Submitted Written Testimony from Vistra Energy to:

Senate Subcommittee on Energy Innovation
Regarding: Artificial Intelligence Within The Energy Sector
Springfield, IL

10/18/2018

Thank you Chairperson Hunter and members of the Subcommittee on Energy Innovation, for considering Vistra Energy's written testimony on the topic of Artificial Intelligence Within the Energy Sector.

While Vistra Energy is new to Illinois, we have a long history of operating in electricity markets. The companies making up Vistra Energy have a rich heritage that stretches all the way back to 1882, when the first electric light brightened the North Texas night. Today, Vistra Energy is a premier, integrated power company based in Irving, Texas, with regional Illinois offices in Collinsville and Springfield. As an integrated power company, Vistra combines an innovative, customer-centric approach to retail with a focus on safe, reliable, and efficient power generation. Through our retail and generation businesses (which include TXU Energy, Homefield Energy, Dynegy, and Luminant) Vistra operates in 12 states and six of the seven competitive markets in the U.S., with about 6,000 employees. Vistra's retail brands serve approximately 2.9 million residential, commercial, and industrial customers across five top retail states, and its generation fleet totals approximately 41,000 megawatts of highly efficient generation capacity, with a diverse portfolio of natural gas, nuclear, coal, solar, and battery storage facilities. We are proud of our commitment to service and the role we play in the economic, civic and cultural development of the markets we operate in.

Back in 1882, when we started, the grid was a highly analog and manual place. Even as times progressed into the 1900's and up to the last few decades, the grid continued to require significant levels of manual intervention from plant personnel manually flipping switches and opening valves to meter readers walking neighborhoods to record customer usage. But with the advent of the digital and internet age, seismic changes have hit industries across the globe as more and more functions can be automated, digitized and their information sent over wi-fi and other networks. While it has taken the electric industry longer to adopt these technologies (than say telecommunications, retail or finance), that adoption has begun and it is significantly changing the way utilities, generators and electric providers do business.

Application of Artificial Intelligence, that is using computers that can perform tasks that normally require human intelligence to perform, is still in its infancy in the electric industry. Today, most of the technological advancement in the industry is focused on data and communication efficiencies resulting in lower-cost operations and more rapid response times.

For example, the backbone of the smart grid is the digital meter. These meters (depending on model) are able to capture much more information and communicate it more efficiently and effectively than the old analog meters. The capture of usage data in intervals measured in minutes (instead of months) has enabled, in some markets, the ability to market time-of-use based products (such as our own Solar Days / Free Nights offer in the ERCOT market). The advanced communication features provided by these "smart" meters enable meter read information to be captured more efficiently, with fewer resources, thus reducing costs, and provide quicker communication to the Utility when outages occur, enabling quicker recovery times.

In a similar vein, Vistra also uses advanced technologies that allows it to monitor power plant operations across the country from one control room in Texas. In addition to the local, plant site, control and monitoring, these advanced technologies, for example, use sensors to detect vibrations, changes in heat rate, efficiencies, and other variables to signal when equipment, sometimes as small as a bearing, may be failing, and necessitate maintenance, thus providing for safer and more efficient operations, and reliable supply of electricity. Similarly, Vistra is an emerging leader in combining battery storage and solar technologies and continues to seek opportunities to use existing and emerging technologies, including AI, to transition into the future.

However, as with any new technology, there are risks. The digitization of our operations and records does increase our risk for cyberthreats. Vistra Energy takes the threat of cyber-attack very seriously and we implement industry best practices, federal requirements as well as other requirements to secure our assets from cyberthreat. It should be noted that the electric industry is one of the few industries with existing and enforceable cybersecurity standards. Even so, the realm of the internet moves at hyper-speed, and the cyber-attack of yesterday, or even 5 minutes ago, will change and adapt to the security and defenses put in place to thwart them. This requires that defenders implement a rapid response to evolving threats and develop a strategy that creates defense in depth, instead of relying on any single defense method. This constantly evolving battleground against cyber-threats just happens to also be a great arena for the application of AI.

In the past, many security software programs would examine the code behind applications to see if known malware had been included. This was a form of specific pattern recognition, which required a constantly updated catalog of known malware patterns. However, as malware developed more quickly it wasn't always possible to keep the catalog current in a timely fashion, thus opening a window for malware to embed into a system before the pattern was included in the catalog. Today, one of the ways to protect digital systems is to use security software that monitors systems using AI implemented heuristics. With AI implemented heuristics, security software can be given loose parameters of what normal activity is on a system and then alert personnel when it identifies activity outside this norm. This means, instead of relying specific identification of a malware via specific patterns of code, the security program identifies malware by the patterns of behavior on a system, a much more effective way to identify malicious activity in a rapidly changing environment.

Another potential use for AI is in the management of Microgrids. Microgrids are small electric grids that contain their own infrastructure and generation but can also be attached to the larger utility grid. The most basic form of microgrid is a backup electric system, at say a hospital, where when the utility grid experiences an outage the facility can continue to receive electricity through its own on-site generation. In more advanced forms, a microgrid may determine the best source of generation (whether on-site or from the utility grid) based on market and usage conditions, not just outage situations. These advanced forms of microgrids are made possible via computer systems using AI heuristics to manage the flow of power. These systems can determine if the microgrid should "island" (i.e., disconnect from the utility grid) to save money or if the microgrid should ramp-up its on-site generation to put power onto the utility grid when market prices are high. It may ramp down on-site generation when people go home for the day or decide to pull in more electricity from the utility grid when a stormy day reduces the effectiveness of on-site solar generation. Beyond microgrids, AI can be used in a similar manner in the back office of electric companies to help manage trading desk operations in real time or help to forecast load and commodity prices via modeling and scenario simulation.

A real-life example of AI use in the energy industry can be taken from Australia where IBM has used their AI platform Watson (of Jeopardy fame) to help an energy company, Woodside, retain employee knowledge. To ensure precision in their operations, Woodside relied heavily on historical context and procedural information. Unfortunately, every time an expert with years of knowledge and knowhow retired, that experience walked out the door with them. So, the question for Woodside became, how do you retain the knowledge of senior experts and make it possible for junior employees to locate, analyze, and learn from it? To make existing knowledge

available throughout the company and preserve decades upon decades of collective wisdom, they turned to IBM and Watson. Watson was trained with over 600,000 pages of documentation and was continuously tested to ensure its accuracy and ability to analyze new records. Once launched, over 80% of employees at Woodside used Watson. Before Watson, Woodside's engineers spent up to 80% of their time trying to uncover possible solutions or hazards – and only 20% of their time on the actual engineering work. With Watson, time spent on researching was reduced by 75%, because Watson enabled easy access to decades of wisdom and learnings built up by Woodside's own employees. With Watson, not only did Woodside save $10 million-worth of time and keep employees safe, but they also created a bridge for knowledge transfer from the past and for the future. (https://www.ibm.com/watson/stories/woodside/)

AI in the electric industry is still nascent; however, the opportunities are there. Perhaps the best enabler of AI in the industry is competition, where the ability to perform more efficiently, cost-effectively and accurately is always at a premium. AI holds the promise to meet and defeat cyberthreats, enable a more distributed/consumer centered grid, and capture decades of accumulated knowledge and share it effectively with the next generation. We thank the committee for taking the time to examine this important topic and providing Vistra Energy the opportunity to provide comments. Should the committee membership have additional questions, please feel free to reach out to Jeff Ferry, Sr. Director Government Affairs, for additional information, at Jeffrey.Ferry@Vistraenergy.com.