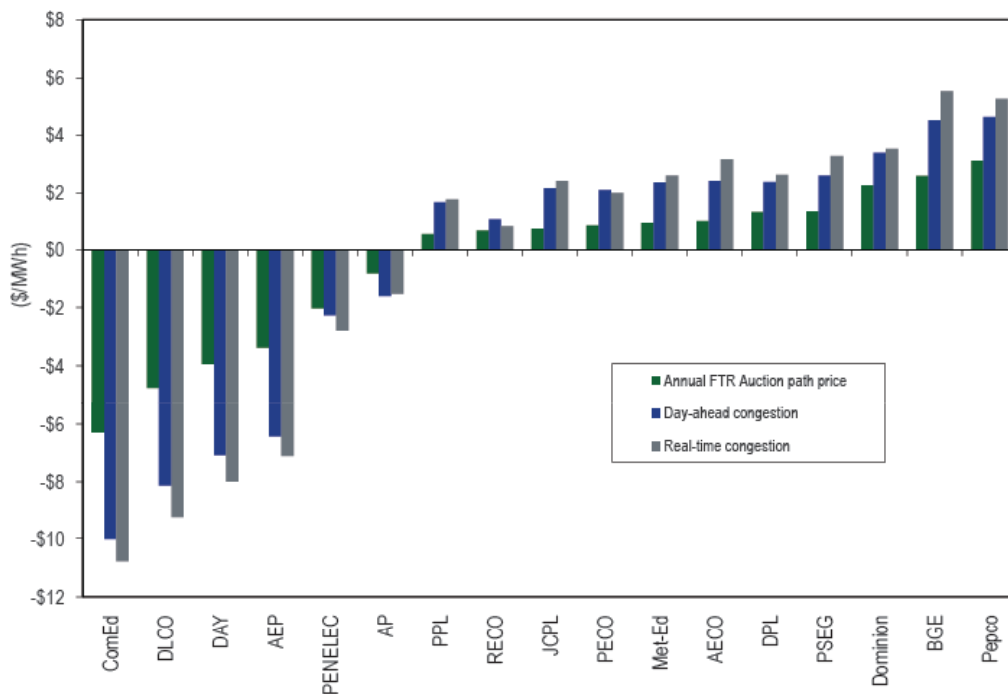
Percent Hedged



Source: PJM State of Market Report, 2011

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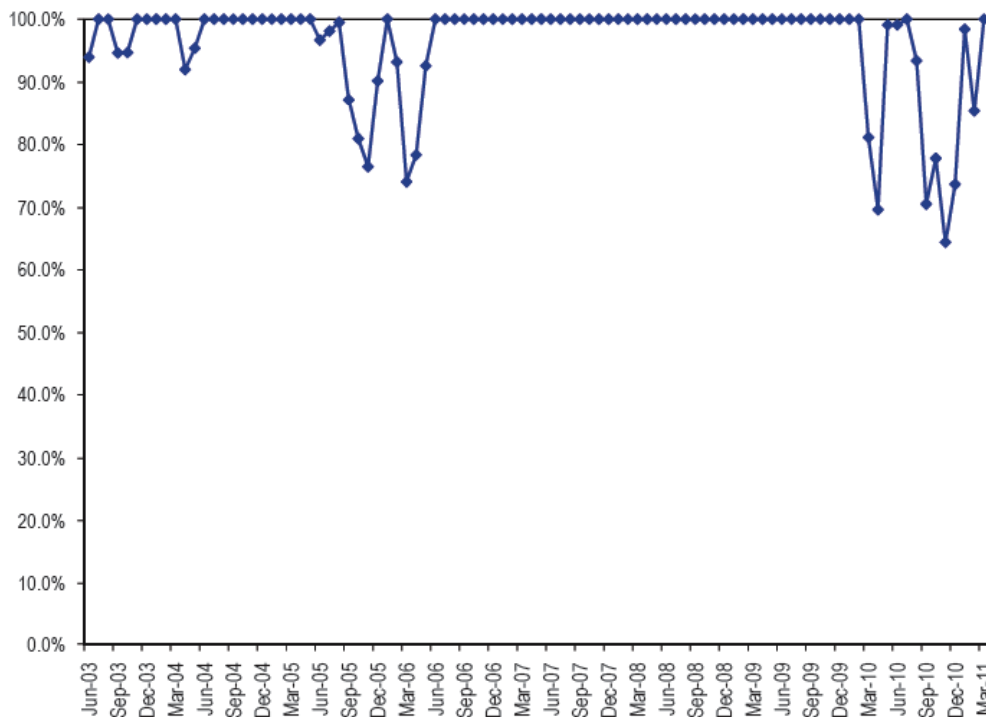
Convergence of CRR Prices & Payoffs: By Zone (To Western Hub)



Source: PJM State of Market Report, 2011

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Revenue (In)Adequacy: FTR Payout Ratio by Month



Source: PJM State of Market Report, 2011

Market Power

PJM Market Monitoring Unit:

- Market structure; participant behavior; performance *all competitive*

CAISO MMU:

- Annual report doesn't even mention market power

Review: Performance?

- Activity → *Increasing*
- Congestion hedging → *Largely effective*
- Convergence of FTR prices and payoffs →
Improving but far from complete
- Revenue adequacy → *Ongoing annoyance*
- Other credit problems →
Power Edge's spectacular failure
- Market power → *No problems noticed*

Thank you!