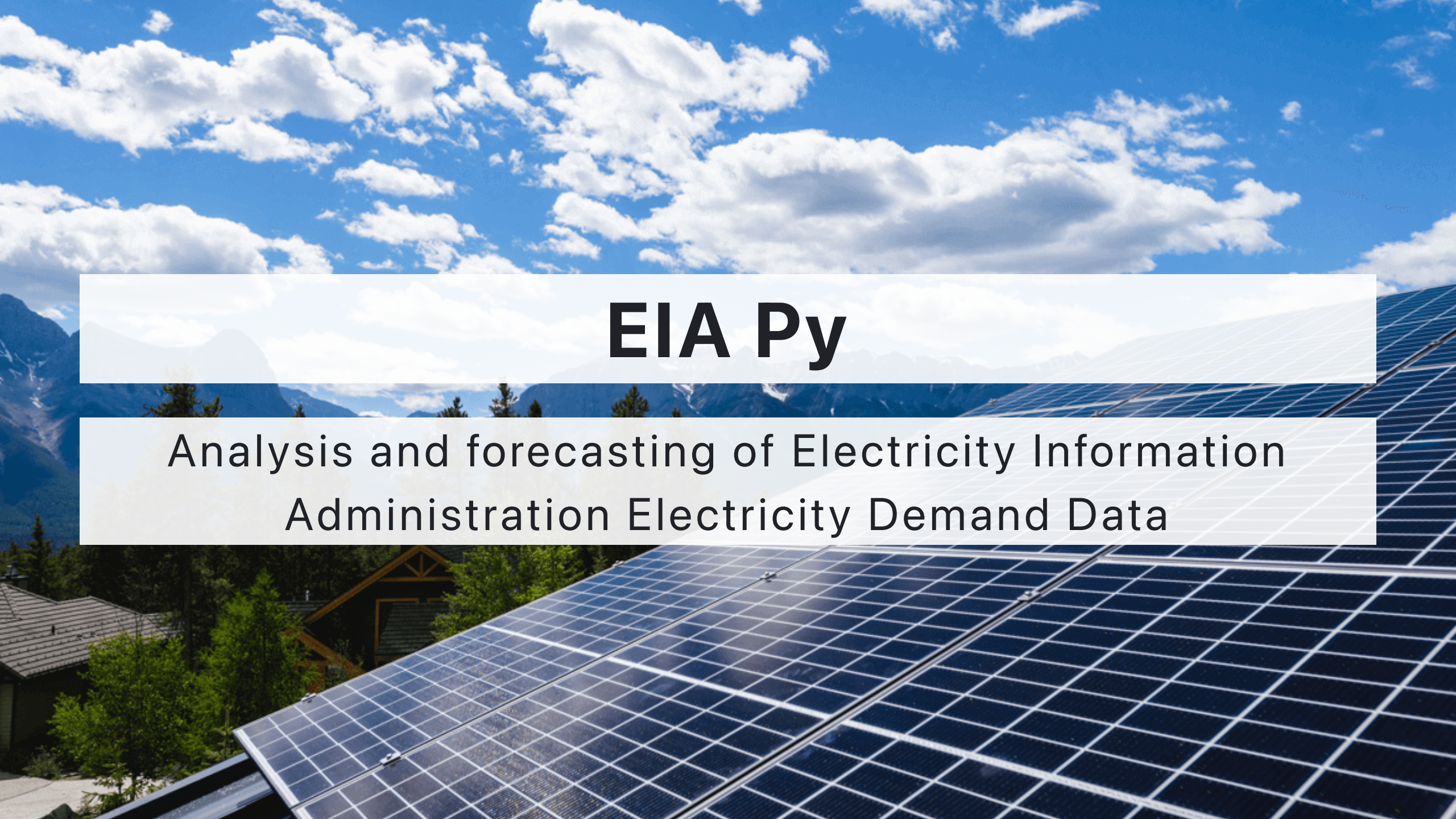


EIA Py

Analysis and forecasting of Electricity Information Administration Electricity Demand Data

