# VISUALIZATIONS OF PUBLIC FUNDAMENTAL DATA

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# I.   PRESENTATION

The objective of this repository is to share with an [MIT license](#) the visualization tools used with public data and developed by the Wholesale Markets Surveillance Directorate ([DSMG](#)) of the Regulatory Commission of Energy ([CRE](#)). It can be used by final users such as developers and energy analysts. All suggestions are welcome at [opensource@cre.fr](mailto:opensource@cre.fr).

# II.   INPUT DATA

The data used for the visualizations proposed in this repository come from different public data sources. They have to be stored in the folders indicated in *./global_var/path_folders.py* which is *~/_public_data/* by default.

### II.1 eCO2mix

Data about the supply and demand equilibrium and provided by *Réseau de Transport d'Electricité* ([RTE](#)) through [eCO2mix](#) allows to illustrate the production and the consumption on the French electricity network. They can be downloaded automatically. No account is necessary.

### II.2 ENTSO-E

The European Network of Transmission System Operators for Electricity ([ENTSO-E](#)) publishes fundamental data on its [transparency platform](#). The source files used for the visualizations in this repository currently have to be downloaded manually with the [SFTP share](#). An account is necessary.

### II.3 Météo-France

As the French national meteorological service, [*Météo-France*](#) provides [observation data](#) extracted from the Global Telecommunication System ([GTS](#)) of the World Meteorological Organization ([WMO](#)). The data can be downloaded automatically. No account is necessary.

### II.4 RTE

RTE publishes fundamental data about the French electricity transmission system. The files have to be downloaded manually on the platform [RTE services portal](#). An account is necessary.

### II.5 Local organization of the input data

The default arborescence proposed to store the data is the following:

| ~/_public_data/ | | | |
|---|---|---|---|
| | 11_ENTSOE/ | | |
| | | ActualGenerationOutputPerUnit/ | |
| | | | 2014_12_ActualGenerationOutputPerUnit.csv |
| | | | ... |
| | | ActualTotalLoad/ | |
| | | | 2014_12_ActualTotalLoad.csv |
| | | | ... |
| | | DayAheadPrices/ | |
| | | | 2014_12_DayAheadPrices.csv |
| | | | ... |
| | | Outages/ | |
| | | | OutagesGU/ |
| | | | 2014_12_OutagesGU.csv |
| | | | ... |
| | | | OutagesPU/ |
| | | | 2014_12_OutagesPU.csv |
| | | | ... |
| | 20_MeteoFrance/ | | |
| | | synop/ | |
| | | | postesSynop.csv |
| | | | synop.201001.csv |
| | | | ... |

| 24_RTE/ | | | |
|---|---|---|---|
| | Centrales_production_reference/ | | |
| | | Centrales_production_reference.xls | |
| | DonneesIndisponibilitesProduction/ | | |
| | | DonneesIndisponibilitesProduction_2010.xls | |
| | | ... | |
| | eCO2mix_RTE/ | | |
| | | eCO2mix_RTE_Annuel-Definitif_2012.xls | |
| | | ... | |
| | ProductionGroupe/ | | |
| | | ProductionGroupe_2012/ | |
| | | | ProductionGroupe_2012-semestre1.xls |
| | | | ... |

**Tableau 1 – Local organization of the input data**

## III.   DESCRIPTION OF THE CODE

### III.1 Organization of the modules

| Folder | Used for |
|---|---|
| global_var | Configuration variables and in particular input and output folders |
| global_tools | Various tools widely used by the other modules (e.g. to format strings). |
| auctions | load and plot auction results |
| capacity | load capacity data |
| load | load and plot load curves |
| outages | load and plot outages data |
| production | load and plot production curves |
| weather | load and plot weather data |
| multiplots | plot data from multiple sources |
| _scripts | All the scripts to run and obtain the visualizations |

**Tableau 2 – Organization of the modules**

### III.2 Parameters of the scripts

| Variable name | Type | Possible values | Purpose |
|---|---|---|---|
| close | bool | True; False | Close the figure after saving |
| company_outages | None or string | any company that publishes | - |
| contract_delivery_begin_year | int | 2018; ... | - |
| contract_delivery_period_index | int | depends on the selected contract_product | - |
| contract_product | string | "M"; "Q"; ... | - |
| contract_profile | string | "BASE"; "PEAK" ... | - |
| data_source_auctions | string | "ENTSOE" | - |
| data_source_load | string | "eCO2mix"; "ENTSOE" | - |
| data_source_outages | string | "ENTSOE"; "RTE" | - |
| data_source_production | string | "eCO2mix"; "ENTSOE"; "RTE". | - |
| data_source_weather | string | "MétéoFrance" | - |
| date_max | None or string | localized pd.Timestamp | Right xlim of the plot |
| date_min | None or string | localized pd.Timestamp | Left xlim of the plot |

| diff_init | bool | True; False | Plot the differences between pairs of dates |
|---|---|---|---|
| figsize | (int,int) | (8,6) | Figure size |
| folder_out | path | global_var.path_plots | Plots output |
| load_nature | string | "load forecast D-1 (GW)"; "load forecast D-0 (GW)"; "load (GW)" | - |
| map_code | string | "FR"; ... | - |
| map_code_auctions | list of strings | ["FR", "GB", "BE"...] | - |
| production_nature | string | "production (GW)" | - |
| production_source | None or string | "biomass"; "solar"; ... | - |
| publication_dt_extrapolate | list of localized pd.Timestamp | - | Availability plotted as seen from these dates |
| publication_dt_max | None or localized pd.Timestamp | - | - |
| publication_dt_min | None or localized pd.Timestamp | - | - |
| smoother | string or pd.Timedelta | "basic"; | For aesthetic purposes |
| unit_name | None or string | any production unit | - |
| weather_nature | string | "observation" | - |
| weather_quantity | string | "nebulosity (%)"; "temperature (°C)"; "wind_speed m/s)" | - |

