



## **Item 10.1: Real-Time Co-optimization (RTC) Task Force (RTCTF) Update**

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ERCOT Compliance Director

Board of Directors Meeting

ERCOT Public  
February 11, 2020

## RTCTF Update

- RTCTF Stakeholder Update
- TAC Voting Results on Key Principles (KPs)
- RTC KPs
- Next Steps
- Appendix
  - Recently approved RTC KPs
  - Procedural Processes

# RTCTF Stakeholder Update

~~Thursday, April 4, 2019 (Initial meeting, Charter and Approach)~~

~~Monday, April 22 (RTC Orientation Session)~~

~~Tuesday, April 30 (Begin reviewing Key Principles)~~

~~Monday, May 13~~

~~Friday, June 7~~

~~Friday, June 21~~

~~Friday, July 12~~

~~Friday, Aug. 9~~

~~Tuesday, Aug. 27~~

~~Thursday, Sept. 19~~

~~Tuesday, Sept. 24 (Special meeting for ISO Lessons Learned)~~

~~Wednesday, Oct. 9~~

~~Wednesday, Oct. 30~~

~~Tuesday, Nov. 19~~

~~Tuesday, Dec. 3~~

~~Thursday, Dec. 19~~

~~Friday, Jan. 10~~

~~Wednesday, Jan. 22~~ > TAC Jan. 29, 2020 > Board Feb. 11, 2020

Phase 1  
RTC Principles

# TAC Endorsement of Key Principles\*

- At the January 29, 2020, TAC meeting, TAC endorsed the remaining KPs:

## Unanimous Endorsement:

- KP1.1, Sections (2), (6), (7) & (8) - Ancillary Service Demand Curves and Current Market Price Adders
- KP1.2, Section (3) - System-Wide Offer Cap and Power Balance Penalty Price
- KP1.3, Sections (11) & (14) - Offering and Awarding Ancillary Services in Real-Time
- KP1.4, Sections (3) & (4) - Systems/Applications that Provide Input into the Real-Time Optimization Engine
- KP1.5, Sections (14) - (16) - Process for Deploying Ancillary Services
- KP1.6, Section (5) - Ancillary Service Imbalance Settlement
- KP3, Sections (13) - (20) - Reliability Unit Commitment
- KP5, Sections (2)(a), (7)(b) & (7)(j) - Day-Ahead Market
- KP6 - Market-Facing Reports
- KP7 - Performance Monitoring

\* Details of each endorsed KP are in the Appendix

## RTC Key Principles

- All RTC Key Principles have been consolidated into a single “book” (44-page document), which includes development summaries and TAC voting records.
  - RTC KPs 1-7 are to be used to develop Nodal Protocol Revision Requests (NPRRs) and other applicable Other Binding Documents (OBDs) for the implementation of RTC.
  - Out of Scope design principles and policy issues that have been determined to be beyond the scope of the RTC project have been documented within KP 8, and shall not be considered in the development of NPRRs and/or OBDs for the purpose of implementing RTC.

## KP8 - Out of Scope and Post-RTC Review Items

- The following issues have been determined to be outside the scope of the implementation of RTC:
  - Day-Ahead Market enhancement to introduce willing buyer, willing seller concept
    - PUCT decision related to KP5
  - Maintaining participation factors for Regulation Service deployments
    - TAC decision related to KP1.5
  - Price Adjustments for AS when Energy Price is reduced to Value of Lost Load
    - RTCTF decision related to KP1.2
  - Energy Offer Curve updates in Real-Time and make-whole considerations for Resources
    - RTCTF decision related to KPs1.3 and 4(c)&(d)
  - AS substitution for Real-Time to substitute higher value AS having lower offer for lower value AS
    - RTCTF decision related to KP1.3

## Next Steps

- ERCOT requests that the Board endorse all RTC KPs, and direct ERCOT to develop and sponsor NPRRs and OBDRRs based solely on RTC KPs for the implementation of RTC, with the understanding that out of scope issues, as set forth in KP 8 will not be considered in these NPRRs and/or OBDRRs.
- In March 2020, ERCOT plans to file a set of NPRRs (and a single Impact Analysis (IA)) for RTC implementation, in accordance with Section 21 of Protocols.
- TAC has recommended that RTCTF serve as the clearinghouse to address RTC NPRR/OBDRR language changes and comments (April – October 2020; 10 meetings).
- ERCOT will submit all NPRRs/OBDRRs and related comments from RTCTF, in a consolidated fashion, to PRS for consideration at its November 2020 meeting, with the goal to take them to TAC that month, and the Board in December 2020.