Project Links

- GitHub Repo
- API Docs
- Slides
- Data Understanding Dashboard

Objectives

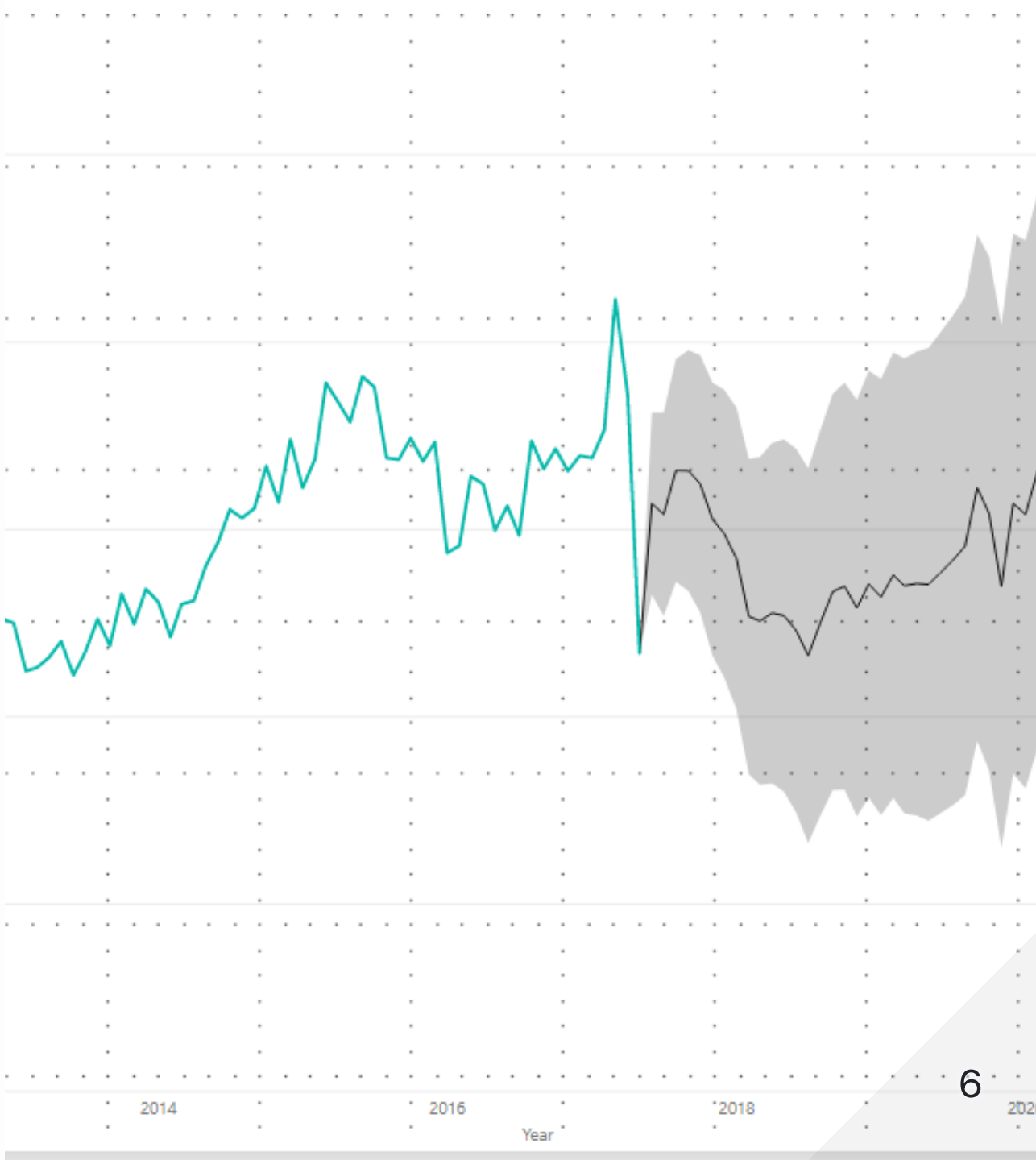
Publish `eia-py`

- publish a high quality PyPi package
- allow others to scrape and use the Energy Information Administration data
- efficiently cache data to minimize downloads

Energy Information Administration data analysis

- How electric energy is being consumed around the States?
- What are the sources contributing to its generation?
- What impact do the sources have on the environment?

Forecast electricity demand



Using the Python Package

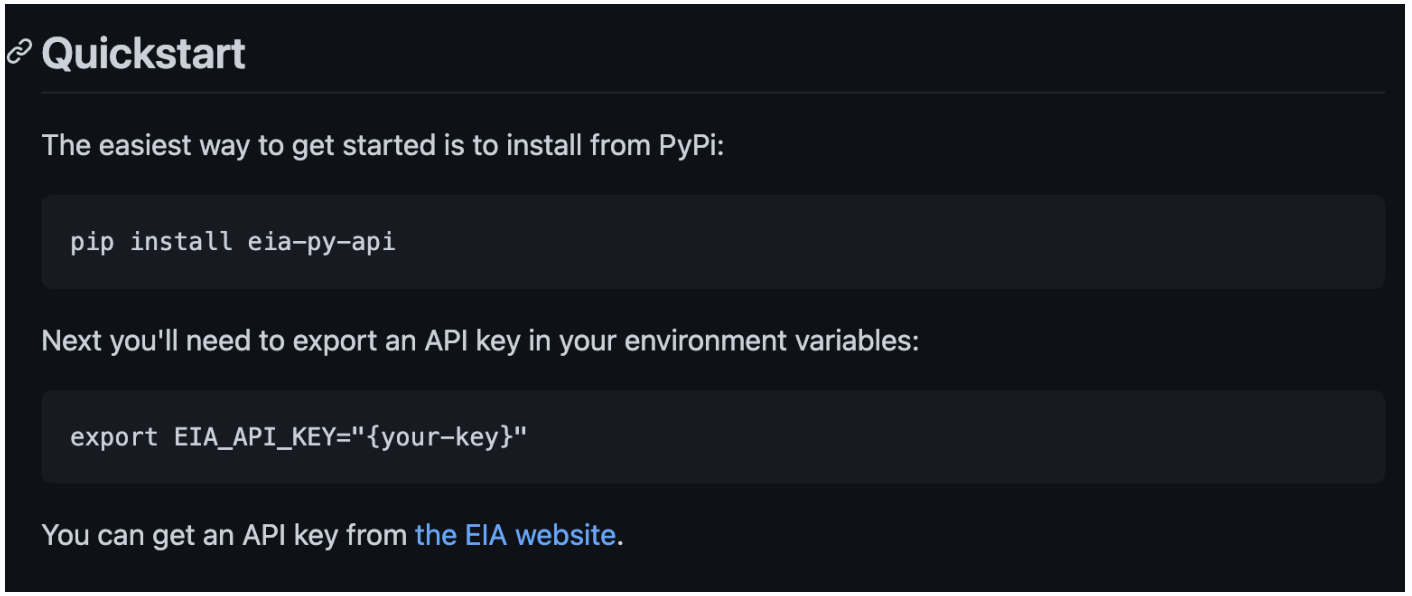
```
pip install eia-py-api
```

```
import eia
dataframe = eia.load_dataframe()
# Scrapes, caches, and loads all data into a `pd.DataFrame`.
# Reuses cached data to avoid excessive redownloads
```

```
>>> eia.load_dataframe('electric-power-operational-data')
      Unnamed: 0   period location stateDescription  ...  ash-content ash-content-units heat-content
0              0  2021-06       SD     South Dakota  ...          0.0           percent       0.0000
1              1  2021-06       SD     South Dakota  ...          0.0           percent       0.0000
2              2  2021-06       SD     South Dakota  ...          5.2           percent      16.4020
3              3  2021-06       SD     South Dakota  ...          5.2           percent      16.4020
4              4  2021-06       SD     South Dakota  ...          0.0           percent       6.0000
...          ...      ...      ...              ...  ...          ...               ...          ...
4995        4995  2021-10       MD         Maryland  ...          0.0           percent       0.0000
4996        4996  2021-10       MD         Maryland  ...          0.0           percent       2.4031
4997        4997  2021-10       MD         Maryland  ...          0.0           percent       5.9700
4998        4998  2021-10       MD         Maryland  ...          0.0           percent       0.0000
4999        4999  2021-10       MD         Maryland  ...          0.0           percent       0.0000

[5000 rows x 38 columns]
```