**Tableau 3 – Parameters of the scripts**

## IV. PROPOSED VISUALIZATIONS

### IV.1 Auctions
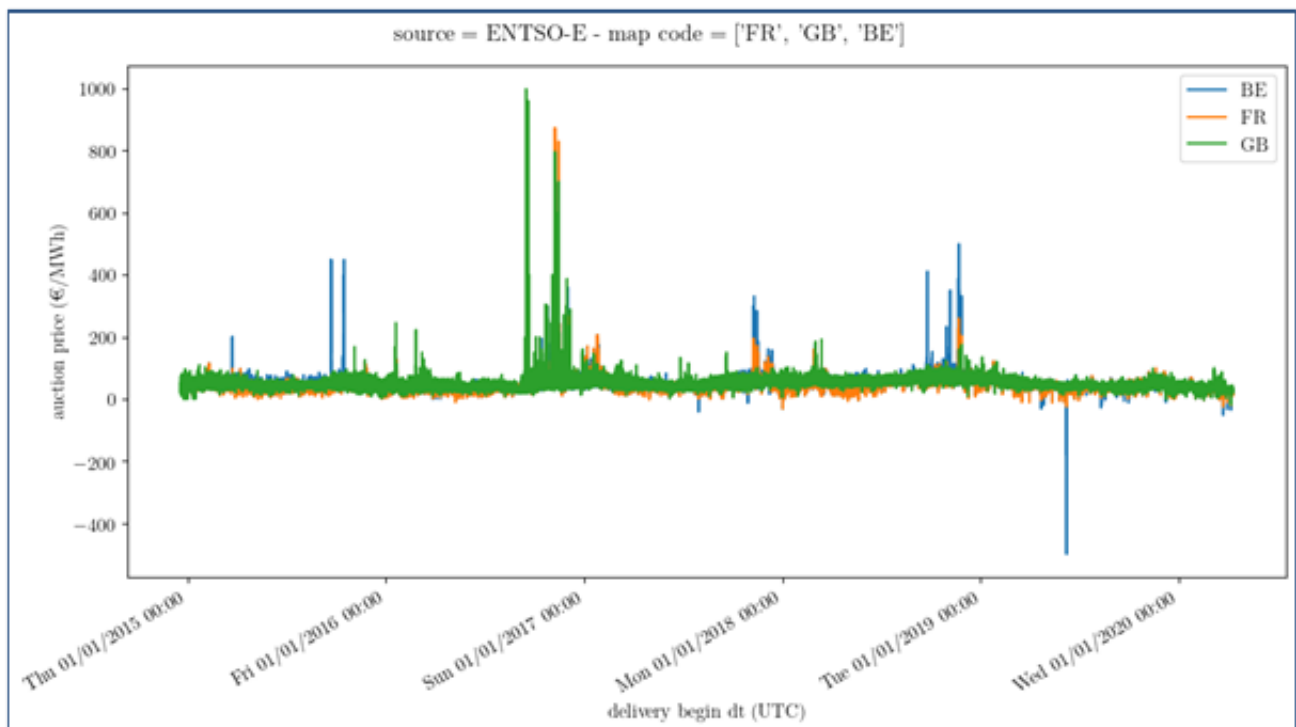
IV.1.1./_scripts/auctions/main_price.py



**Figure 1 - Fixing prices of day-ahead auctions**

