CMWG Meeting January 15, 2020

Credit Requirements, Settlement and Market Outcomes

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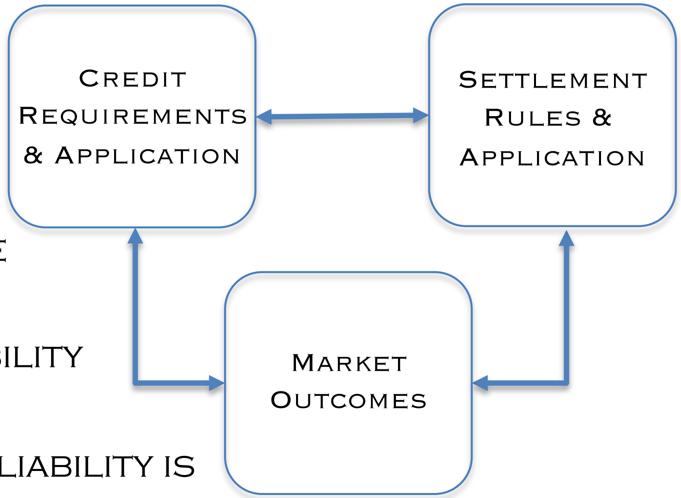
Introductory Comments

- Strong credit requirements, like grid reliability, are necessary (but not sufficient) for an electricity market to deliver the outcomes we need, want and expect.
  - There is no debate about this statement. Nor is it controversial.
- Nevertheless, we must at the same time, acknowledge that credit requirements affect market outcomes.
- In the end, the "stronger" the credit requirements, just like the more reliable the system, the higher the price of electricity.
- While the analogy between credit and reliability Is useful in some ways, the two have obvious differences. In particular, credit and not reliability is directly related to:
  - The settlement interval – the longer the interval the more credit is required.
  - Price caps/rules and price adders. A market with a price cap of $9000 creates more exposure than does a market with a $1000 price cap – for a given settlement interval.



- The high price cap (and potential price adders) in ERCOT necessarily puts a spotlight on credit and the settlement interval.
  - Not recommending a review of the credit requirements:
    - However, every RTO/ISO should be looking at the effects of credit on market outcomes and this is even more true in ERCOT due to the high price cap.

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FIRST EXAMPLE – PERSISTENCE

- IN THE FIRST EXAMPLE, CREDIT SPIKE IS PERSISTENT DESPITE DAM RESULTS:

Interval (Day)	TPE as a % of TPE @ T=1	1-day % change in TPE	TPE as a % of TPE Mean	DAM HB_NORTH x16 as % of price at T=1	RT HB_NORTH x16 as % of price at T=1
1	100.00%		45.26%	100.00%	100.00%
2	102.44%	2.44%	46.37%	101.47%	85.98%
3	106.98%	4.42%	48.42%	105.56%	169.66%
4	145.54%	36.04%	65.87%	110.42%	118.79%
5	40.60%	-72.11%	18.37%	118.24%	110.53%
6	60.49%	49.00%	27.38%	151.81%	122.62%
7	98.86%	63.44%	44.75%	194.44%	119.22%
8	347.81%	251.82%	157.42%	174.70%	437.85%
9	345.91%	-0.55%	156.57%	116.03%	106.61%
10	358.75%	3.71%	162.38%	111.11%	112.59%
11	346.40%	-3.44%	156.79%	168.99%	132.95%
12	268.86%	-22.38%	121.69%	165.68%	129.91%
13	323.86%	20.46%	146.59%	161.11%	319.84%
14	308.91%	-4.62%	139.82%	119.77%	138.84%
15	282.96%	-8.40%	128.07%	106.25%	109.89%
16	262.29%	-7.30%	118.72%	90.96%	129.16%
17	255.26%	-2.68%	115.54%	97.22%	105.77%

- THE TABLE CONTAINS THE ACTUAL CREDIT REQUIREMENTS FOR 17 CONSECUTIVE DAYS IN 2018. THIS IS ACTUAL DATA THAT HAS BEEN CONVERTED TO PERCENTAGES.
- FROM DAY 7 TO DAY 8, CREDIT REQUIREMENTS ROSE BY NEARLY 252%.
- FOR THE INTERVAL THE SAMPLE VARIANCE FOR THE CREDIT REQUIREMENTS WAS: $6,870,640,530,429.
- BY DAY 16 PRICE IN THE DAM WAS BELOW WHAT IT WAS ON DAY 1 OF THE SAMPLE PERIOD, YET CREDIT REQUIREMENTS WERE 162% HIGHER.
- OVER THIS TIME PERIOD THERE WAS VIRTUALLY NO CHANGE IN THE MARKET ACTIVITY OF THE PARTICIPANT WHICH WAS LIMITED TO THE DAM AND A VERY SMALL CRR POSITION.

