

# Daylight Saving Time and Energy Consumption

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# Question

- Does Daylight Saving Time save energy?

(wikipedia)

- DST's potential to save energy comes primarily from its effects on residential lighting, which consumes about 3.5% of electricity in the United States and Canada. Delaying the nominal time of sunset and sunrise reduces the use of artificial light in the evening and increases it in the morning. As Franklin's 1784 satire pointed out, lighting costs are reduced if the evening reduction outweighs the morning increase, as in high-latitude summer when most people wake up well after sunrise. ...and recent research is limited and reports contradictory results. Electricity use is greatly affected by geography, climate, and economics, making it hard to generalize from single studies.

# Data Sources

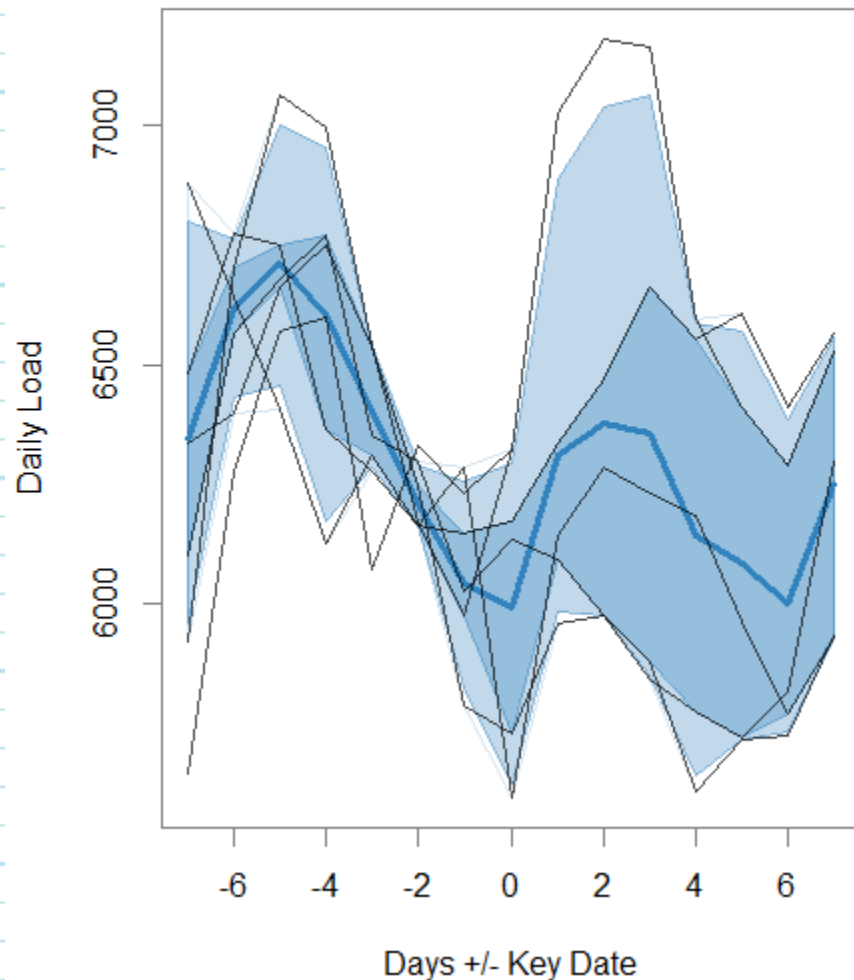
- Daily & Hourly Load from BPA Balancing Authority
  - From 1/1/2007 to 3/13/2016
- Daily Low and High Temperature
  - From 9/17/2010 to 3/13/2016

→ Due to the nature of data that is available, re-state the question to the following:

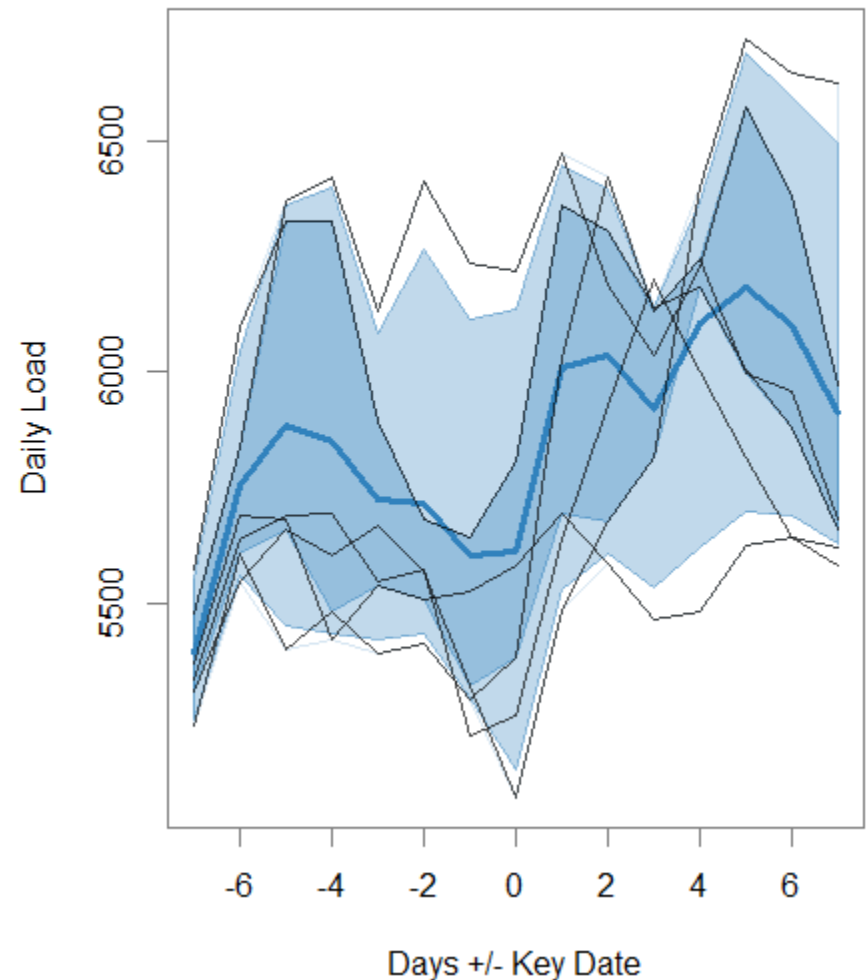
- Does DST save energy during November and March in the Pacific northwest?
- To answer this question, we'll look at data around "key" dates: 1<sup>st</sup> Sunday of November and 2<sup>nd</sup> Sunday of March.