# APPENDIX

- Recently approved RTC KPs
- Procedural Process

## Key Principle 1.1: Ancillary Service Demand Curves and Current Market Price Adders

- KP 1.1 The pricing of reserves and energy with Real-Time Co-optimization (RTC) will reflect the use of Ancillary Service Demand Curves (ASDCs) based on the Operating Reserve Demand Curve (ORDC) while continuing to adjust for defined out-of-market actions taken by ERCOT to maintain reliability.
- Sections (summarized)
  - 2) The existing process of having a pricing run to capture the effects of reliability deployments will continue, as will the existing reliability deployment triggers for executing that process. However, the pricing run will be modified to also co-optimize energy and Ancillary Services (AS).
    - a) AS offers from Reliability Unit Commitment (RUC) instructed Resources, including Reliability Must-Run (RMR) Resources, will be removed for the pricing run.
    - b) Energy Offers for RUC-instructed Resources, including RMR Resources, will be administratively set to \$11,000/MWh for pricing run. This Energy Offer cap is subject to mitigation for non-competitive constraints.
  - 6) The Real-Time On-Line Reliability Deployment Price Adder process will apply to both energy and AS; the adder for each AS product will be the positive increase in Market Clearing Price for Capacity (MCPC) between the dispatch and pricing run.

## Key Principle 1.1: Ancillary Service Demand Curves and Current Market Price Adders

- Sections (summarized)
  - 7) For Reg-Down, the ASDC will be a constant value equal to Value of Lost Load (VOLL).
  - 8) ERCOT will work with stakeholders prior to RTC go-live to develop a framework and reporting to periodically review RTC pricing outcomes relative to pricing outcomes that would have been realized through the ORDC for a reasonable period of time.
- Meeting/Discussion & Consensus:
  - Meeting/Discussion on 11/19/19, 12/3/19, 12/19/19
  - Consensus on (2), (6), (7) on 12/3/19
  - Consensus on (8) on 12/19/19

## Key Principle 1.2: System-Wide Offer Cap and Power Balance Penalty Price

- KP 1.2 The values of and interaction between System-Wide Offer Cap (SWOC), VOLL, and Power Balance Penalty Price (PBPP) must be evaluated as part of implementation of RTC. This Key Principle identifies which values are changing and which one are remaining the same.
- Sections (summarized)
  - 3) For the DAM, the SWOC will be equal to VOLL
- Meeting/Discussion & Consensus:
  - Meeting/Discussion on 10/30/19 & 11/19/19
  - Consensus on (3) on 11/19/19

## Key Principle 1.3: Offering and Awarding Ancillary Services in Real-Time

- KP 1.3 Defines offers and awards of AS in Real-Time by outlining the key mechanisms and timelines for submitted AS Offers, as well as the AS considered and awarded under RTC.
- Sections(summarized)
  - 11) QSEs will have the ability to continuously update their AS Offers. SCED will use the most recently available AS Offer. *[Note- This changed previously approved TAC language reflecting AS Offer would align with Energy Offer Curve (EOC) submissions]*
  - 14) A behavioral rule will be created that QSEs shall not submit confirmed trades for AS sub-types in excess of their DAM self-arrangement quantity (including “0” or “null”).
    - a) QSEs will be notified by 1430 in the Day-Ahead if they have an overage.
    - b) If an overage is not resolved by the end of the Adjustment Period, QSEs with any overage will be charged the Real-Time MCPC for those quantities.
    - c) If ERCOT exceeds the AS sub-type limits system-wide in Real-Time, no awards will be prorated.
- Meeting/Discussion & Consensus:
  - Meeting/Discussion on 11/19/19, 12/3/19, 12/19/19
  - Consensus on (11) on 12/3/19, and on (14) on 12/19/19