More information available in the GitHub repo README



Quickstart

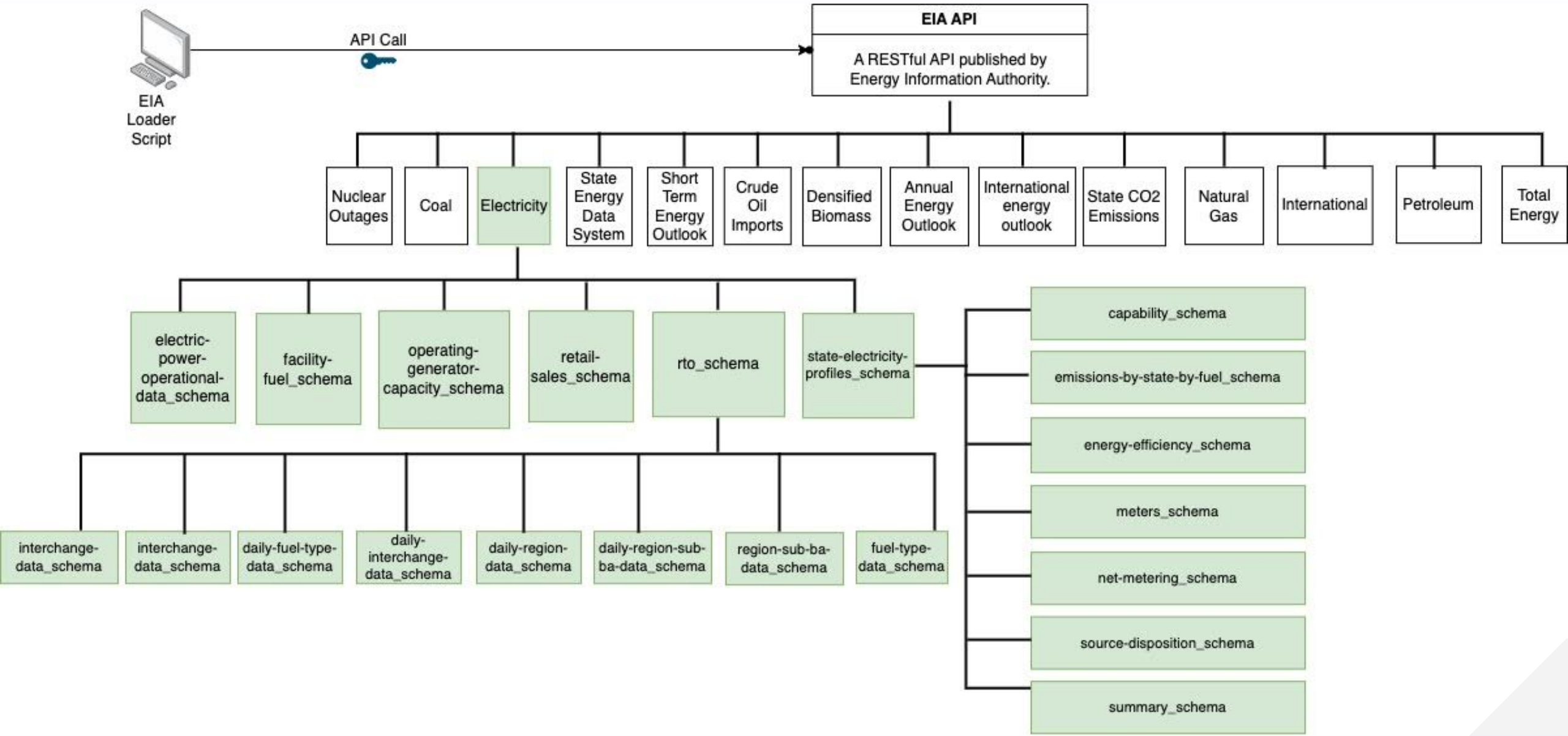
The easiest way to get started is to install from PyPi:

```
pip install eia-py-api
```

