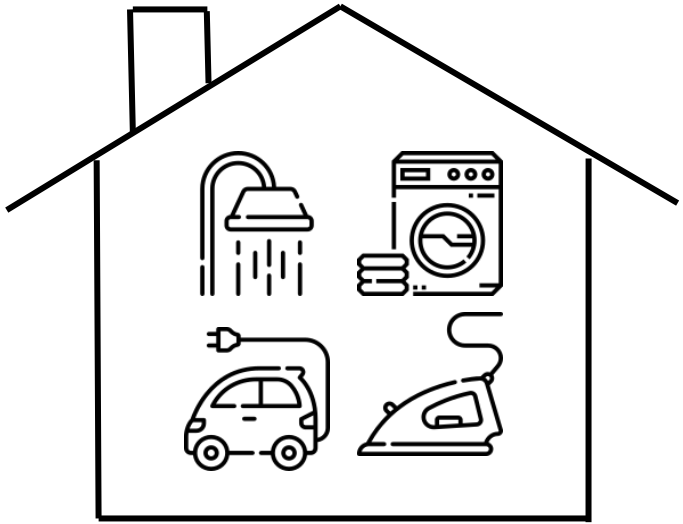
SPARC

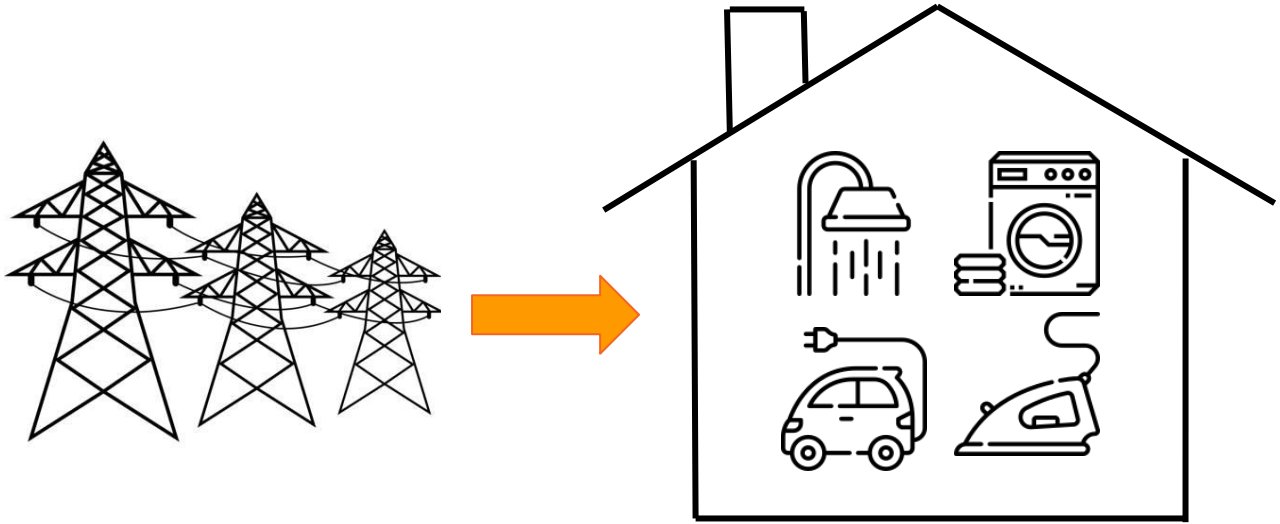
Schedule Power And Reduce Carbon

CS 329s | **Kun Guo, Nina Prakash, Griffin Tarpenning** | March 9, 2022

MOTIVATION



