Achieving the Paris Agreement Goals

Projecting Energy Production Sources in the United States With Time Series Modeling

Summary

- The Environmental Protection Agency (EPA)
  - Seeks to reach the goals set by the IPCC.
- Osborne Analytics
  - Data Science firm of Greg Osborne, hired by the EPA.
- Business Problem
  - Meeting Paris Agreement Goals.
- Time Series Modeling
  - Analysis Projecting current energy production.
- Interpolate to make recommendations
  - Meeting demand while cutting GHG
- Word Associations
  - One word for each Company/Brand or Product Combination.
- More recommendations are possible.
- Thank you

Business Problem

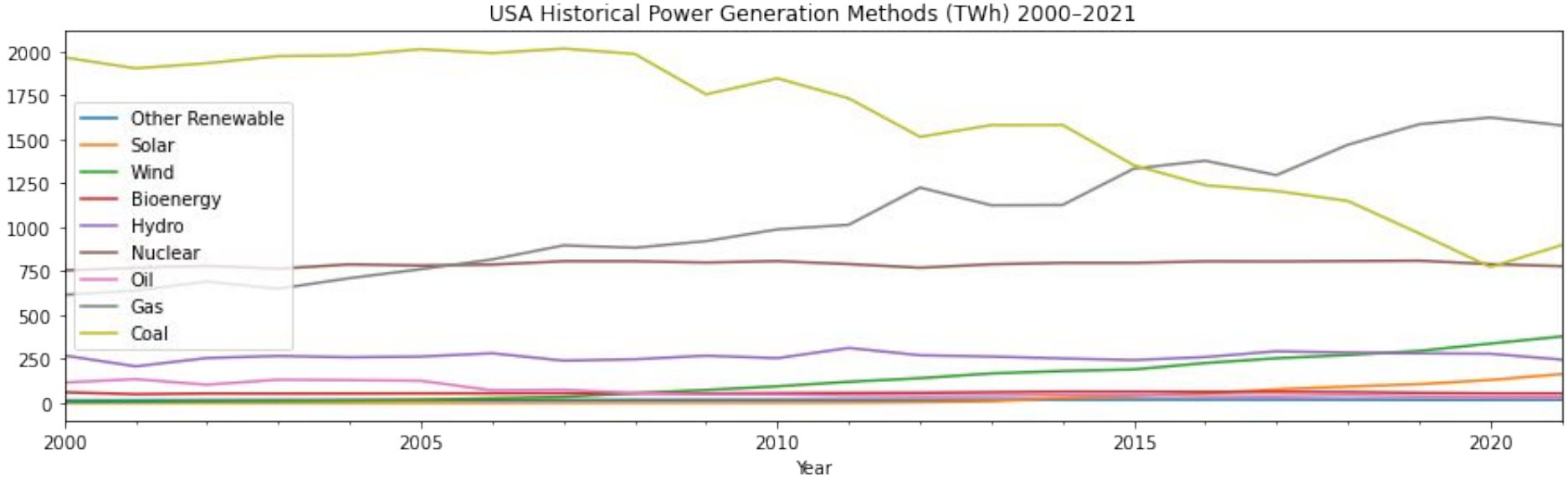
- Fossil fuel electricity generation releases greenhouse gases (GHG)
- GHGs in the atmosphere dangerously warm the planet
- The United States agreed to reduce, then eliminate, GHG emissions by signing the Paris Agreement

- The US must reduce all GHG emissions to 45% of 2010 levels by 2030, then entirely by 2050
- The US is not on track to meet this target in the electricity generation sector

