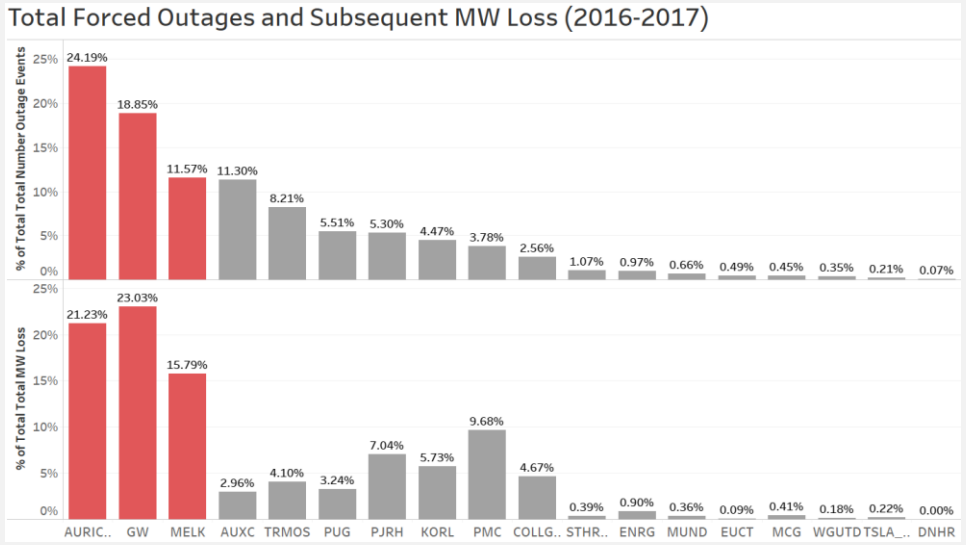
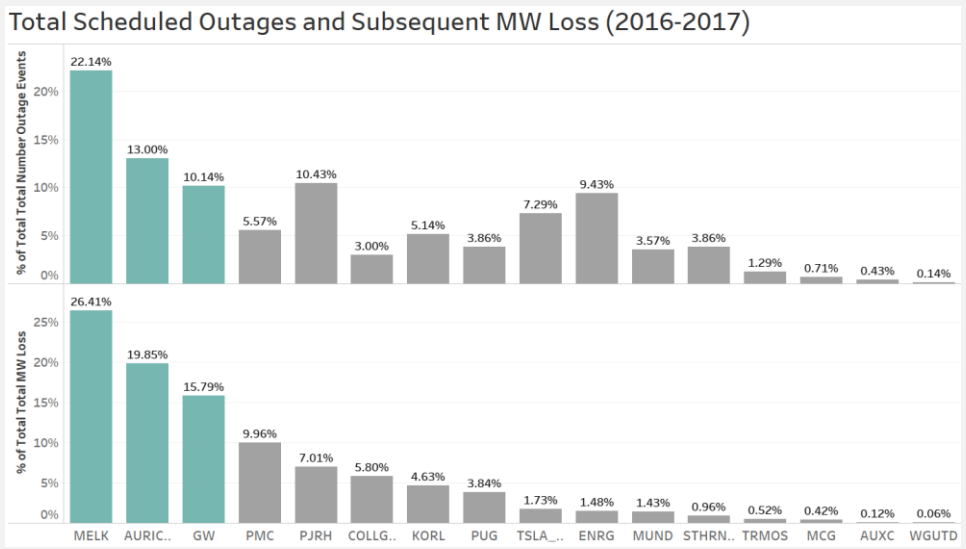
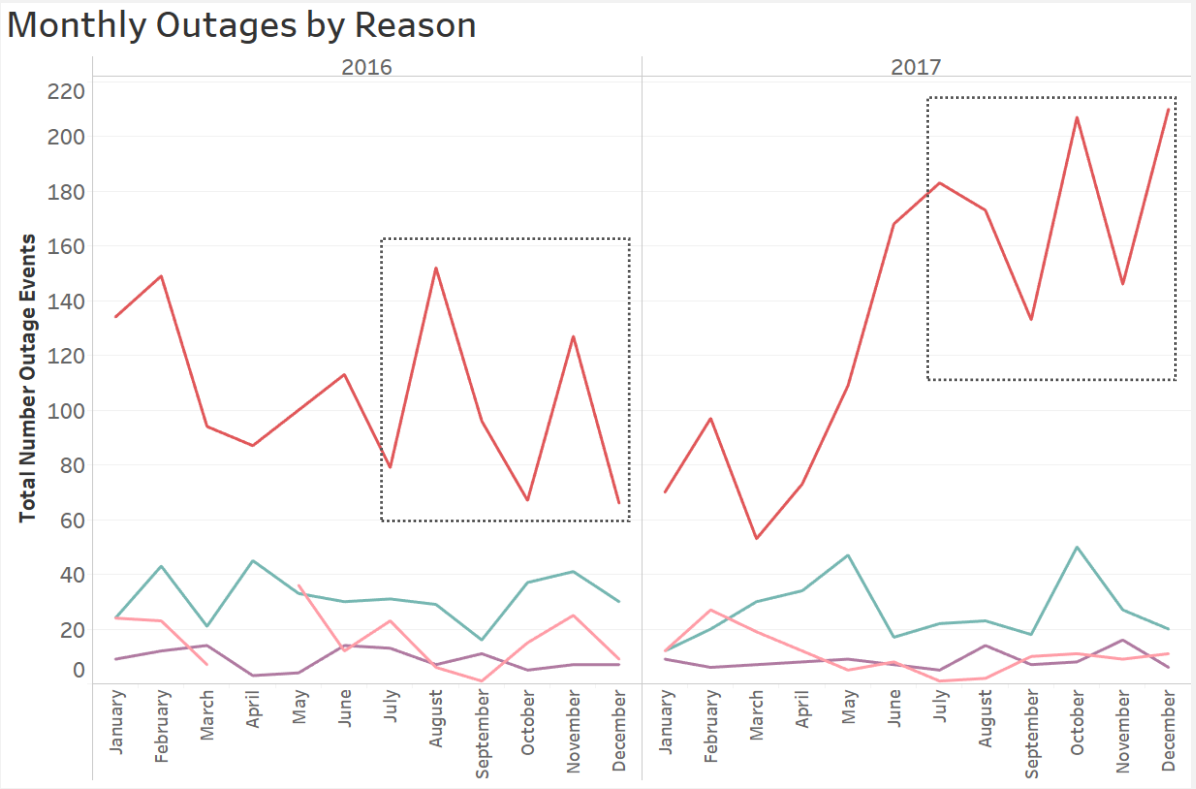
American Energy Market Regulator Case Study