## IV.2 Load

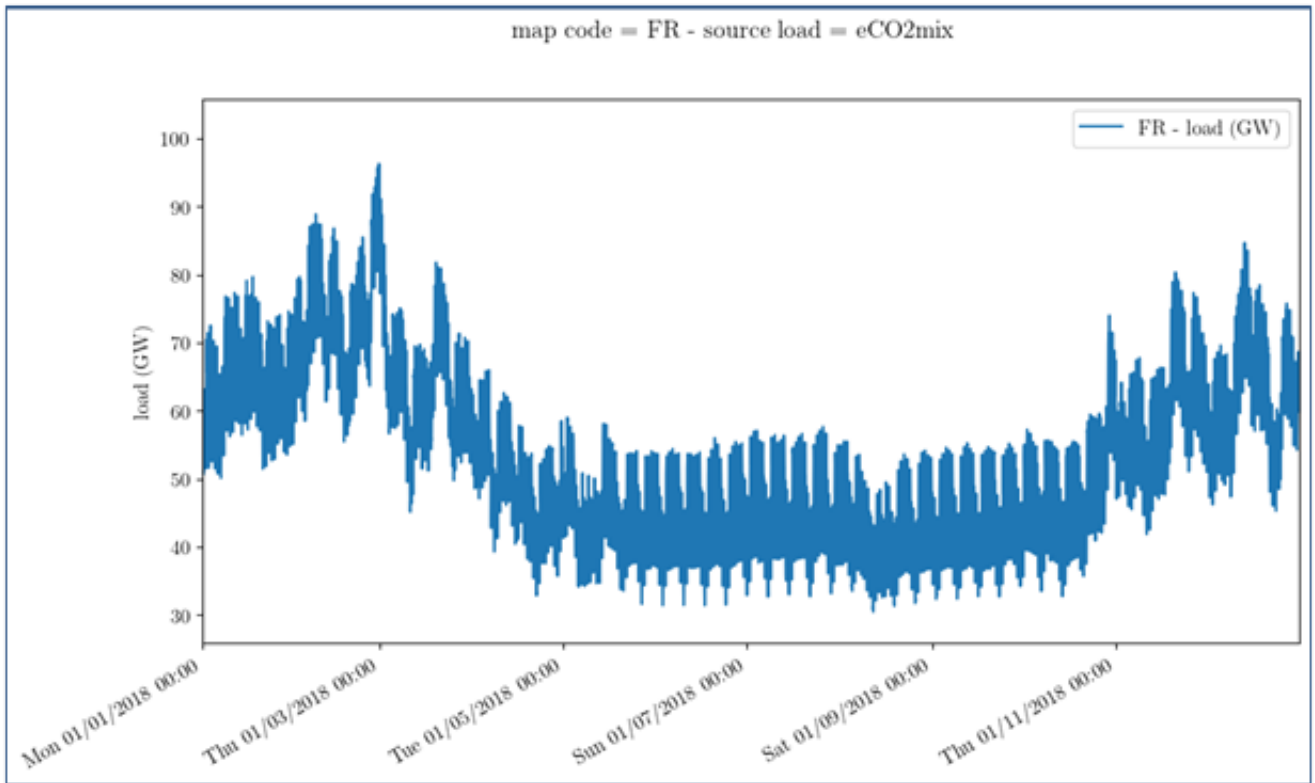### IV.2.1. /_scripts/load/main_power.py



**Figure 2 - National load**

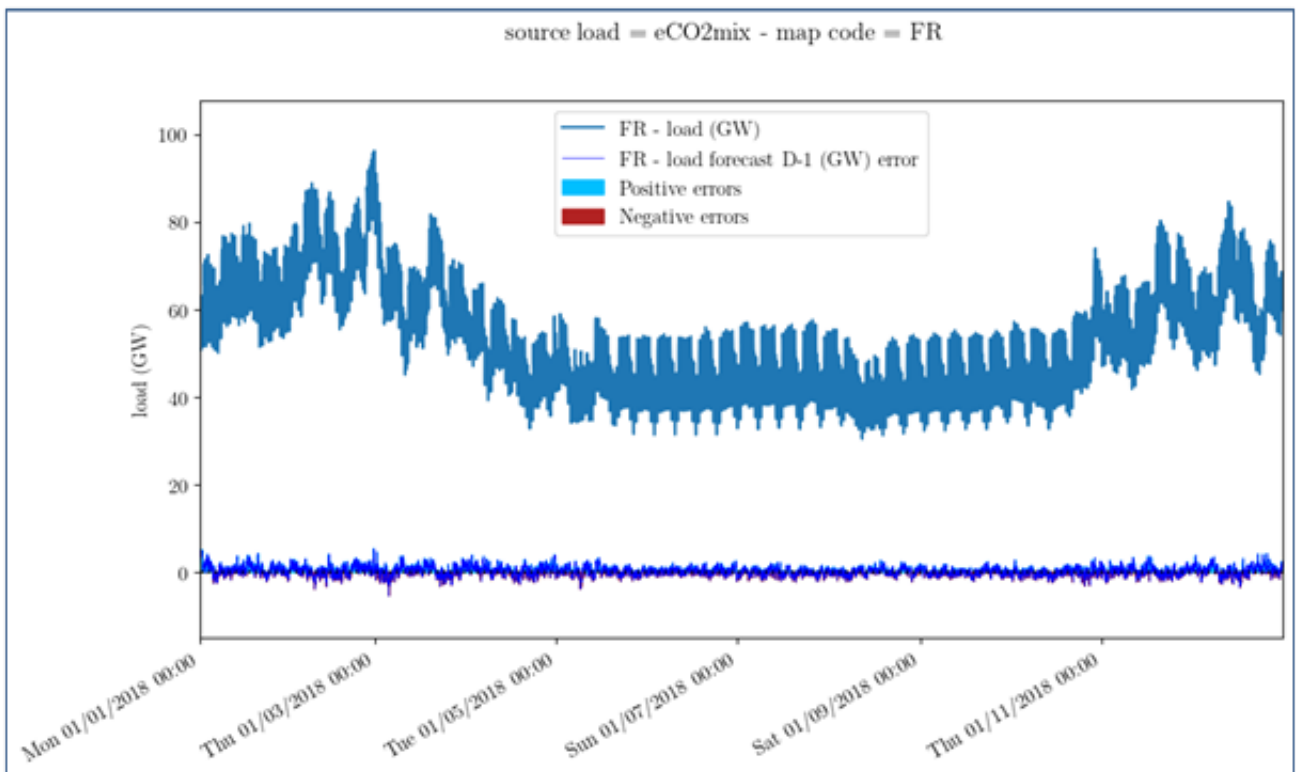### IV.2.2. /_scripts/load/main_forecasting_error.py



