Item 10.1: Load Forecasting Overview

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Board of Directors Meeting

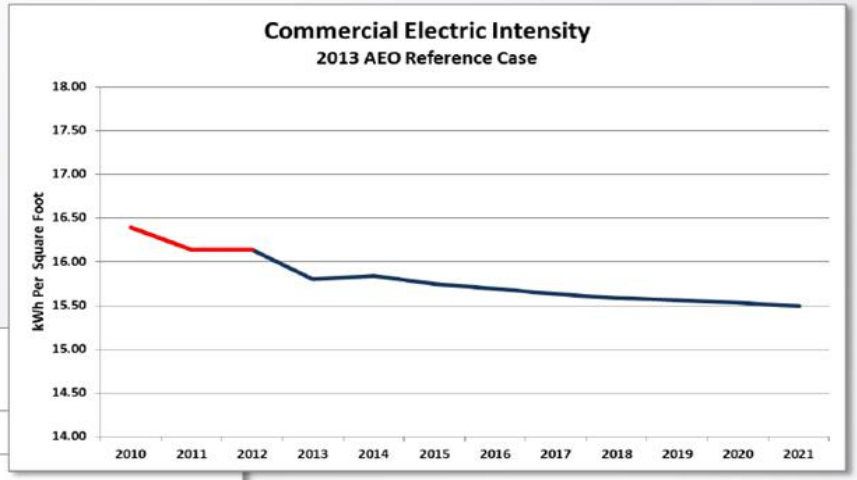
ERCOT Public
February 12, 2019

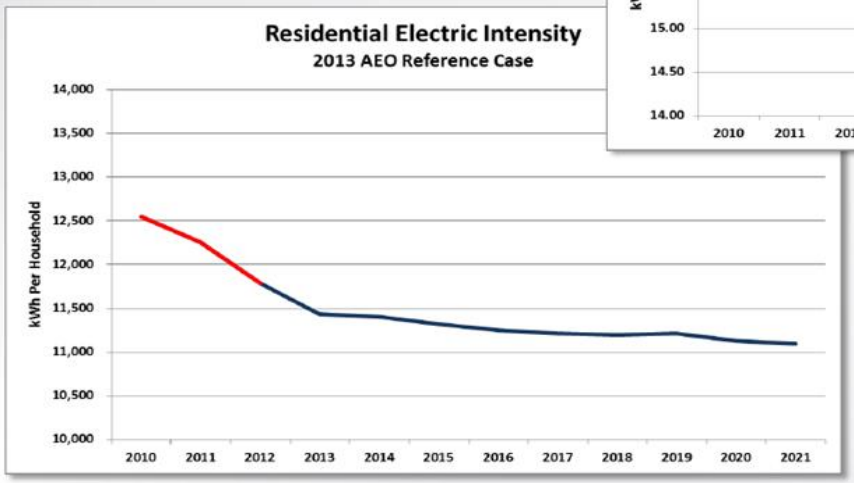
December 2013

Trends

AVERAGE USE IS DECLINING

- Downward trend in average use for the residential and commercial sectors
- Energy efficiency is making an impact