By Eric Wheeler

Due to the large number of forced outages that occur, I have determined that Q3 and Q4 are the least stable times throughout the year. This is a primary result of three companies, AURICON, GW, and MELK, who prove to be the least reliable market participants based on their record of forced outage events, energy loss, and mismanagement of scheduled outages between 2016-2017.



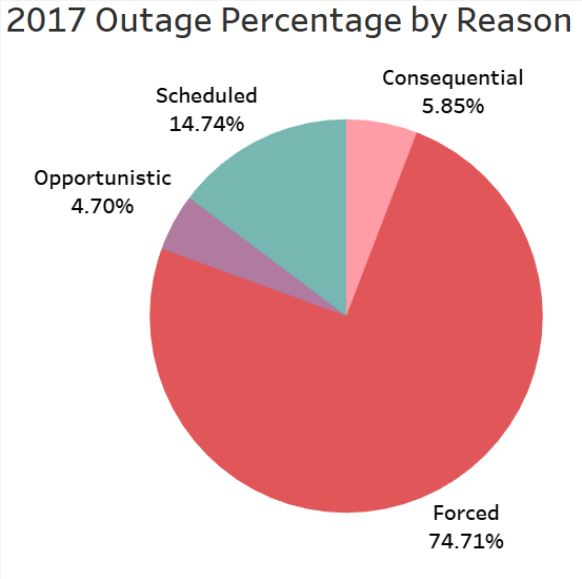


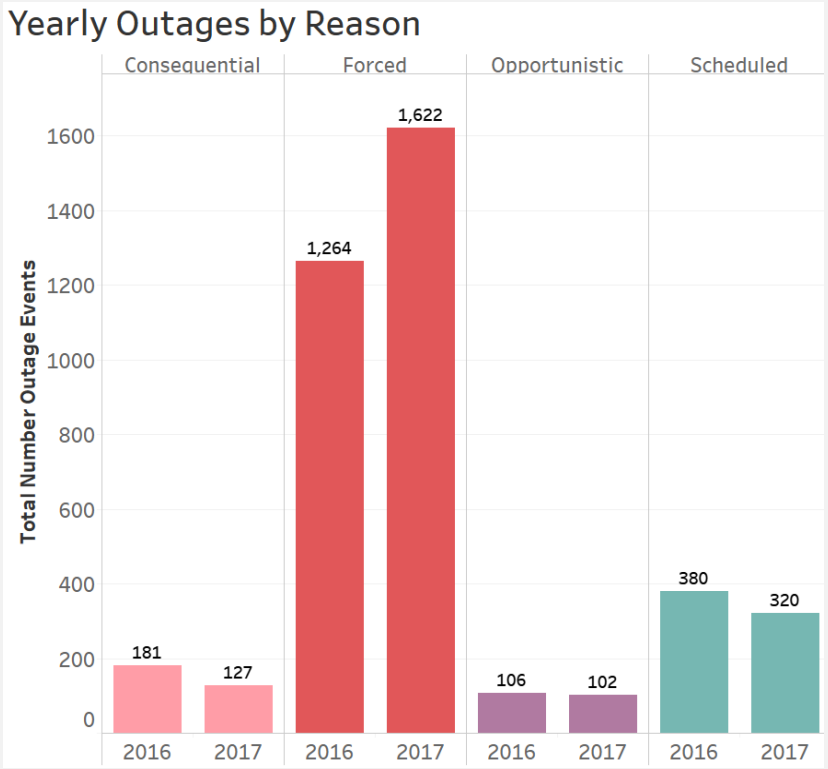


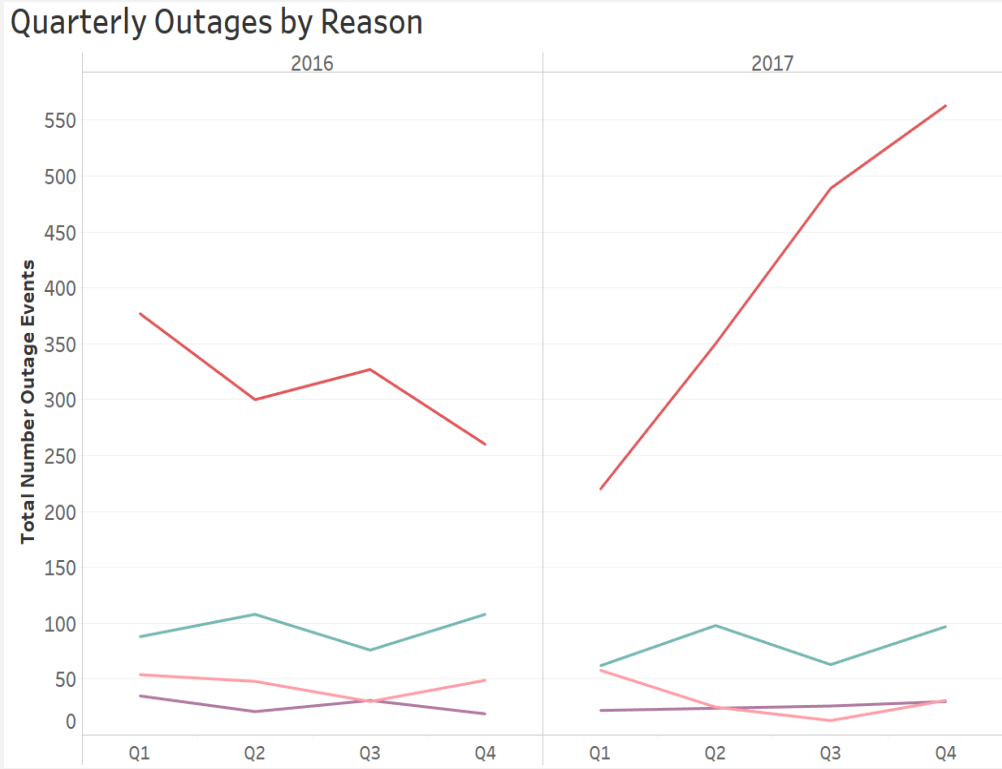
1. From 2016-2017, these three companies accounted for 55% of the total forced outage events and 60% of the total MW lost due to forced outages.

2. During the same period they also accounted for 45% of all scheduled outages and 62% of total megawatts lost due to scheduled outages.

Forced outages are particularly critical as they place a disproportionate amount of stress on the energy system and threaten the reliability of the network. In 2017, forced outages saw a 28% increase, ultimately accounting for 75% of the total outages for the year.

