

Reliability Pricing Model Variable Resource Requirement (VRR) Curve

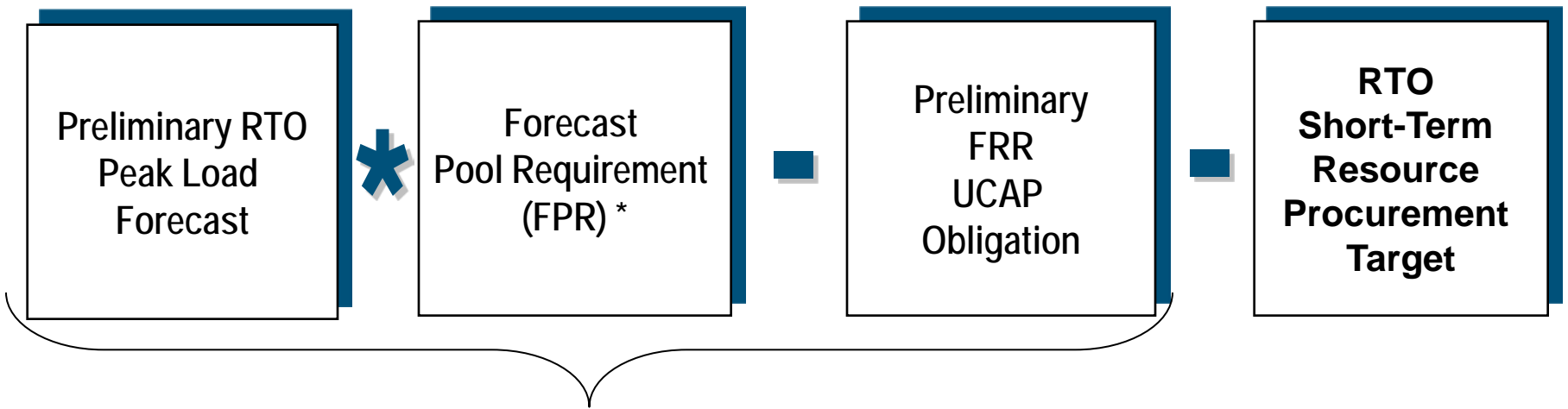
RPM Training – Appendix B
February 2012

- VRR Curve is determined prior to the Base Residual Auction
- Curve parameters are posted by February 1st prior to the Base Residual Auction
- Posted curve parameters may be adjusted prior to the Base Residual Auction to account for entities that have elected the FRR Alternative

- Target Level
- Cost of New Entry (CONE)
- Net Energy & Ancillary Services (E&AS)
Revenue Offset

Beginning no later than for 2015/16 DY and continuing no later than for every third DY thereafter, PJM will perform a review of the shape of the VRR Curve, CONE values, and E&AS offset methodology.

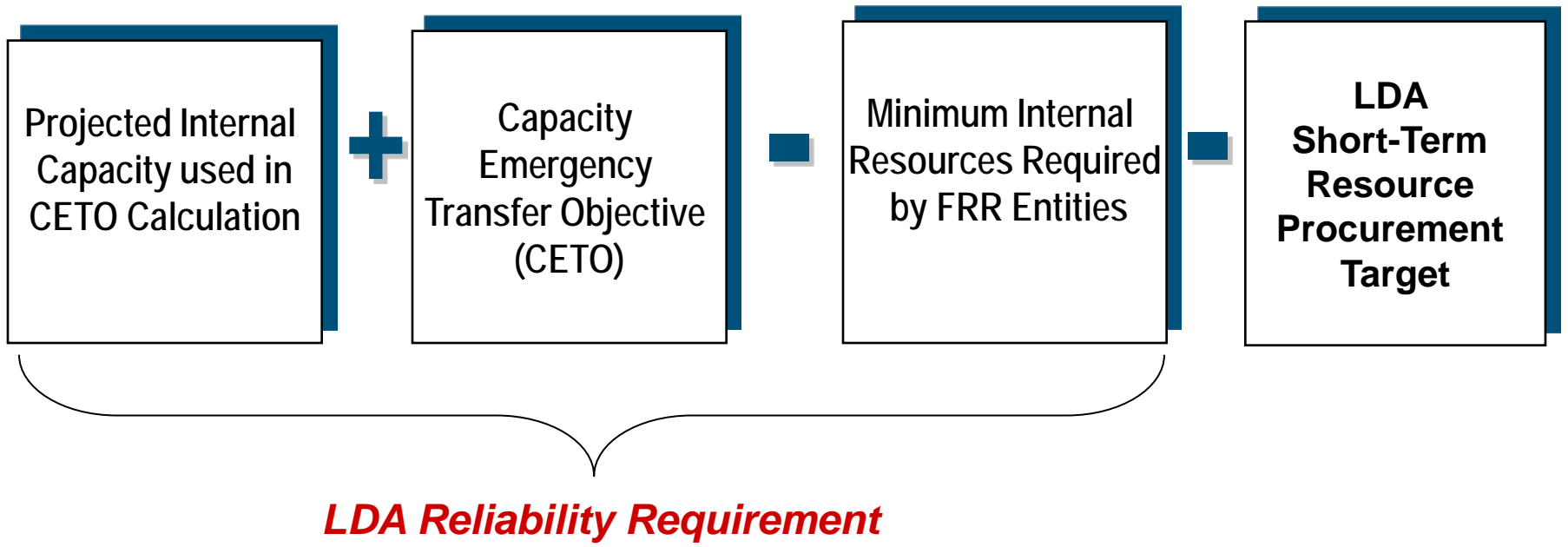
- The **PJM RTO Target Level** is determined as PJM Region Reliability Requirement less RTO Short-Term Resource Procurement Target.
- PJM Region Reliability Requirement is equal to Preliminary RTO Peak Load Forecast times Forecast Pool Requirement less Preliminary FRR UCAP Obligations in PJM. Region.



