*RTC+B Ancillary Service Demand Curve (ASDC) Issue*

*9/19/2024*

**Executive Summary**:

This paper offers an explanation on the historical need and processes for development of ASDCs for implementation of the Real-Time Co-optimization plus Batteries (RTC+B) Program. Although current, approved Protocols already define the ASDCs from the work done in 2019, there is concern with whether these curves should be modified prior to RTC+B implementation.

The purpose of AS Demand Curves is to create a value (price) on reserves when they become scarce. Per the definition in Protocol § 2, “A curve that reflects the value of each Ancillary Service product by price/quantity pairs for each hour of the Operating Day.”[[1]](#footnote-1)

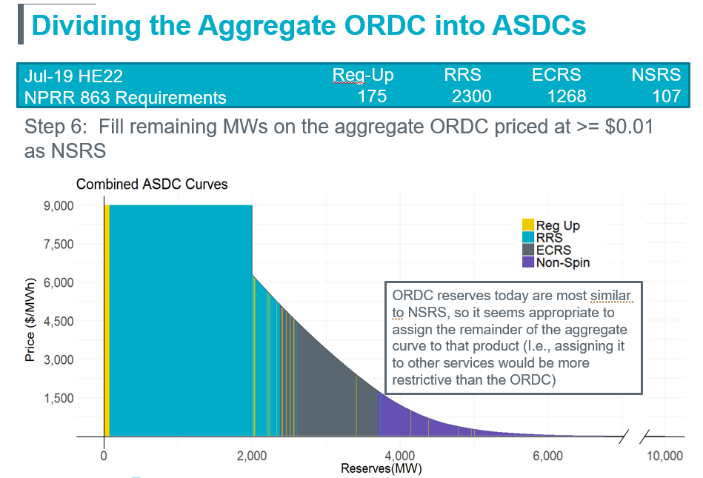
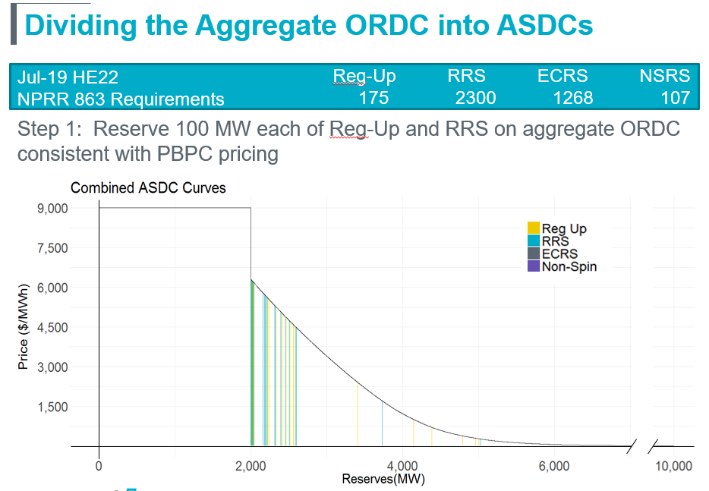
**Background:**

After Nodal go-live in 2010, the real-time market was observed to have low real-time energy prices, even when capacity and reserves were scarce. The lack of higher price signals during these shortages was resolved by implementing an Operating Reserve Demand Curve (ORDC). Note that during the development of the single ORDC, there was recognition that most other markets had Real-Time Co-optimization and AS demand curves.

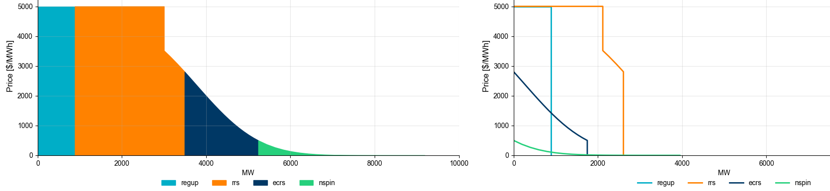
Years later in 2019, as [key principles](https://www.ercot.com/files/docs/2020/02/20/RTC_KeyPrinciples_Combined_v20200211.doc) for RTC were being developed by ERCOT and stakeholders, the Public Utility Commission of Texas (PUCT) was asked to weigh in on some key RTC design elements, including what the value of ASDCs should be for RTC. In June 2019, Commission Staff filed a memorandum recommending that the design of the ASDCs replicate, as closely as possible, the pricing outcomes of the ORDC in order to preserve the existing Market Equilibrium Reserve Margin (MERM) and that the set of Ancillary Services approved in NPRR 863 form the basis of that design.[[2]](#footnote-2) PUCT Chairman Walker subsequently filed a [memo](https://interchange.puc.texas.gov/search/documents/?controlNumber=48540&itemNumber=59) agreeing with Commission Staff’s recommendation and providing direction on certain RTC design elements, including the ASDCs:

*“I also agree with the recommendation of the Commission Staff regarding the design of the ASDCs. These demand curves should be designed for real-time co-optimization to replicate the pricing outcomes of the ORDC. Furthermore, the set of ancillary services approved by the ERCOT Board of Directors in Nodal Protocol Revision Request 863 should form the basis for the ASDC design.”[[3]](#footnote-3)*

The Commissioners discussed and agreed with this approach at the PUCT’s June 27, 2019 Open Meeting. With this direction, ERCOT proposed to the RTC Task Force that the AS Demand Curves be defined as slices of reserves under the ORDC curve, with the highest valued AS being Regulation-Up (URS), followed by Responsive Reserve Service (RRS), followed by ERCOT Contingency Reserve Service (ECRS), and lastly Non-Spinning Reserve Service (NSRS). These curves were interspersed with lower value services to create some ramp shape to each service (see graphic). The ramp values were derived from the Power Balance Penalty curve (working documents in Key Principle 1 at [link](https://www.ercot.com/mktrules/puctDirectives/rtCoOptimization)).



In response to ERCOT’s proposal, Dr. Shams Siddiqi proposed a simpler design with the idea that the different AS products should be separate and district curves without a dispersing the values across other products (graphic follows):



After considerable discussion in Real-Time Co-optimization Task Force (RTCTF) meetings, the ASDCs as proposed by Dr. Siddiqi were unanimously approved at the September 25, 2019 TAC meeting within Key Principle 1.1, and were incorporated in the RTC-related Protocols approved in 2020 with NPRR1008. Specifically, Protocol Section 4.4.12 states:

*(6) ERCOT shall disaggregate the AORDC developed pursuant to paragraph (5) above into individual ASDCs for each Ancillary Service product as follows:*

*(a) The ASDC for all Reg-Up in the Ancillary Service Plan shall use the highest price portion of the AORDC;*

*(b) The ASDC for all RRS in the Ancillary Service Plan shall use the highest price portion of the remaining AORDC after removing the portion of the AORDC that was used for the Reg-Up ASDC;*

*(c) The ASDC for all ECRS in the Ancillary Service Plan shall use the highest price portion of the remaining AORDC after removing the portions of the AORDC that were used for the Reg-Up and RRS ASDCs;*

*(d) The ASDC for Non-Spin shall use the remaining portion of the remaining AORDC after removing the portions of the AORDC that were used for the Reg-Up, RRS, and ECRS ASDCs.*

*(7) Each ASDC will be represented by a 100-point linear approximation to the corresponding part of the AORDC. Fewer points may be used for cases where it would not result in decreased accuracy in representing the corresponding part of the AORDC.*

**This policy decision was settled in 2020, but revisited beginning in February 2024 as ERCOT provided examples of the ASDC values using this Protocol requirement, and more recently by the Independent Market Monitor (IMM) in meetings with ERCOT in August 2024.**

As of 9/13/2024, the current issues in discussion at the RTCBTF can be summarized as:

ERCOT’s understanding is that there are two ORDC/ASDC issues being discussed: 1) that the current ORDC shape is not accurate due to the impacts of “conservative operations” and should be changed for RTC, and 2) that the shape of the ASDCs under the ORDC need to be changed.

Issue #1- Regarding the shape of the existing ORDC: ERCOT is currently analyzing and preparing the ORDC biennial study to file with the PUCT by November 1. That analysis may identify areas for potential change; however, to date, ERCOT has not observed any operational or market concerns with the ORDC (current observations shared by ERCOT at June 14, 2024 RTCBTF meeting). During discussion at the RTCBTF the following issues came up:

[Vistra (through Texas Competitive Power Advocates (TCPA) comments)](https://www.ercot.com/files/docs/2024/03/13/ASDC%20proposal%203-12-24.docx) raised concerns that the ORDC-based ASDC shape will not align market outcomes with operational preferences (particularly ERCOT’s committed capacity margin targets), but has not made a specific proposal for consideration pending availability of the RTC Simulator results to better contextualize those concerns.

[Hunt Energy Network (HEN) separately raised concerns](https://www.ercot.com/files/docs/2024/03/18/HEN_ASDCs%20under%20RTC%20031924.pptx) about the currently approved rules for the ASDCs, underlying AORDC, and AS qualification, including: Changing the calculations for the AORDC to ignore Off-Line reserves; Fully eliminating the “VOLL-System Lambda” component of the AORDC calculation and simply using VOLL in its place; Increasing the maximum price on the ASDCs that are used in the optimization for Reg-Up and RRS and the Power Balance Penalty Price such that Reg-Up and RRS are more strictly prioritized during severe scarcity; and Studying the impacts of allowing Intermittent Renewable Resources (IRRs) to provide AS and potentially considering related Protocol changes. (See endnote #1 for more details)

At the September 13, 2024 RTCBTF meeting, stakeholders discussed whether the objective in PUCT Staff June 2019 memo to “preserve the existing Market Equilibrium Reserve Margin” (MERM) warranted revisiting, given changes in the market and policy environments since 2019. (See endnote #2 for more details)

Issue #2- Regarding the shape of the ASDCs: Stakeholders on both sides of the issue (including the IMM) have raised concerns that the ASDCs may not reflect the value of each AS product in today’s environment.