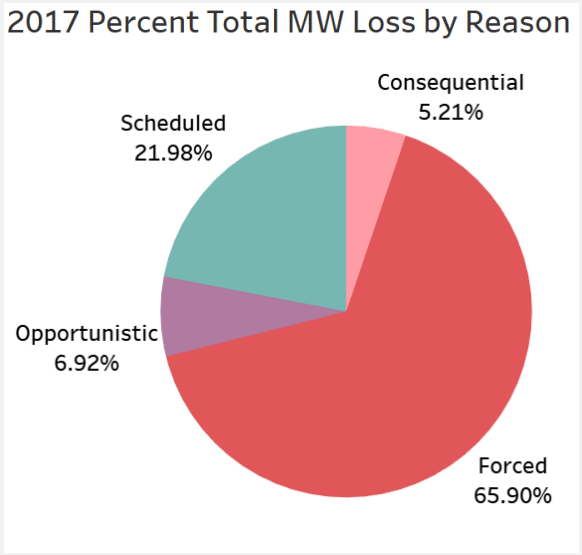


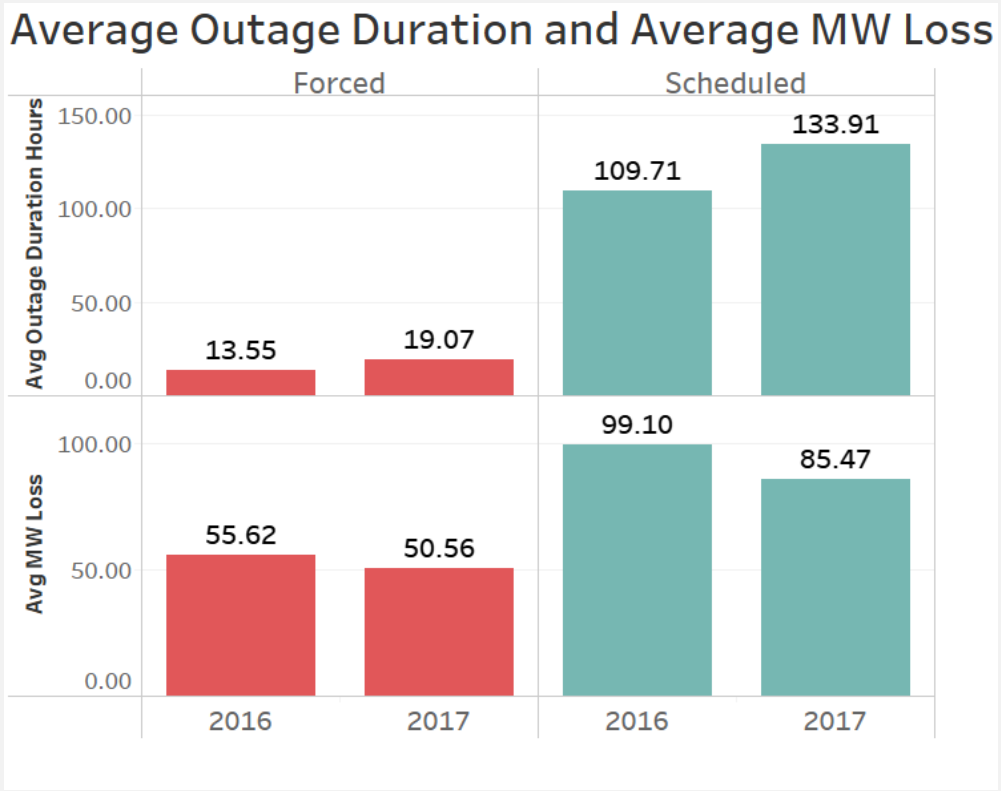


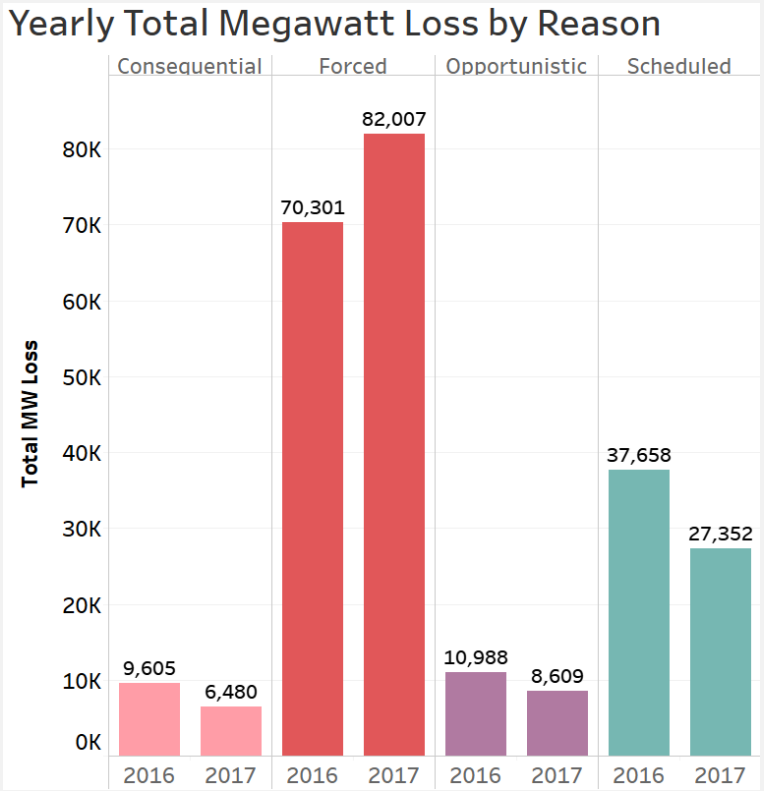


1. This 75% figure attributed to forced outages in 2017 is up from 65% in 2016.
2. Aside from forced outages, all other outage reasons experienced a decrease from 2016-2017.
3. In 2017, forced outages increased each quarter throughout the year, with the largest number of outages occurring in Q3 and Q4.
4. As the second most prominent reason for outage, scheduled outages remained steadier in both years, although it is worth noting that market participants had peaks in scheduled outages during Q2 and Q4 in both years.

Energy loss closely mirrors the results from outage events with forced outages causing the most megawatt loss, and scheduled outages causing the second most. However, when compared to total outages, scheduled outages made up a larger proportion of MW loss with 22% due to having an average outage duration that is 7x that of forced outages.