PJM Region Reliability Requirement

* $FPR = (1 + IRM) * (1 - \text{Pool-wide Avg. EFORD})$

- Individual **LDA Target Level** is determined as LDA Reliability Requirement less LDA Short-Term Resource Procurement Target.
- LDA Reliability Requirement is equal to Projected Internal Capacity (UCAP) used in CETO calculation plus CETO less the minimum Internal Resources required by FRR Entities located in the LDA.



- Based on the cost to install a new combustion turbine.
- FERC approved the following updated CONE values for the 2015/16 DY.
- A procedure to adjust the value of Cost of New Entry based Handy-Whitman Index of Public Utility Construction Costs was approved by FERC on October 30, 2009.

CONE Values for 2015/2016 (in UCAP terms):

Cone Region 1

AE, DPL, JCPL,
PECO, PSEG, &
RECO

\$313/MW-day

Cone Region 2

BGE & PEPCO

\$267/MW-day

Cone Region 3

AEP, APS,
COMED, DAY,
ATSI, DEOK, DUQ

\$358/MW-day

Cone Region 4

METED,
PENELEC, & PPL

\$294/MW-day

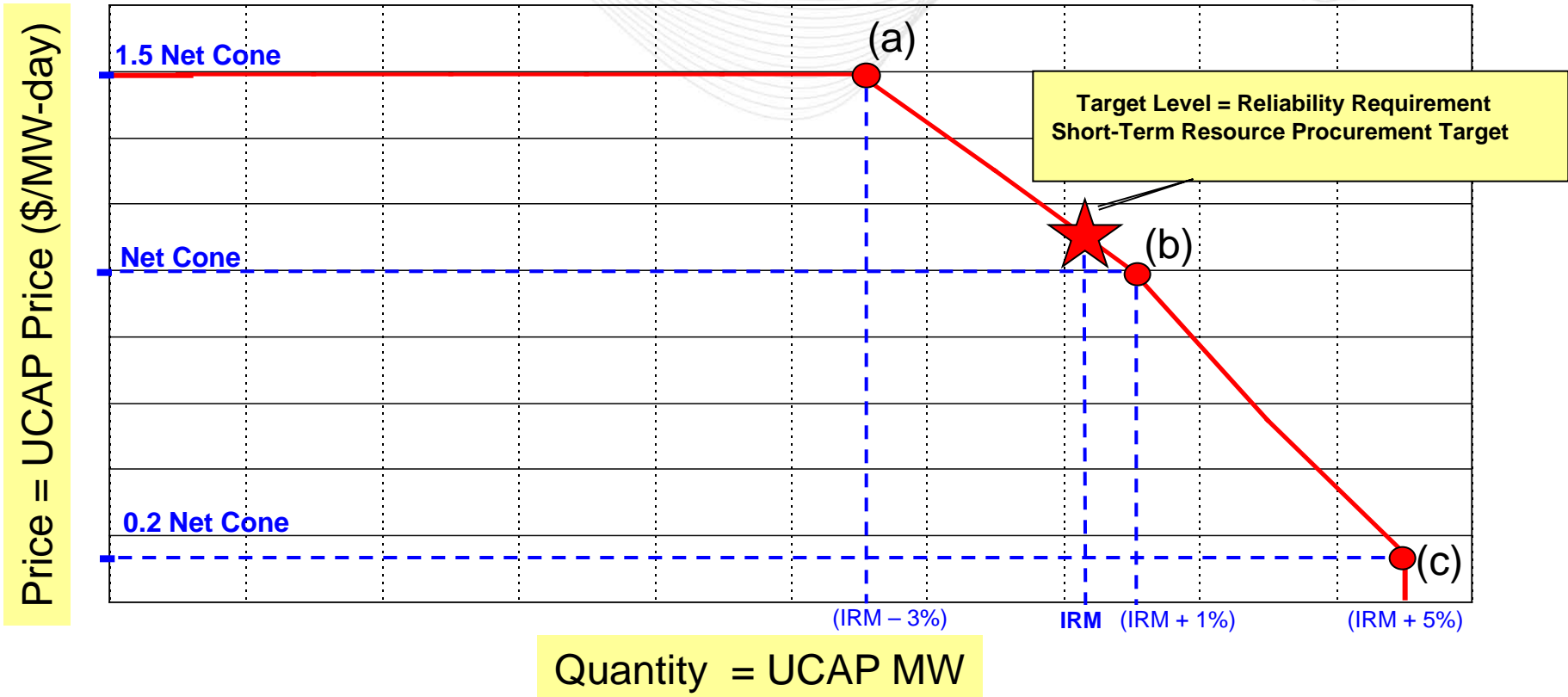
Cone Region 5

DOM

\$287/MW-day

If the LDA combines transmission zones with differing CONE values, the lowest value is used for the development of the VRR Curve in the LDA.

- **Net E&AS Revenue Offset is calculated in ICAP terms:**
 - Using historical averages of E&AS revenue data for a reference combustion turbine.