MOTIVATION



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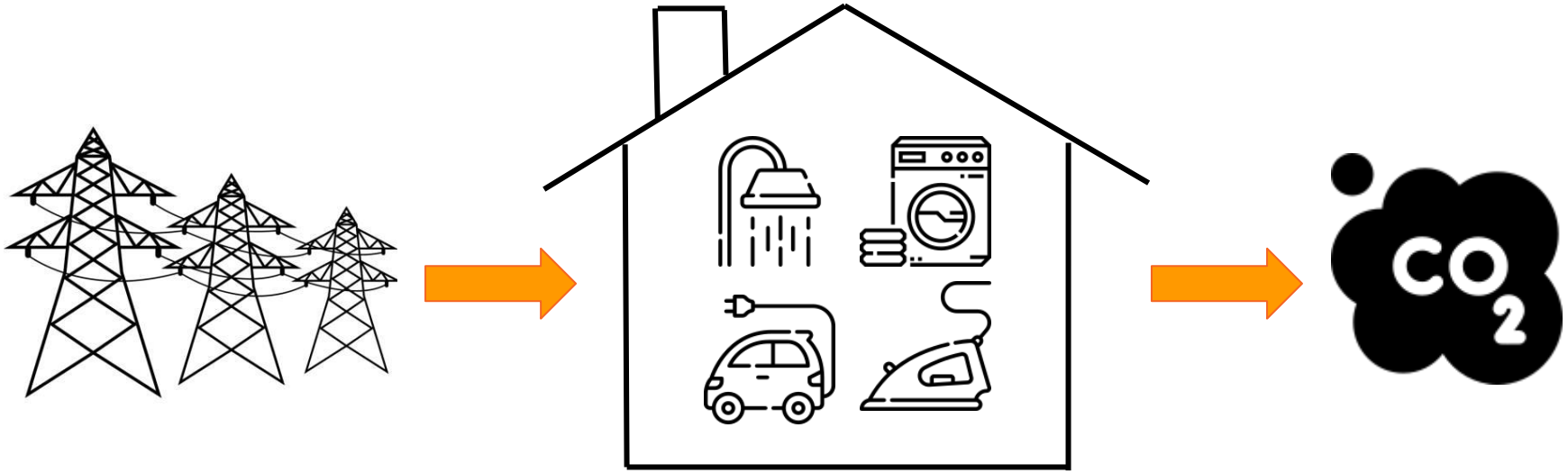

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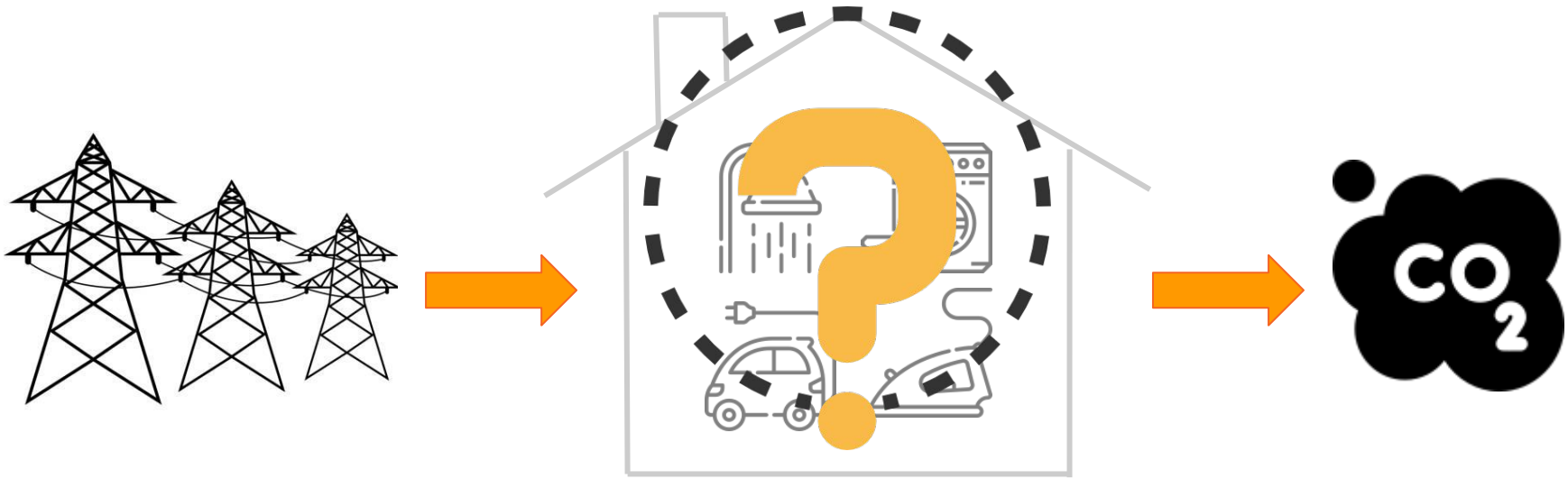