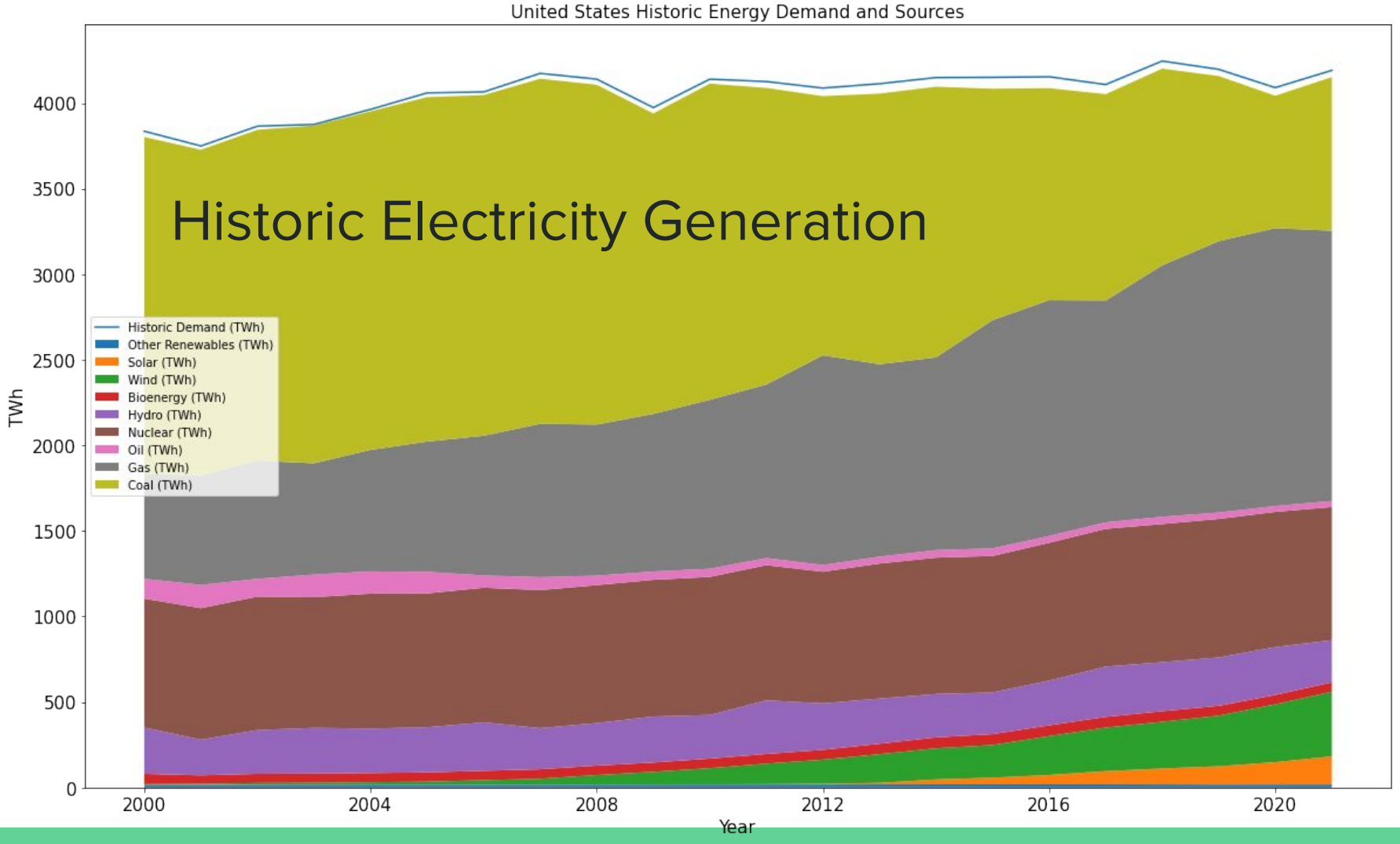
Time Series Analysis

- Time Series analysis can model linear trends, and predict the future.
- The tool can predict electricity generation fuel sources of the future.
- The EPA can compare predicted trends to the Paris targets.
- The EPA can adjust policy to ensure we achieve the goals.