## Key Principle 1.4: Systems/Applications that Provide Input into the Real-Time Optimization Engine

- KP 1.4 Current ERCOT systems that provide input for the Real-Time market (RTM) optimization engine are not designed to accommodate RTC and awards of AS in Real-Time. This Key Principle addresses the necessary modifications to those systems and applications.
- Sections (summarized)
  - 3) For each Resource, QSEs will continue to send up and down Normal Ramp Rates that represent the 5-minute ramping capability of the Resource. In addition, there will be new telemetry to be submitted by QSEs to inform ERCOT of the current physical capability of a qualified Resource to provide AS. These telemetry points will be used as additional limits on AS awards given the Resource's other constraints such as High Sustained Limit (HSL), Low Sustained Limit (LSL), High Dispatch Limit (HDL), and Low Dispatch Limit (LDL).
  - 4) Changes will be made to Resource Status provided by QSEs.
- Meeting/Discussion & Consensus:
  - Meeting/Discussion on 10/30/19, 11/19/19, and 12/3/19
  - Consensus on (3) and (4) on 12/3/19

## Key Principle 1.5: Process for Deploying Ancillary Services

- KP 1.5 To implement RTC, certain processes for deploying AS will need to be modified to accommodate the awarding of AS in Real-Time. This Key Principle looks at the ERCOT systems, ERCOT to QSE communications, QSE to ERCOT communications, and other processes in place that play a role in the sending of Dispatch Instructions and deployment of AS.
- Sections (summarized)
  - 14) For Emergency Base Points, RTC systems will consider AS awards from the most recent SCED execution. Non-AS awarded capacity will be utilized ahead of AS awarded capacity and, if necessary, Non-Spinning Reserve (Non-Spin) capacity will be utilized before ERCOT Contingency Reserve Service (ECRS), and ECRS will be utilized before Regulation Service and RRS capacity.
  - 15) No new Settlement calculations will be needed to address a SCED failure.
  - 16) Fast Responding Regulation Service (FRRS) will not be needed as a subset of Regulation Ancillary Service and will be removed. Energy Storage Resources (ESRs) will be required to qualify and provide the same Regulation Service as other Resources providing Regulation Service.
- Meeting/Discussion & Consensus:
  - Meeting/Discussion on 10/30/19, 11/19/19, and 12/3/19
  - Consensus on (14) - (16) on 12/3/19



## Key Principle 1.6: Process for Deploying Ancillary Services

- KP 1.6 With RTC, the AS imbalance Settlement process needs to be modified since AS will be awarded in Real-Time.
- Sections (summarized)
  - 5) Under RTC, the following credit exposure calculations will be revised to account for RTC AS activity:
    - a) Updates will be made to the Real-Time Liability Completed and Not Settled (RTLCNS) component of Estimated Aggregate Liability (EAL) calculation to include RTC AS activity.
    - b) Updates will be made to the Real-Time Liability Estimates (RTL) component of the EAL to include RTC AS activity (these components will flow into RTLCNS).
    - c) Updates will be made to the Minimum Current Exposure (MCE) component of Total Potential Exposure (TPE) calculation to include RTC AS activity.
- Meeting/Discussion & Consensus:
  - Meeting/Discussion on 11/19/19 and 12/3/19
  - Consensus on (5) on 12/3/19

## Key Principle 3: Reliability Unit Commitment (RUC)

- KP 3 Since RTC will co-optimize the clearing of energy and AS, RUC will review Resources scheduled to be available, and consider moving AS among qualified Resources to meet the forecasted conditions for Real-Time.
- Sections (summarized)
  - 13) The RUC engine will use the same proxy methodology for AS as used for Real-Time.
  - 14) The RUC engine will use the same scaling for AS offers as used for energy offers.
  - 15) RUC will use new information contained in the Current Operating Plan (COP) to determine how much capability for each AS product each Resource will be capable of providing.
  - 16) The energy offer floor for RUC-instructed Resources that have not opted out of RUC Settlement will be \$1,500/MWh for a dispatch run.
  - 17) All RUC-instructed Resources will have their EOC administratively set to a value just below the PBPP (i.e., \$11,000/MWh) in the pricing run only. This EOC is subject to mitigation for non-competitive constraints.
  - 18) The AS Offer Floors for RUC-instructed Resources which have not opted out of RUC Settlement will be \$1,500/MWh for a dispatch run.
  - 19) AS Offers for RUC-instructed Resources that have not opted out of RUC Settlement will be removed for the pricing run.
  - 20) RTC will not affect the ability for QSEs to opt out of RUC Settlement.
- Meeting/Discussion & Consensus:
  - Meeting/Discussion on 10/9/19, 10/30/19, 11/19/19 and 12/3/19
  - Consensus on (13)-(20) on 12/3/19