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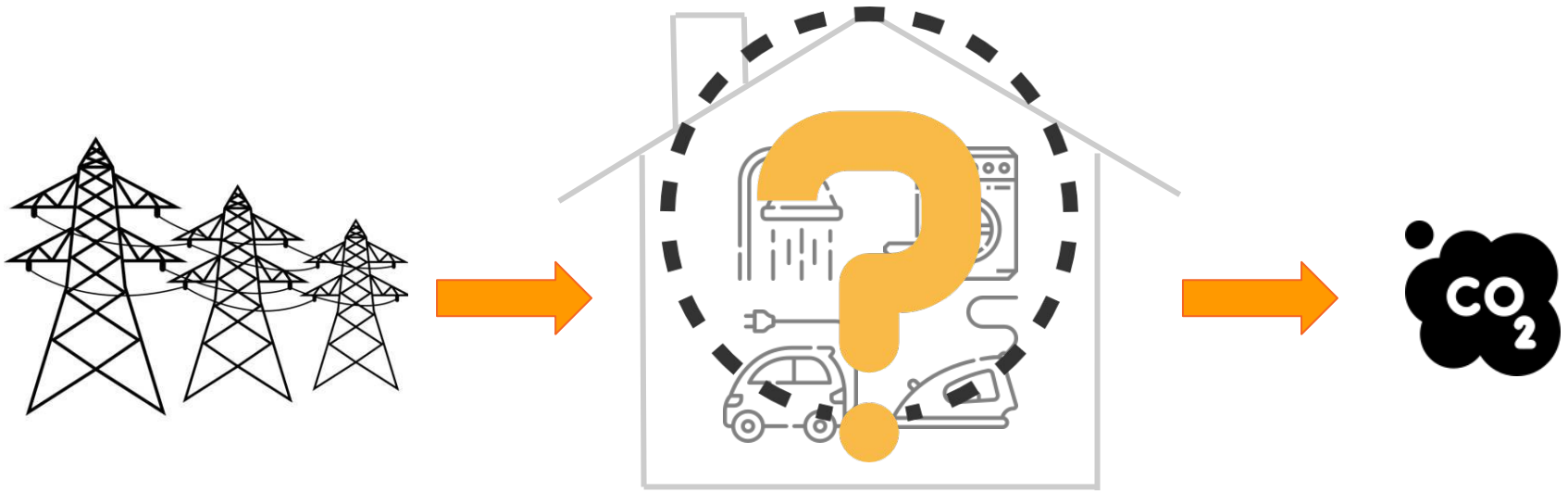