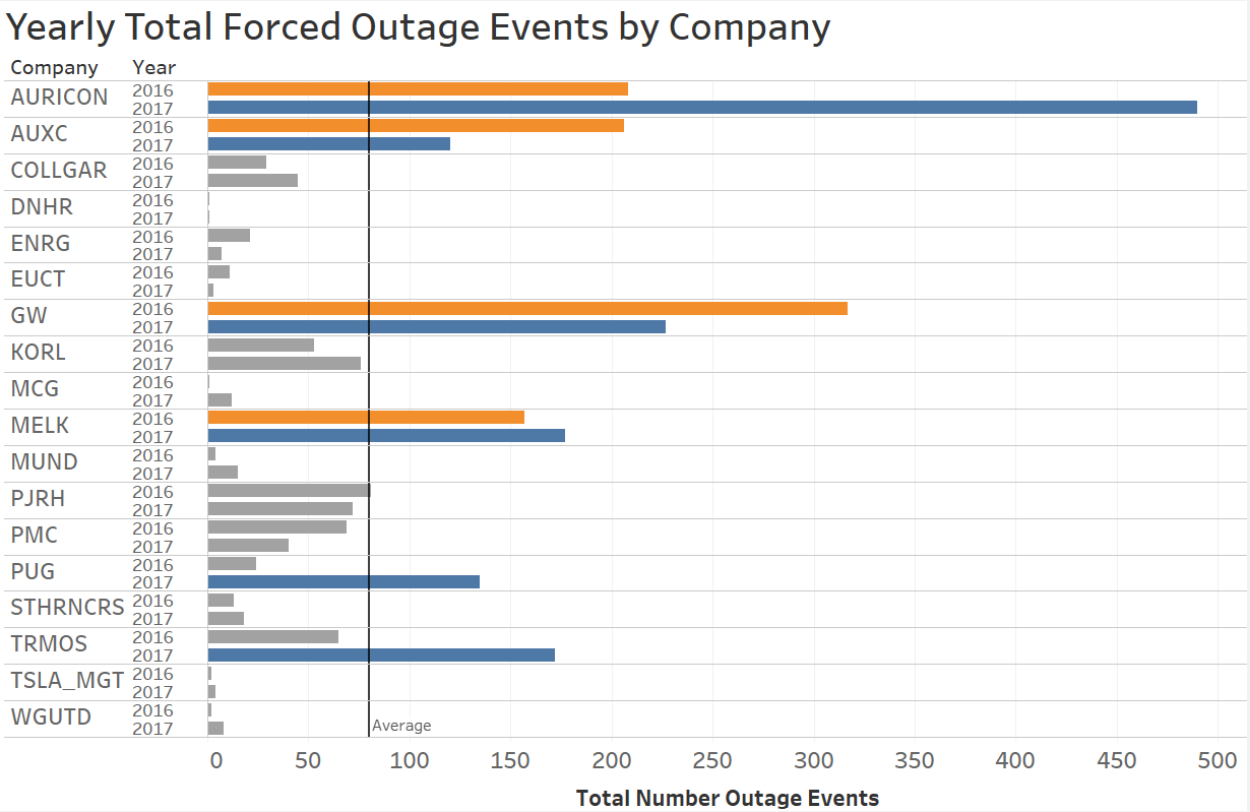


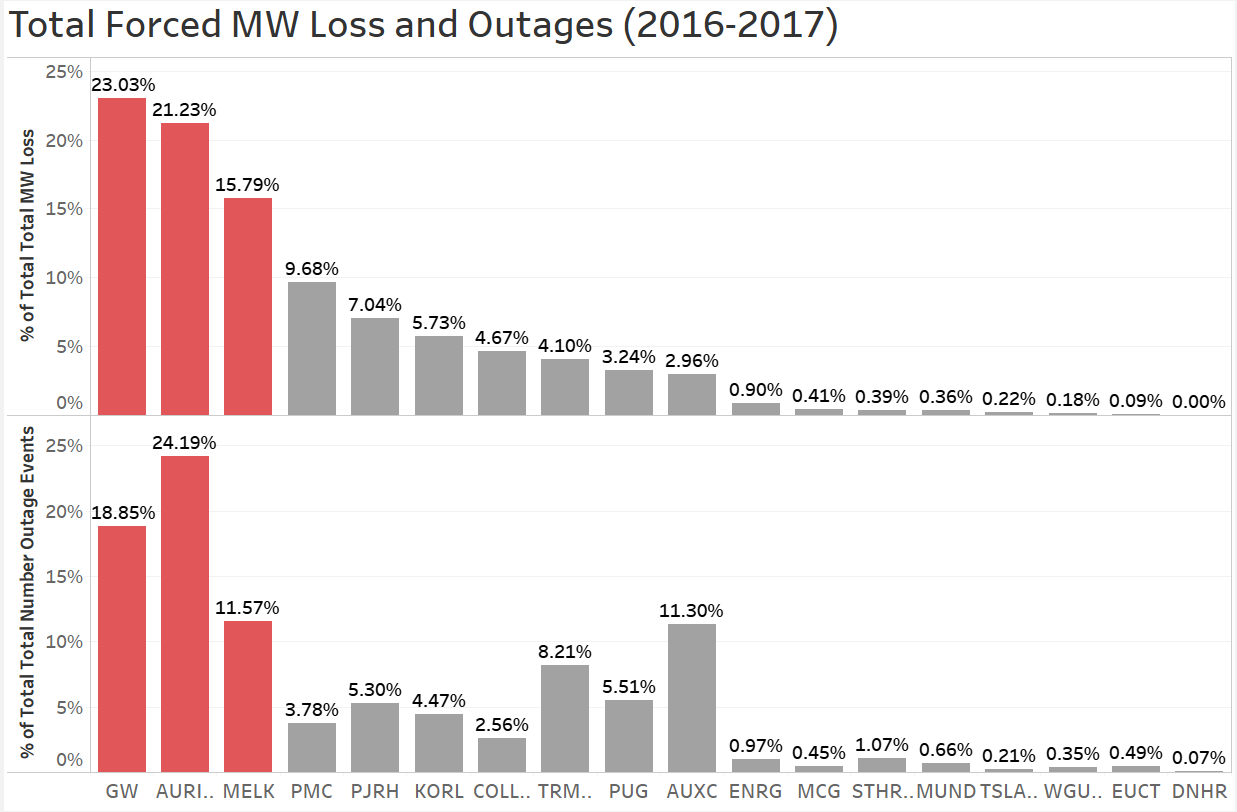




1. In 2017, the average outage duration increased 41% for forced outages and 22% for scheduled outages.
2. Although the average megawatt loss is higher for scheduled outages, forced outages still make up 66% of total MW loss in 2017 as there were 5x more forced outages than planned ones.
3. It's possible that these figures point to an inverse relationship between the number of forced and scheduled outages.

An exploration of the market participants experiencing the most forced outages revealed that there were six companies that had an above average number of forced outages in 2017. Four of these companies, AURICON, AUXC, GW, and MELK also had above average forced outages in 2016, yet AURICON, GW, and MELK actually account for the most MW loss across both years.