# Load around Key Dates

**March**

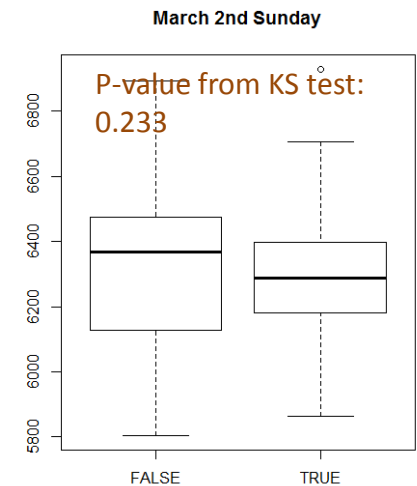
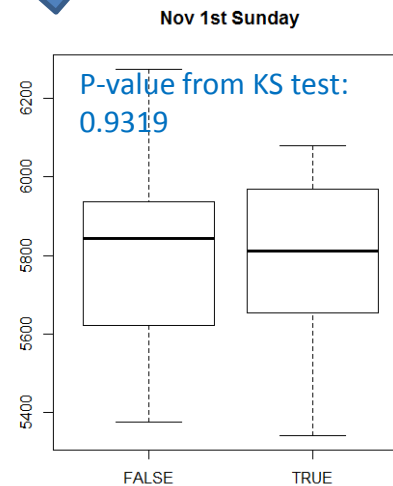
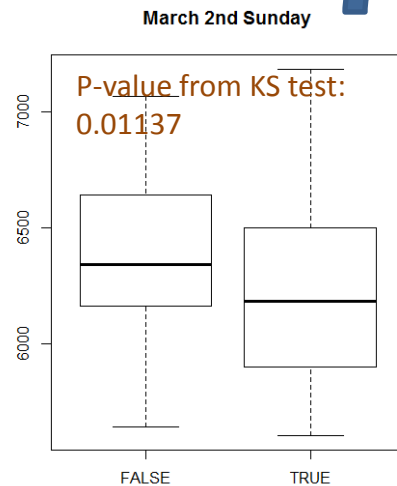
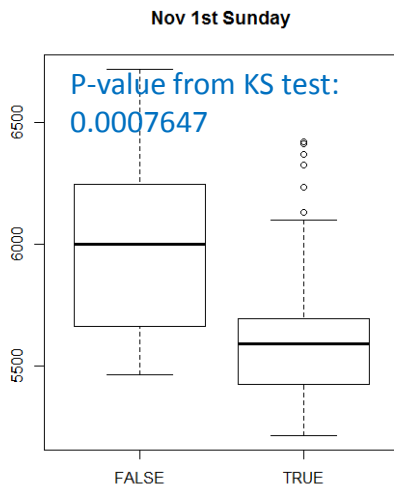
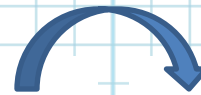
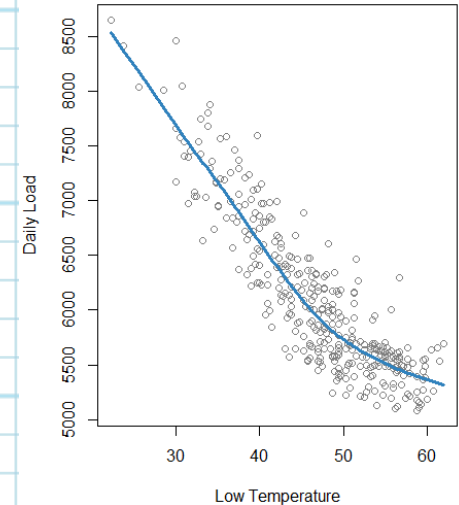


