

Everybody knows how energy will be generated in the future, or do they?

At an event a few weeks ago, a number of speakers prefaced their comments with statements like “**everybody knows** the future will be based on distributed generation – primarily with small scale renewables and storage to provide reliability”. While there is currently a trend towards increased use of wind and solar and batteries are increasing their footprint as viable short-term storage (current batteries mostly provide 4 hours of energy and some provide 8 hours), pronouncing this as the definitive path for the future is premature.



It is hard to understand why so many people seem to believe that securing energy from a traditional large electricity grid is the way of the past and that generating your own electricity, perhaps together with your neighbours in a microgrid, is by far the better way.

After all, in most aspects of our modern lives, we are becoming more and more networked and interdependent with others. We have no problem securing our internet from large telecoms and we love using large social media sites such as Facebook and Instagram to share our most private thoughts with our global network. We are comfortable being totally dependent upon large companies for so many aspects of our

daily lives. We read books and listen to music on our various devices where we depend upon the company being in business as we no longer take physical delivery of content. I spent thousands of dollars on Sonos speakers that provide fantastic sound, but if Sonos disappears tomorrow they will no longer function since they need the Sonos app and its business associations with a range of music providers to keep working. Our NEST thermostats require the app to function at their best and as we move to the "smart" home, all of these devices are operated with apps that require the company supporting them to be in existence for the long-term while we naively assume that because they are so large that Amazon, Facebook and Google will always be there and can never go bankrupt.

Yet somehow, when we have accepted being so dependent upon companies that are larger than some nations for most of what we consider important in our lives, for a basic commodity like electricity, which is essential to enable all of these other services we both need and desire, we conclude that generating it ourselves on our roofs is the best way forward. We have this romantic fantasy that we can live off-grid with a combination of solar power and battery backup. Of course, with a bit of thought we realize that it would be a crisis if it rains for a week and we can't charge our iPhones, so we accept that we cannot go it completely alone. The conclusion being that maybe we need to collaborate with our neighbours and build a small system (or microgrid) to achieve the reliability that we need to power our lives. The question then becomes how big a system do we need?

Electricity generation and distribution is a complex system. It is already distributed in a sense because a traditional grid requires a number of generating stations in different locations connected by a system of wires to provide customers with cost effective and reliable electricity. How big a system do we need to maintain reliability? Well, after the big black out in North America in 2003, it was decided by US

regulators that increased inter-connectivity would be required and all utilities would have to adhere to stringent reliability standards to maintain this interconnection so that one bad actor cannot bring everybody down. So, in a sense we are all connected. The same in Europe where most countries' grids are interconnected to provide a robust reliable system.

Since it is likely that distributed generators will have to be connected to a microgrid and that microgrids will have to be interconnected to maintain robustness and reliability, then aren't we just building a new type of large system similar to what we have now? I guess it is the larger centralized generating stations that people dislike as they believe that smaller renewable generation with each of us being generators is the way forward.

But is it? It may be nice for middle class and wealthy environmentalists to dream about a simple life in which they generate their own electricity on their roof, grow much of what they eat in their own garden and buy organic and GMO-free products to meet the rest of their dietary needs; but does this really reflect the reality of society as it is developing today? The world is urbanizing quickly with most people not living in single family homes in the suburbs, but in high density buildings in cities. Is it realistic to generate our own electricity on the roof of a 200 unit apartment building where our own unit may be only 600 square feet? Should we grow our own food on our concrete balconies? Should we drive our electric car to work and clog the roads because we can charge it overnight when demand is low and avoid the subway because it uses on peak electricity when demand is high?

As the world moves to higher density living, it seems unlikely that we can meet our energy needs with lower density sources of supply. As stated by Michael Shellenberger, "Humankind has *never* transitioned to energy sources that are *more* costly, *less* reliable, and have a *larger* environmental footprint than the incumbent – and yet that's precisely what adding large

amounts of solar and wind to the grid requires. “ ... “In other words, going from energy-dense fuels to solar and wind requires the *rematerialization of energy* in the form of more land, materials, mining, storage, and waste.”

While idealistic environmentalists can live in their big homes in the suburbs and pretend they are living in an isolated cabin in the woods, the rest of us need to power our lives with reliable economic and low carbon electricity. This means high density generation for high density living, and there is no better high-density fuel source than uranium.

One thing we know for sure is that predicting the future is perilous at best. We can be certain that we are more likely wrong than right when gazing into our crystal balls. The next time someone tells you that “**everybody knows...**” remember that this a way to avoid actually providing supporting evidence for their view of the future. What we do know is that the future is ours to shape; that reliable and abundant low carbon energy is required to power it, and that nuclear power has the density to meet these needs economically.