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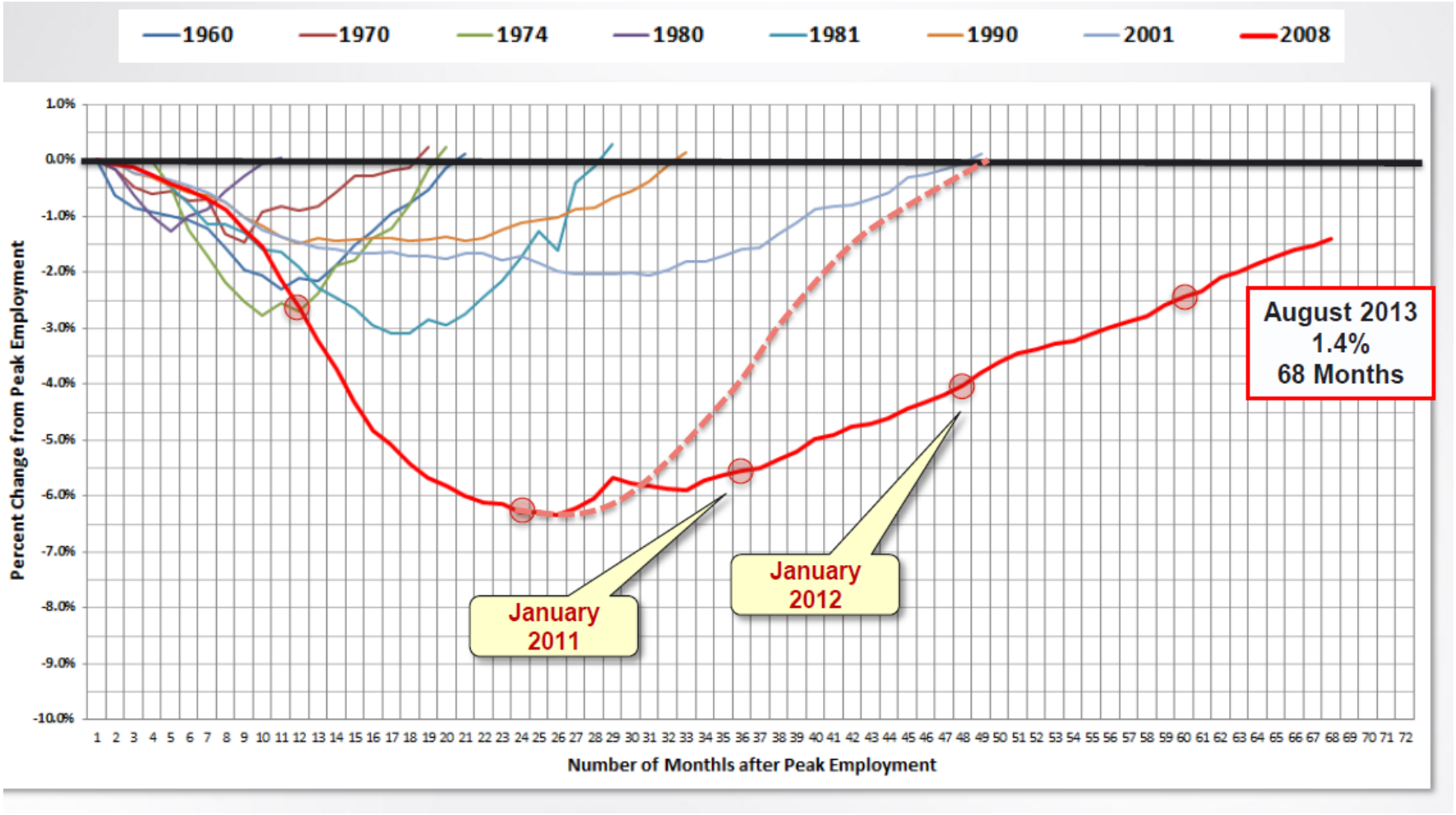
Source: Energy Trends Benchmarking Survey 2013, Mark Quan, November, 2013

Economist view / dilemma



- Much slower recovery than previous recessions

Source: Energy Trends Benchmarking Survey 2013, Mark Quan, November, 2013

Summary of trends

- **Changing relationship between economic variables (GDP, employment, etc.) and energy use**
  - Declining energy use per customer due to
    - Energy efficiency
    - Change in behavior
    - Distributed generation
    - Price responsive load