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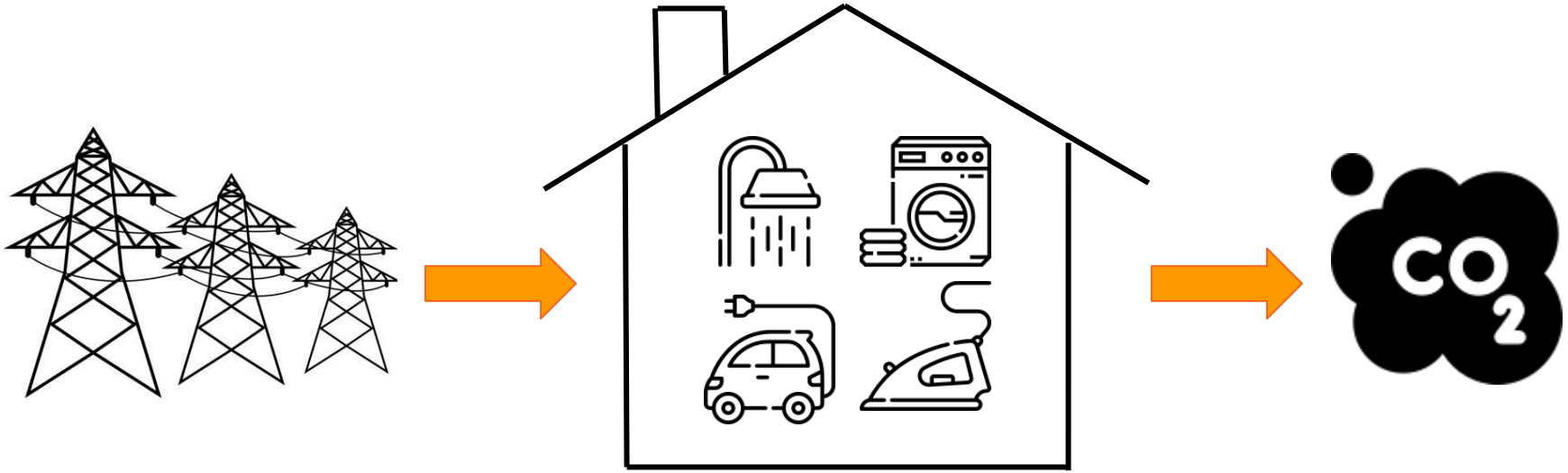

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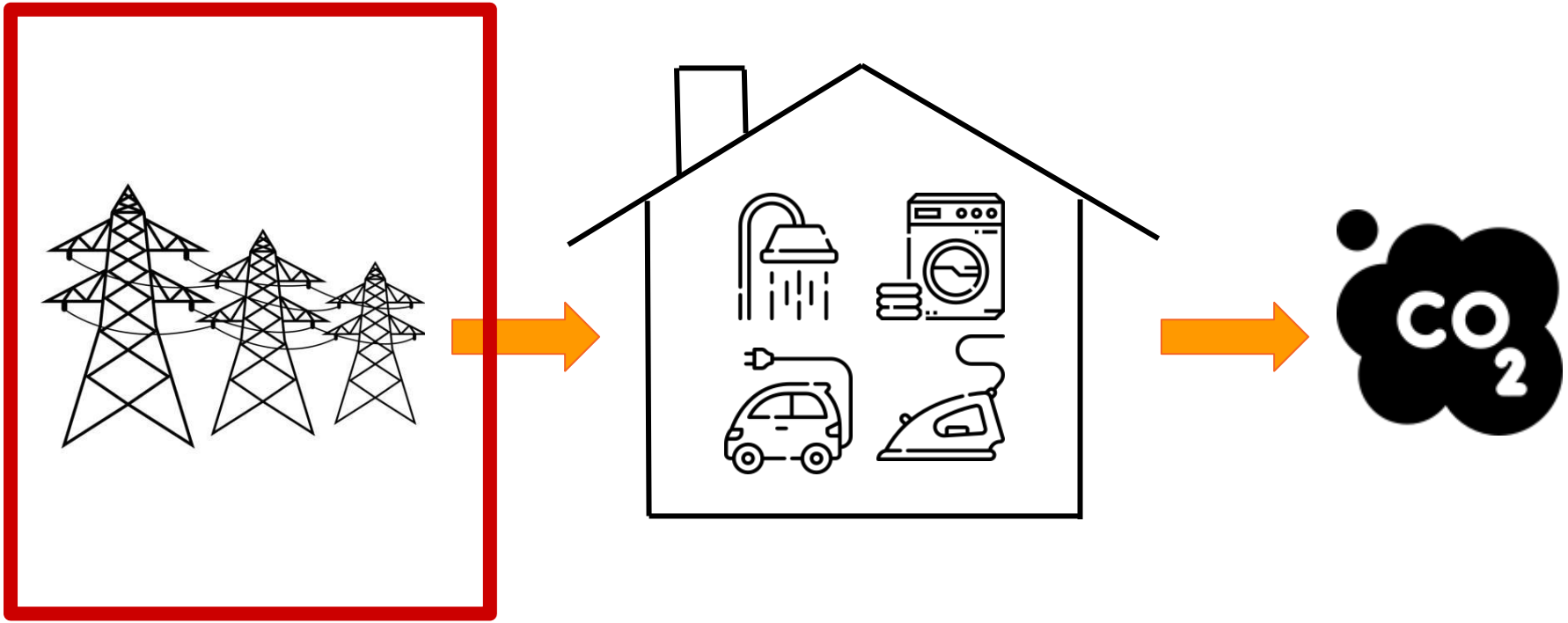