**Figure 3 - National load forecasting error**

## IV.3 Outages

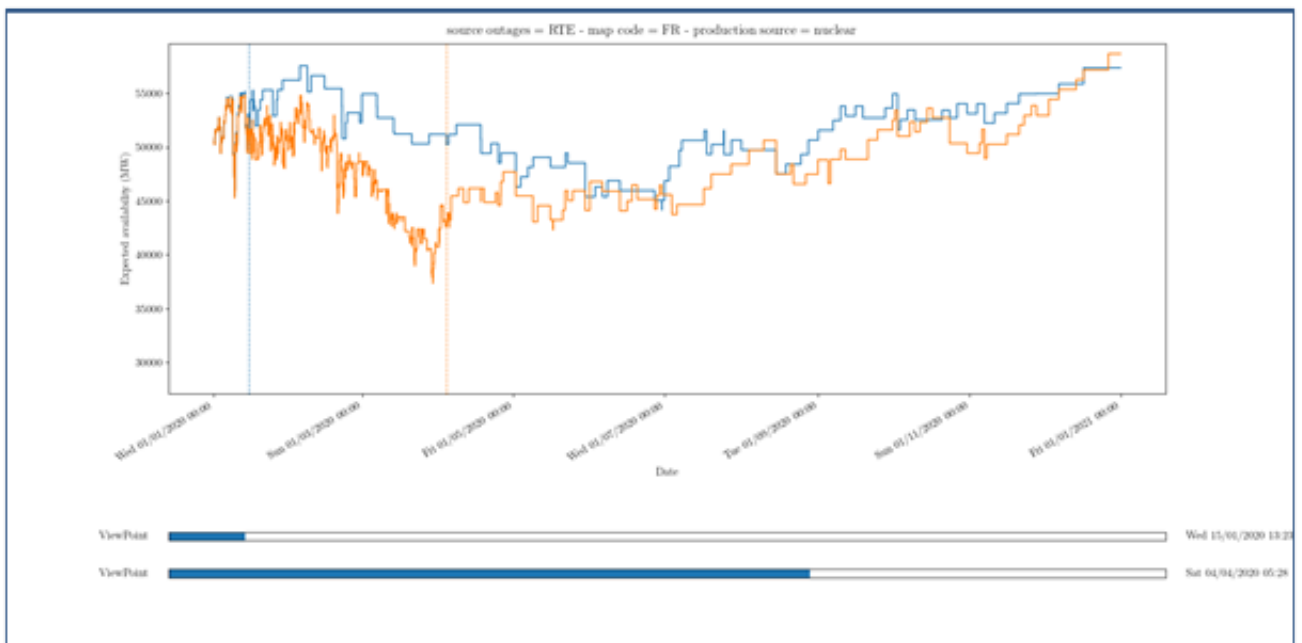### IV.3.1. ./_scripts/outages/main_animated_availability.py



**Figure 4 - Animated view of the availability**

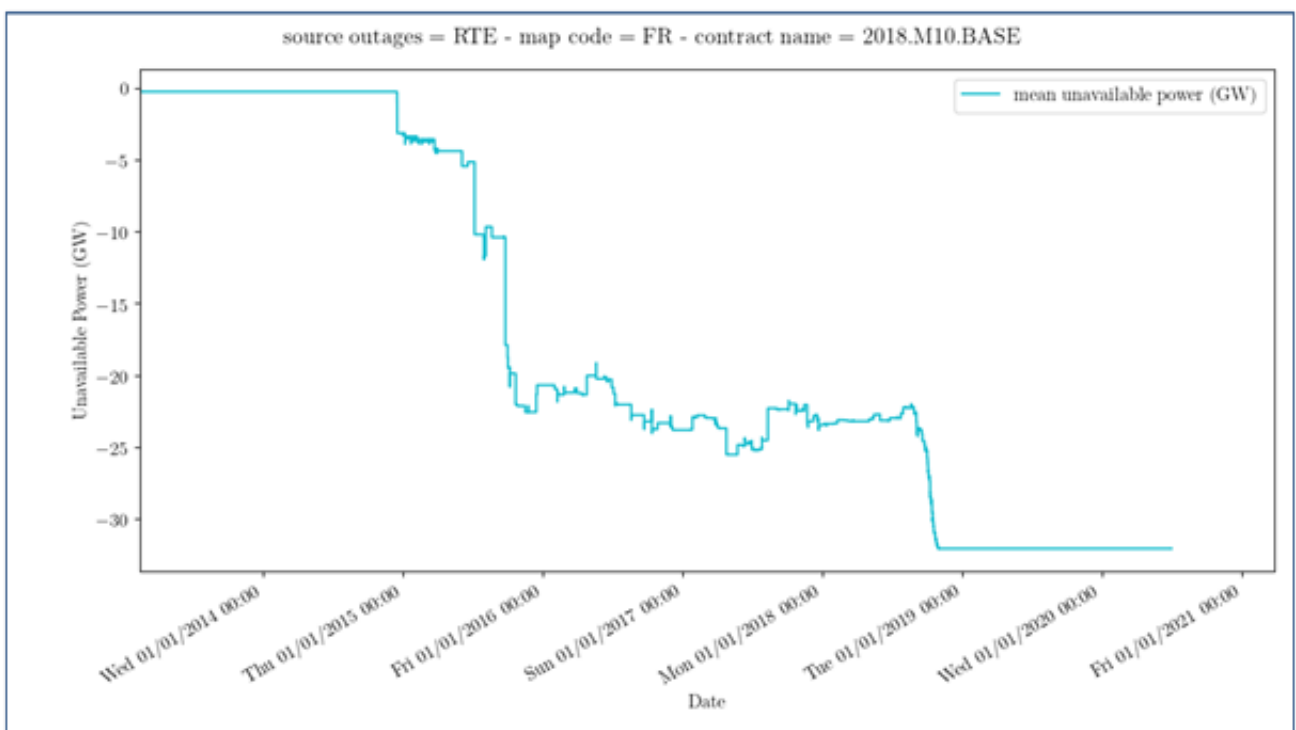### IV.3.1 ./_scripts/outages/main_evolution_mean_availability.py



