

Impact of Coronavirus on Distributed Energy Generation with the Application of Demand-Side Management

BY MARULA TSAGKARI

The Coronavirus pandemic will change the way we live and perceive the world around us and thus, will undoubtedly also affect the way we use energy. The energy sector is already feeling the effects of the coronavirus and these are not expected to go away anytime soon. The global lockdowns changed radically the energy demand patterns due to shut downs of industries, business and schools and necessitating home-office. This new pattern makes it difficult for grid operators to predict energy demand. Additionally, in most countries with strict confinement measures energy demand has dropped dramatically. For instance, electricity demand dropped by 18% in Italy¹ and by 10% in Spain², compared to the demand before the quarantine measures. At the same time, many of these countries/regions like Spain and California rely heavily on renewable energies. This gives us a good indication of how a future network with higher renewable energy penetration could work. The high intermittency of the renewables along with the more unpredictable energy demand patterns, and the shut down of industries which normally apply real time demand management also highlight the need for more network flexibility. The idea of demand side management (DSM) deals with these issues as it tries to balance supply shortage, grid inefficiencies and overloads. Distributed Energy Resources (DERs) feed electricity into the grid while the DSM removes the extra demand out of the grid.

The concepts of DSM via DERs has been discussed intensively the past years, but there are still limited applications and various obstacles. However, one could speculate that the coronavirus outbreak and the new circumstances will push for DSM application and energy decentralization in the longer term for the reasons explained below.

Digitalization

During coronavirus pandemia and due to the lockdowns we observed more reliance on digital technology for everyday tasks like video conferences, online teaching environments and digital workout. All these can lead to a change in mindset, pushing towards the direction of the massive digitalization of our societies in the upcoming years. Although energy has traditionally been a sector that has resisted digitalization sticking with the traditional centralized model of energy flow from the producer to the consumer, one could expect that post coronavirus the trend will be reversed.

The rise of artificial intelligence (AI) can make possible real-time predictions of generation and demand. This can change the way we produce and consume energy making the households important

players in the energy market alternating from consumers to producers. During times of crises and uncertainty people are concerned about things they cannot control and electrical reliability is currently one of those. With the use of distributed energy resources (DERs) with real time DSM the households will increase their resilience as they will be able to directly regulate their energy production and consumption through internet applications, reducing their dependence on utilities and securing their autonomy for themselves and their communities in future crises.

Indeed already there is an increased worry regarding the security of electricity supply. Although many companies assure that they are well prepared to face the pandemic^{3,4} the uncertainty highlights the fact that in times of uncertainty

However, this transition will require time. In the near future, right after the outbreak, there will be few new renewable energy projects, due to the disruptions in the supply chain and lack of liquidity. Already manufacturers forewarn on delays in scheduled projects.⁵

Additionally, the utilities will face severe problems due to payment delays. Already in many countries, utilities are offering relieves for vulnerable consumers who are unable to pay. This money will have to be recovered after the outbreak and thus, consumers may face considerably higher utility bills. This can push consumers to consider cheaper long term alternatives, including generating their own electricity. Short term however, individual consumers will have less available finance to invest on renewable energies and smart meters in their households, delaying the transition to a decentralized system with integration of flexible demand.

One may also suspect a reduction in the demand response as this is often integrated with the industrial operation which is slowed down. In countries like Spain in which there was the provision to start the operation of the demand management market this June there will be significant delays.

In the longer term, however, and as digitalization advances under the new reality, the idea of demand-side management, with the integration of distributed energy will become increasingly predominant. These can vary from small, stand-alone electricity generators that allow for energy stockpiles, to more complex systems integrated with the grid.

Marula Tsagkari is with the Department of Economics, University of Barcelona, Barcelona, Spain. He may be reached at marula.tsagari@ub.edu

See references at end of text.

This will change not only the way we talk about energy, but also the way our communities are organized. Various networks will emerge among prosumers, allowing the function of a peer-to-peer energy market in neighborhoods or in apartment blocks. The adoption of DERs will allow for an optimization of the energy demand and more efficiency that can eventually reduce consumption. At the same time, it will make energy management and grid operation less manual allowing for online control and increasing autonomy. Electricity stockpile through batteries will be possible. Energy utilities will also invest in DERs allowing them to operate cleaner and more reliable systems, using more automation that will reduce the risks in a future pandemic scenario.

Of course this transition to decentralization through DSM will raise big questions especially regarding the role of utilities, the safety of the system against potential cyberattacks and the use of personal data.

Today, the coronavirus outbreak not only highlights the importance of a reliable electricity system, but also paves the way for big changes in line with the

digitalization advances, the rise of clean technologies, and the democratic arrangements that will call for new community arrangements. Despite the initial delays on the operation of demand side management, long term we can expect that the digitalization and the need for control over energy will push for distributed energy sources with the use of distributed energy sources in order to ensure security, reliability, and efficiency of the electricity supply in the post coronavirus market environment.

References

- 1 https://epic.uchicago.edu/insights/is-plunging-power-demand-amid-coronavirus-a-sign-of-things-to-come/?mc_cid=0871e60889&mc_eid=%5bUNIQID%5d
- 2 <https://www.bloomberg.com/news/articles/2020-03-20/power-demand-slows-in-europe-along-with-coronavirus-lockdown>
- 3 <https://www.wired.com/story/americas-electricity-is-safe-from-the-coronavirus-for-now/>
- 4 <https://electricityplans.com/impact-coronavirus-electricity-grid/>
- 5 <https://www.bloomberg.com/news/articles/2020-02-27/coronavirus-is-starting-to-slow-the-solar-energy-revolution>