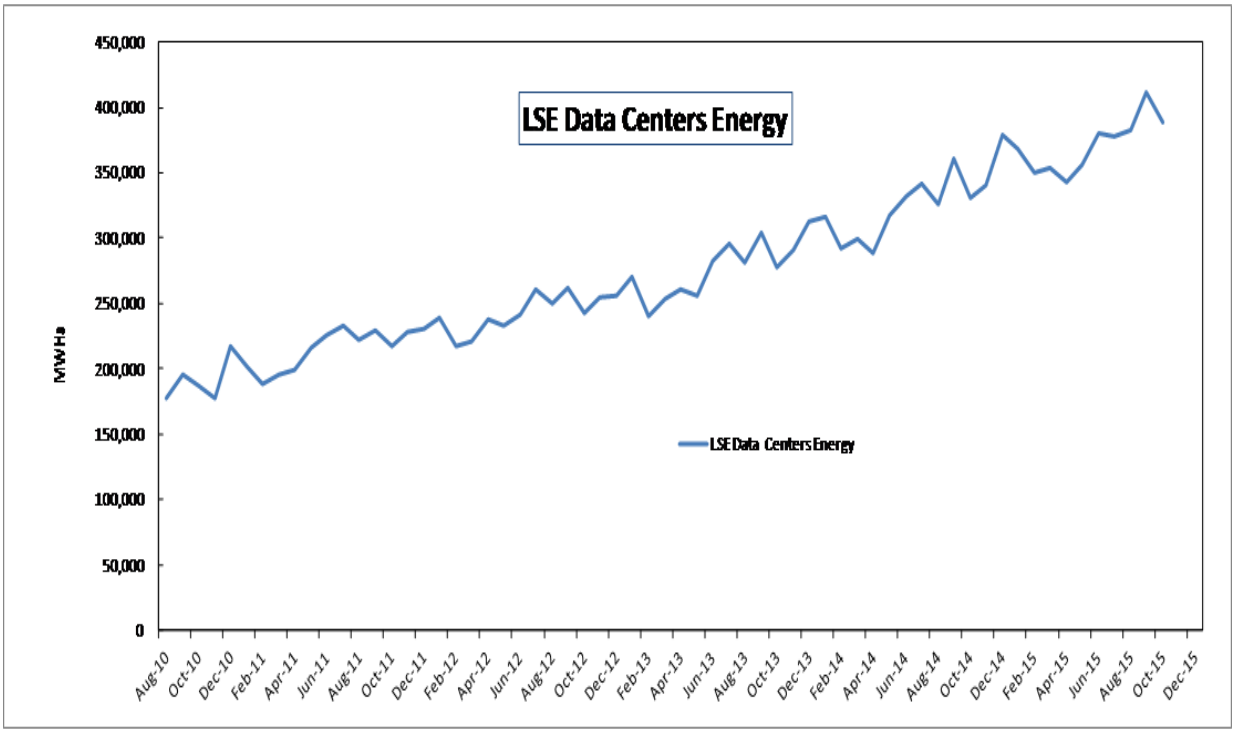
Dominion Load Forecast Adjustment Questions

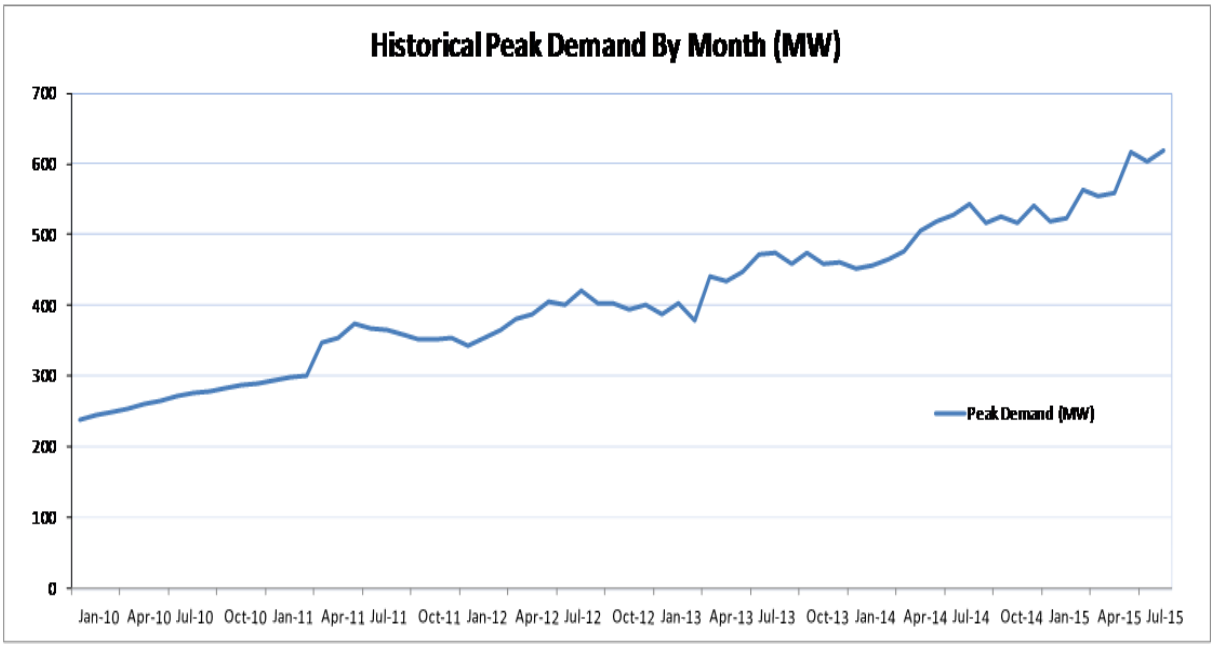
1. You stated that total data center load in DOM is forecast to be about 1500 MW in 2019, of which you estimate 800 MW is "in" the forecast and about 680 MW is not. How this was determined.