**Figure 5 - Mean unavailability during the delivery of a given contract**

### IV.3.1 ./_scripts/outages/main_expected_program.py
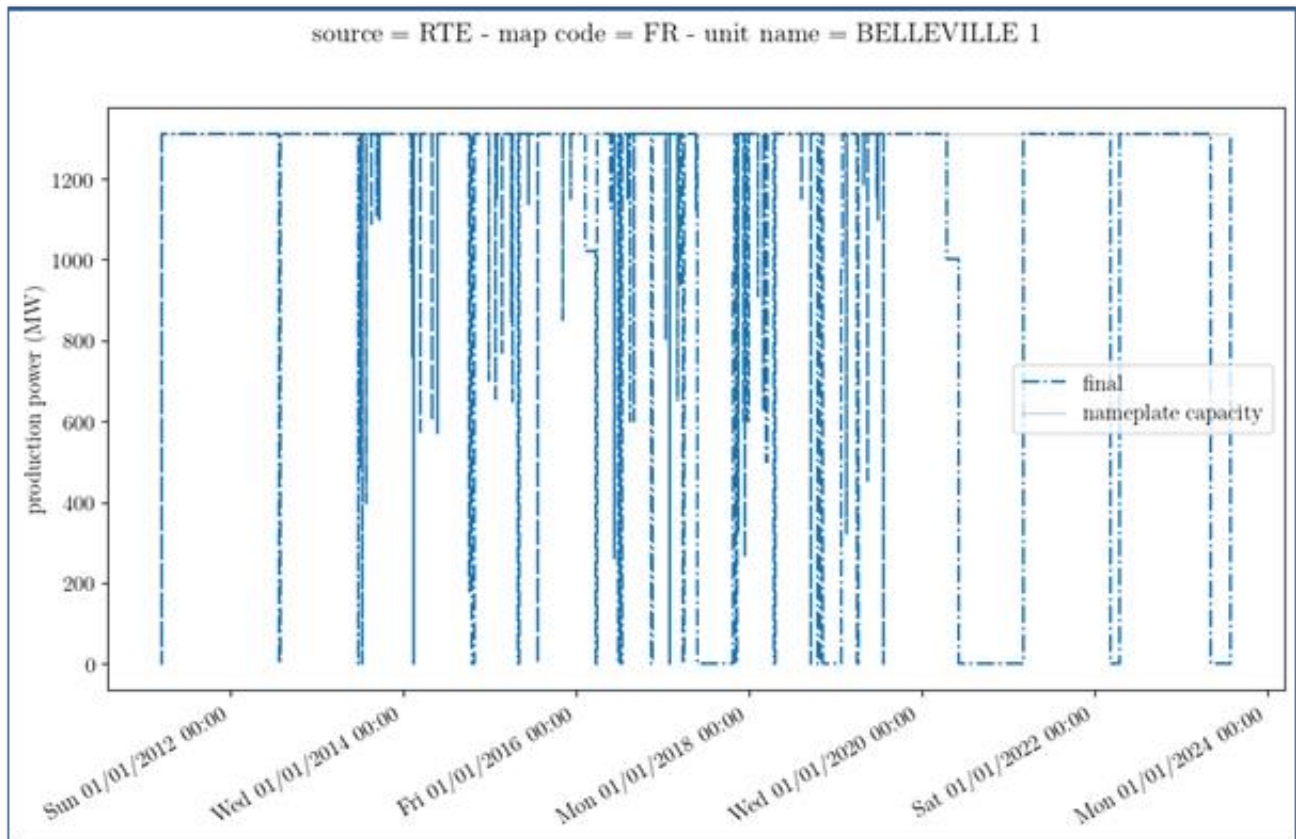


**Figure 6 - Expected availability program of a given unit**

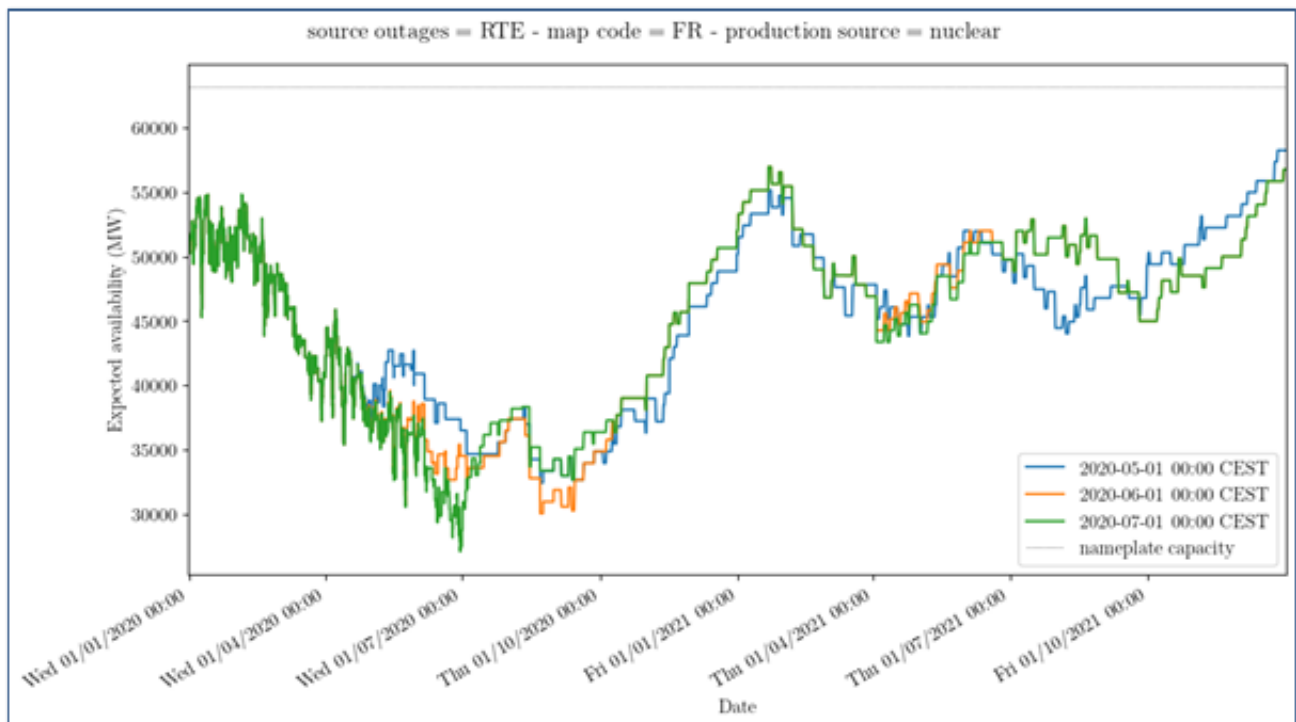### IV.3.1 ./_scripts/outages/main_incremental_program.py



