| PROBLEM | SOLUTION | RESULTS |
|---|---|---|
| Utilites need to accurately forecast pricing for wholesale and retail markets to provide competitive offerings and customized user experiences to customers. | Machine learning solutions provide holistic approaches to price forecasting that consider all market forces and customer data. | Increased accuracy of forecasts and exposure of key drivers of predictions to allow companies to improve their bidding strategies, commercial offerings, and production schedules. |

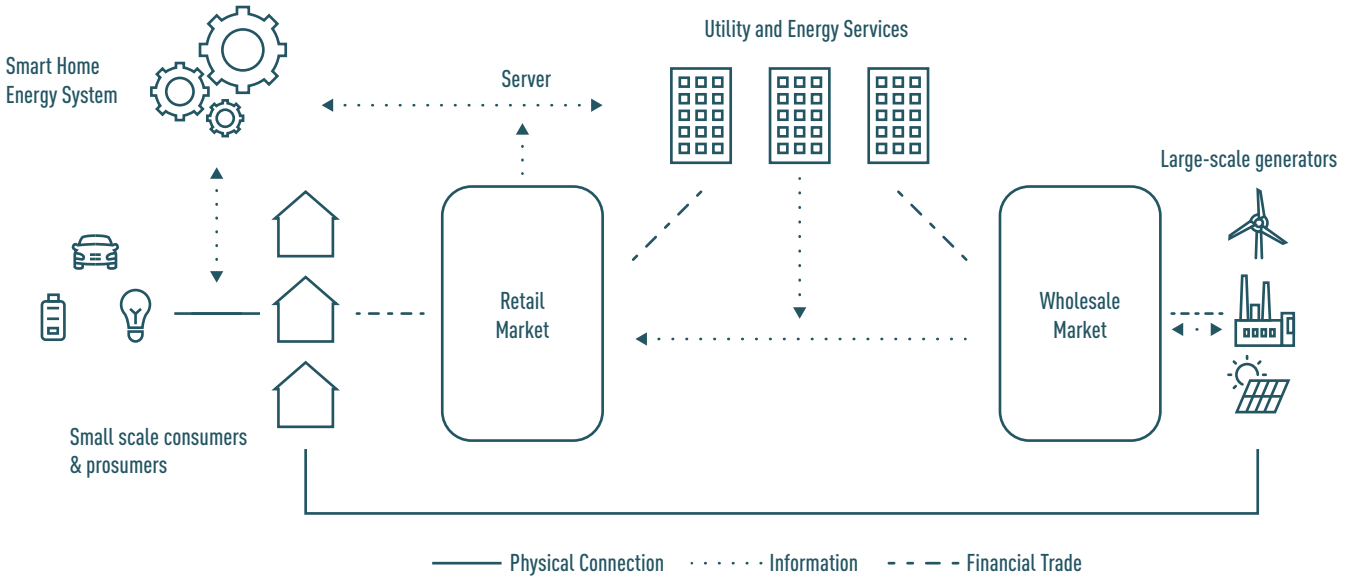
Supply and demand rule the pricing of most transactional goods and services, and energy is no exception. Forecasting of electricity demand has already become one of the main areas of interest for utilities, as it is a critical component of cost-efficient power system management and planning. With utilities increasingly focusing on advanced analytics, accurate price forecasting for both wholesale and retail markets brings the promise of moving beyond traditional approaches to offer better pricing, customized experiences to consumers, and optimization of production schedules.

## The Problem

The challenge of forecasting in the energy market is the relationship and at the same time difference between price forecasting and load forecasting. In the case of load forecasting, predictions are influenced by factors such as the non-storability of electricity, consumer behavioral patterns, and seasonal changes in demand. However, in the case of price forecasting, it's also important to consider financial regulations, competitor pricing, dynamic market factors, and other macro- and microeconomic conditions. This inherent volatility makes forecasting price a challenging proposition.

In the highly competitive and regulated utility business, there is a clear link between the company's bottom line and its forecasting accuracy and reliability. However, legacy forecasting solutions are not designed to handle the variability, complexity, and volume of data emerging in the utility landscape. While we can safely assume that patterns observed in the historical market data carry over into the present and will continue into the future, traditional forecasting approaches struggle to model the market using only generic beliefs and fundamental relations.

What is needed now are comprehensive models that can take all factors into account with real-time visibility into the market, and provide actionable insights.



## The Solution

Machine learning helps make sense of the vast oceans of data coming from the energy market to deliver actionable insights that drive efficiency and provide utilities with a competitive edge. Machine learning provides infinite ways to combine and correlate information from hundreds of sources, including weather, time of day, time of year, holidays, price of gas, wind speed, customer sentiment taken from Twitter or Facebook, and more. This is achieved through models that look for subtle, transient movements of price data on an hourly or even second-by-second basis with millions of combinations. The result is a holistic data approach to price forecasting that considers the whole picture both from the perspective of market forces and from the perspective of the customer.