**November**



# Temperature and Daily Load

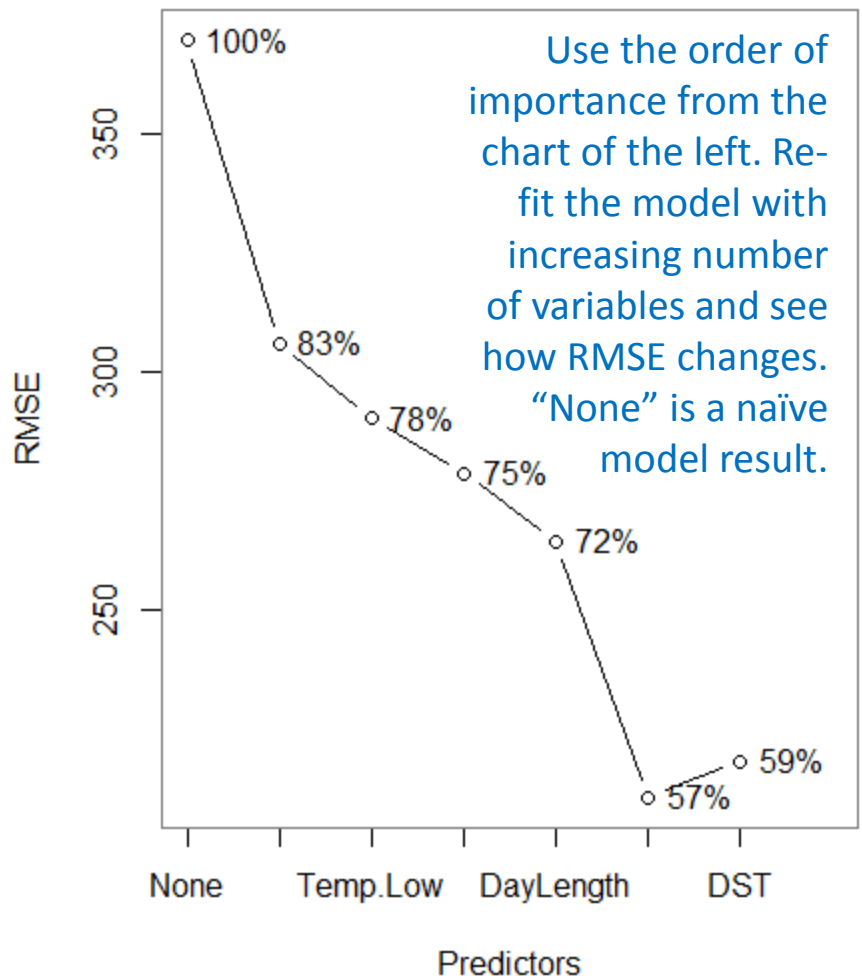
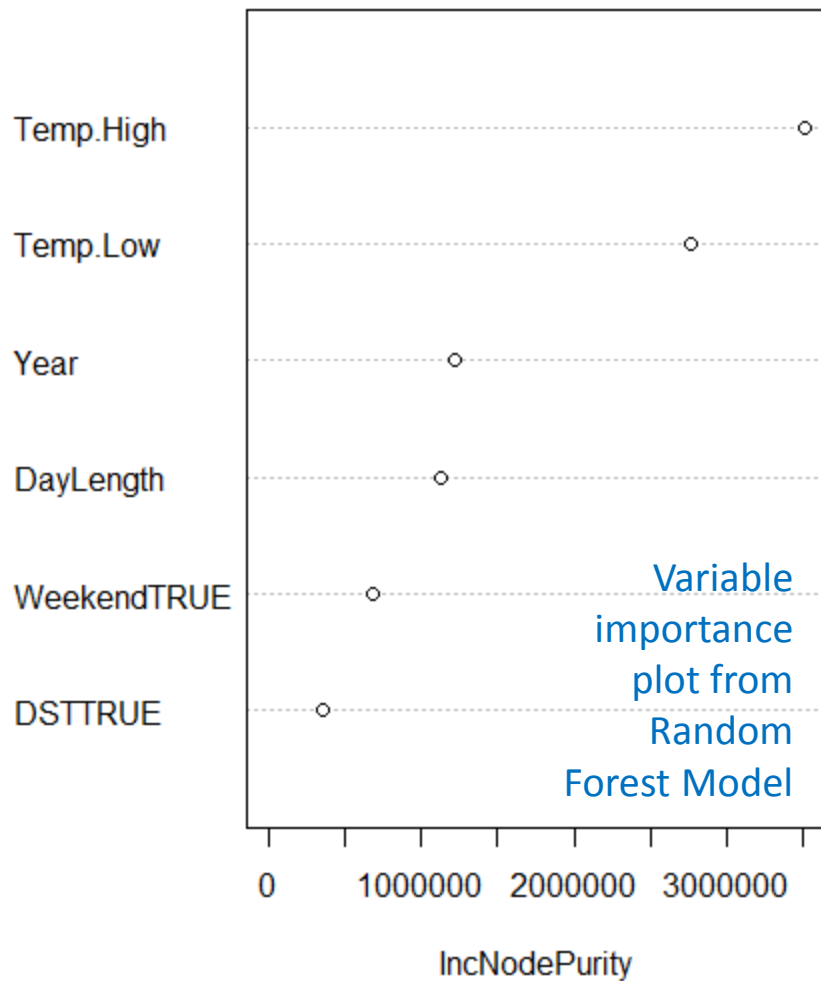
- Temperature is the largest factor in energy consumption, and the relationship is non-linear.
- Use spline and adjust the load to negate the effect of the temperature.
- Kolmogorov-Smirnov test indicates that there aren't much effects of DST on daily load at least in November. Maybe in March.



# Importance of DST as a Predictor

rf(Daily Load ~ Temp + Year + DayLength + Weekend + DST)

RF: March



# Summary

Question: Does DST save energy during November and March in the Pacific northwest?