**Figure 7 - Planned unavailability at different dates**

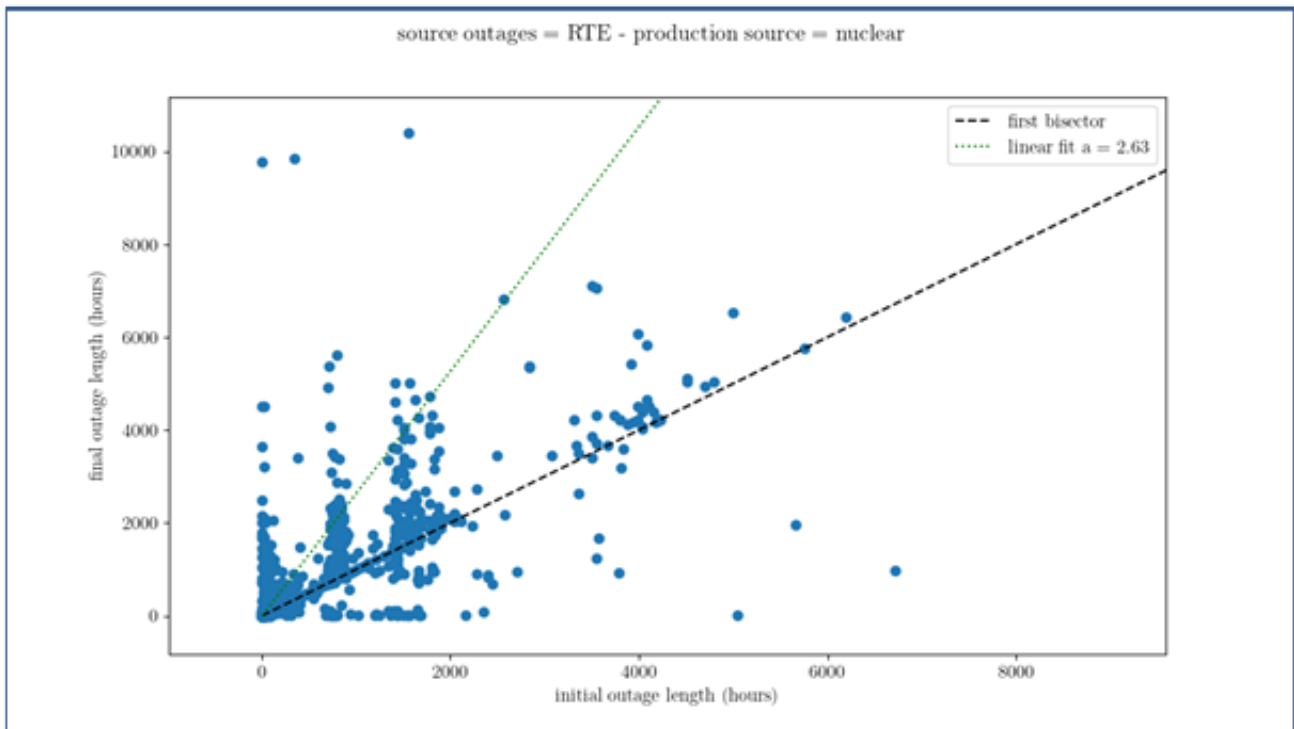### IV.3.1 ./_scripts/outages/ main_regression_delays.py



**Figure 8 - Linear fit between observed and announced unavailabilities. The coefficient being obtained with the minimization of a squared error, outliers have a large effect.**

## IV.4 Production

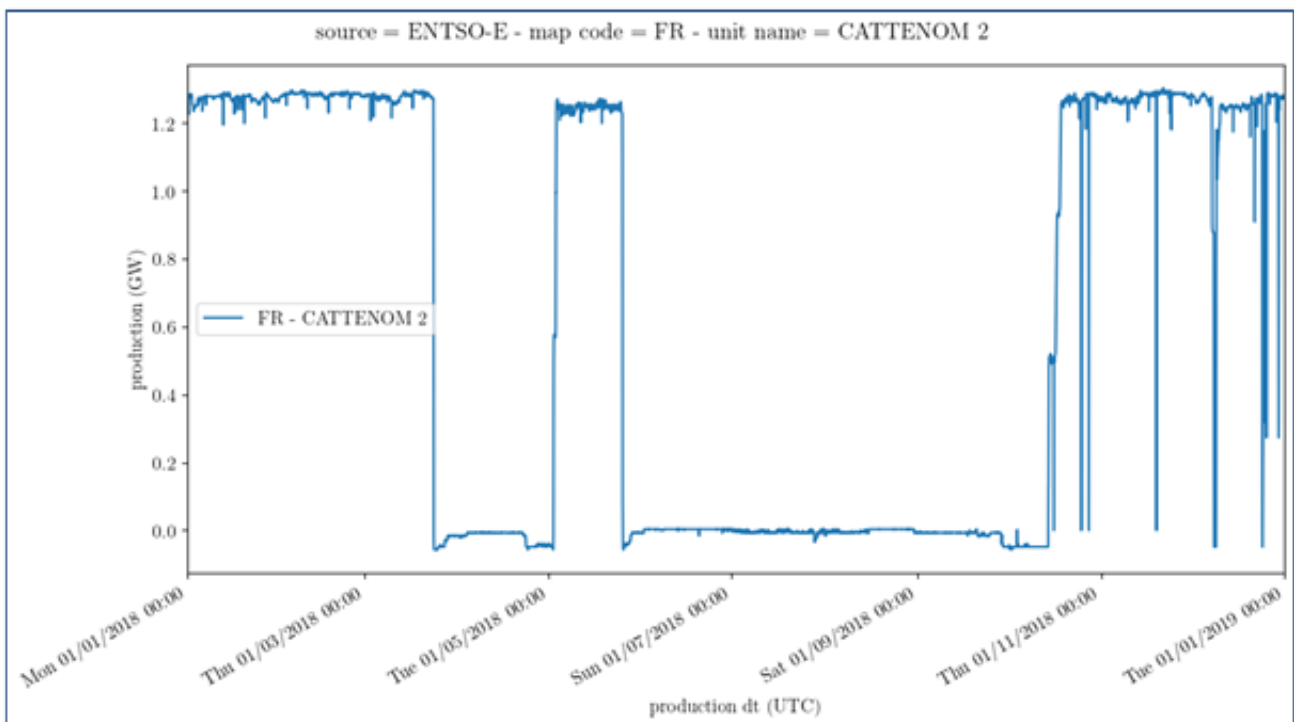### IV.4.1./_scripts/production/main_power.py



