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NEURAL NETWORK MODELING VS ECONOMETRIC MODELING

Neural Network Modeling VS Econometric Modeling

A sea change is currently underway in the electric utility industry in the U.S. and abroad which is often referred to collectively as the "energy transition." This broad umbrella definition can refer to many and diverse happenings within the sector over the past decade and into the future. Rapidly declining costs of renewable energy sources and their increasing penetration of the supply stack, the proliferation of energy efficient technologies, home solar panels and their impact on load growth, and the advent of distributed generation sources and the digital technologies that manage their dispatch are all part of this phenomenon.

Another development taking a more prominent seat at the energy transition table is the subject of forecasting energy load growth.

As far back as the 1970s, electric utilities were universally using econometric models to produce long-term forecasts. Economic Regression Models were used by utilities to forecast long-term load growth as changes in economic factors such as population growth, inflation, industrial productivity, employment numbers, and OPEC production, were all heavily correlated with electricity demand growth. This model has had a 40-year run as the predominant methodology and is well entrenched. Its use is widespread across the industry and the science behind it is commonly understood.

However, when the foundation of an entrenched methodology changes, spectacular failures often follow, leaving a gap that needs to be filled with new thinking.

Over the past decade, demand has remained flat despite continued growth in traditional economic factors. This is due to the proliferation of energy efficiency technologies, home solar panels, and the advancements of information distribution, allowing consumers to make better choices.

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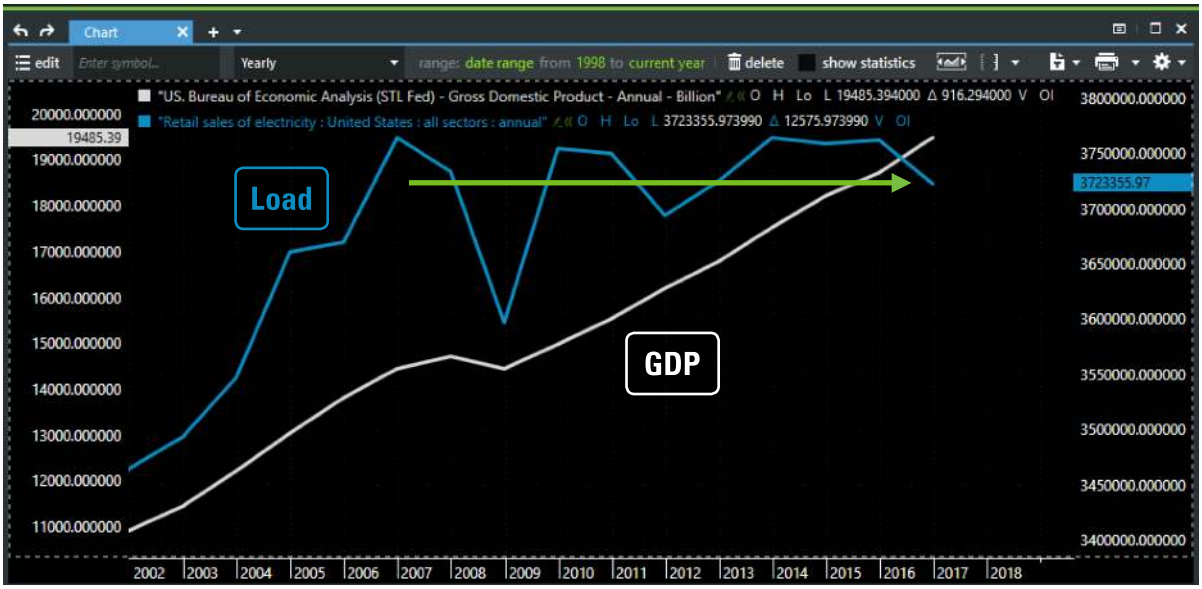

While there is no "silver bullet" solution to this evolution, what is clear is that the old way no longer works.

PRT has been at the forefront of developing alternative methods of forecasting electric load since the 1990s. Their methodology employs machine learning and neural networks rather than econometric regression to produce more accurate forecasts. Machine learning and neural network technologies are better able to blend with new paradigms that are responsible for load growth such as customer count, home solar panels, and historic statistical load information. While this approach was first adopted only to forecast short-term load, allowing many weather forecasts to be blended together, the science can be equally successful in producing accurate long-term forecasts.

PRT's experts believe the better approach would be to employ AI technology in the short-term forecast time horizon and statistical methodologies in the long-term forecast horizon to compare and/or blend the results. One example of how this approach is better suited for the current energy industry, is from ERCOT.

In December 2013, ERCOT very publicly announced a change to their forecast methodology. The ISO had been using weather and economic indicators, such as non-farm employment, to forecast future electric demand. However, they determined the relationship between economic growth and electric demand had decoupled in recent years. To address this, ERCOT staff developed a new load-forecasting model that instead considered growth rates in customer accounts. ERCOT announced that this new model employed neural network technology because it offers the flexibility to apply new premise count variables over time and better reflected changing conditions that could affect future growth in electric demand.

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A more recent example involves the 2018 rejection of Dominion Energy's entire Integrated Resource Plan (IRP) by the State Corporation Commission (SCC) of Virginia. While it is not uncommon for a regulator to require changes or rework to portions of an IRP, the SCC of Virginia had never outright rejected an entire plan since it began reviewing them in 2009. Leveraging PRT's forecast methodology, the SCC was able to better assess IRP proposals. The Commission specifically found that Dominion Energy's long-term forecast for energy demand had been consistently unrealistically high for many years. Adding that they had "considerable doubt regarding the accuracy and reasonableness of the company's load forecast for use to predict future energy and peak-load requirements." By being able to accurately evaluate Dominion Energy's IRP and requiring them to make changes, the Virginia SCC has been able to protect ratepayers and ensure the most cost-effective planning scenarios are evaluated.

The playing field in the electric utility industry has experienced significant changes over the last decade. Econometric-only based forecasts are underperforming and the criteria for forecasting has changed. The future of energy forecasting is machine learning and neural networks to produce more accurate forecasts. PRT has been at the forefront of this change for more than 20 years with its online forecasting tools.

For more information on how you can get the most accurate information available for electric load and price, and solar and wind power, please contact us.

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