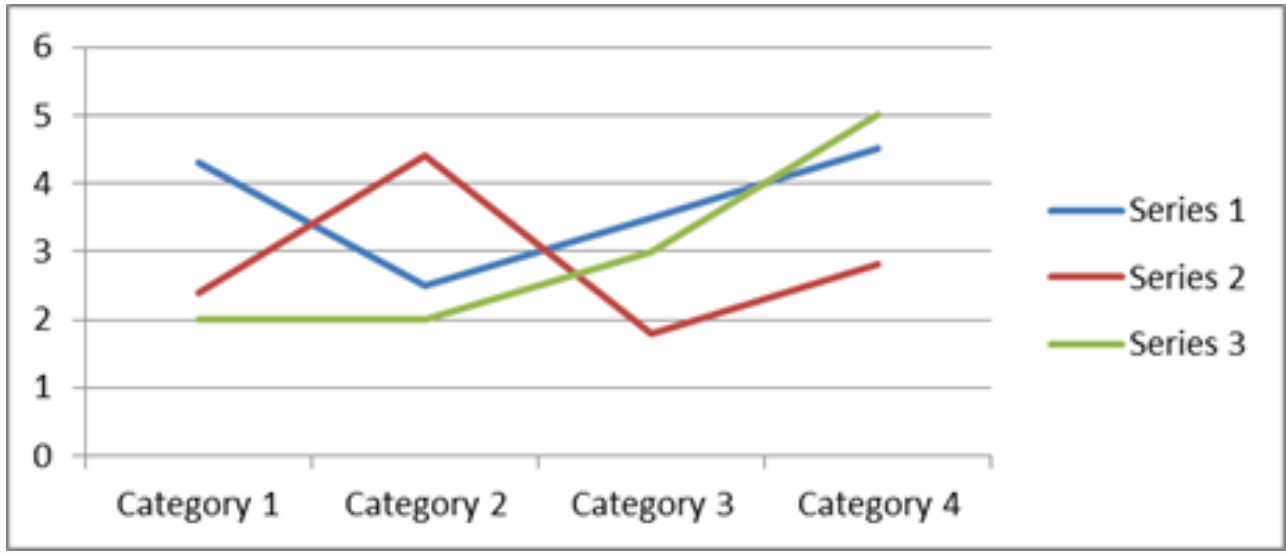
Next you'll need to export an API key in your environment variables:

```
export EIA_API_KEY="{your-key}"
```

You can get an API key from the EIA website.


EIA Loader Script
API Call
EIA API
A RESTful API published by Energy Information Authority.
Nuclear Outages
Coal
Electricity
State Energy Data System
Short Term Energy Outlook
Crude Oil Imports
Densified Biomass
Annual Energy Outlook
International energy outlook
State CO2 Emissions
Natural Gas
International
Petroleum
Total Energy
electric-power-operational-data_schema
facility-fuel_schema
operating-generator-capacity_schema
retail-sales_schema
rto_schema
state-electricity-profiles_schema
capability_schema
emissions-by-state-by-fuel_schema
energy-efficiency_schema
meters_schema
net-metering_schema
source-disposition_schema
summary_schema
interchange-data_schema
interchange-data_schema
daily-fuel-type-data_schema
daily-interchange-data_schema
daily-region-data_schema
daily-region-sub-ba-data_schema
region-sub-ba-data_schema
fuel-type-data_schema

Data Anaysis



Green Score

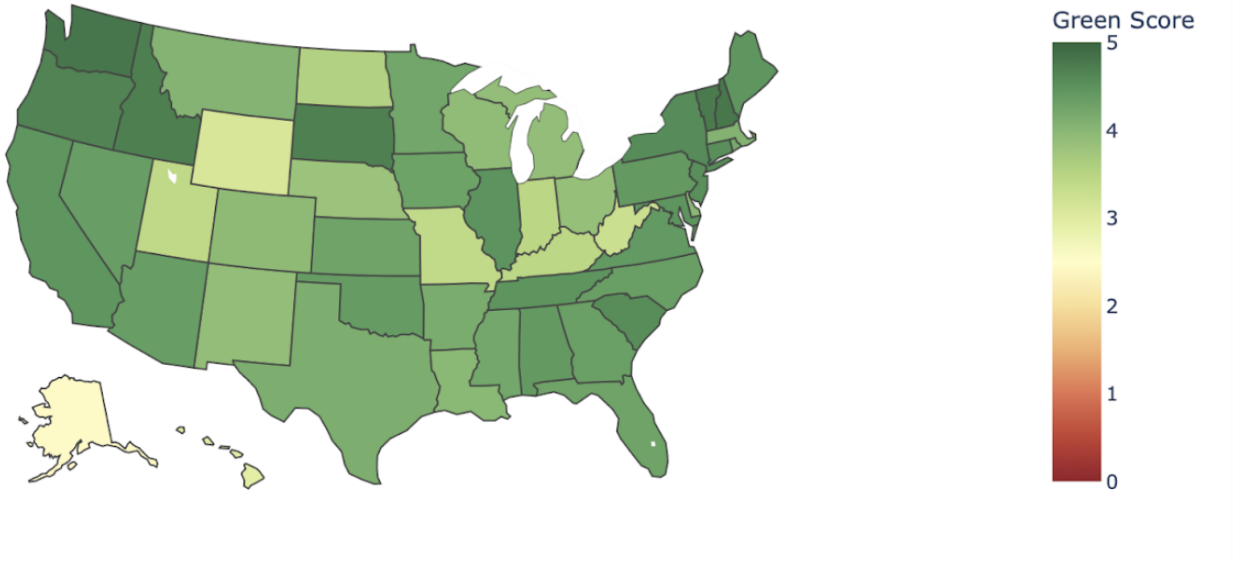
- Scalar between 0 (Poor) and 5 (Best)
- Measures the environmental impact of electricity generation
- Primarily takes NOx and CO2 into account
- scales NOx to CO2 equivalent
- normalises the value to per unit of electricity generation