 - Net E&AS Offset is calculated using a historical average of the three most recent calendar years.



A VRR Curve is defined for the PJM Region.
Individual VRR Curves are defined for each Constrained LDA.

- The price (y-axis) in UCAP terms at each point on the VRR curve is calculated as:

Net CONE

$$\text{Point (a) = } \frac{[1.5 (\text{CONE} - \text{Net E\&AS})]}{1 - \text{Pool Wide Avg EFORd}}$$

$$\text{Point (b) = } \frac{[1.0 (\text{CONE} - \text{Net E\&AS})]}{1 - \text{Pool Wide Avg EFORd}}$$

$$\text{Point (c) = } \frac{[0.2 (\text{CONE} - \text{Net E\&AS})]}{1 - \text{Pool Wide Avg EFORd}}$$

Since Net CONE is in ICAP terms we divide by (1 – Pool Wide Average EFORd) to convert the price to UCAP terms.

- The quantity for each point (x-axis) on the VRR curve is based on the Reliability Requirement (*Rel Req*) in unforced capacity less Short-Term Resource Procurement (STRP) Target (or Forecast ILR Obligation prior to 2012/2013):

$$\text{Point (a) = } \left[\text{Rel Req} \frac{(100\% + \text{IRM} - 3\%)}{(100\% + \text{IRM})} \right] - \text{STRP Target}$$

$$\text{Point (b) = } \left[\text{Rel Req} \frac{(100\% + \text{IRM} + 1\%)}{(100\% + \text{IRM})} \right] - \text{STRP Target}$$

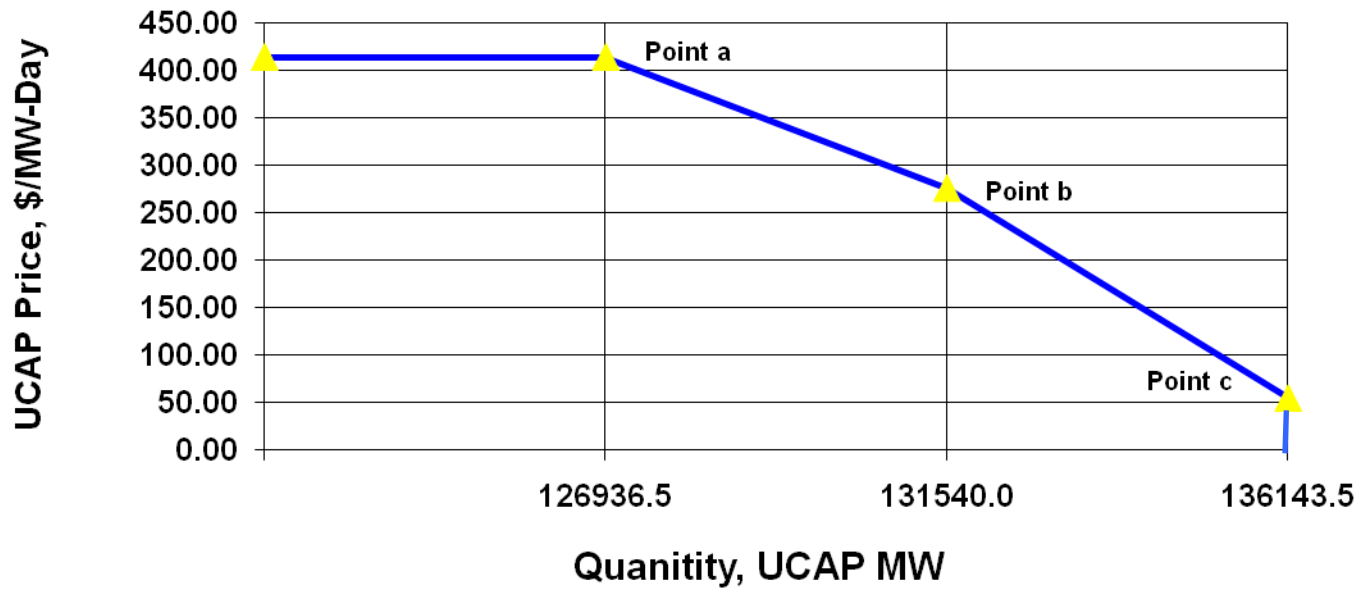
$$\text{Point (c) = } \left[\text{Rel Req} \frac{(100\% + \text{IRM} + 5\%)}{(100\% + \text{IRM})} \right] - \text{STRP Target}$$