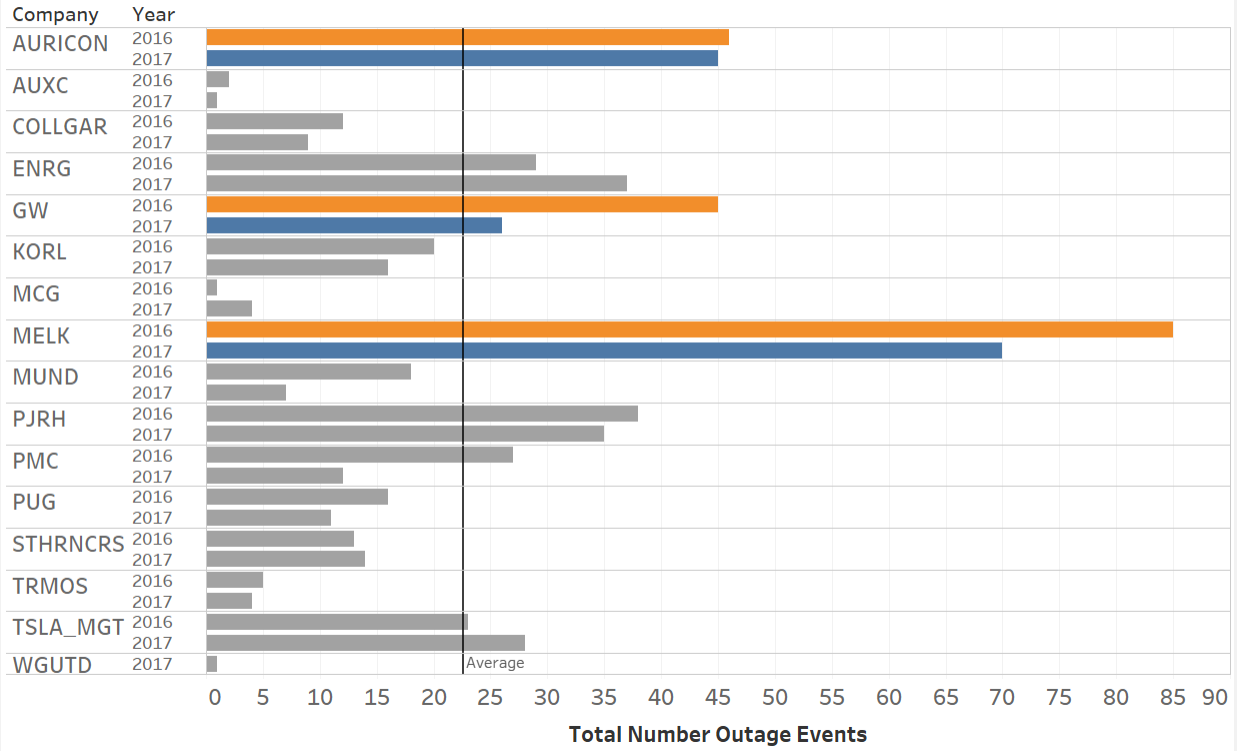




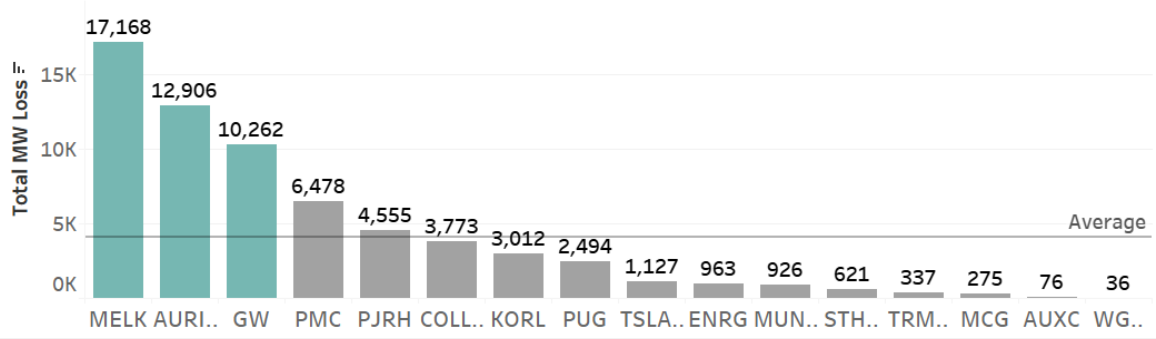
1. From 2016-2017 AURICON, GW, and MELK made up 60% of the total forced outage energy loss and 55% of the total forced outages.
2. AURICON saw the most significant jump in forced outages in 2017 experiencing a 136% increase.

As the second leading cause of outages and energy loss, scheduled outages play an important role in energy stability and market reliability as well. AURICON, GW, and MELK had above average scheduled outages in both 2016 and 2017, accounting for 45% of total scheduled outages and 62% of scheduled outage energy loss during that time frame. This shows that having more planned outages isn't necessarily a good thing.

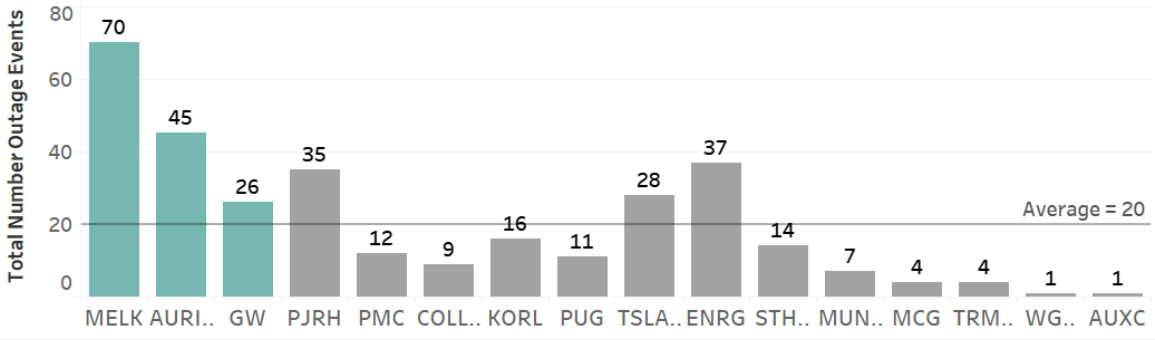
Yearly Total Scheduled Outage Events by Company



Total Scheduled MW Loss (2016-2017)

