

ENERGY DEMAND FORECASTING

Cortana Intelligence Solution

Trends and Business Requirements

- In the past few years, Internet of Things (IoT), alternative energy sources, and big data have merged to create vast opportunities in the utility and energy domain.
- The utility and entire energy sector have seen consumption flattening out and consumers demanding better ways to control their use of energy.
- In order to innovate and renew themselves, utilities and smart grid providers need to accurately forecast short and long term demand so that they can provide better and more reliable service for their customers.



When we use the word 'Smart', we actually refer to a grid that can...

- Learn and then make predictions
- Foresee temporary overload situations and automatically adjust for it
- Make itself smarter over time by first predicting and then acting

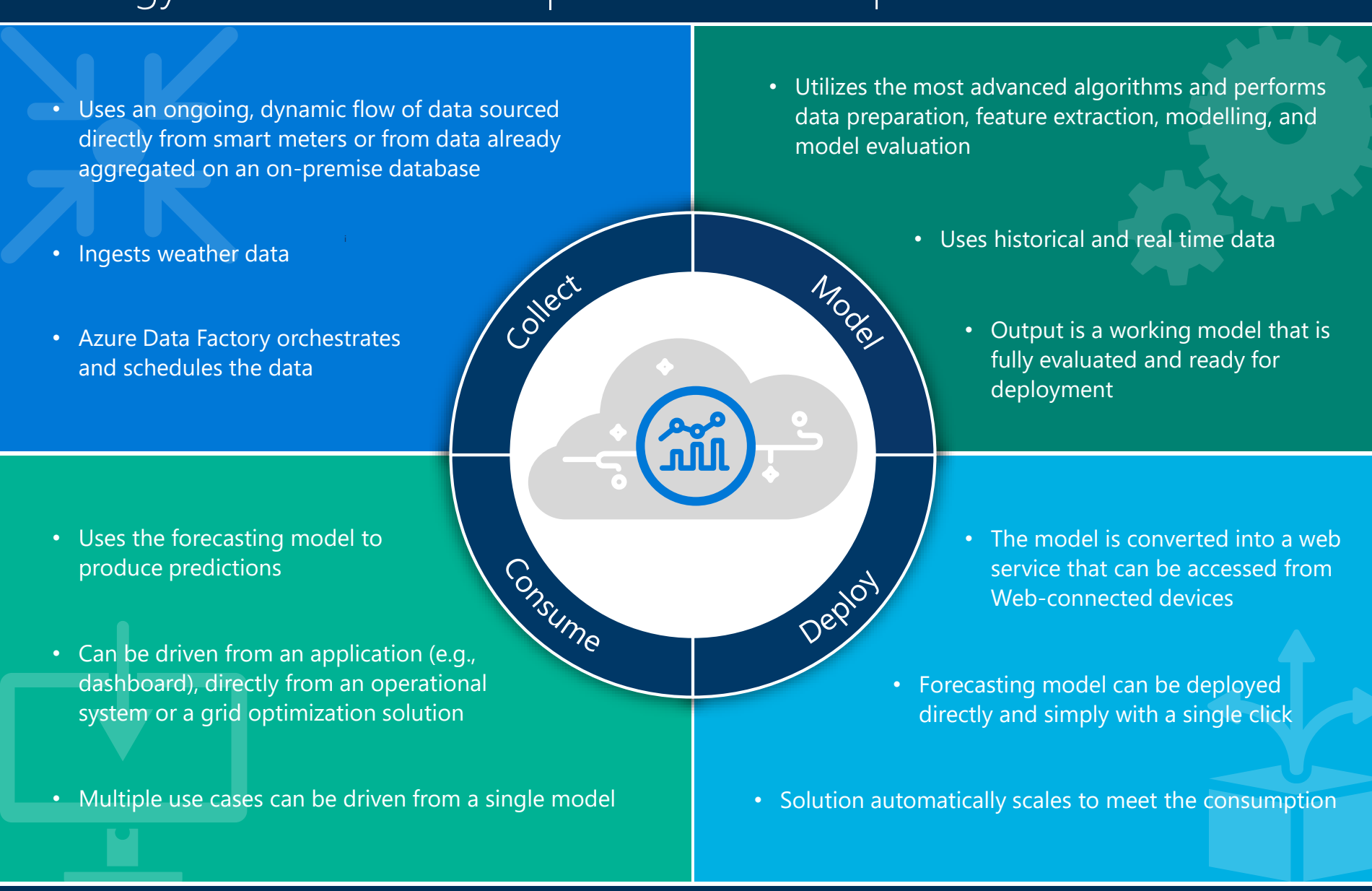
Energy Demand Forecast | Short Term vs Long Term

Forecasting can be considered as the foundation for many core use cases in the energy sector. Demand forecasting, in particular, can help solve critical business problems. In general, we consider two types of energy demand forecasts:

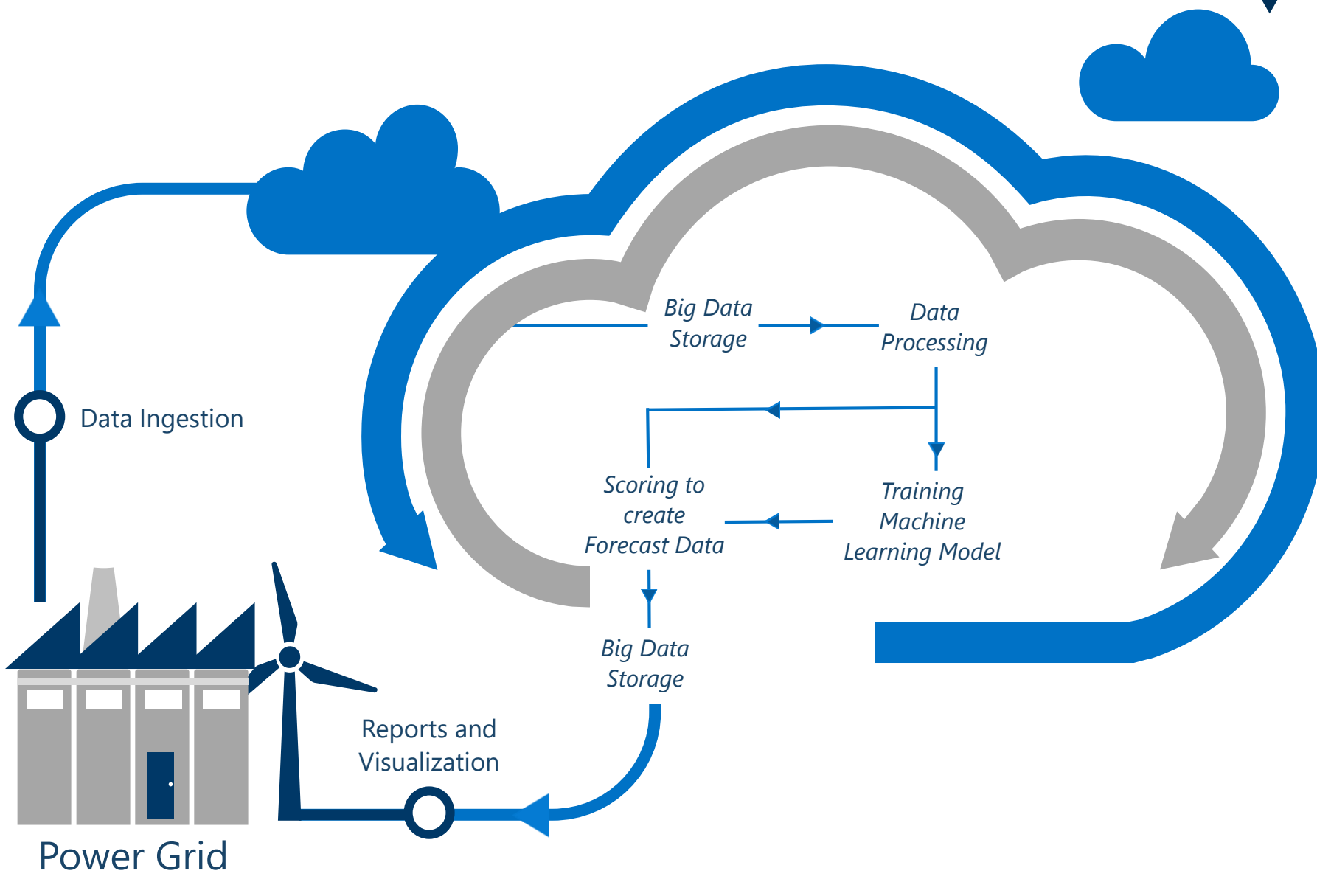
Short Term	Attributes	Long Term
Produced every hour or 24 hours	Forecast Frequency	Produced once a week, monthly or quarterly
Hourly 	Data Granularity	Hourly or daily
Demand/Supply balancing Demand response Pick hour forecasting	Use Cases	Long term planning Grid asset planning Resource planning
Day of week Hour of Day Hourly Temp.	Predictors	Month of Year Day of Month Long term temp. & climate
2-3 years' worth of data 	Historical Data	5-10 years' worth of data
MAPE* of 5% or less	Prediction Accuracy	MAPE* of 15% or less

