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| PrincipleNumber | 1.3 | Principle Title | Offering and Awarding Ancillary Services in Real-Time |
| Date Posted | November 26, 2019 |
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| Executive Summary | Real-Time Co-Optimization (RTC) will allow Qualified Scheduling Entities (QSEs) to offer and be awarded Ancillary Services (AS) in Real-Time. |
| Principle Description | The purpose of Key Principle 1.3, Offering and Awarding Ancillary Services in Real-Time is to outline the key mechanisms and timelines for submitted AS Offers, as well as those considered and awarded under RTC. Specifically, this principle addresses the following concepts: (a) AS Offer structure and timing; (b) QSE telemetry for updating available capacity from AS Offers; (c) Under-frequency relay (UFR) Load Resource scheduling for Responsive Reserve (RRS) UFR and ERCOT Contingency Reserve Service (ECRS); (d) On-Line hydro Generation Resource (hydro Generation Resources not operating in synchronous condenser fast-response mode) scheduling for RRS, Non-Spinning Reserve (Non-Spin), and ECRS; and(e) Constraints to be used for the RTC clearing process.  |
| RTCTF Discussion  | On 6/21/19, ERCOT provided a presentation and whitepaper discussing constraint formulation for RTC. There was specific discussion on KP1.3 subsections (1), (2), and (4).On 7/12/19, RTCTF discussed comments that ERCOT received, and ERCOT provided a presentation looking at telemetered ramp rates and constraints for Combined Cycle Generation Resources (CCGRs).On 8/9/19, South Texas Electric Cooperative Inc. (STEC) presented proposed changes to KP1.3, with a focus on the treatment of hydro Resources (subsection (3)). ERCOT also presented on a number of topics related to KP1.3, including discussion on subsections (5) through (9). On 8/27/19, ERCOT continued presentations on KP1.3, including subsection (9). ERCOT staff also presented material introducing KP1.3 subsections (10) through (13).On 9/19/19, RTCTF reviewed ERCOT’s examples of AS deployment and re-procurement, including impacts to Load Resources. RTCTF reviewed Siddiqi proposal, but group consensus was to continue forward on ERCOT’s proposal in subsection (8). RTCTF modified (9) to include Real-Time feedback to impacted QSEs with mitigated AS limits related to AS infeasibility.On 10/9/19, RTCTF discussed KP1.3 subsections (1) through (15) and reached consensus on subsections (1), (2), (3), (4)(a), (4)(b), (5), (6), (7) (8), (10), and (11).On 10/30/19 RTCTF discussed Exelon comments to subsection (4)(c-d) and agreed to move them to KP8. For subsection (12)(c), ERCOT discussed and plans to develop Protocols whereby the AS proxy offer price floors will be a separate configurable parameter that will be set by TAC as a single value for each AS product and product sub-category. For subsection (16) (AS Substitution), RTCTF reached consensus to remove this concept from KP1.3. RTCTF reached consensus on subsections (8)(c), (9), (12), and (13).On 11/19/19, RTCTF discussed Exelon comments to previously TAC-approved subsection (11) as well as the new subsection (15) proposed in Siddiqi comments.  |
| TAC Action Requested | On 10/23/19, TAC vote to endorse KP1.3 subsections (1), (2), (3), (4)(a), (4)(b), (5), (6), (7) (8), (10), and (11) for purposes of informing the Board.On 11/20/19, TAC vote to endorse KP1.3 subsections (8)(c), (9), (12), and (13) for purposes of informing the Board. |
| TAC Action Summary | On 10/23/19, TAC voted to endorse KP1.3 subsections (1), (2), (3), (4)(a), (4)(b), (5), (6), (7) (8), (10), and (11) for purposes of informing the Board.On 11/20/19, TAC voted to endorse KP1.3 subsections (8)(c), (9), (12), and (13) 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*

None

# *Principle concepts Previously Endorsed by TAC*

1) QSEs will have ability in Real-Time to indicate whether a Resource is temporarily unable to provide AS due to operational constraints.

2) UFR Load Resources will be able to self-provide RRS UFR and ECRS; the amount of which will based on Day-Ahead Market (DAM) and AS trades.

3) On-Line hydro Generation Resources not operating in Synchronous Condenser Fast-Response mode will be able to maintain RRS, Non-Spin, and ECRS on those Resources through modification of the Mitigated Offer Cap (MOC).

4) RTC will account for frequency responsive capacity of a CCGR when awarding AS that is required to be frequency responsive.

a. In Real-Time, QSEs will supply data informing ERCOT systems, on the portion of the total CCGR MW output that is being provided from the CCGR’s frequency responsive capacity, and, the high and low limits of the CCGR’s frequency responsive capacity.

b. Utilizing these additional Real-Time data provided by the QSE informing ERCOT systems of the CCGR’s frequency responsive parameters, RTC will limit frequency responsive AS awards to be within the frequency responsive capability limits.

5) RTC will not change limitations on sub-categories of AS products (e.g., FRRS, FFR, and RRS and ECRS provided via UFR).

6) Off-Line Resources providing Non-Spin that are in startup due to a manual deployment of Non-Spin by ERCOT will continue to be eligible for being awarded Non-Spin for the first 25 minutes following the deployment.  The eligible capacity will be based on the High Sustained Limit (HSL) of the Resource less its Base Point instruction.

