Using **VisNet® Hubs** to monitor how energy usage has changed during Covid-19

Background

2020 will go down in the history books as the year that brought us Covid-19. The global pandemic has had a dramatic effect on day-to-day life, impacting us personally and professionally. By extension, Covid-19 has changed the way in which we, as a society, use electricity.

In particular, social lockdowns dramatically change where we consume electricity. With millions of people working from home, low voltage (LV) networks - the network that connects us to the grid - is operating in a different pattern than ever before. Fortunately, we have had VisNet® Hubs across the UK monitoring LV substation data during this unique time.

The VisNet® Hub monitoring platform provides measurements and insights into LV distribution systems. The VisNet® hardware is complemented by a software package, enabling network operators to manage their LV networks in real-time. Alarms, historical data, and the dynamic status of equipment for the entire LV network can be managed from one web application.

This case study shares some of our observations, providing insights into how Covid-19 has affected electricity usage on LV networks.

Observations

As working from home has become the new normal for many during the lockdown periods, we have observed a dramatic shift in power demand when comparing LV substations supplying mainly domestic and those supplying commercial properties.

Figure 1 displays the power flow for a substation supplying mostly commercial users from February to May 2020. As highlighted on the graph, when the UK first announced a country-wide lockdown on March 23rd, the power demand of the substation dropped by approximately 80%. With shops closed, the power consumed by those properties is reduced to a minimum.

In contrast, *figure 2* displays similar data, but for a substation supplying mainly domestic customers with a high number of embedded photovoltaic (PV) devices. During daylight hours, the power generated by the PV is greater than that consumed by users. We therefore witness reverse power flow, which is where the power flows from the houses back to the substation; this is shown as negative power on the graph and is typical for circuits with a high volume of PV installed. Again, we observe a near-overnight change in energy consumption as lockdown is introduced.

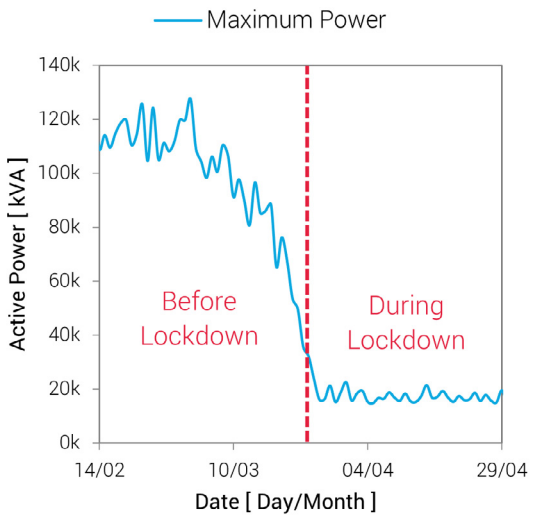

Figure 1: Substation data supplying commercial properties. The red line indicates the start of the UK lockdown.

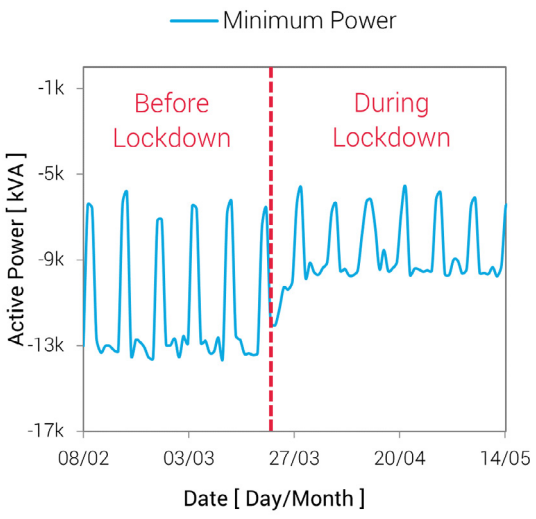

Figure 2: Substation data supplying residential properties with a high number of embedded photovoltaic devices. The red line indicates the start of the UK lockdown.

Case Study

Interestingly in this example, the peak energy demand does not noticeably increase. This makes sense, as we are not using more energy at peak times, we're simply using energy at home when we previously would not (during working hours). The demand introduced from home working uses the excess energy generated by the embedded PV, that peaks during daylight/working hours. This is measurable by observing the minimum power levels before and after lockdown is announced. Minimum power flow levels increase by approximately 35% on average.

Insights

Covid-19 is the embodiment of unforeseeable challenges to the electricity network. Emerging suddenly, the global pandemic has had a dramatic and lasting effect on our lives. It demonstrates how little control we have over unknown and unlikely challenges that lay ahead. Network monitoring enables us to track, quantify and understand the impact of such challenges. This allows us to act when needed, ensuring a robust LV network, fit for the future.

VisNet® Hub will provide LV network operators the visibility required to manage these ever-changing circumstances we find ourselves in. If you would like to know more about the VisNet® Hub and its many capabilities, please click **here**.