Machine learning models correlate internal customer behaviour data with external data sets and trends to offer a high degree of personalization and insights:

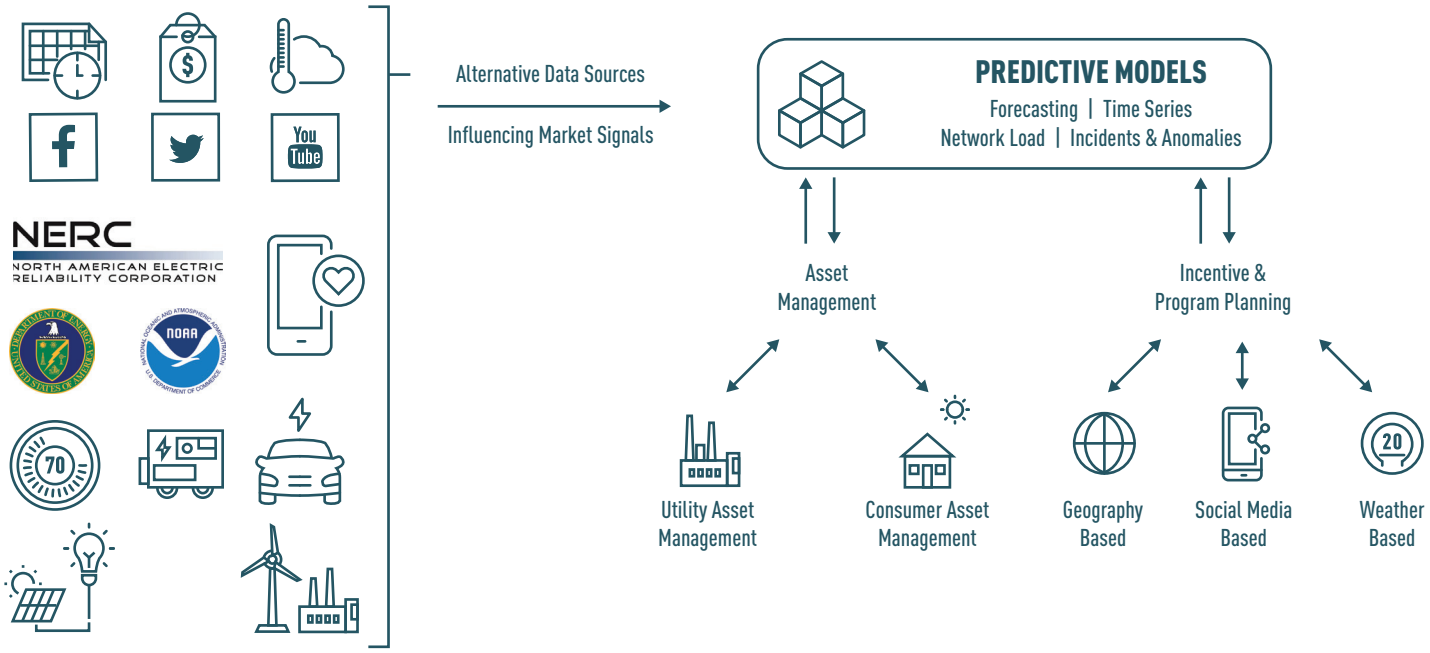
Customer Segmentation: Models help profile known and unknown customer preferences over specific coverage area and demographics

Custom Trading: Model insights enable commercial strategies with monetary incentives for consumers and prosumers using dynamic tariff schemes

Risk Analysis: Correlations from models help identify individual likelihood of delinquency and help design alternative payment structures

Normally, the creation of these machine learning models would be a daunting task. Doing so demands a solid understanding of data science, subject matter expertise on market behaviours and dynamics, and constant dedication to scaling and maintaining these models over time. Thousands of models need to be created, optimized, and constantly maintained in order to reap the benefits of machine learning for energy trading. To make this technology accessible, automation is not just desirable; it is a must.

SparkCognition has developed Darwin™, an automated model building solution that tackles the complexity of machine learning model creation and model scalability throughout operations. Darwin provides a productive environment that empowers business and market analysts to quickly prototype use cases and develop, tune, and implement machine learning applications faster than traditional methods. With Darwin, utilities can activate the use of their data to increase the accuracy of their forecasting efforts, allowing them to offer correct price signals to their consumers by optimally targeting them according to their individual preferences.




## The Results

Improving load and price forecasts through machine learning allows utilities to better balance the grid, reduce fossil fuel dependency and increase the use of renewables. Machine learning improves predictions and unveils key drivers to inform flexible electricity consumption strategies that dynamically respond to market signals in real time. Utilities harnessing the power of machine learning can adjust their bidding strategies and production or consumption schedules to reduce risk and maximize profits in day-ahead trading. These capabilities translate direclty to the bottom line: A one percent reduction in the mean absolute percentage error (MAPE) for a utility with 1GW peak load would translate to a savings of roughly $600,000 per year[1].

1 https://www.revolvy.com/page/Energy-forecasting