**Figure 9 - Production of a given unit**

## IV.1    Weather
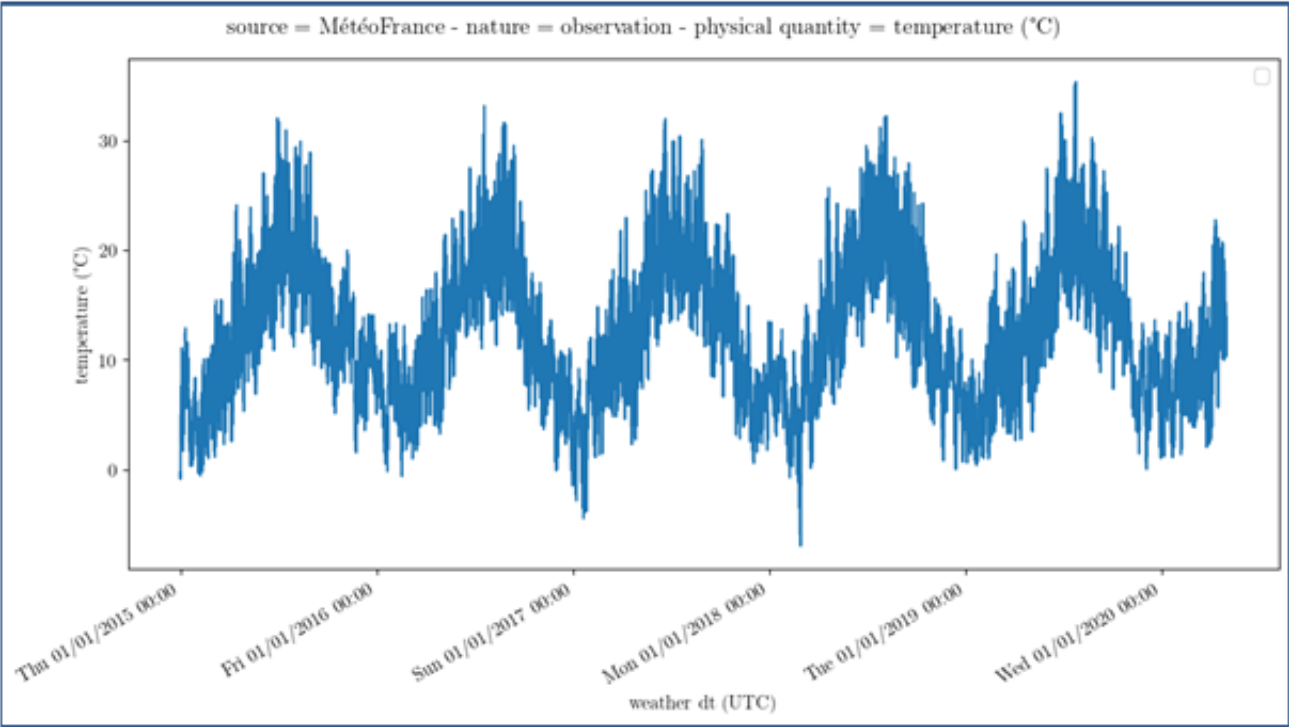
### IV.1.1./_scripts/weather/main_curve.py



**Figure 10 - National mean temperature**

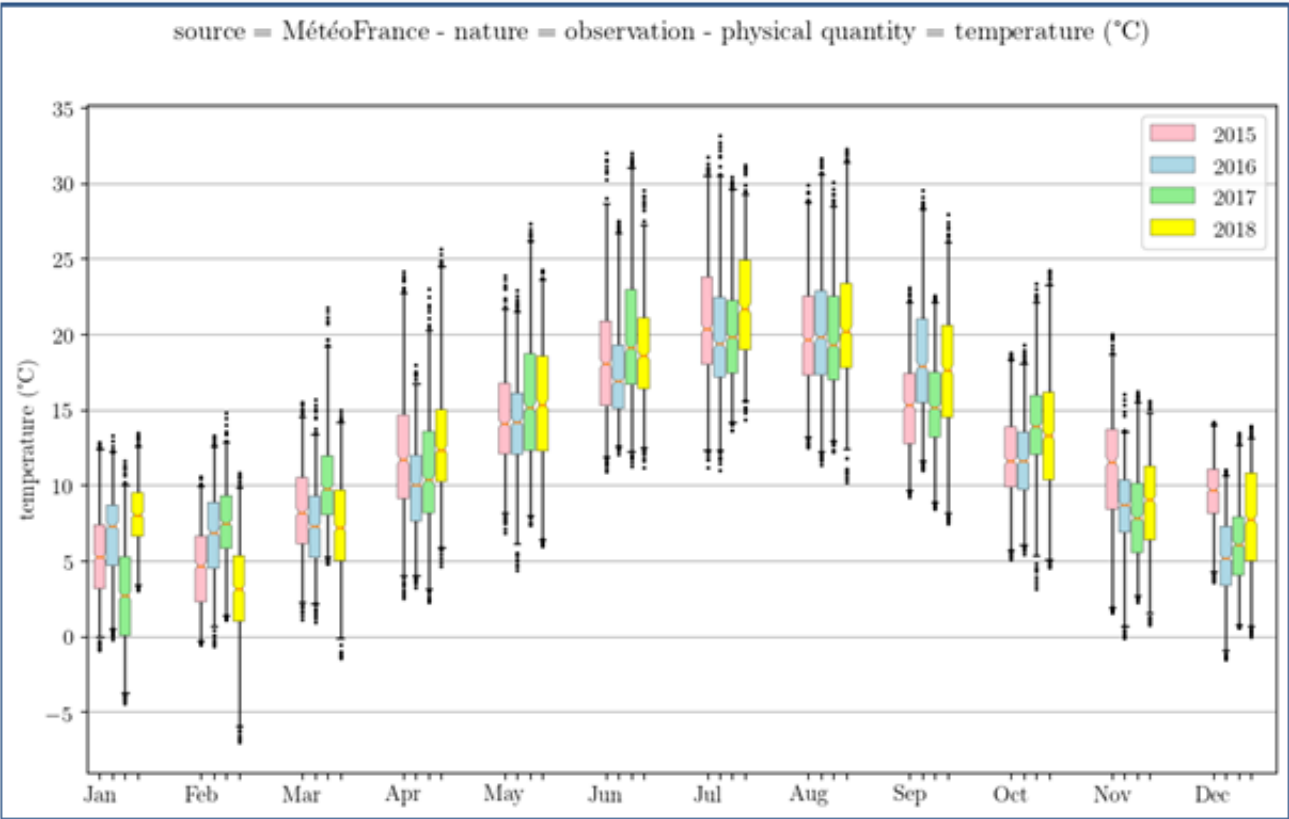### IV.1.1   ./_scripts/weather/main_distribution.py



