# **PDCWG Questions on 2023 Ancillary Service Methodology and the review of 2023 ECRS requirements**

*First round of questions received: Nov 4, 2022
Follow Up questions received: Nov 15, 2022*

1. **When do you expect ECRS being in service?**

**ERCOT Response:** Please reference slide 5 in [this slide deck that was presented at Nov 11 PRS.](https://urldefense.com/v3/__https%3A/gcc02.safelinks.protection.outlook.com/?url=https*3A*2F*2Fwww.ercot.com*2Ffiles*2Fdocs*2F2022*2F11*2F09*2FPRS_November_2022_Project_Update.pptx&data=05*7C01*7CBracy.Nesbit*40LCRA.ORG*7Cecef1e6edbad49e7c81508dac6680249*7C31f538b956aa4ab1a7f0dcdab940fd79*7C0*7C0*7C638040447415887956*7CUnknown*7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0*3D*7C3000*7C*7C*7C&sdata=bDME6mJhFOiIoew73h0Lpt9vNeuIwE*2FuwegDtMSZpMo*3D&reserved=0__;JSUlJSUlJSUlJSUlJSUlJSUlJSUlJSUlJSU!!DR3VkBMYqM1H!ZE1Vqht7oLxzNYYLQV28fJi9zHca_E1SBPU6KyCu333Qy7f1OS9MPiRnswJDVG3hNwPq2A62S9RF79M9GL8YMg$) Per this deck ECRS is currently targeted to be implemented between May 23 and May 25.

**Follow Up Question: This is a large span of time.  Is some specific reason for the uncertainty?**

**ERCOT Response to Follow Up:** Since Nodal Go-Live, the ECRS project will be the first time that ERCOT will be implementing system changes to add a new Ancillary Service into ERCOT Grid and Market operations. This is a fairly involved project that has wide ranging impacts including, Energy Management System (EMS), Market Management System (MMS) and Settlements and Billing (S&B) and involves both ERCOT internal and vendor development. ERCOT is actively working on implementing ECRS project. ERCOT will communicate updates on the project through Protocol Revision Subcommittee (PRS), Technology Working Group (TWG) and Stakeholder workshops as we start getting closer to the implementation date of the project.

1. **Slide 42 seems to indicate that simulations indicate acceptable capacity exists with this methodology.  When discussing NOGRR 226, ERCOT indicated that a faster response from load resources would be needed when inertia was less than 150 GWs.  When will this faster response be implemented?**

**ERCOT Response:** From the NOGRR226 study, what ERCOT has found is that the current RRS program is no longer able to meet ERCOT’s design criteria for RRS if the 1st stage of UFLS setting is moved to 59.4Hz from 59.3Hz. Load Resources with faster response time is only needed if the 1st stage UFLS setting is changed to 59.4Hz. ERCOT did not recommend this change and the 2023 AS study is conducted based on the assumption that the 1st stage UFLS setting will remain unchanged.

**Follow Up Question: What is the Frequency Rate of Change ERCOT is using to calculate the time response from 59.4Hz versus 59.3Hz?**

**ERCOT Response to Follow Up:** The maximum Frequency Rate of Change occurs immediately following the disturbance. After the Load Resources is in effect, the Frequency Rate of Change becomes modest. ERCOT has not observed a significant difference in Frequency Rate of Change between two cases with UFLS settings of 59.4 Hz and 59.3 Hz as long as a sufficient amount of Load Resources is available.

1. **We know that the unit models used are not applicable at frequencies lower than 59.8 Hz.  How can we ensure we have adequate resources to respond especially at inertia levels below 175 GWs?**

**ERCOT Response:** Currently there are a few different ways in which ERCOT is managing risk around potential lack of performance during extremely low frequencies. Specially,

1. ERCOT’s study setup when establishing RRS requirements
	* is highly conservative in its accounting available headroom for response.
	* includes a 100 mHz margin (i.e. the studies establish response needed to keep nadir at 59.4Hz and not 59.3Hz). This margin is to account for any deviation in actual condition in comparison to what is assumed in the studies be it a low starting frequency or inadequate response due to non-linearities that current models do not account for.
2. The existing resource specific limit on provision of RRS-PFR has generally helped ensure that RRS-PFR requirements are carried by several resources, which does help us limit exposure to issues related to lack of performance of a single resource.
3. ERCOT’s RRS studies have also shown that during lower inertia levels fast non-proportional response from Load Resources on UFR (and even FFR resources) is much more effective that traditional PFR (i.e. equivalency ratio UFR/PFR is greater than 1.0). Having this fast response in ERCOT’s RRS portfolio during low inertia conditions also helps in reducing the risk of hitting 59.3 Hz due to lack of performance of the response from PFR.

