Resource Limit Calculator (RLC)

* Changes proposed
	+ Discontinue ramp rate sharing because RTC will economically select Energy and Regulation-Up/Down respective of ramp rates (no issues identified). Suggestion was made to enhance reasonability checks on telemetered values.
	+ RLC calculated Resource Limits of HASL and LASL will be discontinued. HSL/LSL and telemetered ramp rates will be used directly to calculate HDL/LDL (no issues identified).

RTC HDL and LDL calculated as follows:

* + - $HDL=Min(HSL,TelemMW+NormalRampRateUp\*5)$
		- $LDL=Max(LSL,TelemMW-NormalRampRateDn\*5$)

Load Frequency Control (LFC)

* ERCOT reinforced effectiveness of current design for immediate Dispatch from SCED. Similarly, RTC awards and Dispatch will be immediate as applicable to the services.
* Changes proposed
	+ Regulation Deployment/instruction from ERCOT will change from QSE portfolio level (remove Participation Factors) to Resource specific.
	+ Upon receipt of new Base Points and AS awards from RTC, LFC will reset the Regulation instruction to zero.
	+ Updated Desired Base Points (UDBP) will be replaced by “Updated Desired Set Point” (UDSP). UDSP is the sum of two components, Base Ramp and Resource specific regulation instruction. Base Ramp is a four minute ramp similar to UDBP, except that the starting point of the ramp is the expected output of the generator considering previous base point and last Resource specific regulation instruction from LFC before new Base Points were input to LFC. LFC, in its calculations, determines the Resource specific instruction and then adds it to the Base Ramp and sends UDSP every 4 seconds till the next RTC results are available.

Feedback: For a Controllable Load Resource (CLR) with a bid to buy, the term Updated Desired Generation (UDG) is not appropriate.

ERCOT Response: Agree, Change UDG to Updated Desired Set Point (UDSP)

* + The system level regulation requirement will be distributed to Resource specific regulation instructions proportionate to their regulation awards, respecting resource limits (HSL,LSL, ramp rates) by considering both UDSP and previous resource specific regulation instruction. Undeployed system level regulation will be distributed to resources with regulation awards that still have undeployed regulation award capacity.

Feedback: Seems like we should also discuss the amount of Base Point changes being asked for by SCED in Resources that are not getting regulation included in their UDSP.

ERCOT Response: UDSP for Resources not getting regulation will be same as today’s UDBP. Concept behind UDSP is for LFC to ramp Resource from last desired output MW output (sum of previous Base Point and last Resource specific regulation instruction) to next Base Point plus any Resource specific regulation instructions. Under RTC, for a Resource not getting regulation instructions, the UDSP at the end of the 4 minute ramp is their last Base Point which corresponds to their last desired output MW.

* Other Feedback
	+ With ramping limitations on Reg up and Reg Down being included in HDL and LDL calculations, discuss if there should be an “automatic process” to kick off an off cycle SCED run if the amount of deployed regulation is greater than a pre-established percentage such as 75% so that new Base Points are calculated and total regulation is restored.

ERCOT: Current system already has a feature like this that includes a timer and consideration of prevailing frequency deviation from nominal value. Can discuss at a future meeting

* + ERCOT was asked to provide a diagram of existing QSE Generation Resource control showing portfolio dispatch with PFs and a modified diagram showing how generation set point control will work in a RTC environment. [To be complete, include QSE constant frequency control mode when communication with ERCOT is lost]

ERCOT: Will present diagram at a future meeting

* + The telemetered ramp rates (Up and Down) are very important. ERCOT should provide clarification on what values to be telemetered. For example, a Resource operating near a break point in its ramp rate curve, can telemeter a ramp rate that is a “blend” of the ramp rate values above and below the break point or provide the “instantaneous” ramp rate at the prevailing output.

ERCOT: ERCOT will provide clarification but please note the telemetered ramp rates are an input to SCED/RTC that is trying to dispatch Resources to meet the demand five minutes out. This will be discussed as part of telemetry changes/modifications under RTC.

* + In the LFC presentation, a RTC constraint was described that limited the maximum Regulation Up/Down award considering the minimum of either the Up and Down ramp rates. This can be too restrictive, especially if the telemetered ramp rate provided to ERCOT is a “blended” ramp rate.

ERCOT: ERCOT will review and bring this topic up for discussion at future meeting when proposed RTC constraints are presented.

* Market discussion for further consideration
	+ Desire to have the ramp sharing be a tunable parameter to allow for further consideration at another time. (Yellow highlights are the changes from what was presented at RTCTF on April 30, 2019)

$$BasePoint+ScalingFactorUp\*RegUpAward\leq HDL$$

$$LDL\leq BasePoint-ScalingFactorDn\*RegDnAward$$

*ScalingFactorUp* and *ScalingFactorDn* can take values between 0 and 1.0. Default value is 1.0. A value less than one indicates some level of ramp sharing. These scaling factors can be based on time of day or some other criteria to allow flexibility

* + Consider implementing flexibility in start of UDSP in LFC (e.g. Telemetered Output vs. Previous Base Point + Last Regulation Instruction).

Links to RLC and LFC presentations at [April 30, 2019 RTCTF meeting](http://www.ercot.com/calendar/2019/4/30/179710-RTCTF)

* RLC: [**3.1 Resource Limit Calculator v2 043019**](http://www.ercot.com/content/wcm/key_documents_lists/179711/3_1_-_Resource_Limit_Calculator_-_4-30-19_-_Final.pptx)
* LFC: [**3.2 Load Frequency Control 043019**](http://www.ercot.com/content/wcm/key_documents_lists/179711/3_2_-_Load_Frequency_Control_-_4-30-19_-_Final.pptx)