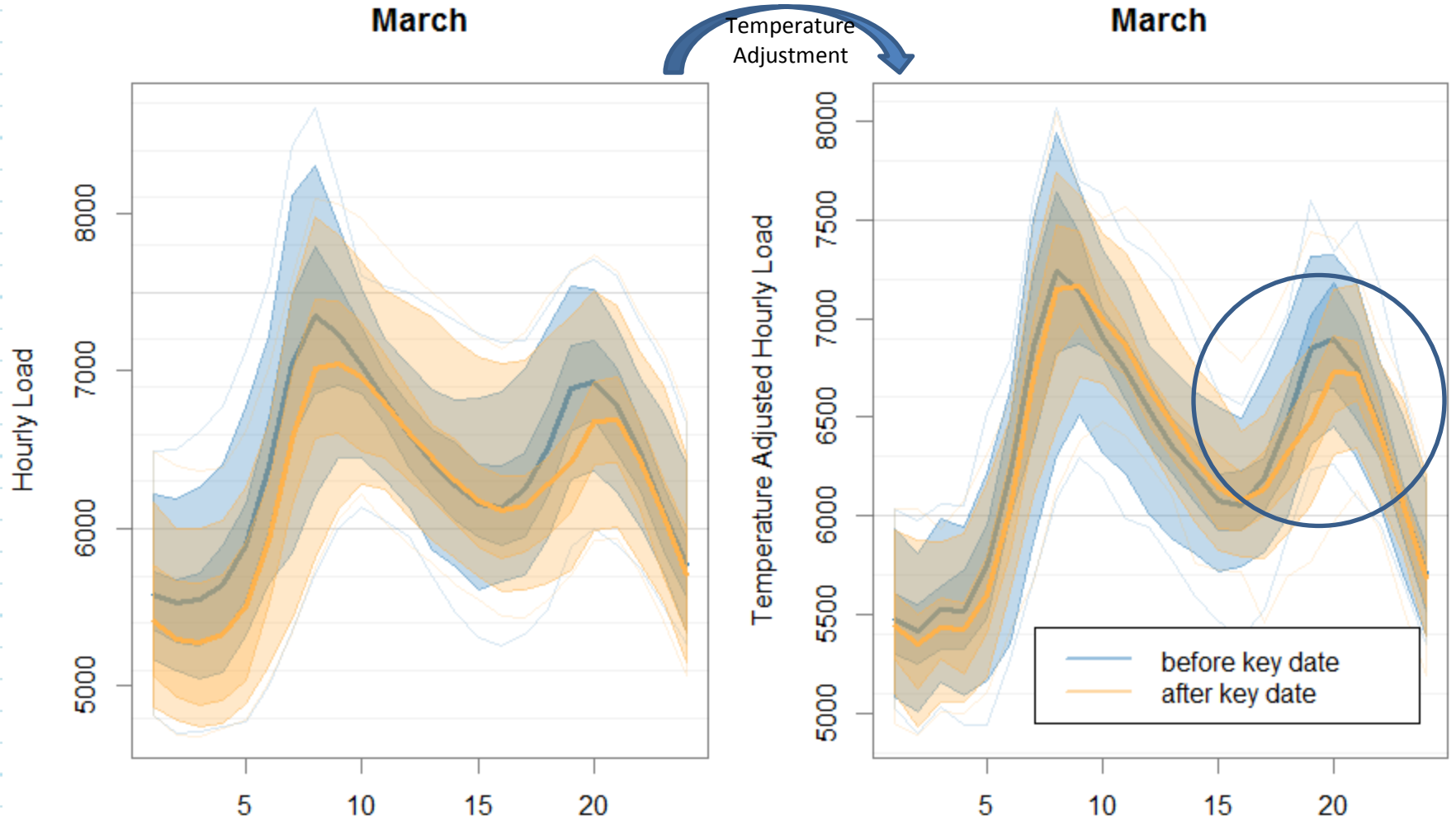
Answer: Does not seem like it.

Note:

If we can get Indiana energy consumption data at county levels, we may be able to answer a bit more general question...

“As of 2016, Indiana has 12 counties observing Central Daylight Time while the remaining 80 counties observe Eastern Daylight Time.” (Wikipedia)

# March Hourly Load





# March Hourly Load

- Vertical lines indicates sunrise and sunset.
- It shows visible reduction in load at the beginning of evening peak hours.

