

Avoidable Cost Rate (ACR) and Variable Operating and Maintenance (VOM) timing

Cost Development Subcommittee

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Background Information

The Cost Development Subcommittee (CDS) is responsible for developing, reviewing, and recommending standard procedures for calculating the costs of products or services provided to PJM when those products or services are required to be provided to PJM at a cost-based rate. These cost based offers are used by PJM to schedule generation in cases in which structural market power is found to exist.

Currently, the CDS is discussing Variable Operating and Maintenance (VOM) costs and reviewing the Manual 15: Cost Development Guidelines definitions for clarity and to ensure appropriate recovery of costs. In a subset of this discussion, the proposals being considered to move overhaul and inspection costs for Combustion Turbines (CTs) and Combined Cycle Units (CCs) into the capacity market and remove them from energy market component of VOM. The drive behind this approach is that some stakeholders believe that since overhauls and inspections are more of a fixed cost than a variable cost, it would be more appropriate to recovery those costs through capacity market rather than the energy market.

While reviewing Variable Operating and Maintenance costs, the CDS requested this document to explain the relationship between Avoidable Cost Rate (ACR) and VOM with respect to overhauls and inspections for CTs and CCs. ACR is a component of the Market Seller Offer Cap calculated in the RPM capacity market. Currently, costs for inspections and overhauls for these unit types can only be recovered through VOM in the energy market. The CDS is considering the redefinition of VOM to move overhaul and inspection costs into the Reliability Pricing Model (RPM) capacity market. This paper will explain the mathematical relationship between putting overhauls in ACR or VOM. The CDS problem statement defines the issue as:

The current definition of incremental or short run marginal costs, in Manual 15 “Cost Development Guidelines” does not clearly specify the components of variable operations and maintenance (VOM) that are incremental and includable in cost-based energy offers. Some components of VOM may currently not be includable in cost-based offers in the appropriate market (capacity market or energy market).¹

This document will outline the effects of different timing on the removal of overhauls and inspections from energy cost offers, as well as the addition of overhaul and inspection costs into the RPM Capacity Market.² At this time, these are proposed changes being considered, and are not currently endorsed by the CDS. Part of the language the CDS is considering changing in Manual 15 is:

Long Term Maintenance Expenses - Combustion Turbine and Combined Cycle Plant major inspection and overhaul expenses may be included in variable maintenance expenses regardless of accounting methodology if they meet specific criteria.³

Since overhauls and inspections for CTs and CCs can be recovered in VOM, they cannot be recovered in the RPM offer cap. The tariff states that avoidable expenses are incremental expenses directly required to operate a Generation Capacity Resource that a Generation Owner would not incur if such a generating unit did not operate in the Delivery Year or meet Availability criteria during Peak-Hour Periods during the Delivery Year. For the purpose of determining an Avoidable Cost Rate, avoidable expenses shall exclude variable costs recoverable under cost-based

¹Problem Statement to Address VOM in CDS <http://www.pjm.com/~media/committees-groups/subcommittees/cds/20110808/20110808-item-04d-vom-problem-statement.ashx>

²Solution Matrix from September 2011 CDS <http://www.pjm.com/~media/committees-groups/subcommittees/cds/20110912/20110912-post-meeting-materials-cds-collaborative-solution-matrix-vom.ashx>

³ Manual 15: Cost Development Guidelines <http://pjm.com/~media/documents/manuals/m15.ashx>

offers to sell energy from operating capacity on the PJM Interchange Energy Market under the Operating Agreement.
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Reliability Pricing Model (RPM) and Energy Market Relationship

Overhaul and inspection costs are currently included in VOM for CTs and CCs. Basic VOM and ACR equations are related in the following ways:

$$RPM\ Offer\ Cap = ACR - Net\ Revenues$$

Where ACR is the Avoidable Cost Rate and Net Revenues are the total revenues earned by a unit in PJM's Energy and Ancillary Service Markets less variable costs. However, Net Revenues obscures the underlying components of gross revenue and the cost offer.

$$RPM\ Offer\ Cap = ACR - (Gross\ Revenue - Energy\ cost\ offer)$$

The energy cost offer can be further split into the following components:

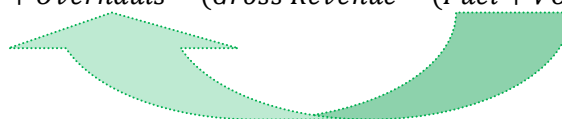
$$Energy\ Cost\ Offer = Fuel + VOM + Overhauls$$

The energy market cost offer for CTs and CCs currently includes overhaul and inspection costs so we can show that the cost offer is a function of fuel, VOM, and Overhauls.

$$RPM\ Offer\ Cap = ACR - (Gross\ Revenue - (Fuel + VOM + Overhauls))$$

By expanding the components of the energy market offer from the above equation, it is then mathematically possible to move overhauls out of the energy market offer and into capacity market without a fundamental change to the above equation.

$$RPM\ Offer\ Cap = ACR + Overhauls - (Gross\ Revenue - (Fuel + VOM))$$



By making the change, instead of recouping overhauls in the energy market, the revenue needed to support overhauls would now be recovered in the capacity market. This is assuming that this rule change would not affect the marginal price of energy and ancillary services and that timing of the markets is not an issue.