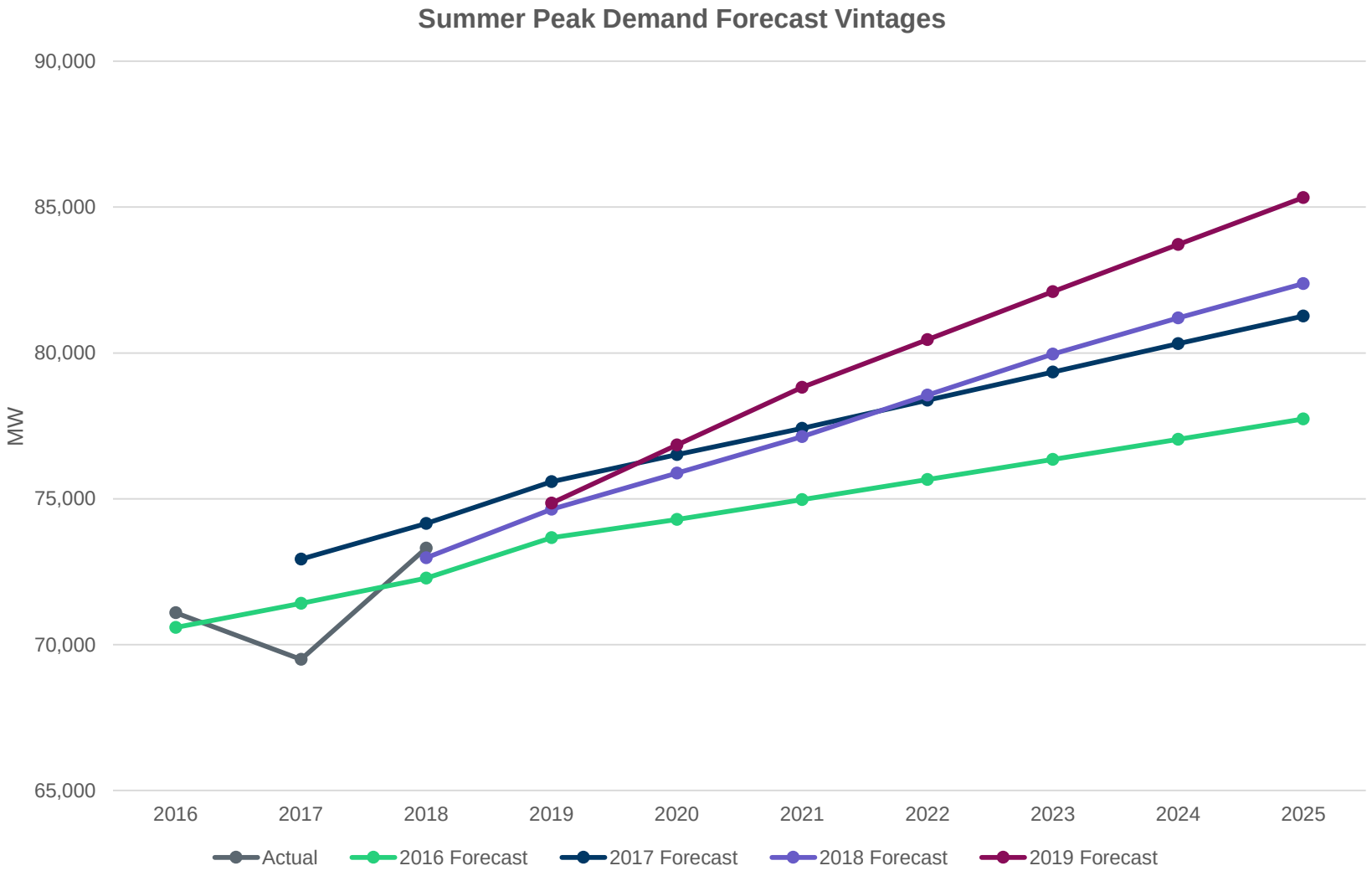
- **Overly optimistic economic recovery forecasts**

Updated Long-Term Load Forecast

- **Daily energy forecasted using Neural Network Models**
  - Able to determine/account for variable interactions more robustly when compared to linear regression models
  - All predictor variables are used as inputs in each network node
  - More detailed/precise model formulation