stateDescription	green_score_norm
Washington	4.800611
New Hampshire	4.796714
Vermont	4.763041
Idaho	4.692732
South Dakota	4.691485
Oregon	4.655318
New York	4.576435

Best 7 States

stateDescription	green_score_norm
Alaska	2.458610
District of Columbia	2.780220
Hawaii	2.932841
Wyoming	3.118355
West Virginia	3.268793
Missouri	3.395691
Utah	3.411592

Worst 7 States



Green Score Over Time

TODO ADD PLOT LINK

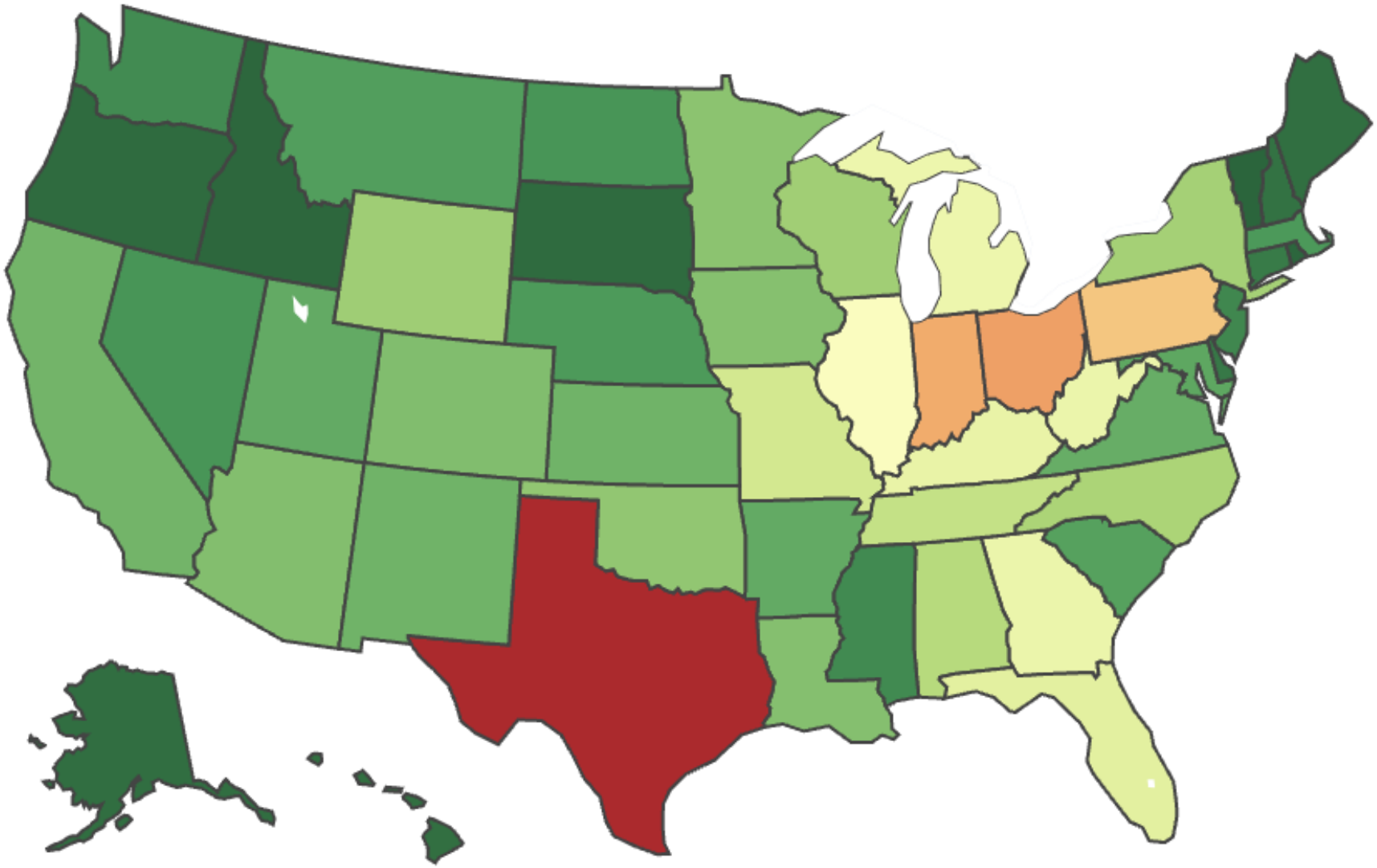
Link to the live plot on the dashboard

Trend!