Market Timing

In the current system RPM auctions are three years in the future, and depend on three historical years of net revenues (also known as Energy and Ancillary Service Offset). For the upcoming 2015/2016 auction happening in May 2012, a unit's RPM cost offer would look like the following:

$$RPM\ Offer^{DY\ 2015-2016} = ACR^{2011\ escalated\ to\ 15/16} - Net\ Revenues_{2009,2010,2011}$$

In May 2012 PJM will procure capacity for the 2015-2016 delivery year (June-May). A unit's RPM offer cap for the 2015/2016 delivery year would be equal its Avoidable Cost Rate for 2011 escalated to 2015/2016 delivery year minus the average Net Revenues for 2009-2011.

⁴CDS Educational Paper for VOM background <http://pjm.com/~media/committees-groups/subcommittees/cds/20110228/20110228-item-06a-cds-educational-paper-for-vom.ashx>

CDS Scenarios Examined

At the September meeting the CDS developed different scenarios to deal with the timing issues involved in moving overhauls and inspections into the capacity market.⁵

Scenario 1:

Change VOM methodology as of 2015/2016 BRA Auctions. Add overhauls into ACR in May 2012 at the time of the 2015/2016 Delivery Year Auction. Take Overhauls out of VOM beginning 6/1/2015 (start of 2015/2016 DY)

Again, the first capacity auction for the 2015/2016 delivery year will happen in May 2012. The RPM offer for Delivery Year 15/16 would include ACR 2011 costs escalated to 2015/2016.

$$RPM Offer^{15-16} =$$

$$ACR (w/Overhauls)^{2011 \text{ escalated to } 15/16} - Net Revenues(w/ Overhauls)_{AVG(2009-2011)}$$

In this scenario, both the ACR and the net revenues offset include inspection and overhauls.

$$RPM Offer Cap = ACR + Overhauls - (Gross Revenue - (Fuel + Overhauls + VOM))$$

So the cost of overhauls would be imbedded into the cost offer, and subtracted from gross revenue.

$$RPM Offer Cap = ACR + \cancel{Overhauls} - Gross Revenue - Fuel - \cancel{Overhauls} - VOM$$

$$RPM Offer Cap = ACR - Gross Revenue - Fuel - VOM$$

The RPM Offer would include inspection and overhauls in both ACR and net revenues offset all years until 2021/2022:

$$RPM Offer^{DY 2021-2022} = ACR^{2019 \text{ escalated to } 21/22} - Net Revenues_{(2016,2017,2018)}$$

This is because 2016 will be the first full year to not include inspection and overhauls in the energy market cost offer.

Scenario 2:

Switch to new VOM methodology as of Jan 1, 2012. Anything moved out of VOM will be adding into ACR offers for 2015/2016 DY at the May 2012 Base Residual Auction.

This is the same as the scenario above except that 2012 would be the first year to not include VOM and so the first delivery year to not include overhauls in both the cost offer and ACR is 2018/2019 auction in May 2015.

$$RPM Offer^{DY 2018-2019} = ACR^{2015 \text{ escalated to } 18/19} - Net Revenues_{2012,2013,2014}$$

This is because 2012 will be the first full year to not include inspection and overhauls in VOM.

⁵ Collaborative Solution Matrix September 2011 <http://www.pjm.com/~media/committees-groups/subcommittees/cds/20110912/20110912-post-meeting-materials-cds-collaborative-solution-matrix-vom.ashx>

Scenario 3:

Take out overhauls in VOM methodology as of June 1, 2012. Overhauls will be added into ACR offers for 2015/2016 DY during the May 2012 Base Residual Auction.

Again, the first capacity auction for the 2015/2016 delivery year will happen in May 2012. The RPM offer for Delivery Year 15/16 would include ACR 2011 costs escalated to 2015/2016.

$$RPM\ Offer^{DY\ 2015-2016} = ACR^{2011\ escalated\ to\ 15/16} - Net\ Revenues_{AVG(2009,2010,2011)}$$

In this scenario, both the ACR and the net revenues offset include inspection and overhauls.

$$RPM\ Offer\ Cap = ACR + Overhauls - (Gross\ Revenue - (Fuel + Overhauls + VOM))$$

So the cost of overhauls would be imbedded into the cost offer, and subtracted from gross revenue.

$$RPM\ Offer\ Cap = ACR + \cancel{Overhauls} - Gross\ Revenue - Fuel - \cancel{Overhauls} - VOM$$

$$RPM\ Offer\ Cap = ACR - Gross\ Revenue - Fuel - VOM$$

The RPM Offer would include inspection and overhauls in both ACR and net revenues offset all years until 2019/2020:

$$RPM\ Offer^{DY\ 2019-2020} = ACR^{2016\ escalated\ to\ 19/20} - Net\ Revenues_{(2013,2014,2015)}$$

This is because 2013 will be the first full year to not include inspection and overhauls in VOM.

Scenario 4:

Costs may be transitioned immediately (as these costs may already be included in the (RPM price – ACR)). Implementation when language approved; No Transition Required.

How this scenario plays out depends upon when the implementation language is approved.

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