London Economics International LLC

Analyzing consequences of reduction in the RUC Offer Floor on real-time energy prices (NPRR 1092)

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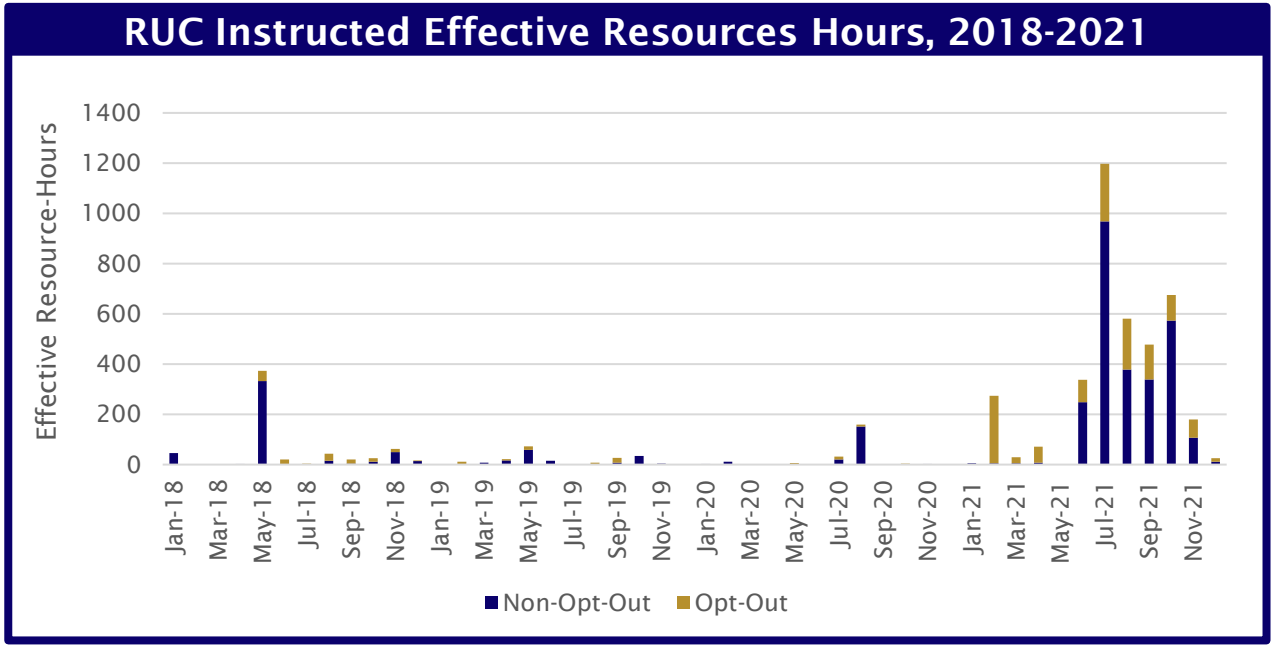
LEI was asked by Vistra Corp. to examine the implications of NPRR 1092 on real-time energy price

- ERCOT has authority to initiate Reliability Unit Commitment ("RUC") and bring online resource capacity that did not otherwise self-commit in order to ensure capacity sufficiency on a system-wide or localized basis (e.g., cure local insufficiency due to transmission constraints)
- ERCOT's RUC instructions have increased since June 2021 - 96% of RUC commitments in 2021 were instructed to maintain additional online reserves (not for resolving local issues)