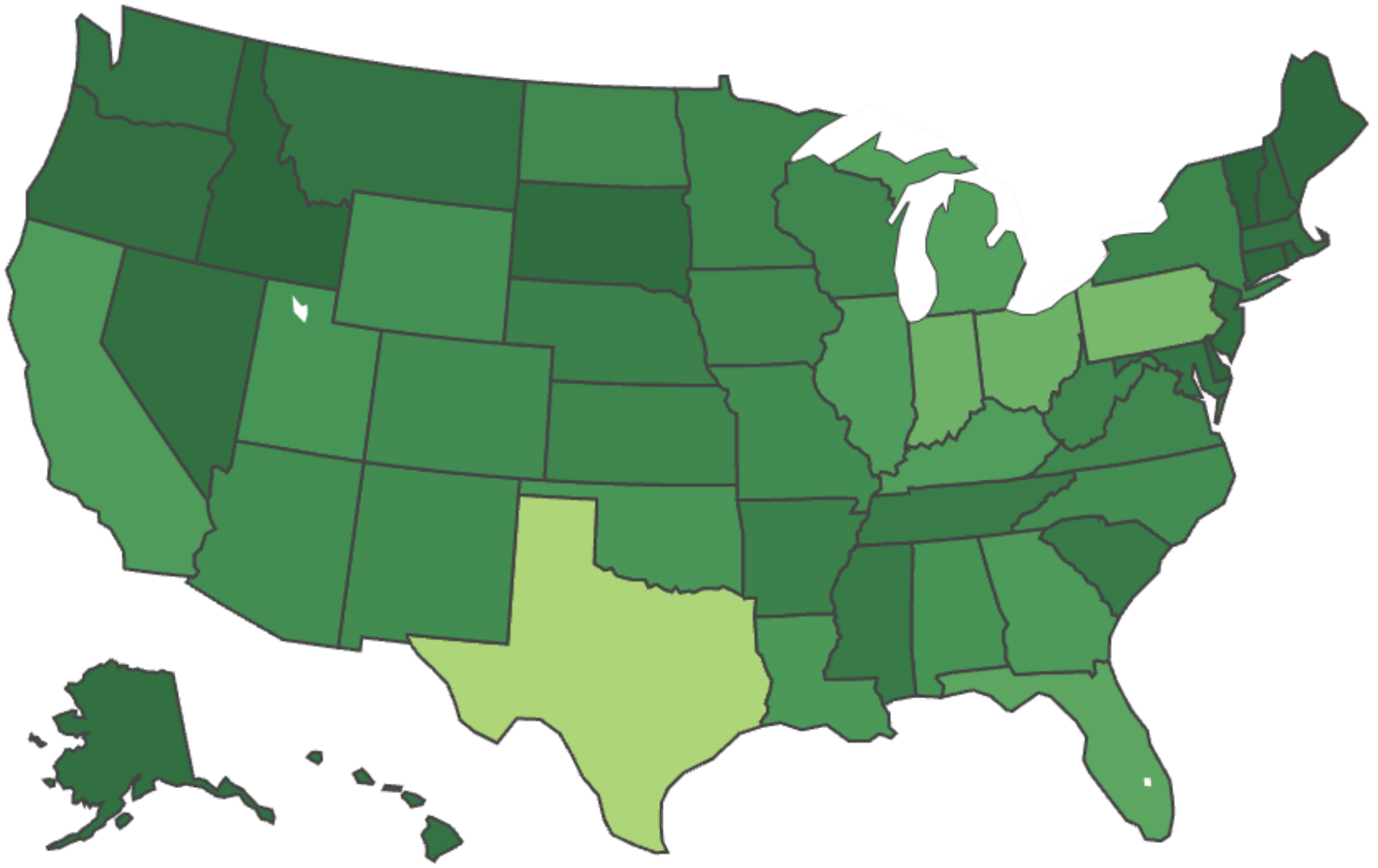
The Green Score has been improving over the years!

- Decision makers are pushing towards more greener sources of energy
- This essentially could be due to improved power generation techniques

"Good Job Everyone!!!"



Except Texas



"Good Job Texas!!!"

SO2 Score

- SO2 is a secondary pollutant
- Separated for the primary score
- Scalar between 0 (Best) and 5 (Poor)
- SO2 emission during electricity generation.
- Again is normalised per unit of electricity generation