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Second Example – Non-event

- In the second example, expectations are not met:

Interval (Day)	TPE as a % of TPE @ T=1	1-day % change in TPE	TPE as a % of TPE Mean	DAM HB_NORTH x16 as % of price at T=1	RT HB_NORTH x16 as % of price at T=1
1	100.00%		2.54%	100.00%	100.00%
2	3277.71%	3177.71%	83.41%	209.61%	391.41%
3	2876.93%	-12.23%	73.21%	179.11%	416.62%
4	16149.17%	461.33%	410.95%	105.08%	109.70%
5	19877.91%	23.09%	505.83%	206.32%	95.08%
6	12326.64%	-37.99%	313.68%	210.34%	295.16%
7	18.86%	-99.85%	0.48%	239.41%	85.63%
8	18.86%	0.00%	0.48%	72.24%	98.81%
9	18.86%	0.00%	0.48%	97.31%	132.84%
10	18.86%	0.00%	0.48%	76.42%	130.64%
11	276.07%	1363.42%	7.03%	35.00%	96.75%
12	18.86%	-93.17%	0.48%	30.38%	687.34%
13	18.86%	0.00%	0.48%	30.49%	228.91%
14	18.86%	0.00%	0.48%	25.22%	95.59%

- The table contains the actual credit requirements for 14 consecutive days in 2018. Once again, this is actual data that has been converted to percentages.
- From day 6 to day 7, credit requirements fall 99.9% even though the DAM price had been rising and was higher in Day 7 than it was in Day 6.
- For the time period, the standard deviation of the credit requirements as a percentage of the mean for the credit requirements was 174%.
- Over this time period there was virtually no change in the market activity of the participant which was limited to the DAM and a very small CRR position.

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Third example – Persistence and Unmet Expectations

- In the third example, expectations are not met and there is persistence:

Interval (Day)	TPE as a % of TPE @ T=1	1-day % change in TPE	TPE as a % of TPE Mean	DAM HB_NORTH x16 as % of price at T=1	RT HB_NORTH x16 as % of price at T=1
1	100.00%		13.00%	100.00%	100.00%
2	63.92%	-36.08%	8.31%	86.93%	46.37%
3	187.10%	192.71%	24.33%	86.93%	46.27%
4	190.45%	1.79%	24.76%	76.11%	87.48%
5	186.74%	-1.95%	24.28%	99.60%	66.81%
6	395.73%	111.92%	51.45%	208.26%	100.67%
7	514.90%	30.11%	66.95%	235.58%	84.98%
8	1888.88%	266.84%	245.59%	1763.25%	78.58%
9	1122.83%	-40.56%	145.99%	1534.94%	692.97%
10	1078.16%	-3.98%	140.18%	70.57%	76.71%
11	1065.46%	-1.18%	138.53%	46.52%	54.73%
12	1066.02%	0.05%	138.60%	51.61%	63.76%
13	1255.28%	17.75%	163.21%	46.80%	50.17%
14	1361.30%	8.45%	176.99%	50.02%	46.42%
15	1060.21%	-22.12%	137.85%	67.91%	57.78%

- The table contains the actual credit requirements for 15 consecutive days during the summer of 2019. Once again, this is actual data that has been converted to percentages.
- On Days 8 and 9 the DAM price spikes considerably but then falls back to more "normal" levels.
- For the interval the sample variance for the credit requirements was: $42,375,819,761,196.
- Extreme (unanticipated) increase in credit requirements followed by unexpected persistence.
- Over this time period there was virtually no change in the market activity of the participant which was limited to the DAM and a very small CRR position.

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Summary

- In these three examples there is no reason to suspect that ERCOT did not correctly calculate the credit requirements.
  - Will provide the actual data to ERCOT if they would like.
- The bulk of the credit requirements arise through TPEA (as anticipated).

$$TPEA = \text{Max}\,[0, MCE, \text{Max}\,[0, ((1\text{-}TOA) * EAL_q + TOA * EAL_t + EAL_a)]] + PUL$$

- This is a relatively small participant in the DAM and a very small participant in the CRR market who is concerned about next summer.
- Best immediate solution:
  - Reduce the settlement interval from 5 days to either 2 or 3 days.
    - Does not require any changes to the credit equations.
    - Does not reduce the strength of the credit requirements.
    - Reduces the cost to participate in the market with no increase in risk.
    - Improves liquidity and price discovery.
    - Have not revisited the settlement interval since price cap has risen from $3,000 to $9,000 or from the addition of ORDC and RTD price adders.
    - Need to implement before, rather than after, next summer.
- Absent this, it is difficult to understand how these examples – which are spread out over two years – are consistent with a well-functioning market.
  - How do you manage this kind of exposure to credit requirements?
  - What are the costs to the market from this specific aspect of the market design?
  - What are the unintended consequences with respect to the short and long-term market outcomes – including the market structure?
- Next steps?

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