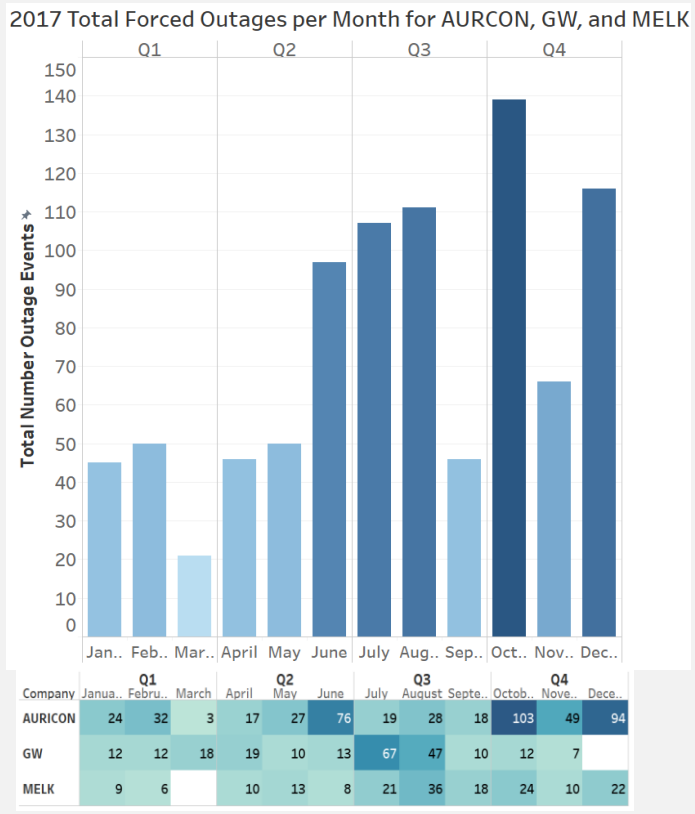


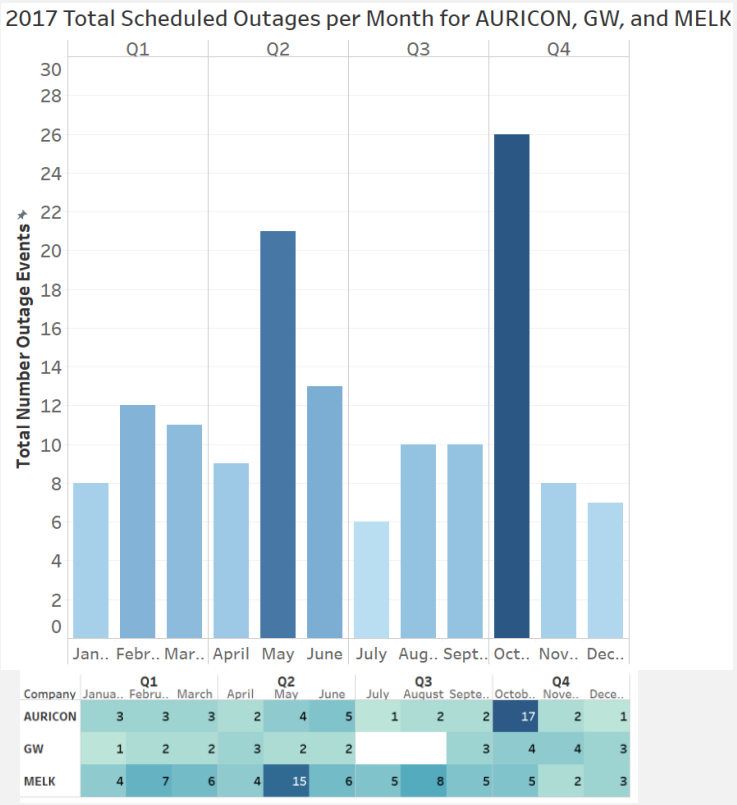
2017 Total Scheduled Outages

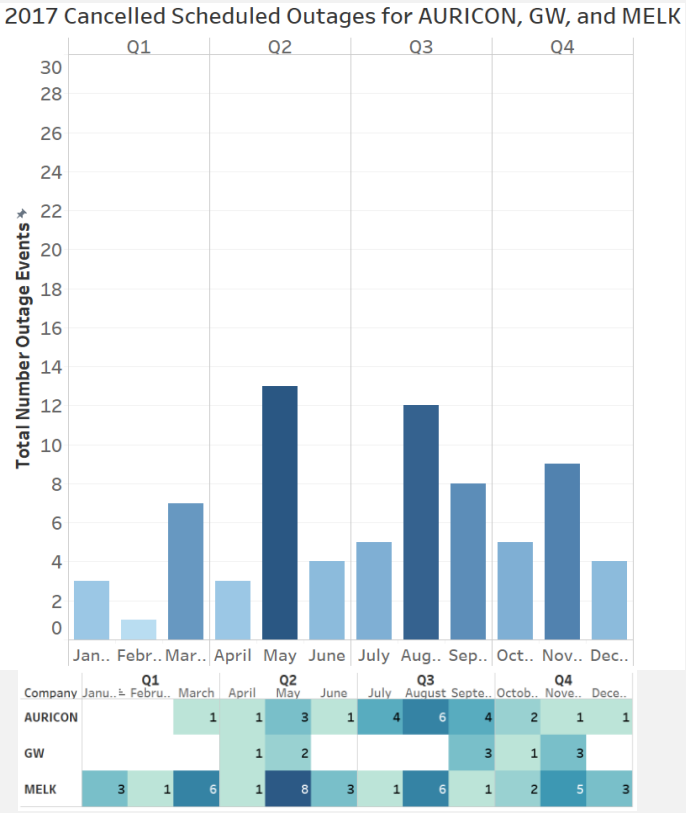


1. In order to reduce the high levels of MW loss for these companies caused by both forced and scheduled outages, I believe it is essential to reduce their total annual scheduled outages to a rate more reflective of the average rate of 20 while increasing an emphasis on strategic timing to maximize effectiveness and limit instability during Q3 and Q4.

