U.S. Natural Gas & Electric Company

Build Demand Response Propensity Model Backed by Machine Learning

A Demand Response propensity model presents an opportunity to successfully and economically prevent capacity shortages during critical peak hours, while reducing power supply costs that directly impact customers. Since demand response is “virtual,” the electricity provided is green and renewable.

Company Profile

This public utility provides natural gas and electricity to 6.7 million of Michigan’s 10 million residents, serving customers in all sixty-eight of the state’s Lower Peninsula counties.

Project Goals

The overarching goal of this project was for Pacific Data Integrators' team to build a cohort of 'Demand Response' propensity models backed by machine learning. This model would help the client manage the electric grid efficiently and reduce costs.

Ingest smart meter data under one umbrella from several unorganized, internal and external sources

Develop interactive dashboards driven by advanced analytics, to equip business stakeholders with the ability to understand complex segmentation

Spearhead the successful acquisition of a new customer base via multiple marketing channels (optimized by machine learning methodology)

Profile 1.6 million active residential customers based on their load consumption behavior

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Business Challenges

Unstructured and missing data regarding customer attributes; plus poor data precision for some fields

The need to leverage several databases, both internal and external

Computation of sophisticated ML algorithms is not plausible in local machines for large datasets

Implemented Solution

Under the umbrella of demand response, a cohort of different propensity models were created to support the company's vision of enrolling more customers under the demand response program.

Propensity models were developed for AC Peak Cycling, Summer Time of Use, and Power Michigan Drive (Electric Vehicle program)

Integrated smart meter data (MV-90 for both commercial and industrial customers)

Optimized voltage levels delivered to customers, reduced energy usage, increased efficiency year-round & implemented peak demand reduction on the hottest day(s) of the year

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Project Results

Drove the foundation of a dedicated, high-powered server for computationally expensive algorithms

Galvanized a demand response propensity model regarding an energy saving program (AC peak cycling), ensuring profitable marketing enrollments

Work done on AC peak cycling propensity model was well received by the client's SVP and CEO

Successfully profiled 1.6 million residential customers based on their load consumption behavior for the first time in the client's post-modernization 15-year history

Developed an eco-system of in-house demand response programs, where a single pipeline can deliver customized marketing needs; replacing the dependency on several third-party vendors

Revived dormant program enrollments for AC peak cycling, exceeding the sales target by leveraging advanced machine learning-based analytics