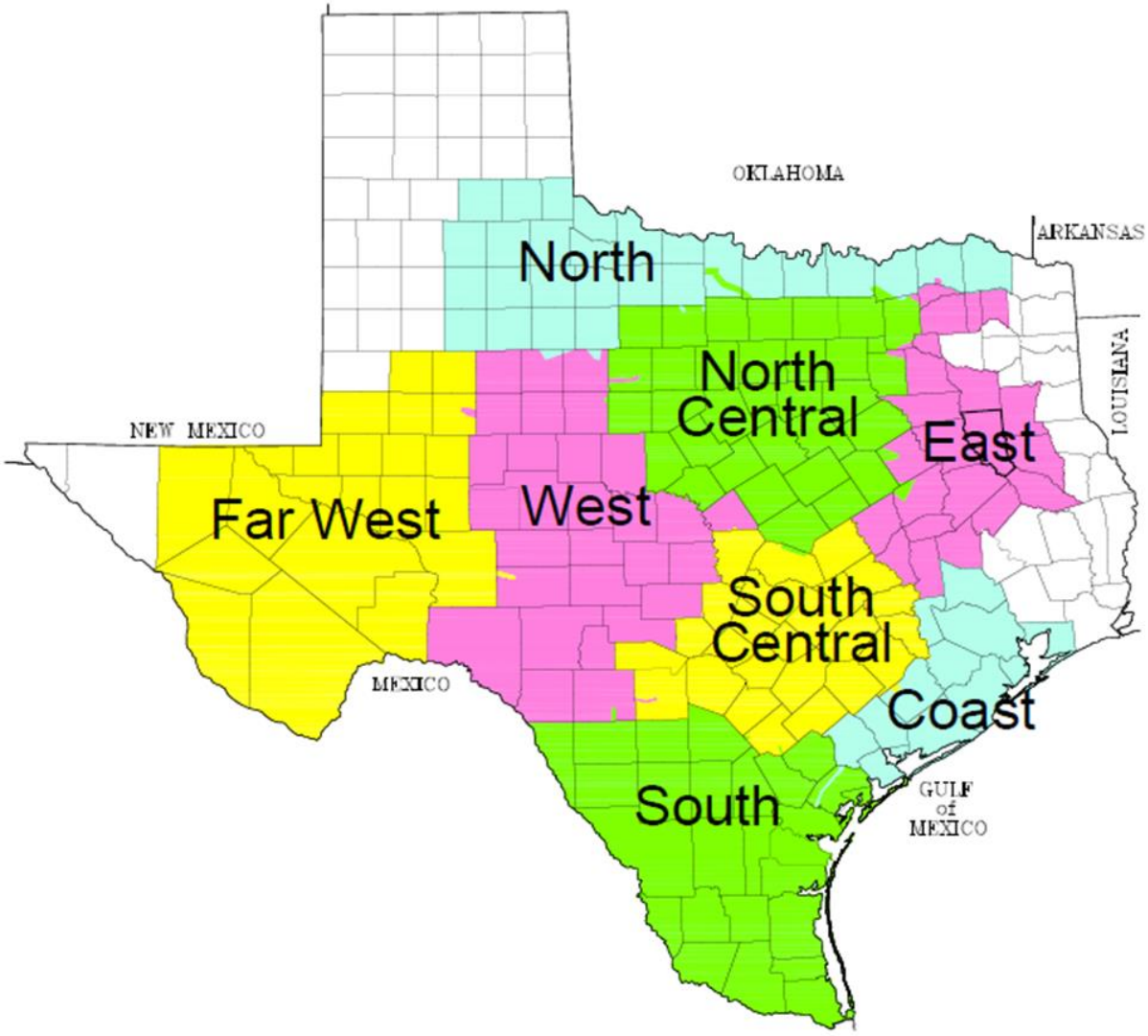
- **Premise counts were used as the growth variable instead of economic variables**
  - Historical premise accounts will be very stable and not subject to significant changes as were exhibited by non-farm employment revisions

Recent forecast comparison



February 2019

Weather Zones



Variables

- **Calendar Variables**

  Day of week, Holiday, DST, Season

- **Weather Variables**

  Temperature, Dew Point, Cloud Cover, Wind Speed,
  Cooling and Heating Degree Days

- **Number of Premises**

Load Forecast Adjustments

- 200 MW in Far West
- 200 – 650 MW in Coast

- Hourly Forecast for Lubbock added to ERCOT Forecast from 2021 on
  - Based on Lubbock's Peak Forecast of its growth

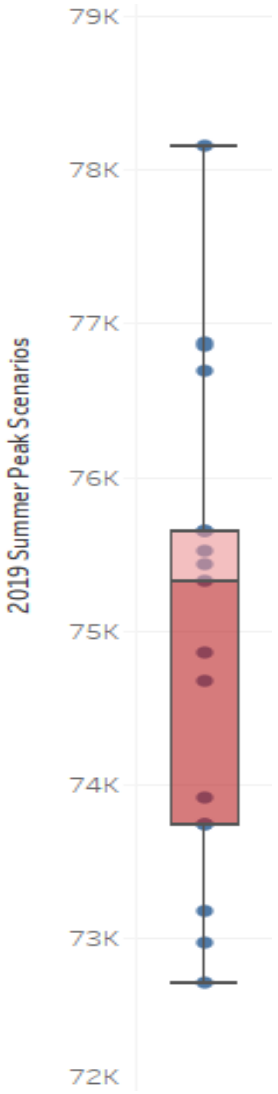
Assumptions and Challenges

- **The following factors are assumed to be included in forecast values based on their historical impacts:**
  - Appliance Stock, Energy Efficiency, Demand Response, 4 CP Impact, Behind-the-Meter DG, Price Responsive Load, Electric Vehicles

- **The following factors can result in significant deviations from the forecast:**
  - Weather Volatility, Economic Uncertainty, Policy Impacts

2019 Summer Peak Forecast Scenarios

Historical Weather Year	
2003	76,851
2004	72,708
2005	73,734
2006	74,671
2007	73,176
2008	73,907
2009	75,649
2010	76,688
2011	78,156
2012	76,873
2013	75,515
2014	73,740
2015	75,434
2016	75,325
2017	72,964
2018	75,646
P50	74,853