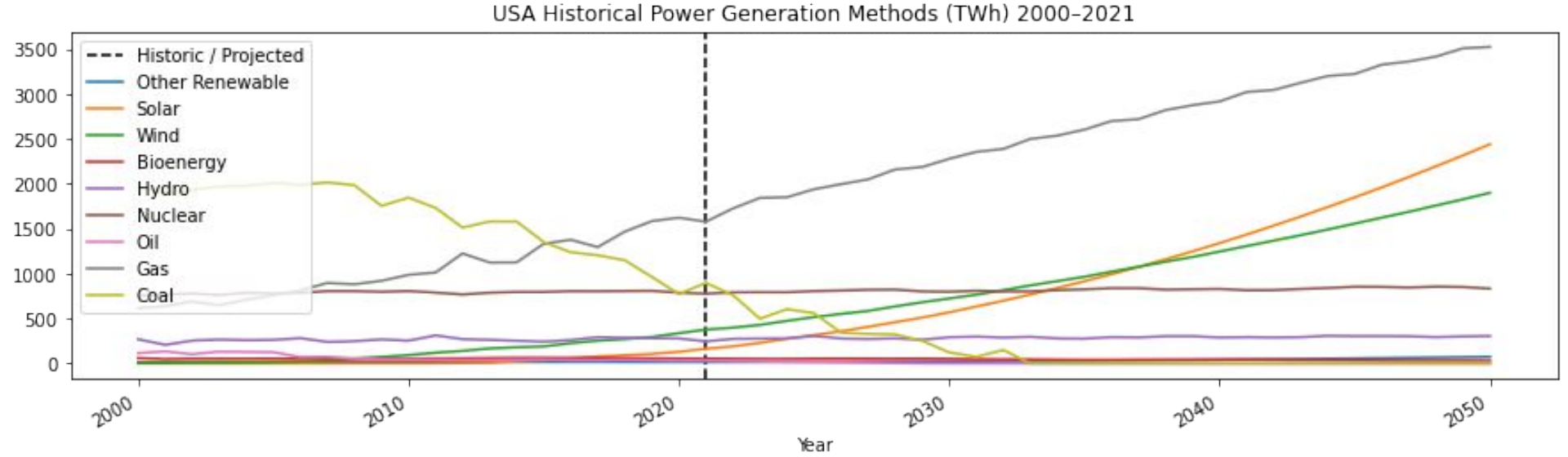
Historic Electricity Generation



- The US uses nine fuel sources for electricity generation.
- Fossil fuels include coal, natural gas, and oil.


United States Historic Energy Demand and Sources
Historic Electricity Generation
Historic Demand (TWh)
Other Renewables (TWh)
Solar (TWh)
Wind (TWh)
Bioenergy (TWh)
Hydro (TWh)
Nuclear (TWh)
Oil (TWh)
Gas (TWh)
Coal (TWh)
TWh
0
500
1000
1500
2000
2500
3000
3500
4000
2000
2004
2008
2012
2016
2020
Year