## Key Principle 5: Day-Ahead Market

- KP 5 Identifies necessary changes for the DAM to bring Day-Ahead AS procurement into alignment with implementation of RTC.
- Sections (summarized)
  - 2) The same ASDCs that are used in Real-Time will be used in DAM.
    - a) In some cases, negative self-arranged quantities may necessitate shifting the DAM ASDC to the right, as they are treated by DAM as bids at the highest price on each corresponding ASDC.
  - 7) AS Virtual Offers
    - b) If awarded, the QSE will be paid the DAM price for the capacity times the quantity awarded. The awarded QSE will pay the Real-Time price times the quantity awarded, ~~via the AS Imbalance calculation.~~ *[Change to previously approved TAC KP]*
    - j) The default uplift Invoice process will include virtual AS awards to the QSE when calculating the maximum MWh activity for the Counter-Party that represents the QSE.
- Meeting/Discussion & Consensus:
  - Meeting/Discussion on 10/30/19, 12/3/19, and 12/19/19
  - Consensus on (7)(j) on 12/3/19 and (2)(a) and (7)(b) on 12/19/19

## Key Principle 6: Market-Facing Reports

- KP 6 Identifies changes to market-facing reports that will be necessary for the market for implementation of RTC.
- KP 6 (summarized)
  - 1) As necessary, existing market-facing reports and user interfaces will be removed or modified, and new market-facing reports and user interfaces will be created to implement RTC and achieve Key Principles.
  - 2) The list of reports and user interfaces contained in the appendix of this document will be used to guide the development of Protocol language for RTC.
- Meeting/Discussion & Consensus:
  - Meeting/Discussion on 11/19/19, 12/3/19 and 12/19/19
  - Consensus on (1) and (2) on 12/19/19

## Key Principle 7: Performance Monitoring

- KP 7 Identifies changes to performance monitoring that will be necessary to reflect the implementation of RTC.
- KP 7 (summarized)
  - 1) Generation Resource Energy Deployment Performance (GREDP) and Controllable Load Resource Energy Deployment Performance (CLREDP) calculations will be updated to account for changes made to deployment instructions from ERCOT. The “ABP” and “ARI” components of the GREDP and CLREDP will be replaced with an Average Set Point (ASP) component, where ASP is equal to the time-weighted average of the Updated Desired Set Point (UDSP), which is the sum of a linearly ramped Base Point (Base Ramp) and Regulation Service instruction that the Resource should have produced during a five-minute clock interval.
  - 2) With RTC, the concept of an AS Obligation based on DAM awards, AS self-arrangement, and AS trades is no longer relevant. As such, related compliance requirements and associated reporting will be removed.
  - 3) With RTC, the updating of AS Schedules following a deployment instruction for the purpose of adjusting High Ancillary Service Limits (HASLs) is no longer relevant; accordingly, the compliance requirement and associated reporting will be removed.
  - 4) With the changes for GREDP and CLREDP, the Aggregate Adjusted Base Point (AABP) used in the Base Point Deviation (BPD) Settlement will replace the sum of the Average Base Point (AVGBP) and the Average Regulation Instruction (AVGREG) with the ASP component.
- Meeting/Discussion & Consensus:
  - Meeting/Discussion on 10/30/19, 11/19/19, 12/3/19
  - Consensus on 12/19/19

## Key Principle 8: RTC Out of Scope and Post-RTC Review Items

- KP 8 Captures design concepts that were considered during the development of RTC Principles, but deemed to be outside the scope of the implementation of RTC.
- KP 8 (summarized)
  - 1) DAM enhancement to introduce willing buyer, willing seller concept
    - PUCT decision related to KP5
  - 2) Maintaining participation factors for Regulation Service deployments
    - TAC decision related to KP 1.5
  - 3) Price Adjustments for Reg-Up, RRS, ECRS, and Non-Spin
    - RTCTF decision related to KP 1.2
  - 4) EOC updates in Real-Time and make-whole considerations for Resources
    - RTCTF decision related to KPs 1.3 and 4(c)&(d)
  - 5) AS substitution for SCED to substitute higher value AS having lower offer for lower value AS
    - RTCTF decision related to KP 1.3
- Meeting/Discussion:
  - Numerous meeting discussions through RTC process

# Procedural Process: RTCTF Review Process

