Learning ML-based representations of dispatchable assets

Chiara Fusar Bassini

Hertie School

May 24th, 2024

Project introduction

RES penetration changes the way dispatchable assets are operated, stressing the need for on-demand flexibility.

Can we use ML to better model dispatchable assets?

In particular, we want to derive plant-specific:

- *Techno-economic characteristics*
- *Strategic behaviour.*

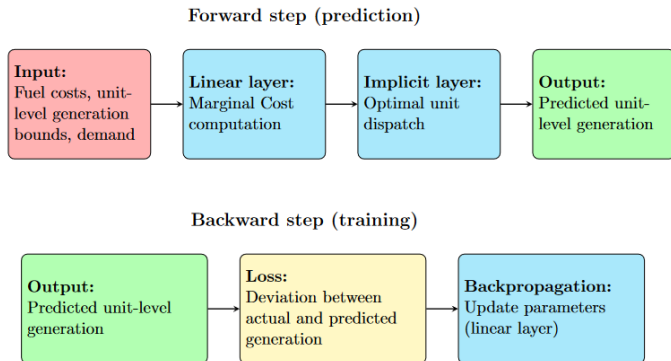Figure: Gas plant Lichterfelde, Berlin (Source: Wikimedia Commons)

Figure: ML-pipeline to derive unit-level parameters.

Data

Operational data on EU generation units ≥ 100 MWp
in compliance with **REMIT** and **Transparency**.

- **Hourly generation**
- **Unavailability events.**

| Unit type	Number of units	% of capacity	% of generation
Lignite	28	83.1%	99.9%
Fossil gas	56	53.8%	80.4%
Hard coal	42	87.5%	89.5%
Hydro (storage)	38	73.4%	77.0%
Hydro (other)	6	18.9%	12.8%
Nuclear	6	100.0%	99.9%
Other	6	16.8%	14.1%

Table: Reporting generation units for Germany in 2021.

Preliminary steps (1)

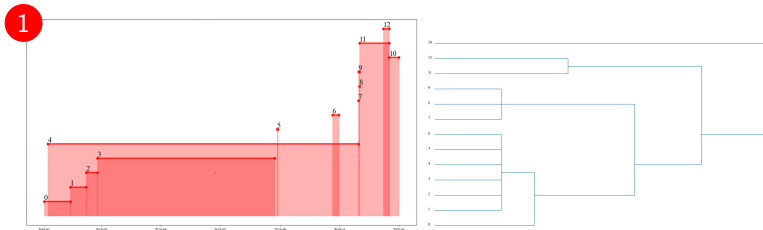Urgent Market Messages (UMMs) must be brought into a time series form.

Data presents several issues:

- **Data availability**
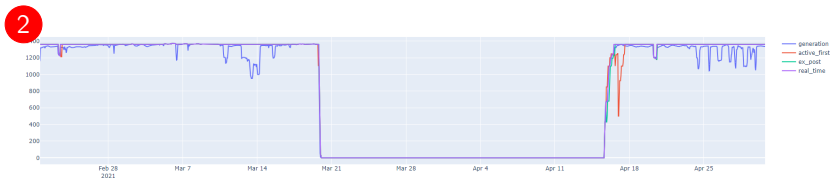- **Message overloading**
- **Overlapping events**.
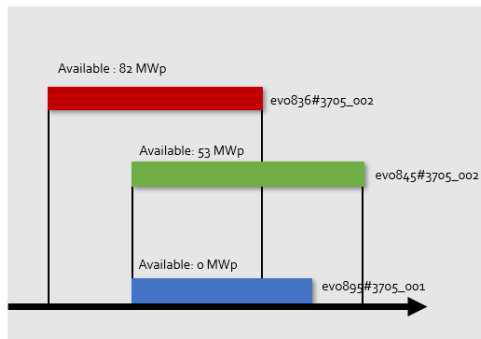
Preliminary steps (2)

Agglomerative interval clustering

Step-wise cleaning

Preliminary results

Key findings:

- Deviations from literature assumptions
- Unclear data generation and pipeline
- Heterogeneity in the data quality.

Unit type	Method 1	Method 2	Method 3	Literature[1]
Lignite	83.2%	87.0%	87.1%	85.6%
Fossil gas	73.7%	76.7%	74.6%	88 - 98%
Fossil oil	73.1%	73.1%	73.2%	93 - 95%
Hard coal	63.5%	71.2%	75.5%	85.6%

Table: Average available capacity (h/a %) for Germany in 2021.

---

[1]Elsner, Peter, et al. *Flexibilitätskonzepte für die Stromversorgung 2050: Technologien, Szenarien, Systemzusammenhänge.* acatech-Deutsche Akademie der Technikwissenschaften, 2016.

Thank you for your time and attention!

Feedback and questions at: c.fusarbassini@hertie-school.org.