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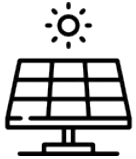


solar

nuclear

wind

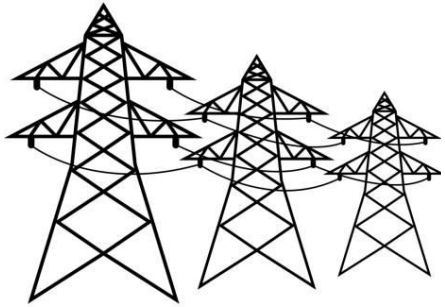
battery

natural gas

hydro

coal

geothermal



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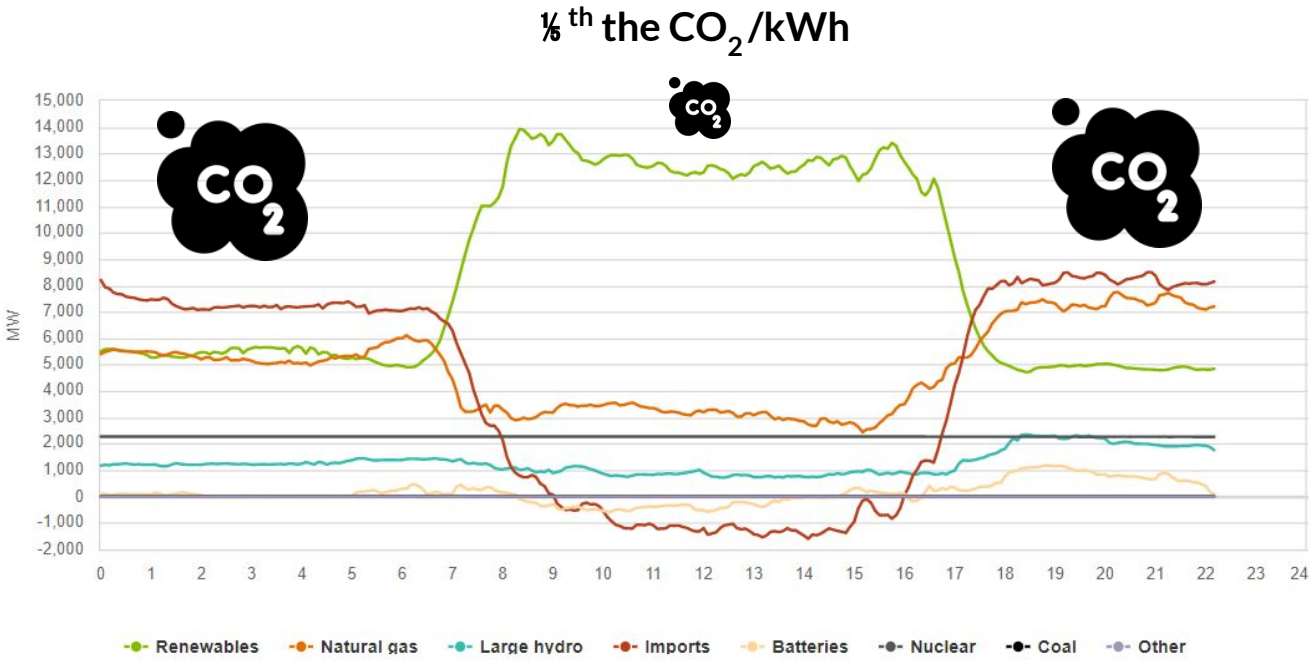