Mid-Term
Load Forecast

Mid-Term Load Forecast (MTLF)

- **Hourly forecast for the next 7 days**
- **7 forecast models are currently available**
  - 5 are internally developed
  - 2 are legacy models
- **Operators determine the active forecast**
  - Internal models are the active forecast > 90% of the time

MTLF Variables

- **Calendar Variables**

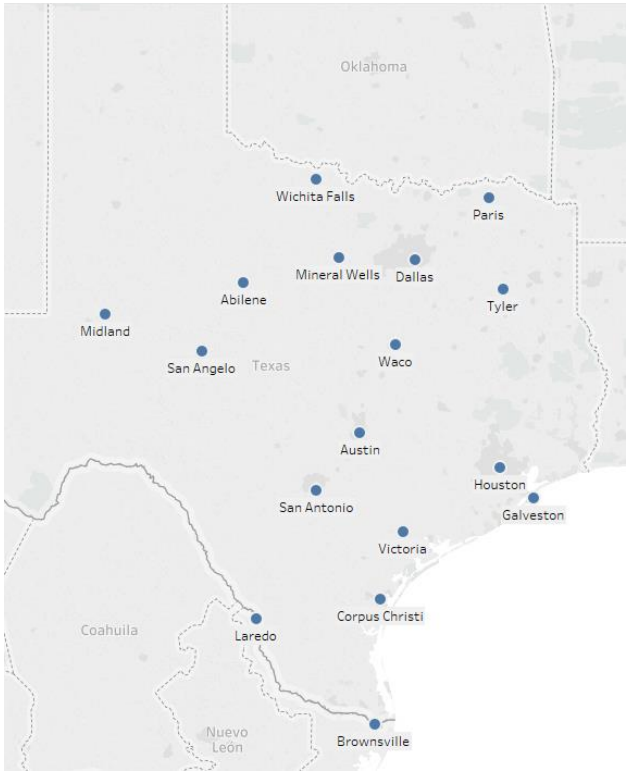
  Day of week, Holiday, DST, Season

- **Weather Variables**

  Dry Bulb Temperature, Dew Point, Cloud Cover, Wind Speed, Heat Index, Wind Chill, Wet Bulb, Sunshine Minutes, Solar Irradiance, Relative Humidity, Precipitation