See response to #2 below.

a. What is the historical trend of total data center load, 1998 to 2015.

See the charts below, which show aggregate historical LSE data center load (in MWh) from August 2010 to November 2015 on a monthly basis, and the aggregate historical peak demand (MW) by month from January, 2010 to July, 2015. Note that this only reflects the LSE portion of data center load for the DOM Zone (does not include wholesale load).





b. How many sites/companies are included in this historical trend? News articles suggest there have been numerous facilities and companies involved in this growth since at least the early 90s, so aggregate data should not be commercially sensitive in any way.
See table below. Data centers vary in size and some data centers have multiple accounts.

Year	Incremental Data Center Additions	Total Number of Data Centers
2010	10	47
2011	13	60
2012	4	64
2013	7	71
2014	15	86
2015	8	94

c. Is this the maximum annual load, or average or what. Most relevant is load at time of summer peak, correct?
The energy chart shown above (answer to 1.a) represents the average monthly load (in MWh) for all data centers. The peak demand chart represents the peak monthly demand (MW) for all data centers.

d. How much of this load historically has been met with on-site generation, especially on peak. And is it behind the meter or not.

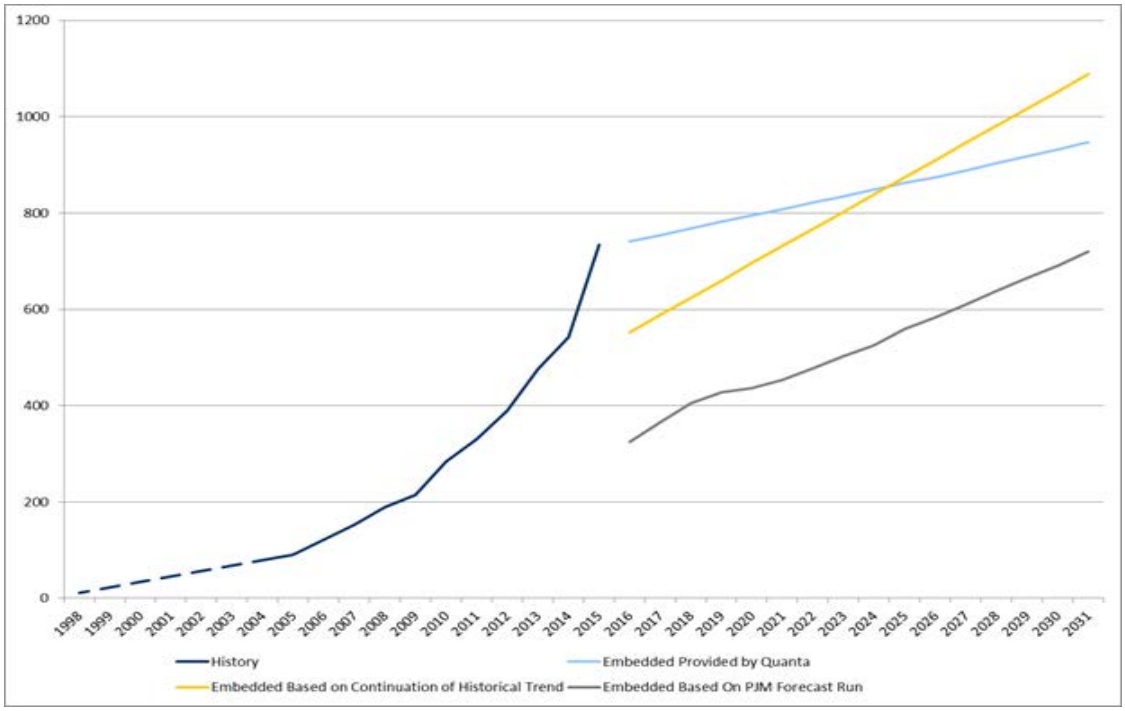
Most, if not all, of the data centers located in the Northern Virginia have diesel generators for emergency back-up purposes only. These generators are typically only permitted to run during emergencies, and are not used during normal peak load conditions.