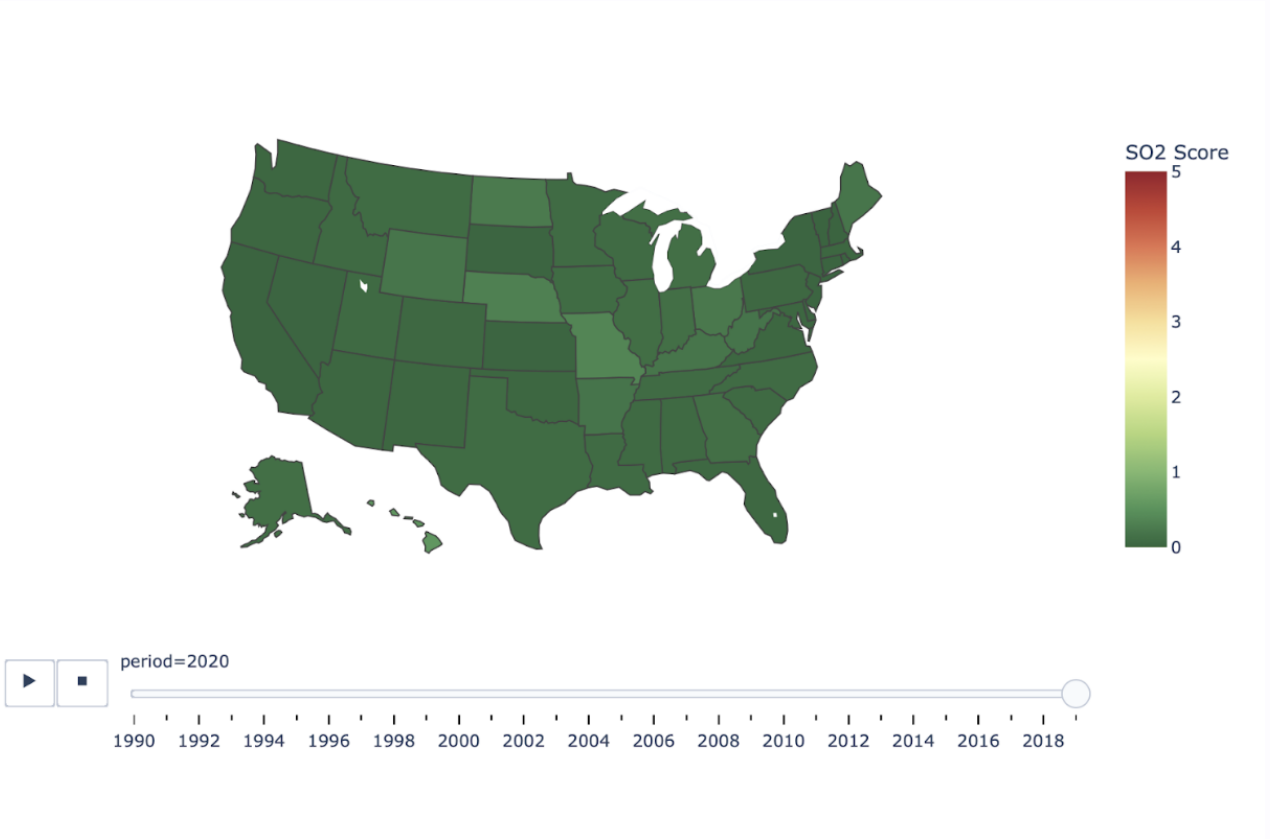
stateDescription	so2_index
Rhode Island	0.000000
District of Columbia	0.000000
Connecticut	0.000000
California	0.000000
Vermont	0.000000
New Hampshire	0.000000
Nevada	0.014409

Best 7 States

stateDescription	so2_index
Hawaii	0.547550
Missouri	0.360231
Nebraska	0.317003
North Dakota	0.244957
Ohio	0.216138
Wyoming	0.187320
Kentucky	0.187320

