




# What does the climate change future look like and what does it mean for the electric utility industry? What other major trends do you foresee emerging in 2016?

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January, 2016

Meet the Author:

An IEEE Fellow, electricity industry visionary, and leader, Dr. Mani Vadari delivers strategic services to a global set of utilities, vendors, and service providers seeking deep subject matter expertise in setting the business and technical direction to develop the next-generation electric/energy system. As a Business Architect, Dr. Vadari has been delivering solutions focusing on Transmission/ Distribution/ generation operations, Energy markets, and Smart Grid for over 35 years. In addition, he is an Adjunct Professor at Washington State University and an Affiliate Professor at the University of Washington. He has published two popular books, "[Smart Grid Redefined: Transformation of the Electric Utility](#)" and "[Electric System Operations – Evolving to the Modern Grid, 2nd Edition](#)", in addition to over a hundred industry papers, articles, and blogs. His books are serving as textbooks at several universities in the US and around the world

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## Setting the Context – Is Climate Change Real or Not!!:

*Many people smarter than me have confirmed that it is very real. A few people who appear to be smarter than me have also said that it is not real. In last week's State of the Union Address, President Obama said the following:*

***What does the climate change future look like and what does it mean for the electric utility industry? What other major trends do you foresee emerging in 2016? But even if the planet wasn't at stake; even if 2014 wasn't the warmest year on record—until 2015 turned out even hotter—why would we want to pass up the chance for American businesses to produce and sell the energy of the future?***

***Seven years ago, we made the single biggest investment in clean energy in our history. Here are the results. In fields from Iowa to Texas, wind power is now cheaper than dirtier, conventional power. On rooftops from Arizona to New York, solar is saving Americans tens of millions of dollars a year on their energy bills, and employs more Americans than coal—in jobs that pay better than average. We're taking steps to give homeowners the freedom to generate and store their own energy—something environmentalists and Tea Partiers have teamed up to support. Meanwhile, we've cut our imports of foreign oil by nearly sixty percent, and cut carbon pollution more than any other country on Earth.***

*Agree or not, real or not, it is important to note that change is here. I, for one, believe that Climate Change is real and is already upon us.*

## So, what does this mean for us?

Quoting from my own blog from a few months ago – "The electric power industry is entering a very uncertain phase from a generation-profile perspective – at least in the US. Coal power plants are being retired at rates almost similar to the ones that were seen from a commissioning perspective in the 60s and 70s."

From a centralized perspective, these sources of power supply are being replaced natural-gas fired power plants. In addition, input of power from renewable sources, mostly wind and solar is on a rapidly increasing trend. While some of the sources of renewable power are from centralized (or large) plants, the majority of this power is coming from distributed sources – mostly rooftop solar. In fact, it is fair to point out that rooftop solar is probably the fastest source of new generation in the US and very soon, will be in the world as well. To support this, a new study described in today's Utility Dive states that "new industry report shows solar photovoltaic prices are moving toward a lower and standard range nationally." *to this.*

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## So, what does this mean to the Utility Industry?

*The growth of energy supply from renewable sources several challenges to the utility industry. I will attempt to drive through some of them in this article.*

- *Volatility of supply: this is the one that everyone is aware of. Most renewable sources of supply tend to have a variability that comes with them. The wind has to be blowing for a wind farm to generate and the sun has to be shining for the solar cell to generate. What should a utility do when there is no wind or solar?*
- *Customer becoming a supplier. With exceptions to the “not so common” situation of an industrial customer with a co-generation facility, the basic utility equation has been that the utility generates and the customer consumes. With solar PV and others, for the first time, this equation will no longer be true. The customer will also generate and when they do so, will expect to get paid for the energy delivered to the grid.*
- *Not in control of the location of supply sources: With the customer taking control of developing generation sources, the utility is no longer in full control of the location of generation sources and needs to deal with it.*

*There are, I am sure, several other challenges that need consideration by the utility.*

## So, what should the utility do about it?


*Surprise – surprise – surprise – utilities are not sitting still, waiting for someone to solve it for them.*

*With New York and California leading the way, it is very clear that utilities are already dealing with this new reality as presented above.*

*Several options are being considered and being implemented at utilities all across North America. Some key examples of what they are doing are presented below.*

- *Better forecasting tools to predict the quantity and location of generation*
- *Newer mechanisms such as microgrids are coming into play which can almost be defined as smaller grids within the existing distribution grid. These grids have the ability to be somewhat self-sufficient in energy supply-demand under some circumstances.*
- *The advent of AMI and better sensing mechanisms in the field is allowing distribution utilities to control demand in ways that were considered not possible before.*
- *Better access to storage mechanisms whose prices are also coming down.*
- *Better power electronics that allow us to dispatch renewable sources of power.*

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## So what?

*The future is bright. The utility industry is very resilient, its personnel are very smart and intelligent. The solutions defined may not be perfect on day one but will continue to evolve with increased penetration of new and unpredictable sources of energy supply.*

*My biggest takeaway from all of this is that – distributed (and renewable) sources of power may actually have the potential to make our grid more secure, reliable, and resilient by moving us away from the dominant dependence on fewer centralized sources of power and towards more sources of power. This new paradigm towards which we are moving could provide us with a better ability to withstand either cyber attacks, weather-related attacks, or man-made attacks.*

*As a power system engineer, I am positive that this is a better future for the utility industry*