e. What is the total data center load that has been the basis for RPM payments?
In summer 2015, the coincident load of the data centers at the time of the PJM peak was approximately 610 MW.

The PLC calculation used for RPM payments takes the average load of PJM's five concurrent peaks (5 CP) from the previous summer. Load is grossed up for both distribution and transmission losses and scaled so that the average DOM zone load during the PJM 5CP match PJM's forecasted capacity obligation. This process is performed at the DOM LSE level.

2. How was the estimate of 1500 MW for 2019 determined.
Analysis was done by Quanta Technology wherein they performed forecast analysis with and without data center load. The difference between the two forecasts yielded the amount of embedded data center load in the forecast. This is the light blue line in the chart below. A counter-analysis performed by PJM looked at two alternative ways of measuring embedded: a) as a continuation of the historical trend and b) a run of the PJM forecast model where data center load is removed from the historical loads. Method A produced the yellow line below, while method B produced the gray line.

With these results in hand, PJM chose to use the light blue line (the Quanta suggestion for embedded) as it appeared to be the most sensible in that either the yellow or gray line would be indicative of significant bias towards underforecasting by the PJM forecast, which has not been borne out by recent analysis. Thus, PJM assumes that more data center load is embedded than otherwise suggested (resulting in a smaller forecast adjustment).



a. How firm are these plans. How much of the growth is "contracted" (per Att C p. 31)
All of the data center load included in the analysis is under contract; based on previous experience, the analysis assumes that only 86% of the contracted amount will be realized

b. Have the developers of the new facilities indicated for what peak loads they plan to pay for RPM capacity?
Neither developers nor customers indicate for what peak loads they plan to pay for RPM capacity. Capacity peak loads are a retail choice issue determined by the EDC based on their filed methodology.

c. How much of the new load will be served with on-site generation.
Most, if not all, of the data centers located in the Northern Virginia have diesel generators for emergency back-up purposes only. These generators are typically only permitted to run during emergencies, and are not used during normal peak load conditions.

d. Will any of the on-site generation be offered into RPM, or be used for load reductions on peak, etc.
To the best Dominion's knowledge, no.

e. In previous iterations, I had suggested that a manual load adjustment should only be made for loads for which the developers have committed to RPM capacity payments. You might check about that.
No explicit commitment to pay capacity charges on a given amount of load is made by a retail customer; it's a part of the retail choice environment and can't be avoided.

3. How was the estimated 800 MW "in" the forecast determined.
a. What was the methodology.
See response to #2 above.

b. I note that even without the load adjustment, you have DOM peak increasing a total of 4.4% from 2016 to 2019, compared to only 1.6% in the adjacent PEPCO zone. What explains the strong growth in DOM in the forecast, other than data centers?

While the projected 10-year economic growth rates for DOM and PEPCO zones are identical, there are several factors that explain the stronger load growth rate for DOM zone. The data centers are part of the difference since they represent significant load growth with a negligible economic impact. Also, the elasticity to economic growth of the two zones differ, such that a given amount of economic growth in DOM zone will produce greater load growth than an equal amount of economic growth in the PEPCO zone.

c. I note that from 2009 to 2015, the DOM WN peak rose 1.9%, while in the adjacent PEPCO zone, the WN peak fell 7.6% over this period. What explains that large difference, and isn't historical data center load growth part of the answer.

Yes, data center growth is a large part of the different history and outlook for DOM load growth versus PEPCO. The energy chart shown above (answer 1.a) for DOM LSE reflects an average data center load growth rate of approximately 13% per year from 2010 through 2015.

4. Efficiency and data center loads: what did you assume about increasing efficiency of data centers, both existing and proposed?

The study assumed that any efficiency increases due to technology or operating/control improvements had been taken into account by the owner-operator/builders of these data centers, and therefore they contracted for less than they would have otherwise.