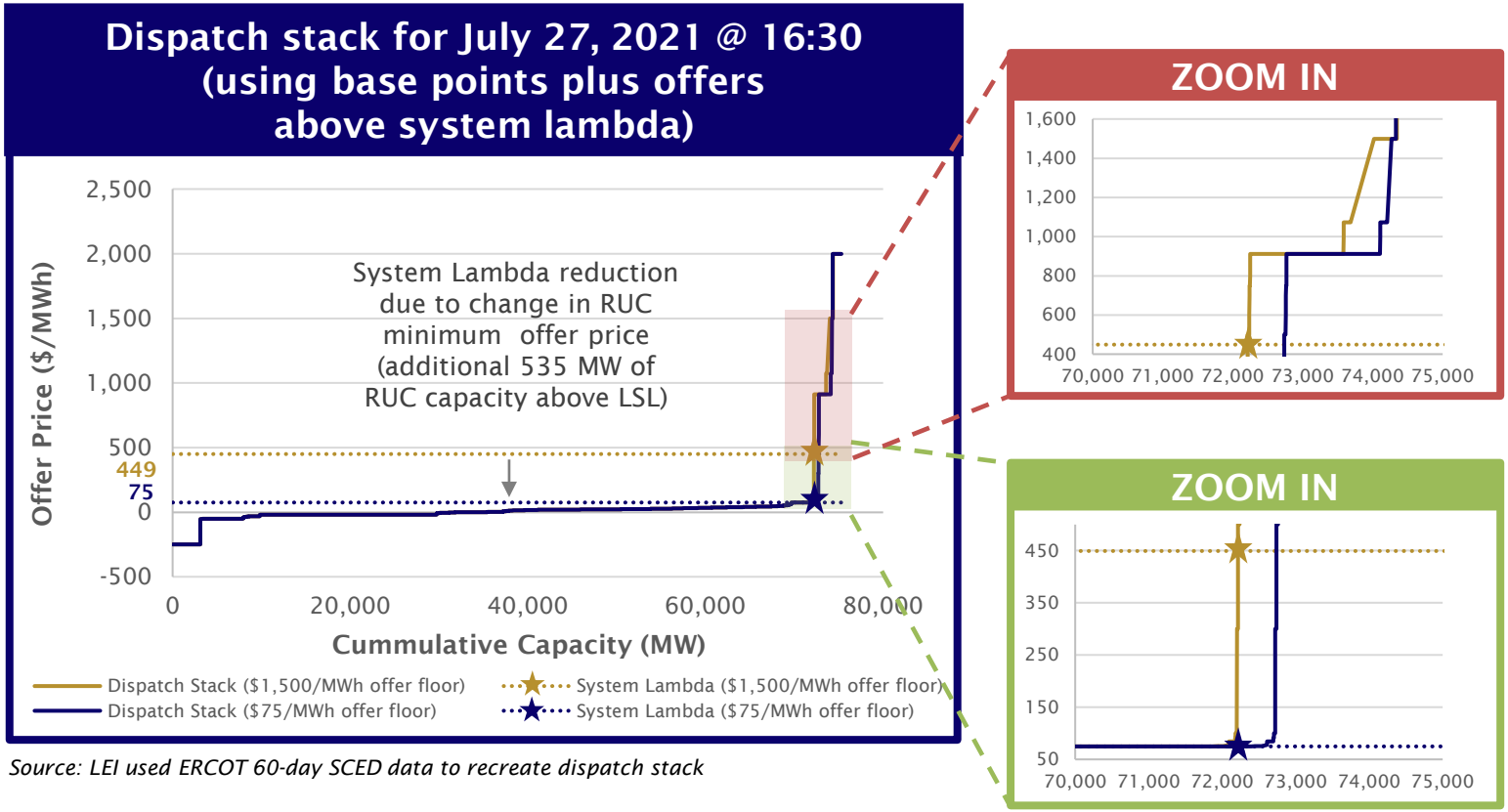


Source: ERCOT, "Annual Review of the Market Impacts of Reliability Unit Commitments - Analysis of 2021", TAC, January 31, 2022.

- Given ERCOT's increased reliance on RUC, in conjunction with other market developments (e.g., ERCOT's increased purchase of non-spin reserves and PUCT-approved ORDC changes), understanding RUC impacts is more important than it has ever been

NPRR 1092 proposes to move the minimum offer floor for RUCs from $1,500/MWh to $75/MWh

- System lambda prices in the second half of 2021 were above $75/MWh in over 200 hours, or about 5% of the time
- A lower RUC offer floor would move the RUC capacity offers down the dispatch stack
- With the change in dispatch stack position, more "out of market" RUC capacity would be dispatched, displacing other economic offers and leading to a lower clearing price



Source: LEI used ERCOT 60-day SCED data to recreate dispatch stack

If lower RUC offer floor causes an increase the volume of energy produced from RUC resources, real-time deployment price adder and the ORDC adder will be negatively affected

- **Real-time online reliability deployment price adder ("RTORDPA") methodology was designed on premise that RUC resources would not be fully deployed ahead of other economically-offered resources**

1. Use the System Lambda determined in the 2nd step of the two-step SCED process **(Run 1)**
2. Perform an additional SCED run to calculate the System Lambda assuming LSL = 0 MW for all RUC Units **(Run 2)**
3. Determine the positive difference between System Lambda estimated under Run 1 and Run 2 **(Item A)**
4. Calculate VOLL minus System Lambda (Run 1) **(Item B)**

   Note: This Item will apply only under tight conditions
5. **RTORDPA = min (Item A, Item B)**