Plot VRR Curve using the following three reference points:

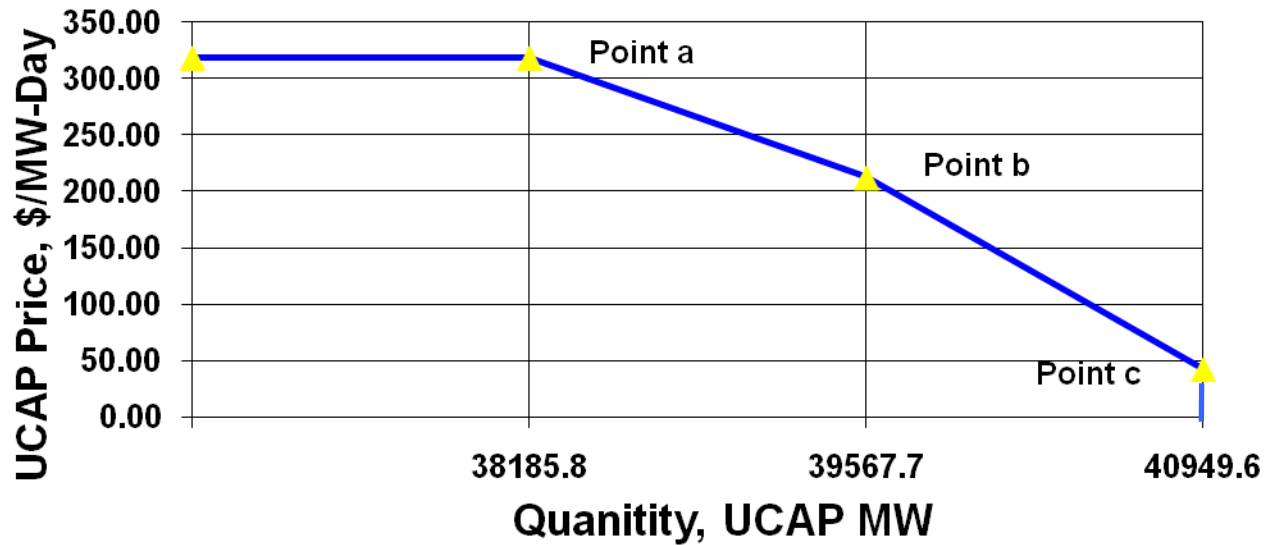
Point	Price (UCAP Price)	Quantity (UCAP MW)
a	$\frac{[1.5(CONE - NetE \& AS)]}{1 - Pool\ Wide\ EFORD}$	$\left[Rel\ Req \frac{(100\% + IRM - 3\%)}{(100\% + IRM)} \right] - STRP\ Target$
b	$\frac{[1.0(CONE - NetE \& AS)]}{1 - Pool\ Wide\ EFORD}$	$\left[Rel\ Req \frac{(100\% + IRM + 1\%)}{(100\% + IRM)} \right] - STRP\ Target$
c	$\frac{[0.2(CONE - NetE \& AS)]}{1 - Pool\ Wide\ EFORD}$	$\left[Rel\ Req \frac{(100\% + IRM + 5\%)}{(100\% + IRM)} \right] - STRP\ Target$

Where:	Rel Req =	STRP Target =
RTO VRR Curve	PJM Region Reliability Requirement	RTO Short Term Resource Procurement (STRP) Target
LDA VRR Curve	LDA Reliability Requirement	LDA Short Term Resource Procurement (STRP) Target

PJM Variable Resource Requirement Curve with FRR Adjustment 2012/2013



EMAAC Variable Resource Requirement Curve 2012/2013



SWMAAC Variable Resource Requirement Curve 2012/2013