Worst 7 States

SO2 Score Over Time



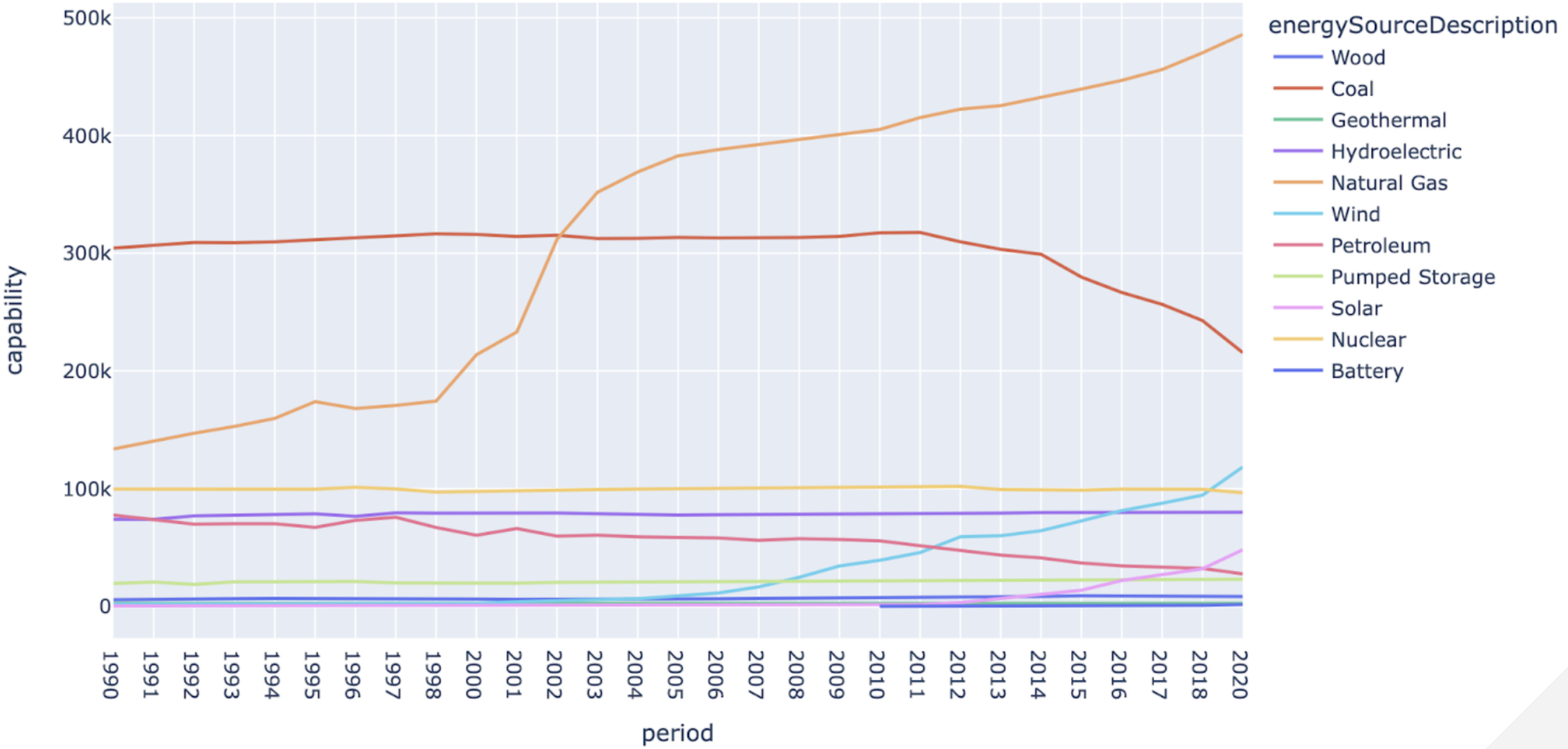
TODO ADD PLOT LINK

Link to the live plot on the dashboard

Trend

The SO2 score has been getting better over the years.

This could be due to using fuel sources with lower Sulphur content.


500k
400k
300k
200k
100k
0
capability
1990
1991
1992
1993
1994
1995
1996
1997
1998
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2020
period
energySourceDescription
Wood
Coal
Geothermal
Hydroelectric
Natural Gas
Wind
Petroleum
Pumped Storage
Solar
Nuclear
Battery

Self Sufficiency Index

- TODO write description

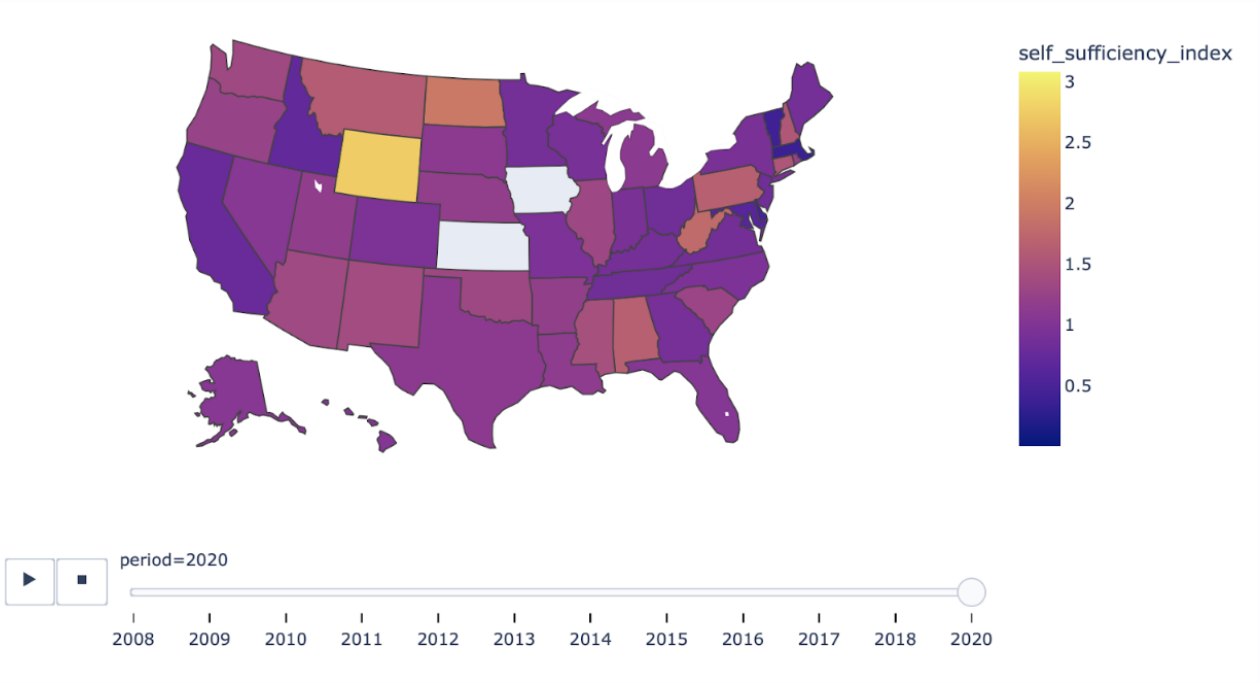
stateDescription	self_sufficiency_index
Wyoming	2.740261
North Dakota	1.932974
West Virginia	1.766445
Alabama	1.649280
Pennsylvania	1.647165
Montana	1.601276
New Hampshire	1.529016

Best 7 States

stateDescription	self_sufficiency_index
District of Columbia	0.020551
Massachusetts	0.364215
Vermont	0.404469
Delaware	0.467728
Maryland	0.625192
Idaho	0.723024
California	0.771761

Worst 7 States

Self Sufficiency Index Over Time



TODO ADD PLOT LINK

Link to the live plot on