- **RUC resource capacity that bumps out other self-committed resources may increase offline or online reserves and depress the ORDC adders ("RTORPA")**
  - Although a large portion of RUC capacity is typically not providing energy, only under few exceptions is that "spare" RUC capacity counted in RTOLCAP or RTOOFFCAP

$$\boldsymbol{RTORPA} = v * 0.5 * \pi_S(RTOLCAP) + v * (1 - 0.5) * \pi_{NS}(RTOLCAP + RTOFFCAP)$$
$$\text{where } v = \max(0, VOLL - System\ Lambda)$$

If an offer block of a running resource is partially-displaced by RUC, then that offer block converts to **online reserves *(RTOLCAP)***

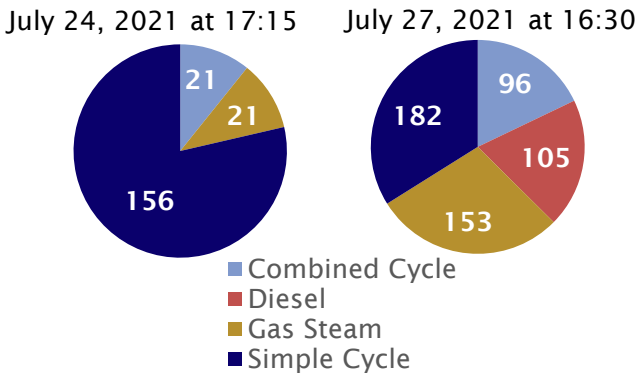
If a fast start resource is fully-displaced by RUC, then that capacity converts to **offline reserves *(RTOFFCAP)***

Reducing RUC energy offer floor would cause System Lambda to decline – sometimes by hundreds of dollars

- **For this illustrative analysis, LEI selected 15-minute intervals on two days in July 2021 during which ERCOT instructed RUC**
  - These days were also characterized by high demand (top 2% for the year), low wind conditions (a fraction of the typical average of 11 GW), system lambdas greater than $75/MWh and relatively high price adders
- **LEI re-estimated the system lambda with a lower RUC offer price ($75/MWh) using the base points from the 60-day SCED reports**
  - Resources' base points were taken as "given", thereby all system constraints were assumed to not change
- **On July 27, 2021 at 16:30, an additional 535 MW of dispatched RUC capacity at $75/MWh would decrease System Lambda by over $374/MWh, while on July 24, 2021 at 17:15 the system lambda would fall by $11.7/MWh (due to additional dispatch of 199 MW of RUC)**
  - Displaced capacity includes both partially displaced units and fully-displaced quick start units
  - In both cases, the re-estimated system lambda would be $75/MWh – however, the outcome for other intervals will depend on relative size of RUC fleet versus the resources being displaced vis-à-vis demand

Date	RUC minimum energy offer floor ($/MWh)	System Lambda ($/MWh)	RUC up to LSL (MW)	RUC above LSL (MW)	Spare RUC capacity (MW)	Total RUC capacity (MW)
July 24, 2021 at 17:15	$1,500.00	$86.67	201	0	639	840
	$75.00	$75.00	201	199	440	840
		-$11.67		+199		
July 27, 2021 at 16:30	$1,500.00	$449.40	141	0	659	800
	$75.00	$75.00	141	535	124	800
		-$374.40		+535		

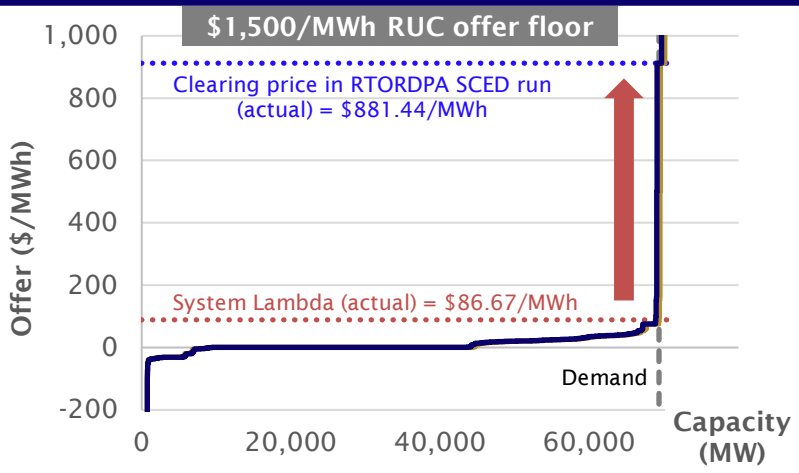
Displaced capacity by technology (MW)

