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| PrincipleNumber | 1.1 | Principle Title | Ancillary Service Demand Curves and Current Market Price Adders |
| Date Posted | October 14, 2019 |
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| Executive Summary | The pricing of reserves and energy with Real-Time Co-Optimization (RTC) will reflect the use of demand curves based on the Operating Reserve Demand Curve (ORDC) while continuing to adjust for defined out-of-market actions taken by ERCOT to maintain reliability. |
| Principle Description | The purpose of Key Principle 1.1, Ancillary Service Demand Curves (ASDCs) and Current Market Price Adders, is to make adjustments to pricing rules as follows:1. ORDC price adders will be eliminated along with the associated Settlement.2. An ASDC for each Ancillary Service (AS) product will be an input in determining Market Clearing Prices for Capacity (MCPCs) in Real-Time.3. In aggregate, ASDCs will reflect the pricing outcomes expected under the 2020 shifted ORDC.4. The process of the Reliability Deployment Price Adder for out-of-market actions will be expanded to also consider changes in MCPCs. |
| RTCTF Discussion  | On 8/9/19, ERCOT staff presented material introducing KP1.1 subsections (1) through (5).On 8/27/19, the RTCTF discussed KP1.1 subsections (1) through (5) and reached consensus on subsections (1), (3), and (4).On 9/19/19, the RTCTF discussed subsection (4) and modified the details of the single aggregate ORDC for disaggregation into individual ASDCs. RTCTF also adopted Siddiqi proposal to subsection (5) defining the disagreggation of the ORDC into ASDCs, and RTCTF added language to ensure this functionality is implemented as parameters to allow flexibility for future changes.On 10/9/19, the RTCTF discussed and reached consensus on KP1.1 subsection (5). Also, ERCOT gave an overview on the concepts for principle (6). |
| TAC Action Requested | On 9/25/19, TAC vote to endorse KP1.1 subsections (1), (3), and (4) for purposes of informing the Board.On 10/23/19, TAC vote to endorse KP1.1 subsection (5) for purposes of informing the Board. |
| TAC Action Summary | On 9/25/19, TAC voted to endorse KP1.1 subsections (1), (3), and (4) for purposes of informing the Board. |
| ERCOT Opinion  |  |
| Board Action Requested |  |
| Board Action Summary |  |

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| Proposed Principle Language |

# *Principle Concepts for TAC Endorsement*

5) ERCOT will design and implement parameters to represent the disaggregation of ASDCs so that potential future changes in values and distribution will not require system changes. The following steps will be taken to disaggregate the single aggregate ORDC into individual ASDCs:

a. Place Reg-Up requirement at the highest priced MWs on the aggregate ORDC;

b. Place RRS requirement at the highest priced open MWs on the aggregate ORDC;

c. Place ERCOT Contingency Reserve Service (ECRS) requirement at the highest priced open MWs on the aggregate ORDC;

d. Place Non-Spinning Reserve (Non-Spin) requirement at the highest priced open MWs on the aggregate ORDC; and

e. Fill remaining MWs on the aggregate ORDC priced at >= $0.01 as NSRS.

# *Principle concepts Previously Endorsed by TAC*

1) The ORDC price adders and the associated process of determining those price adders in Real-Time are eliminated under Real-Time Co-optimization (RTC). Instead, the Real-Time market (RTM) optimization will use ASDCs as input and determine Market Clearing Prices for Capacity (MCPCs) for each of the individual AS products.

3) Real-Time AS Settlement will no longer include the Reliability Deployment Price Adder.  Instead, the MCPCs for AS resulting from including the impacts of the pricing run will be used for Real-Time AS imbalance Settlement.

4) To reasonably reflect the current RTM pricing outcomes expected with the ORDC methodology changes being made starting in March, 2020, the following steps will be taken to develop a single aggregate ORDC for disaggregation into individual ASDCs:

a. For all Security-Constrained Economic Dispatch (SCED) where the sum of RTOLCAP and RTOFFCAP is less than 10,000MW, use the historical RTOLCAP and RTOFFCAP values to calculate the composite LOLP and composite price with composite price defined as:

$$\left(0.5\*\left(1-pnorm\left(RTOLCAP-X, 0.5\*925, 0.707\*1213\right)\right)+0.5\*\left(1-pnorm\left(RTOLCAP+RTOFFCAP-X, 925, 1213\right)\right)\right)$$

$$\*\left(VOLL-min\left(System Lambda, 250\right)\right)$$

b. To account for lower reserve level areas where there are no historical observations, create a single point using the following assumptions:

i. RTOFFCAP = 0, RTOLCAP = 2,000MW

ii. Set System Lambda equal to the average of system lambda, with the historical values capped at $250/MWh, during SCED timestamps with less than or equal to 4,000MW of total reserves

c. Using the results of (a) and (b) above, use regression methods to fit a curve to the average reserve pricing outcomes for the various MW reserve levels.

# *Principle Concepts in DisCussion at RTCTF*

2) The existing process of having a pricing run to capture the effects of reliability deployments will continue.  However, the pricing run will be modified to also co-optimize energy and AS.  To account for the co-optimization in the pricing run, the following modifications will be made to the inputs:

a. AS offers from Reliability Unit Commitment (RUC) instructed Resources, including RMR Resources, will be removed for the pricing run or be assigned a pre-defined high AS offer price.

6) The Reliability Deployment Price Adder process will apply to both energy and AS, and the adder for each AS product will be the positive increase in MCPC between the dispatch and pricing run.

# *Future Decision Points and Issues for Developing Principle Concepts*

1. Determining the shape and price points for the Regulation Down ASDC

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| Applicable Protocol Section(s) |  |
| Impacted System(s) / Application(s) |  |