**Follow Up Question: Please describe how you determine the appropriate amount of Load Resources you will need during these situations.**

1. Lastly, ERCOT also has Real Time and Day Ahead RRS sufficiency monitoring tools which help the Control Room in determining if the RRS available is sufficient to meet frequency response needs in the future on estimated inertia.

**Follow Up Question: Please describe how you determine the appropriate amount of RRS.**

**ERCOT Response to Follow Up:** The response in (c) above is referring to the studies that are conducted to build the RRS Table. [Here’s a link](https://www.ercot.com/files/docs/2017/10/26/05._RRS_Study_2017_Methodology_11022017.docx) from the 2017 RRS study that covers the study methodology used to determine the amount of LRs with UFR needed in Section 3.3 and the LR to PFR equivalency ratio as a function of inertia in Section 4.2. While this is an older study its observation that “the LR-UFR/PFR equivalency ratio is greater than 1.0 at inertia levels lower than 250 GW.s” is still valid and can be seen in the 2023 RRS table shared in [Slide 31](https://www.ercot.com/files/docs/2022/10/25/2023_Ancillary_Service_Methodology_Proposed_OCT_PDCWG_v0.zip) in the 2023 AS Methodology discussion at Oct PDCWG. This help explain how RRS requirement is split PFR/UFR quantities when establishing the Day Ahead AS plan.

Further as the (d) indicates, ERCOT has monitoring tools to ensure that sufficient amount of “frequency responsive headroom” is available in Real Time and even Day Ahead. To explain how the tool works using [Slide 31](https://www.ercot.com/files/docs/2022/10/25/2023_Ancillary_Service_Methodology_Proposed_OCT_PDCWG_v0.zip): The tool ensures that in Real Time (and Day Ahead) the effective PFR (which takes into account the actual (or expected) frequency responsive headroom on supply-side resources, equivalency ratio \* headroom on hydro resources and equivalency ratio \* headroom on LRs with UFR) is greater than corresponding value in row 3 of the table. [Section 3.3 in the Reliability Risk Desk Operating Procedure](https://www.ercot.com/files/docs/2021/08/31/Reliability_Risk_Desk_Operating_Procedure.docx) provides additional information on the actions the Control Room may take using this tool.

1. **If we lose a large generation resource how will the inertia of that unit be replaced to re-establish safe operating conditions?**

**ERCOT Response:** When forced outages of resources occur, SCED will redispatch the MWs from the unit on the remaining units that are online. ERCOT monitors inertia in real-time very closely. When inertia declines to 105GWs, control room will take immediate actions to bring additional unit online per ERCOT’s Reliability Risk Desk Operating Procedure section 3.3 -- [https://www.ercot.com/mktrules/guides/procedures](https://urldefense.com/v3/__https%3A/gcc02.safelinks.protection.outlook.com/?url=https*3A*2F*2Fwww.ercot.com*2Fmktrules*2Fguides*2Fprocedures&data=05*7C01*7CBracy.Nesbit*40LCRA.ORG*7Cecef1e6edbad49e7c81508dac6680249*7C31f538b956aa4ab1a7f0dcdab940fd79*7C0*7C0*7C638040447415887956*7CUnknown*7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0*3D*7C3000*7C*7C*7C&sdata=t70hnYXzI84gQHnmNI*2By*2FoNBaec73qFr2vlTvc8yrsI*3D&reserved=0__;JSUlJSUlJSUlJSUlJSUlJSUlJSUlJSUl!!DR3VkBMYqM1H!ZE1Vqht7oLxzNYYLQV28fJi9zHca_E1SBPU6KyCu333Qy7f1OS9MPiRnswJDVG3hNwPq2A62S9RF79NeNIfhhw$).

**Follow Up Question: While the rate of frequency change at lower inertia levels may theoretically buffered by faster responses, I have not seen any ERCOT studies that determine system stability with very high ratios of IBR’s.   Please share your thoughts.**

**ERCOT Response:** ERCOT had conducted a study that assessed the dynamic stability of ERCOT grid in a high IRR penetration scenario and posted a [study report in April 2018](https://www.ercot.com/files/docs/2018/04/19/Dynamic_Stability_Assessment_of_High_Penetration_of_Renewable_Generation_in_the_ERCOT_Grid.pdf). Observations and recommendations from this study were also summarized at the [Synchronous Inertial Response Workshop II](https://www.ercot.com/files/docs/2018/05/18/00__Inertia_Workshop_05182018_v8.pptx) (in slides 14 through 19).