ISF 2021 Paper Abstract

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Temporal Disaggregation of State Natural Gas Data

This work develops and validates a set of integrated daily models to predict the aggregated natural gas demand for service regions across the United States. The forecasts generated from this project can be used by those buying and selling natural gas commodities, natural gas marketers, and Local Distribution Companies (LDCs) to make early and effective business decisions.

Problems seen in the past with the natural gas infrastructure are not confined by state borders or county lines. Issues occurring in one state may very well influence the natural gas supply in another. This work has the potential to reduce risk of service curtailment in the event of supply disruptions. By simulating a daily national model to predict demand for days with extreme weather events or generally unusual activity, we can be better prepared for the unexpected. These unexpected events, such as hurricanes, service outages in pipeline, accidents or even terrorism, can affect large portions of the nation at once. This high-level approach to forecasting gas load on a region or multi-region scale helps address the uncertainties these events bring and ensure the continuation of service the nation relies on.

The challenge of accurately forecasting aggregated natural gas demand is rooted in the availability, relevancy, and accuracy of information on which we are basing the forecasts. This paper addresses each of these concerns. In this context, availability means what data, publicly or privately owned, is at our disposal. Relevancy is tied to the structure and frequency of the data; to forecast daily demand, daily data is ideally needed to train the models. Accuracy follows the traditional sense of being able to trust the data we are modeling.

Each state model uses a combination of local weather data, econometric data, monthly natural gas consumption data, or private local distribution company consumption data. We disaggregate simulated monthly data sets to daily datasets with XX accuracy. Using the disaggregated dataset to forecast future demand, we produce daily forecasts with an average accuracy of XX.