⅙ th the CO_2/kWh
MW
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
-1,000
-2,000
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Renewables
Natural gas
Large hydro
Imports
Batteries
Nuclear
Coal
Other

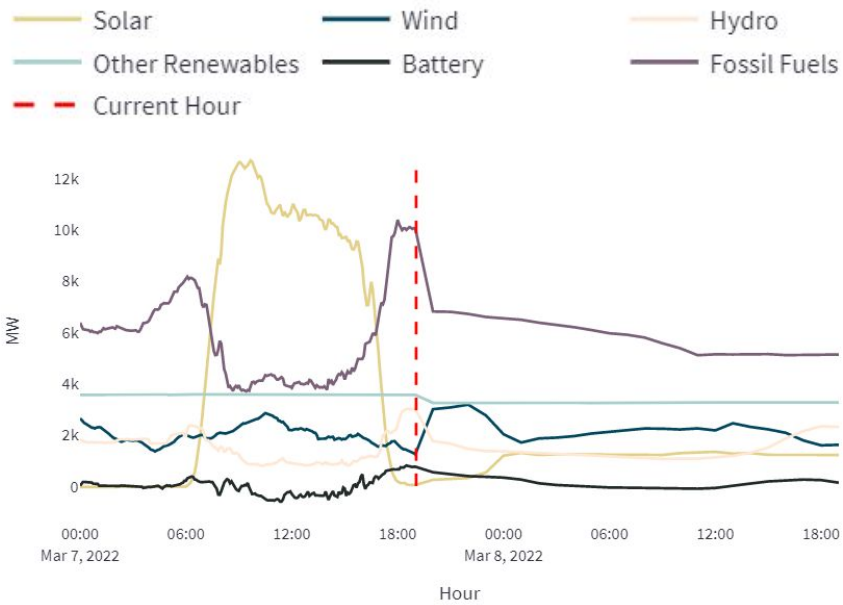
SPARC

Input Features

Generation mix
+
Weather
(time series)

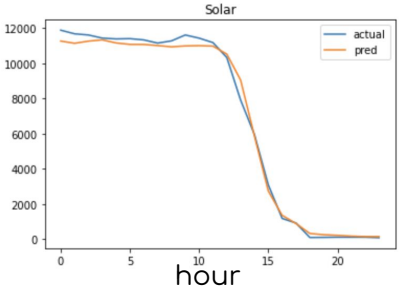
ML Model

Skforecast + XGBoost Regressor
(re-train /hour)