Model Results: Electricity Generation Trends



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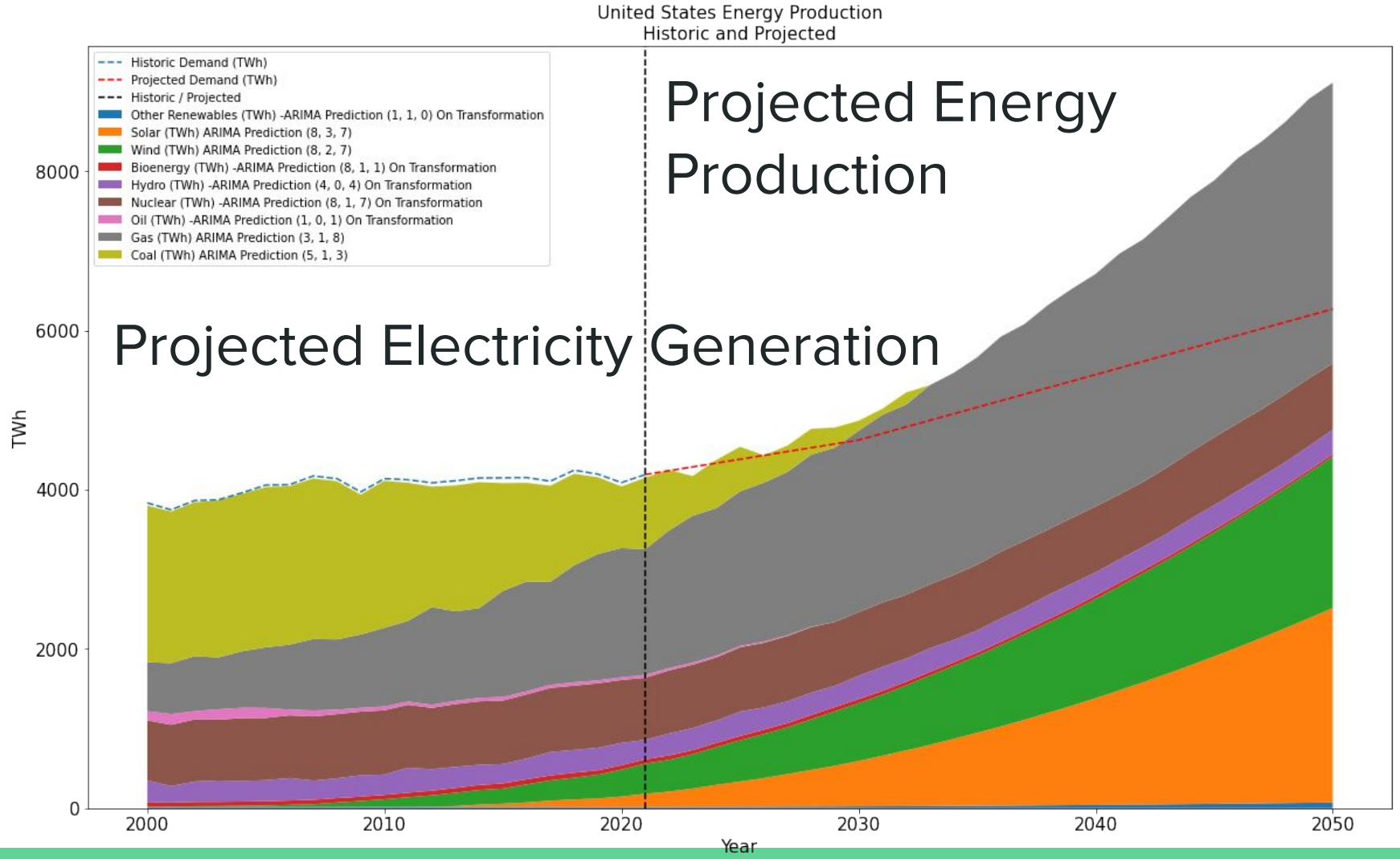
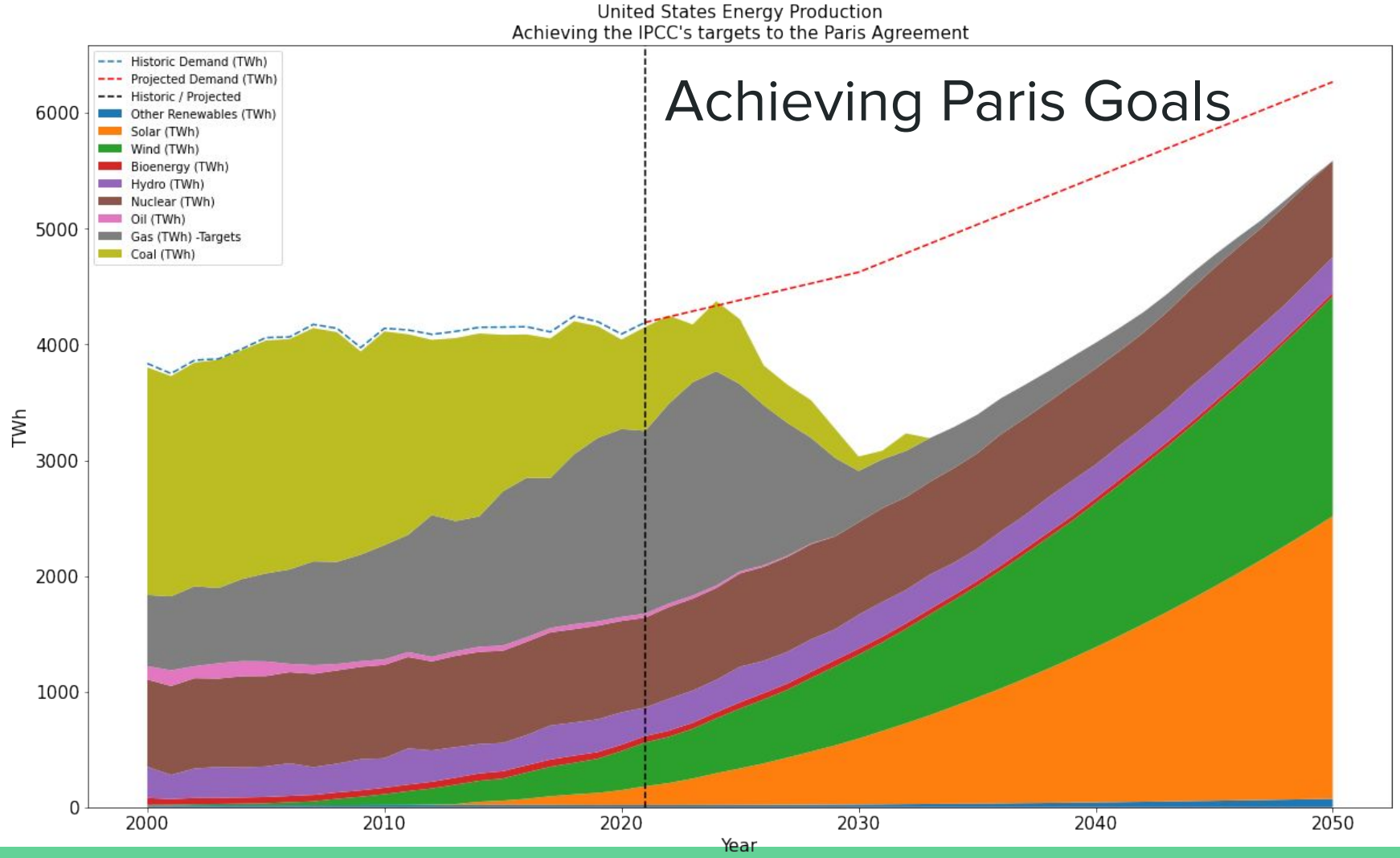
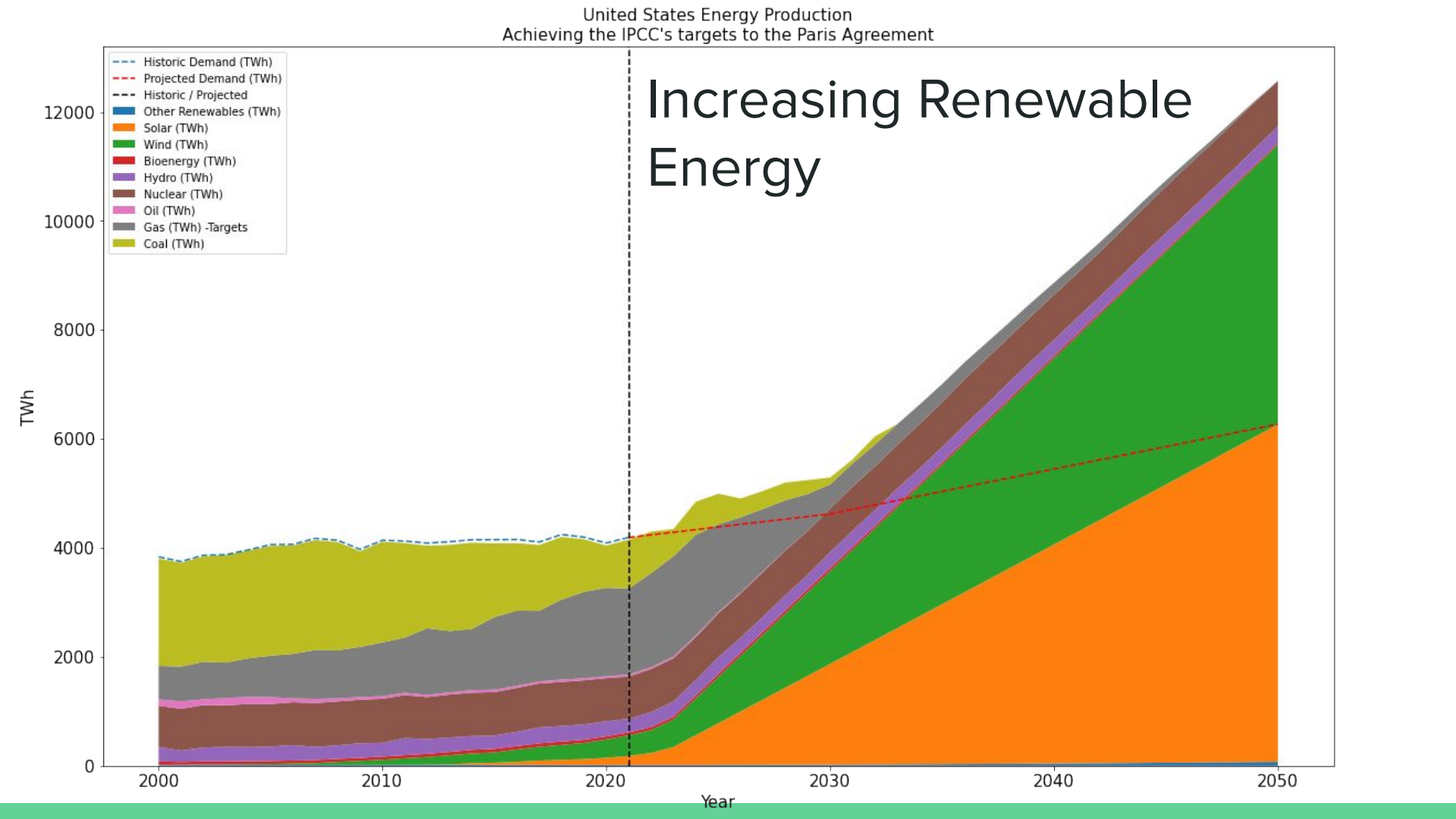