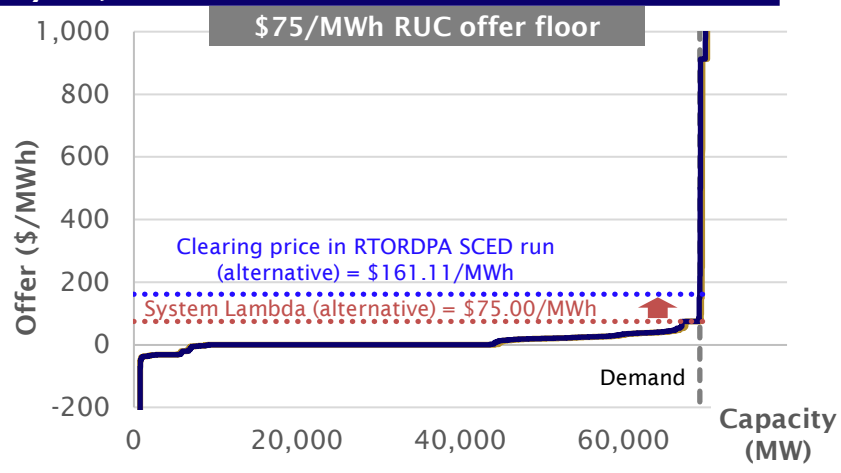


RTORDPA mechanism would not be able to fully offset the decline in system lambda when RUC capacity is running above LSL

- LEI re-created the RTORDPA calculations using the 60-day SCED reports and a RT SPP backcasting tool
- In both intervals, RTORDPA under the $75/MWh offer floor alternative is lower than the actual value, as the RTORDPA SCED curve becomes flatter around the market clearing point
  - For July 24, 2021 at 17:15, RTORDPA would fall from $795/MWh to $86/MWh
  - For July 27, 2021 at 16:30, RTORDPA would fall from $85/MWh to <$1/MWh

RTORDPA SCED curves for July 24, 2021 at 17:15





- Illustrative analysis highlights the inherent flaw in the current RTORDPA SCED run logic
  - RTORDPA should be increasing (rather than decreasing) if the RUC capacity is causing system lambda to fall
  - However, the changes contemplated in NPRR 1092 will increase likelihood that the remaining capacity of the RUC resources (above LSL) is dispatched in the RTORDPA SCED run ("Run 2"), lowering the RTORDPA
- ERCOT can fix the issue by keeping the $1,500/MWh offer price of RUC capacity in the RTORDPA SCED run, which will yield an appropriate system lambda correction factor

RTORPA (ORDC adders) would also decline if the dispatched RUC capacity - due to lower RUC energy offer floor - causes more online or offline reserves

- **LEI identified the displaced capacity due to lower RUC energy floor and considered the implications for the RTORPA pursuant to the ORDC parameters in place in 2021 and also under the new ORDC curve parameters:**
  - **Actual 2021:** $2,000/MWh SWCAP and 2,000 MW MCL ($2,000/MWh LCAP)
  - **"What If" 2021:** what if LCAP was not triggered, so we had $9,000/MWh SWCAP and 2,000 MW MCL
  - **"What If" 2022:** what if we apply 2022 ORDC parameters - $5,000/MWh SWCAP and 3,000 MW MCL
- **Dispatch of additional RUC capacity can lead to additional spare capacity associated with operating resources – adding to online reserves (i.e., RTOLCAP)**
  - Dispatch of additional RUC capacity can also move a unit to offline status (but fully-displaced offline quick start resources count towards offline reserves (i.e., RTOFFCAP))
- **July 27, 2021 interval had a larger quantity of displaced capacity (535 MW) than July 24, 2021 (199 MW) and therefore a bigger distortive impact on the RTORPA**
  - In $/MWh terms, the distortive effect is even larger under the new ORDC parameters ("What If" 2022)
- **The effects of dispatch of RUC capacity on reserves would need to be removed in order to restore the price signal of the ORDC**