For example, the IMM believes a ramp-in for the ASDCs is key to avoid the first MW of RegUp pricing at $5,000. The IMM has not yet proposed an alternative.

Also note that [Shell (through TCPA comments to RTCBTF)](https://www.ercot.com/files/docs/2024/03/13/ASDC%20proposal%203-12-24.docx) proposed to re-distribute some parts of the ASDC curves.

See prior section for Hunt Energy Network issues on ASDCs.

Next Steps:

ERCOT is planning to have the RTC Simulator available in October 2024 for running pricing studies for historical days and could provide analysis capability for studying changes to ASDCs.

Although improvements may be considered, absent any approved changes in the near future, ERCOT does have a current ORDC and ASDC design approved in Protocols for implementation.

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End Notes:

#1 Hunt Energy Network (HEN) proposed the following RTC ASDC changes that would ensure more reliable procured amounts of AS under RTC and avoid undervaluing AS:

1. Since under RTC there is no Offline ORDC adder and to ensure adequate Online Reserves, do not count Offline capacity when forming AORDC for ASDC purposes;
2. Since (VOLL-System Lambda) was used to reduce ORDC adder to keep prices at or below VOLL but not for actually procuring AS, do not reduce VOLL by System Lambda when forming AORDC for ASDC purposes. Unlike current market where this adjustment was needed to keep (System Lambda plus ORDC adder) at or below VOLL, under RTC System Lambda is capped regardless of the ASDCs and thus there is no need to further reduce VOLL in setting the ASCDCs thereby unnecessarily and with negative reliability impact reducing the value of ASDCs when System Lambda is higher – i.e., counter-intuitively reducing the value of AS when the system is tighter and AS should be more valuable.
3. During severe scarcity under RTC, SCED should award critical reliability RRS and Reg-Up instead of ECRS and Non-Spin but SCED may not under current RTC ASDC design. Grid needs to maintain at least 1,500MW of RRS to prevent total collapse from an additional 1,500MW of GR tripping even if it requires firm Load shed – this implies ASDC for first 1,500MW of RRS must be set high enough to ensure that outcome as follows:
   1. Set ASDC for at least 1,500MW of RRS at $9,000.02/MW (assumes Operations will shed Load to maintain 1,500MW of PRC that can be awarded RRS by SCED)
   2. Set ASDC for Reg-Up at $7,000.01/MW
   3. Set Power Balance Penalty at $11,000.03/MW
   4. Still maintain MCPC Cap=$5,000/MW and System Lambda Cap=$5,000/MWh thus ensuring 1,500MW of RRS is given procurement priority over all other Up-AS then priority given to Reg-Up without allowing LMPs and MCPCs to exceed their caps.
4. Related to AS and co-optimized Energy price formation under RTC, study the impact of allowing IRR available capacity (i.e., curtailed IRR capacity) to provide RRS, Reg-Up, ECRS and Non-Spin under RTC and determine whether specific IRR qualification criteria (even possible AS disqualification due to their intermittent nature) need to be developed. Note: IRRs do not currently provide these Up-AS services.

#2 At the September 13, 2024 RTCBTF meeting, stakeholders discussed whether the objective in Commission Staff’s June 2019 memo to “preserve the existing Market Equilibrium Reserve Margin” (MERM), which was adopted after Chairman Walker agreed with Commission Staff’s memo, warranted revisiting, given changes in the market and policy environments since 2019. The [MERM Report at the time](https://www.ercot.com/files/docs/2019/01/23/2018_12_20_ERCOT_MERM_Report_Final.pdf) estimated a MERM of 10.25% that corresponded to a 0.5 Loss of Load Expectation (LOLE), which exceeds the reliability standard criterion for frequency recently adopted by the PUCT in [16 TAC § 25.508(b)(1)](https://www.puc.texas.gov/agency/rulesnlaws/subrules/electric/25.508/25.508.pdf).

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1. Pursuant to Nodal Protocol Revision Request (NPRR) 1013, this definition of ASDCs will be added to § 2 of the ERCOT Nodal Protocols upon system implementation of RTC+B. [↑](#footnote-ref-1)
2. *Review of Real-Time Co-Optimization in the ERCOT Market*, Project No. 48540, Commission Staff Memorandum at 2 (June 20, 2019). [↑](#footnote-ref-2)
3. *Review of Real-Time Co-Optimization in the ERCOT Market*, Project No. 48540, Chairman Walker Memorandum at 2 (June 26, 2019). [↑](#footnote-ref-3)