7) Resources operating in quick-start mode that are in startup due to a deployment from ERCOT will continue to be eligible for being awarded ECRS and Non-Spin.  The eligible capacity will be based on the HSL of the Resource less its base point instruction.

8) During each execution, RTC awards for energy (Base Points) and AS will be based on taking a fresh look at the pool of Resources available to provide energy and AS.

a. Energy awards (Base Points) will be relative to Resource capability (limits, ramp rates).

b. AS awards will be relative to Resource capability (limits, ramp rates, etc.) and the ASDCs irrespective of the quantity of AS already being deployed.

c. All Resources providing FFR shall be considered during the RTC runs following an automatic deployment of FFR, including continued awarding of FFR and economic dispatch of the Resource up to the Resource’s limits. The RTC runs will consider the Resource’s energy and AS offers as well as the physical capabilities (e.g., HSL, ramp rates, etc.) of the Resource at the time of execution.

9) Within RTC, ERCOT operators will have the ability to manually reduce the amount of AS being awarded to Resources that, when deployed, may violate transmission constraints. ERCOT will notify QSE in Real-Time of any AS capability that has been derated by ERCOT including unit’s new AS limit in MW. ERCOT will exclude any such manually reduced AS amounts from the AS imbalance calculation.

10) RTC will utilize the AS Offer structure that will be in place with the implementation of Nodal Protocol Revision Request (NPRR) 863.

11) The AS Offer submission window will be consistent with the Energy Offer Curve (EOC) submission window.

12) Proxy AS Offers will be created for Resources that do not have a valid AS offer curve for the entire operating range of the Resource for use in the Real-Time Market (RTM) and will be consistent with the following guidelines:

a. The proxy offer will be a linked AS Offer across all AS products for which a Resource is qualified to provide. For Resources that are not Load Resources, the proxy offer MW will be equal to the Resource’s telemetered HSL.  For Load Resources, the proxy offer MW will be equal to the Resource’s telemetered Maximum Power Consumption (MPC).

b. For each AS, the price in the proxy AS Offer for that AS for the Resource will be set equal to:

i. For Reg-Up and RRS, the maximum of a proxy offer price floor for that AS, the Resource’s highest submitted offer price for that AS, the Resource highest price offer for ECRS (submitted or proxy), and the Resource’s highest price offer for Non-Spin (submitted or proxy).

ii. For ECRS, the maximum of a proxy offer price floor for ECRS, the Resource’s highest submitted offer price for ECRS, and the Resource’s highest price offer for Non-Spin (submitted or proxy).

iii. For Non-Spin, the maximum of a proxy offer price floor for Non-Spin and the Resource’s highest submitted offer price for Non-Spin.

iv. For Reg-Down, the maximum of a proxy offer price floor for Reg-Down and the Resource’s highest submitted offer price for Reg-Down.

c. Each of the AS proxy offer price floors will be a separate configurable parameter that can be set equal to a defined $/MWh value.

d. The system will be designed to allow different proxy offer price floors for instances in which the same AS can be provided by either Off-Line or On-Line Resources (i.e., the proxy offer price floor for an offline Non-Spin offer may be different than the proxy offer price floor for an online Non-Spin offer).  It will also be designed to allow different proxy offer price floors for different subcategories of AS (i.e., the proxy offer price floor for a PFR-type RRS offer may be different than the proxy offer price floor for a UFR-type RRS offer).

e. The RTC optimization will enforce various Resource specific AS constraints to ensure the AS awards are feasible, considering both QSE submitted AS offers and RTC created proxy AS Offers.

13) Proxy AS Offers will not be created for Resources for use in the DAM.

# *Principle Concepts in DisCussion at RTCTF*

11) QSEs will have the ability to continuously update their AS Offers. SCED will use the most recently available AS Offer.

 *The RTC TF should reject this change from that already approved by TAC. QSEs already have ample tools to provide information to ERCOT regarding the ability of Resources to provide AS and such additional changes to allow AS Offers to be changed in Real-Time only seems needed to respond to economic considerations of the current market as opposed to reliability problems with a given Resource. This goes beyond the acknowledgement of the PUC to provide QSEs tools to indicate the availability of AS on a Resource when problems occur. QSEs can change the HSL of a Resource via telemetry scanned every two seconds. They also can change the ramp rate of deliverable AS either of which will change the Resource’s ability to provide AS.* 14) QSEs with non-zero Load Ratio Share (LRS) values that have confirmed trades in excess of their self-arragement maximum for AS sub-types will be notified by ERCOT of the overage and given time to resolve the issue with the QSEs on the other side of those trades.

a. If the overage is not resolved by 1800 in the Day-Ahead, ERCOT will cancel the “buying QSE” side of trades on a last-in, first-out basis to the extent necessary to ensure that the net quantities do not exceed the maximum allowable amounts.

b. QSEs will have additional time to submit new matching trades until the end of the Adjustment Period, as long as the net quantities do not exceed the maximum allowable amounts.

15) To ensure better price formation and cascading AS prices, the following behavioral rule would apply for RTC: For the same capacity in linked AS offers, RRS and Reg-Up offers should be greater than or equal to ECRS offer, and ECRS offer should be greater than or equal to Non-Spin offer.

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

None

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