United States Energy Production
Historic and Projected
Historic Demand (TWh)
Projected Demand (TWh)
Historic / Projected
Other Renewables (TWh) -ARIMA Prediction (1, 1, 0) On Transformation
Solar (TWh) ARIMA Prediction (8, 3, 7)
Wind (TWh) ARIMA Prediction (8, 2, 7)
Bioenergy (TWh) -ARIMA Prediction (8, 1, 1) On Transformation
Hydro (TWh) -ARIMA Prediction (4, 0, 4) On Transformation
Nuclear (TWh) -ARIMA Prediction (8, 1, 7) On Transformation
Oil (TWh) -ARIMA Prediction (1, 0, 1) On Transformation
Gas (TWh) ARIMA Prediction (3, 1, 8)
Coal (TWh) ARIMA Prediction (5, 1, 3)
Projected Energy Production
Projected Electricity Generation
TWh
0
2000
4000
6000
8000
2000
2010
2020
2030
2040
2050
Year


United States Energy Production
Achieving the IPCC's targets to the Paris Agreement
Achieving Paris Goals
Historic Demand (TWh)
Projected Demand (TWh)
Historic / Projected
Other Renewables (TWh)
Solar (TWh)
Wind (TWh)
Bioenergy (TWh)
Hydro (TWh)
Nuclear (TWh)
Oil (TWh)
Gas (TWh) -Targets
Coal (TWh)
TWh
0
1000
2000
3000
4000
5000
6000
2000
2010
2020
2030
2040
2050
Year


United States Energy Production
Achieving the IPCC's targets to the Paris Agreement
Historic Demand (TWh)
Projected Demand (TWh)
Historic / Projected
Other Renewables (TWh)
Solar (TWh)
Wind (TWh)
Bioenergy (TWh)
Hydro (TWh)
Nuclear (TWh)
Oil (TWh)
Gas (TWh) -Targets
Coal (TWh)
Increasing Renewable Energy
TWh
Year
0
2000
4000
6000
8000
10000
12000
2000
2010
2020
2030
2040
2050

Next Steps: More Research

- Analyze all countries.
- Correlate temperature vs GHG reductions.
- Add 2022 data.
- Analyze Fuel Extraction.
- Analyze transmission losses

Thank You!

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