*MAPE: Mean Absolute Percentage Error

Energy Demand Forecast | Solution Development Process

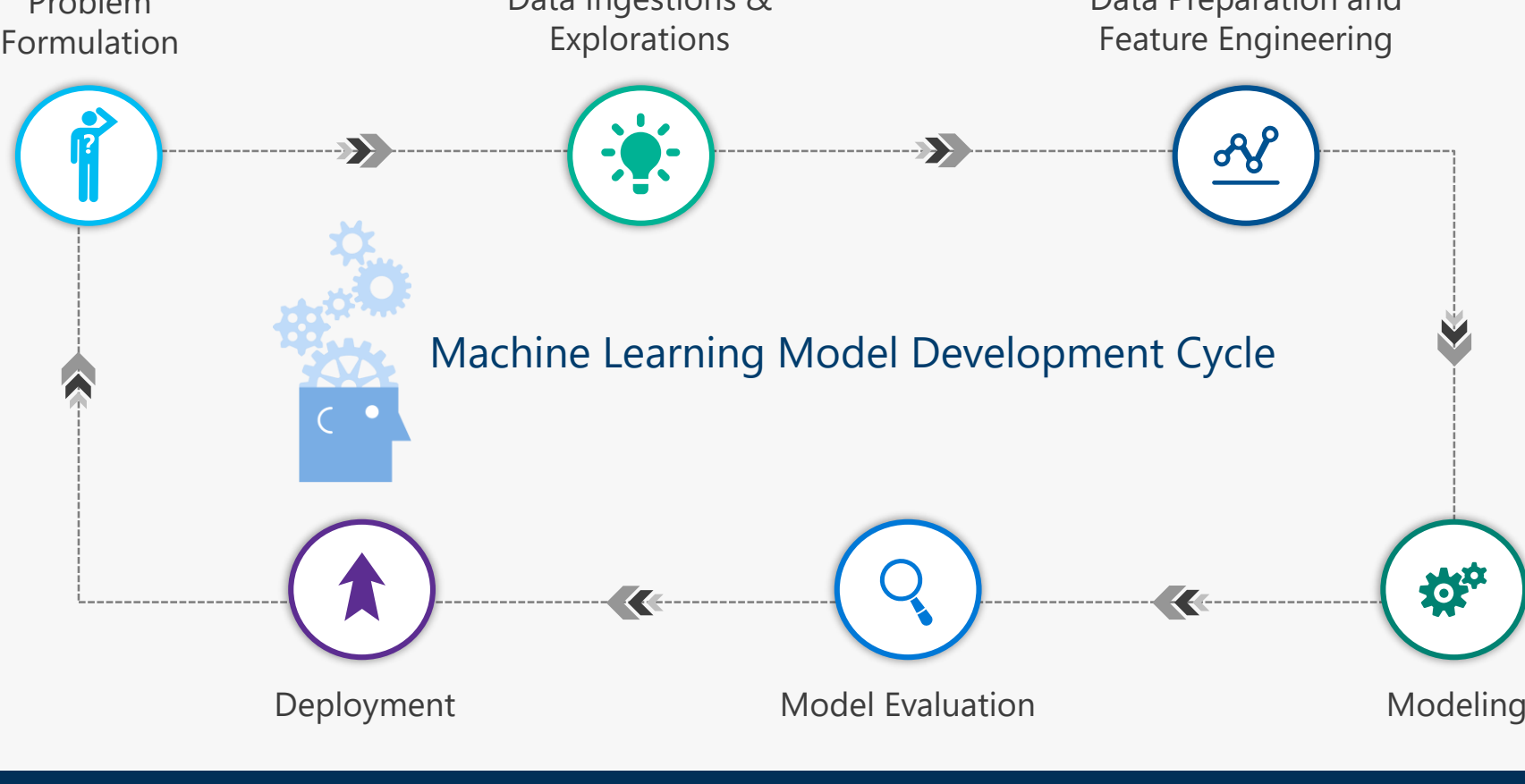


Energy Demand Forecast End-to-End Data Flow



Energy Model Forecast | Data Model Development Cycle

Producing efficient forecasting models requires careful preparation and planning. Breaking down the modeling process into many steps and focusing on one step at a time will dramatically improve the outcome of entire process.



Industry Use Case | Overload optimization

Business need

A cloud-based solution that enables energy companies to predict an overload situation at a substation in their grid. In particular, we want to identify substations that are most likely to overload within the next hour, so immediate action can be taken to avoid or resolve that situation.

Solution

To achieve the business need, an accurate and fast performing prediction is needed which requires implementation of three predictive models.

- ✓ **Long term model** that enables forecasting of power consumption on each substation during the next few weeks or months
- ✓ **Short term model** that enables prediction of overload situation on a given substation during the next hour
- ✓ **Temperature model** that provides forecasting of future temperature over multiple scenarios

Data Qualification Criteria – Prerequisites



Descriptive in Nature



Predictive in Nature



Quantitative & Qualitative Goals



A large Quantity of Quality Data