It is clear that AURICON, GW, and MELK experience the most forced outages in Q3 and Q4, threatening energy stability at a time when it is most crucial. In order to curb forced outages it is necessary to spread out scheduled outages throughout the year with a higher concentration around Q3 and Q4. It might be necessary to penalize market participants who cancel scheduled outages around this time period.

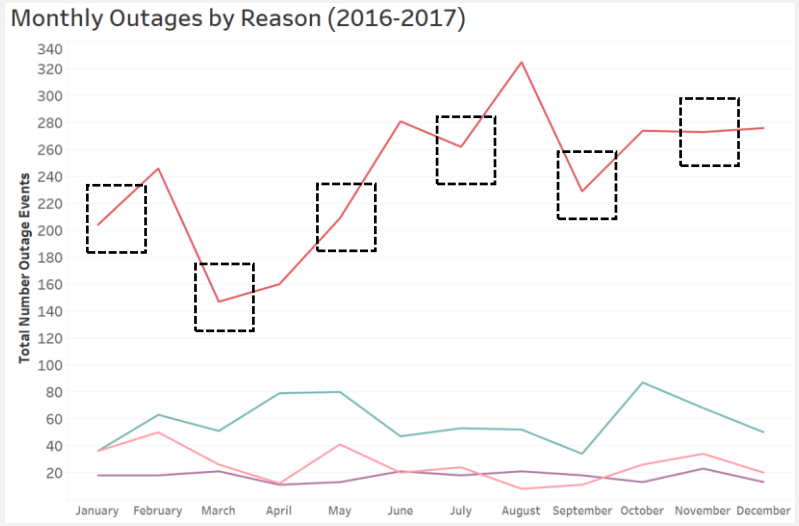


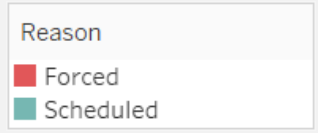


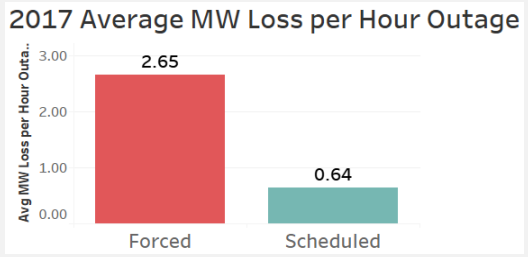


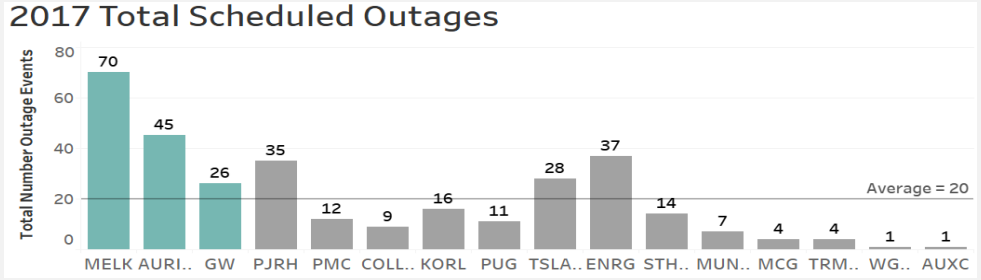
1. AURICON had planned 38% of its scheduled outages in a single month during the final quarter of the year. This is the same quarter it experienced 246 total forced outages. The two months prior it had cancelled 10 planned outages as well.
2. GW had the most forced outages in July and August, the only two months where it had executed no scheduled outages.
3. MELK also had 21% of its scheduled outages in a single month, which was two months before experiencing forced outage spikes during the crucial period of Q3. It had also scheduled 6 outages during the month it experienced its most forced outages.

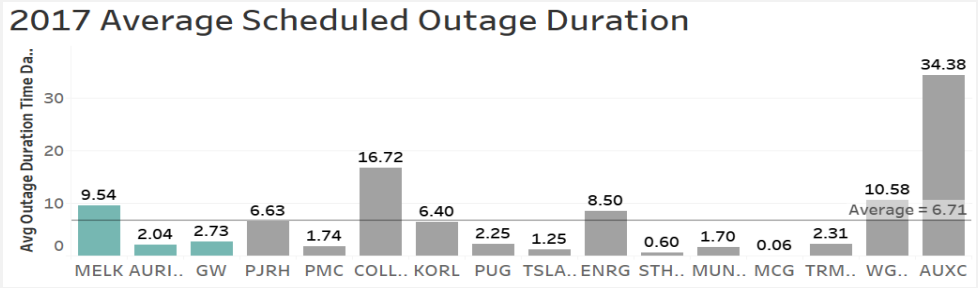
In order to combat the rising instances of forced outages from AURICON, GW, and MELK that threaten to jeopardize energy stability, I believe a three-prong approach of tackling scheduled outage timing, duration, and frequency is sufficient to boost market reliability.











1. Q3 and Q4 experience the most forced outages during the year. An emphasis on requiring a minimum of 3 scheduled outages in the alternating months of January, March, May, July, September, and November will help market participants address maintenance issues and prepare for the periods of heightened market demand.

2. Since maximizing scheduled outages alone does not seem to limit forced outages, AURICON, GW, and MELK should decrease the total number of scheduled outages they have to no more than 24 annually.

3. In order to maximize the benefits of these limited scheduled outages and to ensure adequate maintenance procedures are performed, the average duration of these outages should be adjusted a length of 7 days. An increase in the duration of scheduled outages will have a substantially smaller effect on energy loss compared to forced outages.

4. To ensure cooperation, measures should be put in place to penalize market participants for cancelling scheduled outages especially around Q3 and Q4.

Thank You!

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