Outputs

next 24hr prediction

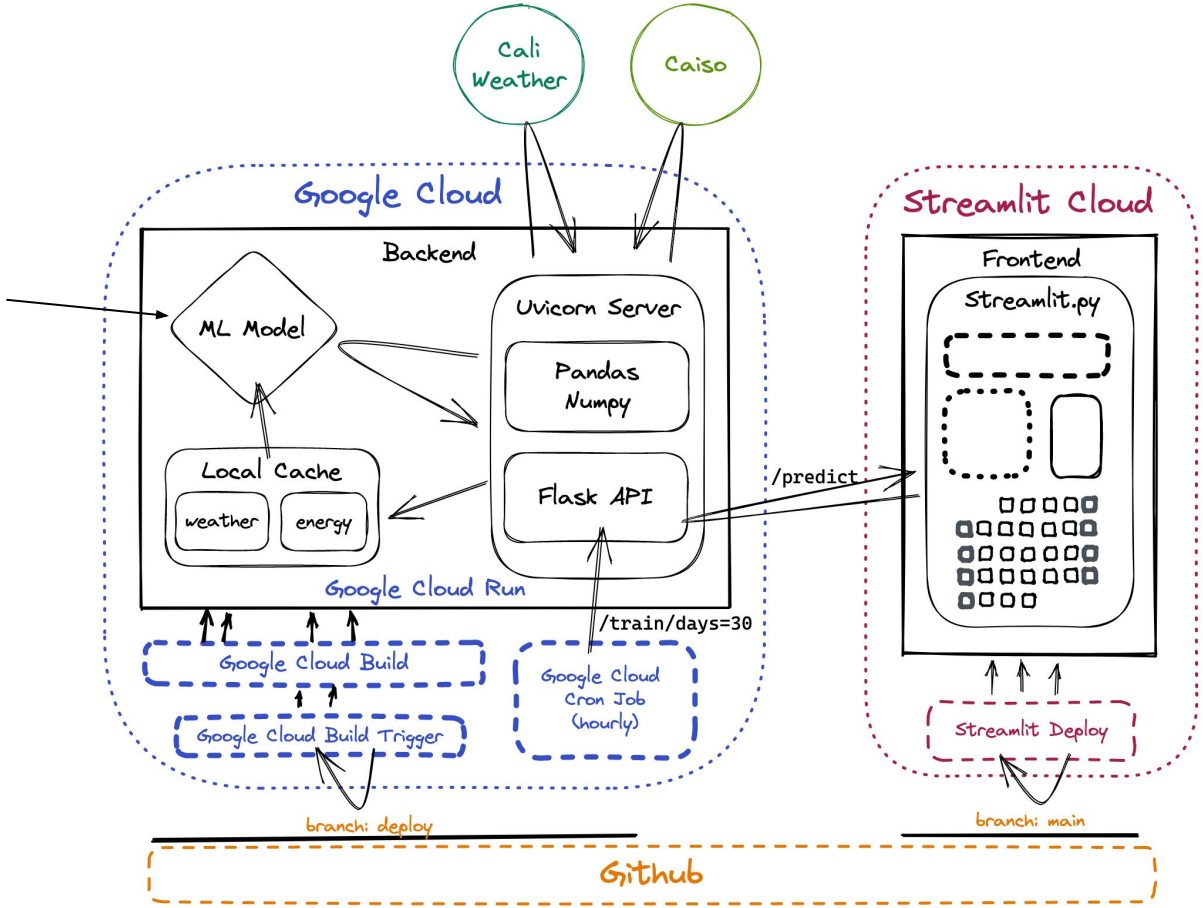


MAPE: +/- 8%*

*certain energy sources (eg. wind) tend to have higher prediction error than others

SPARC

Skforecast +
XGBoost
Regressor



SPARC | LIVE DEMO

https://share.streamlit.io/ninaprakash1/sparc-forecasting/main/frontend.py

BACKUP SLIDES

SPARC

Select an activity

Charge an EV (Level 1)