RTORPA scenarios for July 24, 2021 @ 17:15

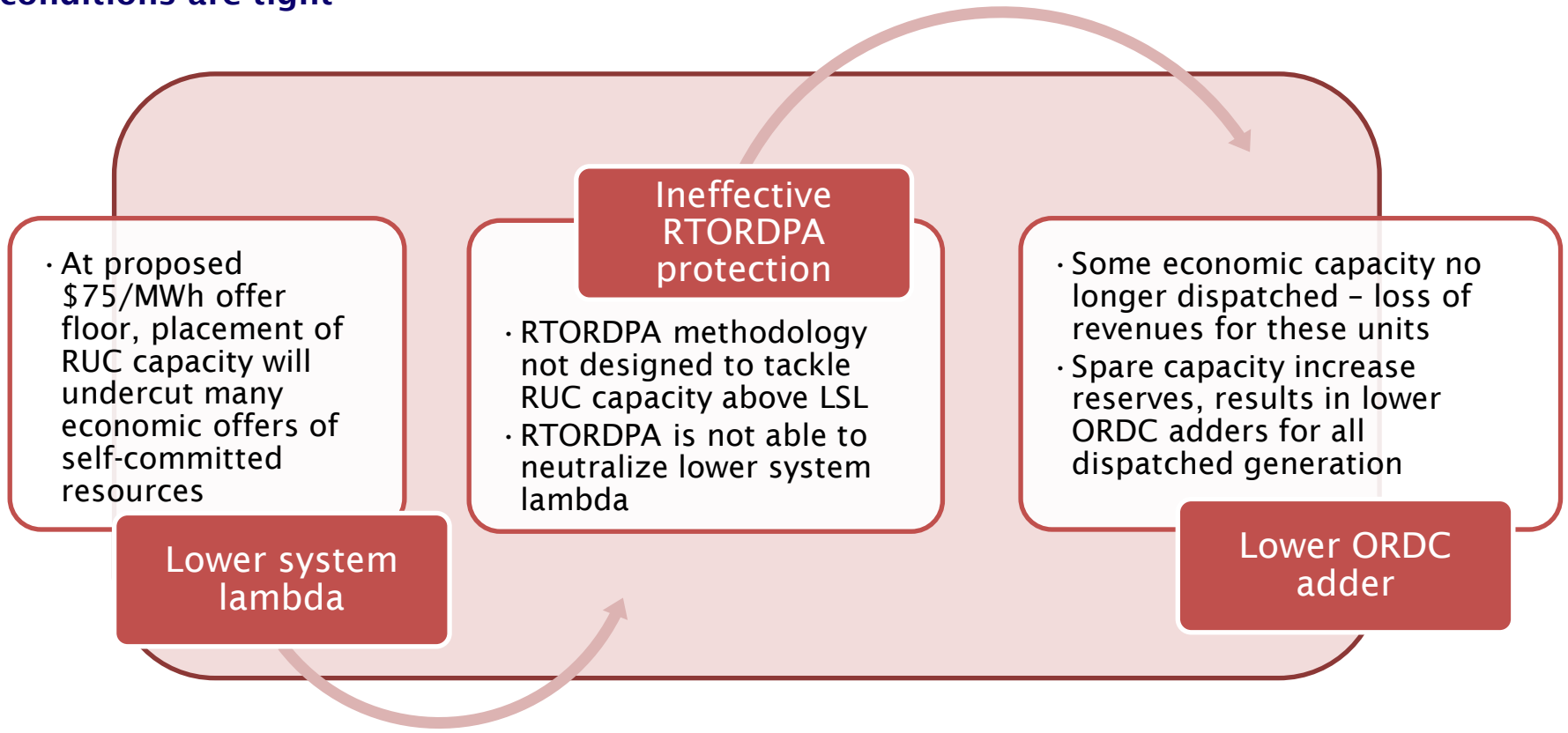
in $/MWh	Base ($1,500/MWh)	Alternative ($75/MWh)	Difference	Reduction
Actual 2021	45.46	33.20	-12.25	-27.0%
"What if" 2021	211.76	153.94	-57.82	-27.3%
"What if" 2022	785.06	649.97	-135.09	-17.2%

RTORPA scenarios for July 27, 2021 @ 16:30

in $/MWh	Base ($1,500/MWh)	Alternative ($75/MWh)	Difference	Reduction
Actual 2021	34.01	14.33	-19.68	-57.9%
"What if" 2021	187.55	66.43	-121.12	-64.6%
"What if" 2022	590.03	293.57	-296.45	-50.2%

Lower energy market prices would *weaken* the economic incentive for self-commitment and investment

- **Lower spot prices are most likely to occur when load is relatively high, and system conditions are tight**



- **Expectation of lower spot prices due to out-of-market action of ERCOT in combination with revised Protocols will lead to lower forward prices – likely delaying and deferring investment**