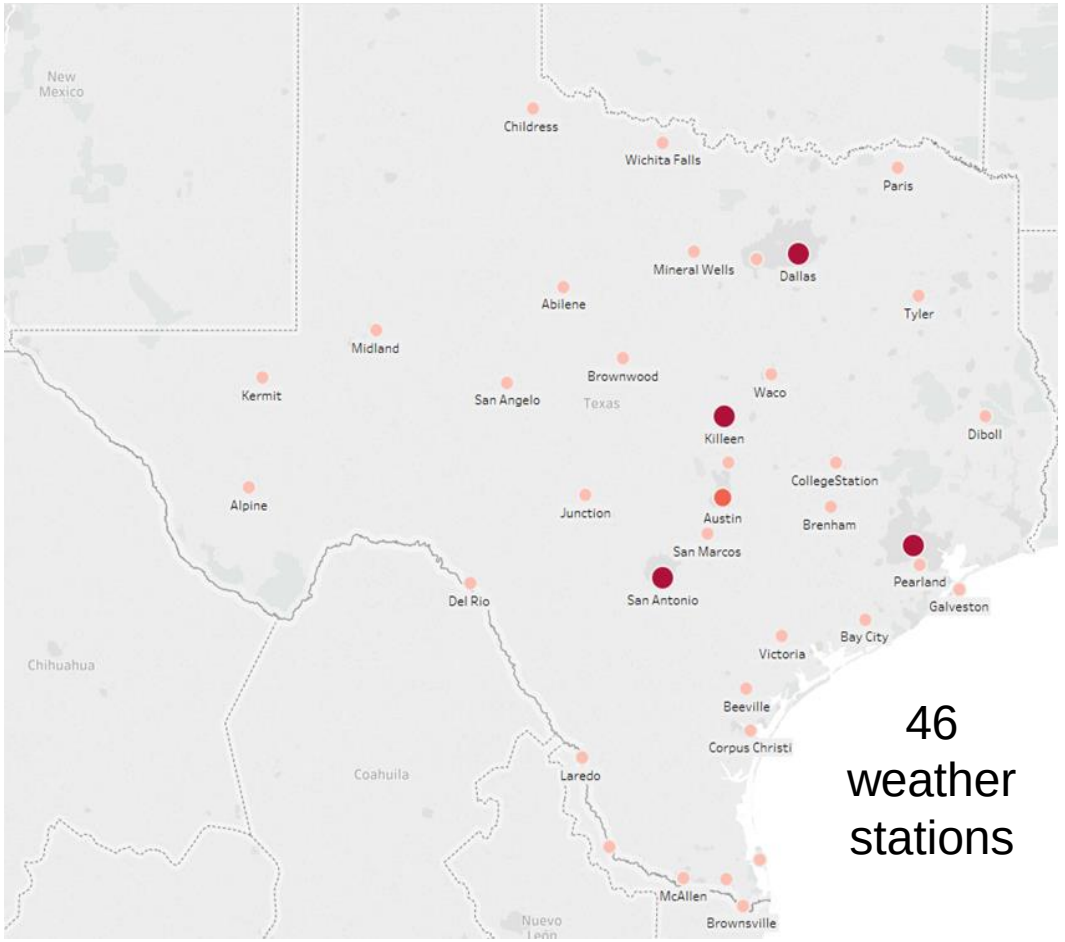
MTLF Improvement

Before 2017



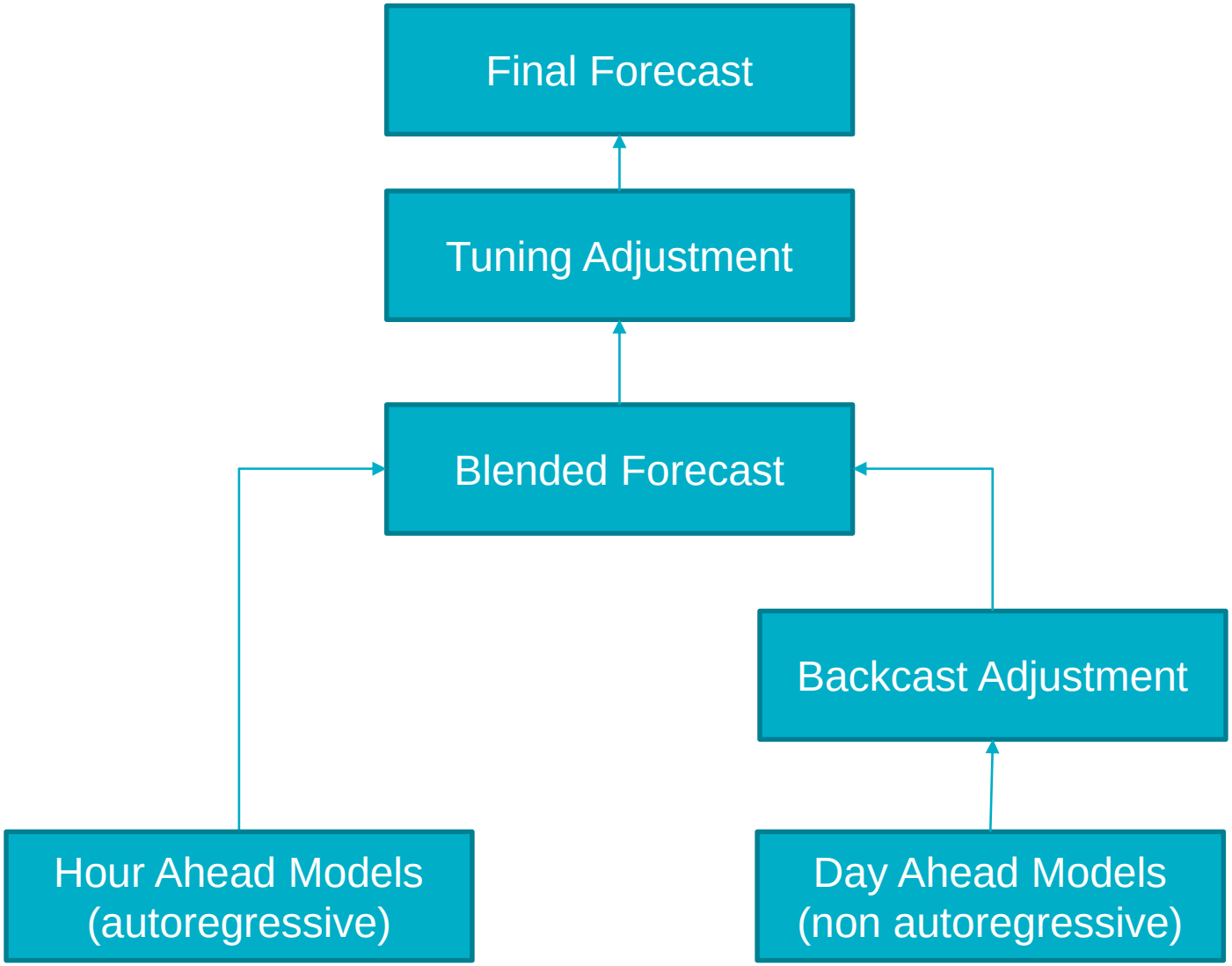
20 weather stations

Current

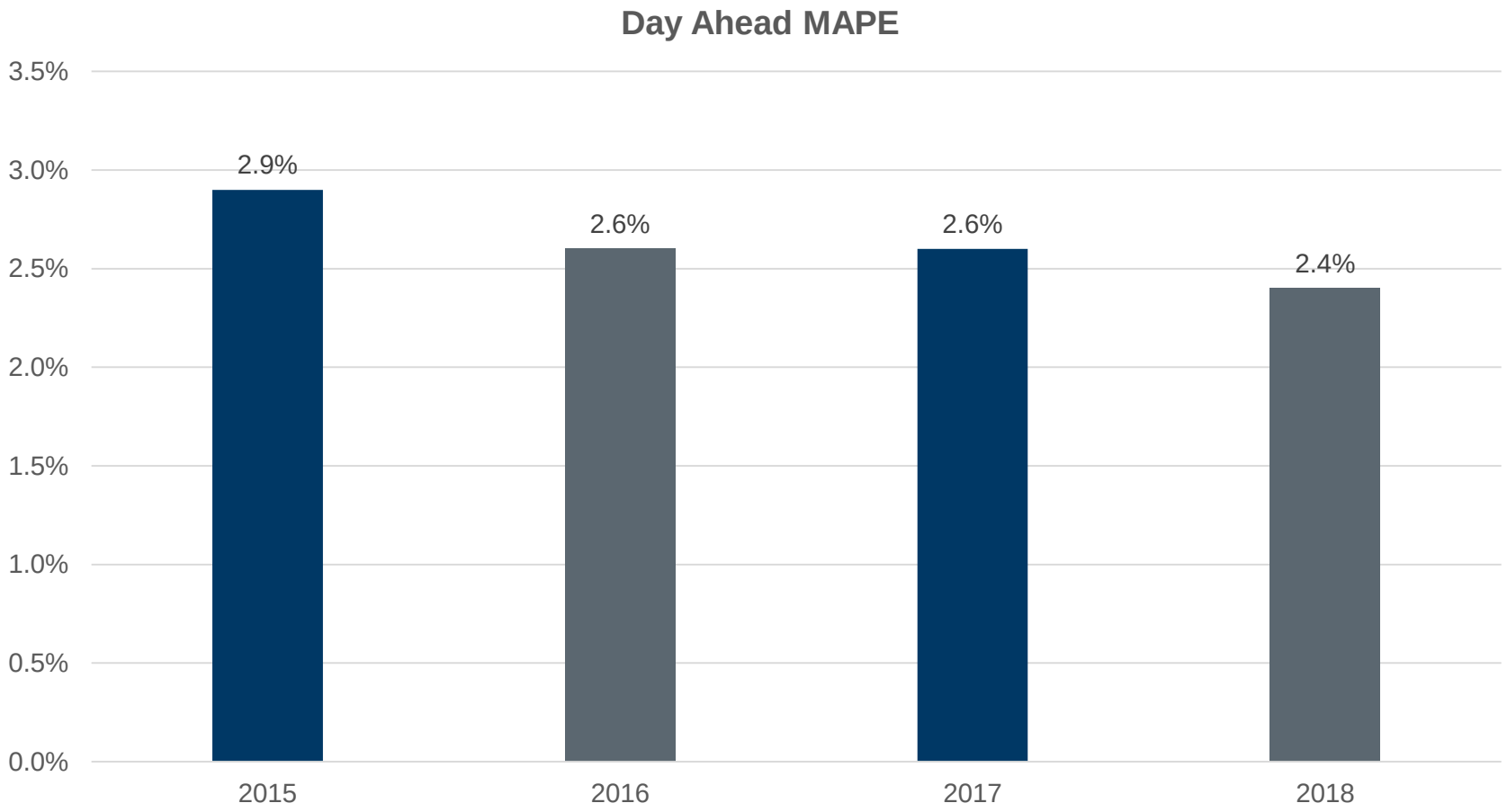


46 weather stations

MTLF Flowchart



MTLF Performance –



- MAPE includes weather forecast error
- Based on the active forecast

Short-Term
Load Forecast

Short-Term Load Forecast (STLF)