Select a time in the next 24 hours

1:00pm

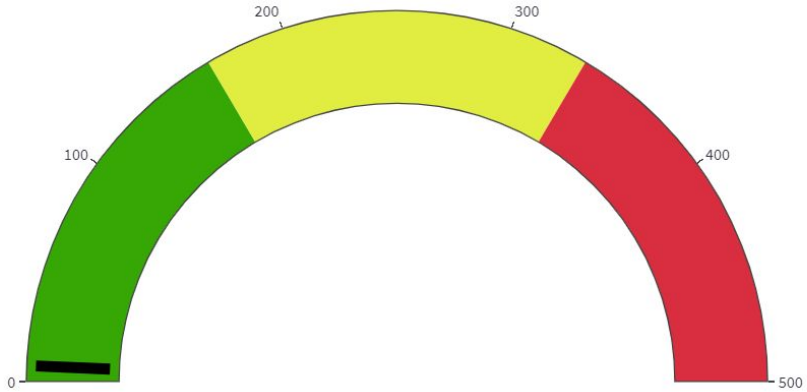
Select a duration

1 hour

SPARC

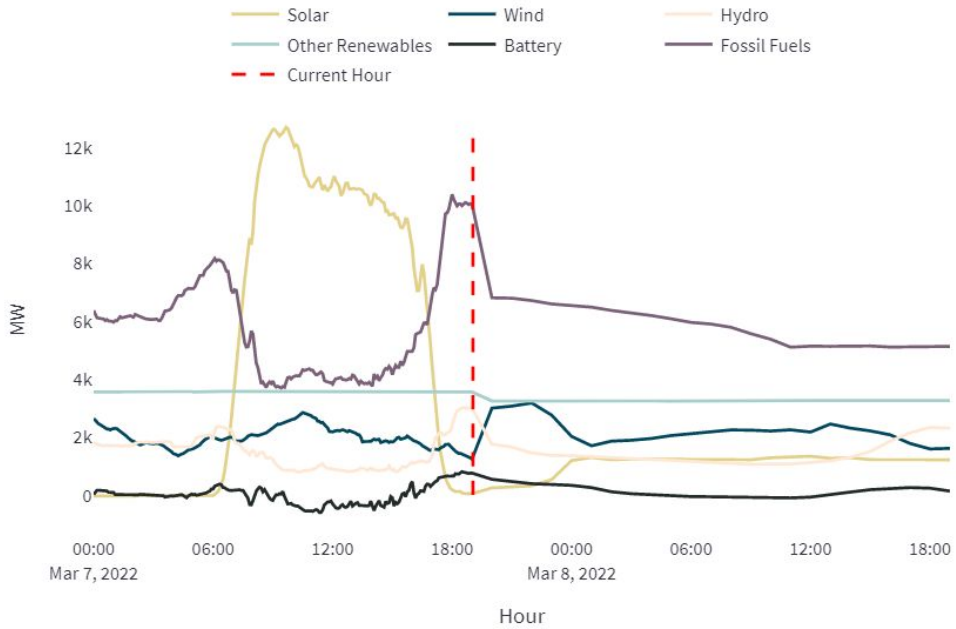
To charge an EV (Level 1) at 1:00pm for 1 hour, you will produce:

6.9 lb CO_2

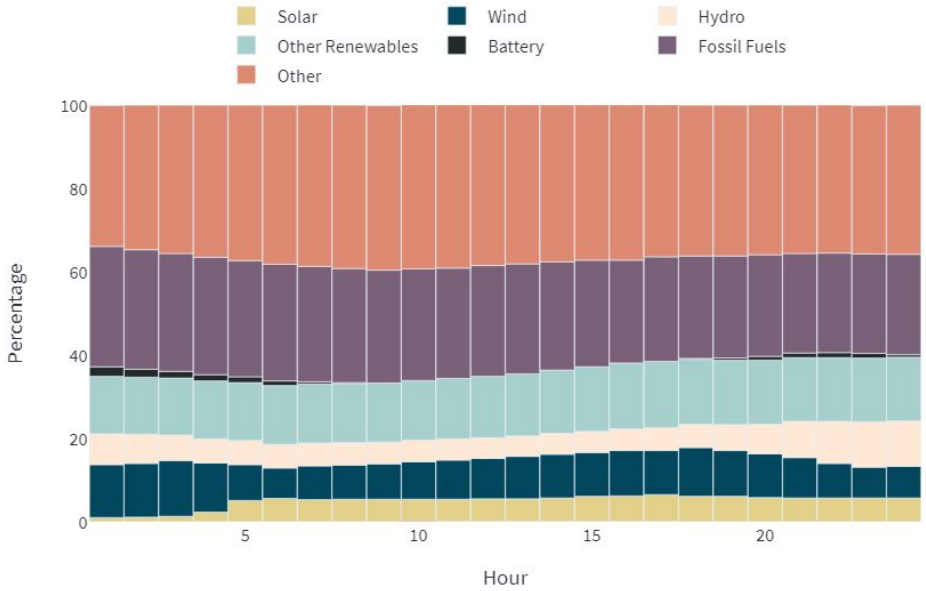


SPARC

Historical and Predicted Generation Mix



SPARC



Click to see recommendation

Based on the forecast results, it is recommended that you begin charging an EV (Level 1) at 06:00PM on Mar 07