- **The STLF is a 5-minute forecast for the next hour**

- **2 forecast models are currently available**

  1 internally developed and 1 legacy model

STLF Variables

- **Previous actual load values and previous day load shapes**

- **Calendar Variables**

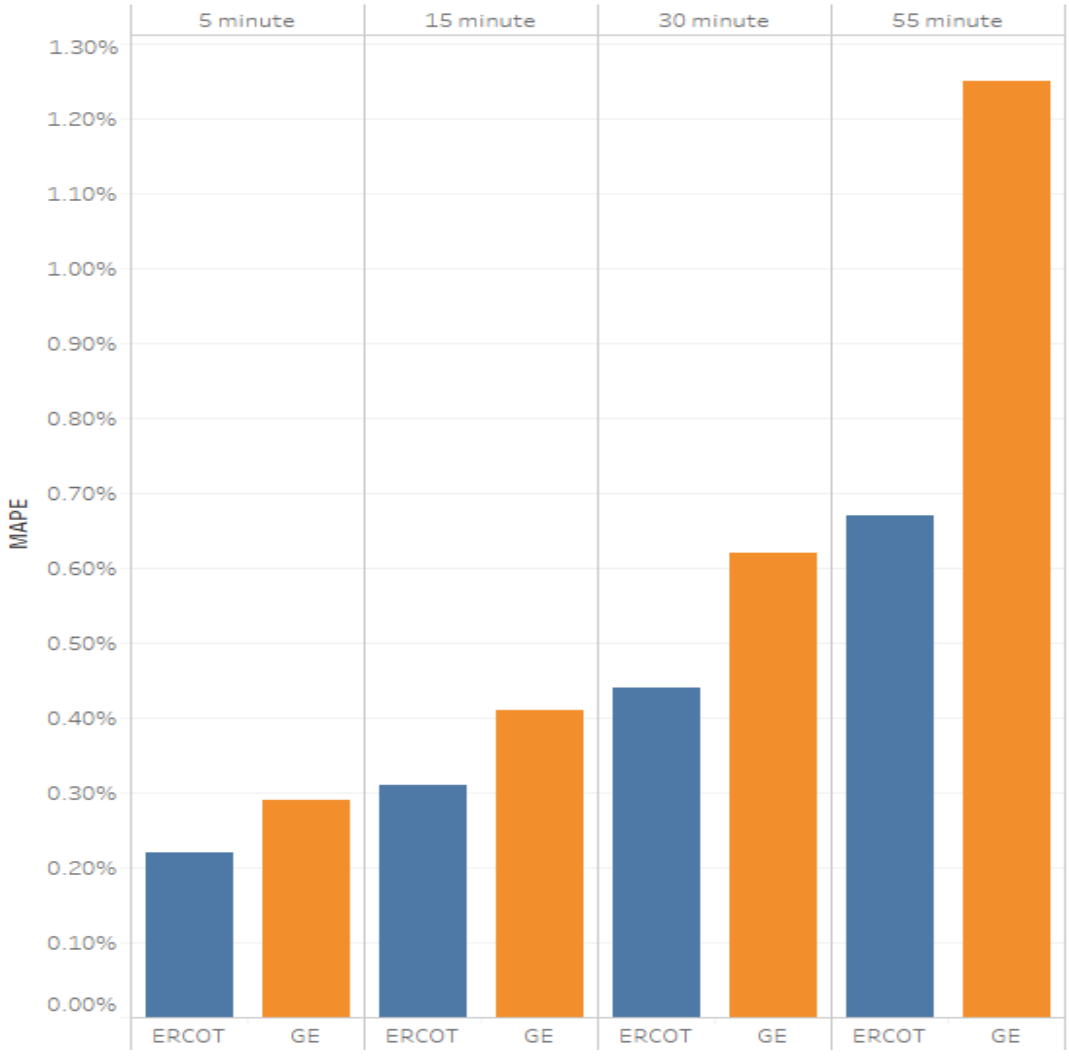
  Day of week, Holiday, DST, Season

- **Weather Variables**

  Dry Bulb Temperature, Dew Point, Cloud Cover,
  Wind Speed, Heat Index, Wind Chill, Wet Bulb,
  Sunshine Minutes, Solar Irradiance, Relative Humidity, Precipitation

STLF Performance

Weekly STLF Error
1/21/2019 to 1/27/19



Questions?