**Figure 11 - Monthly distributions of mean temperatures**

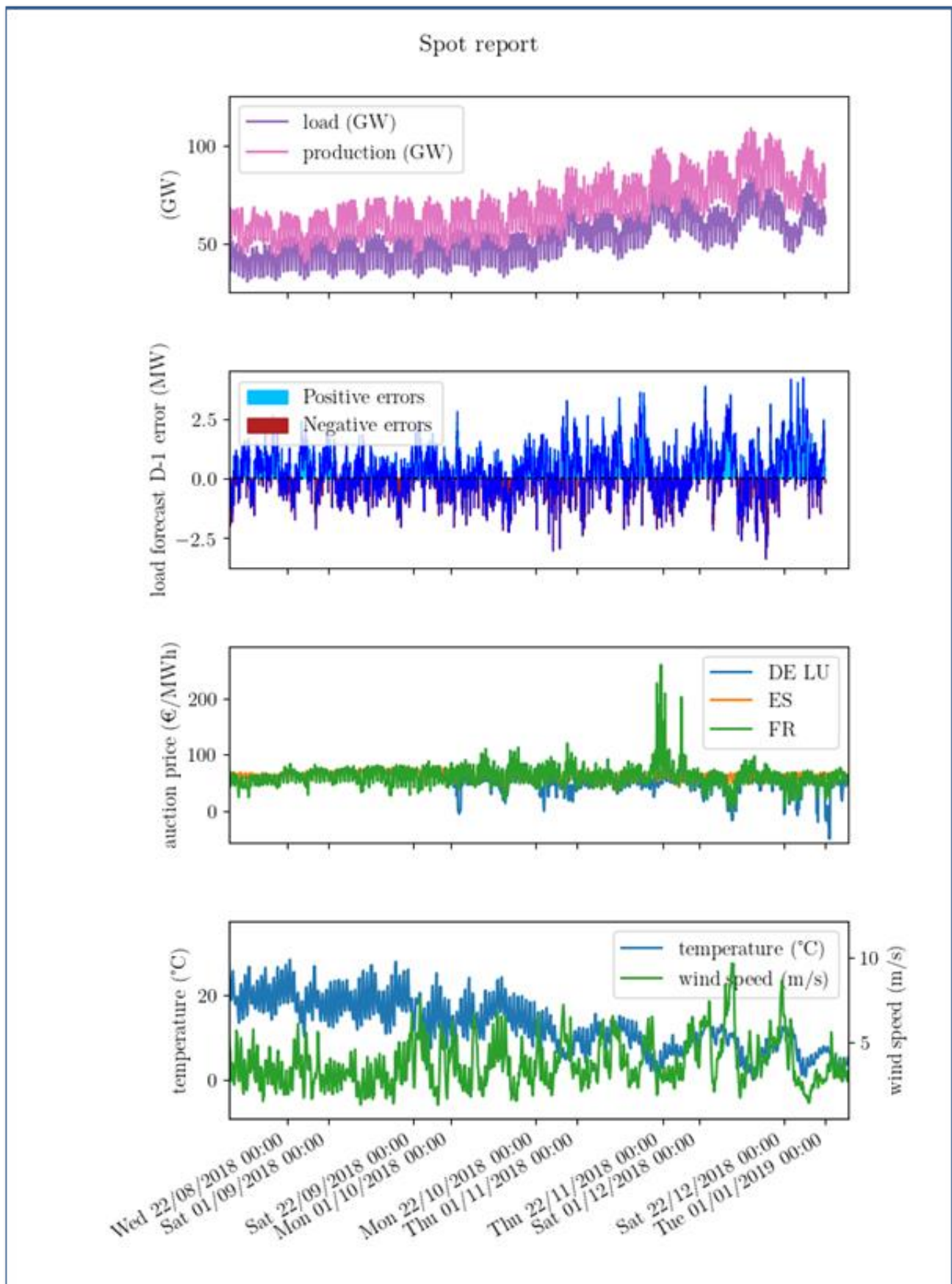## IV.1    Multiplots

### IV.1.1./_scripts/multiplots/main_spot_report.py



**Figure 12 - Spot report**

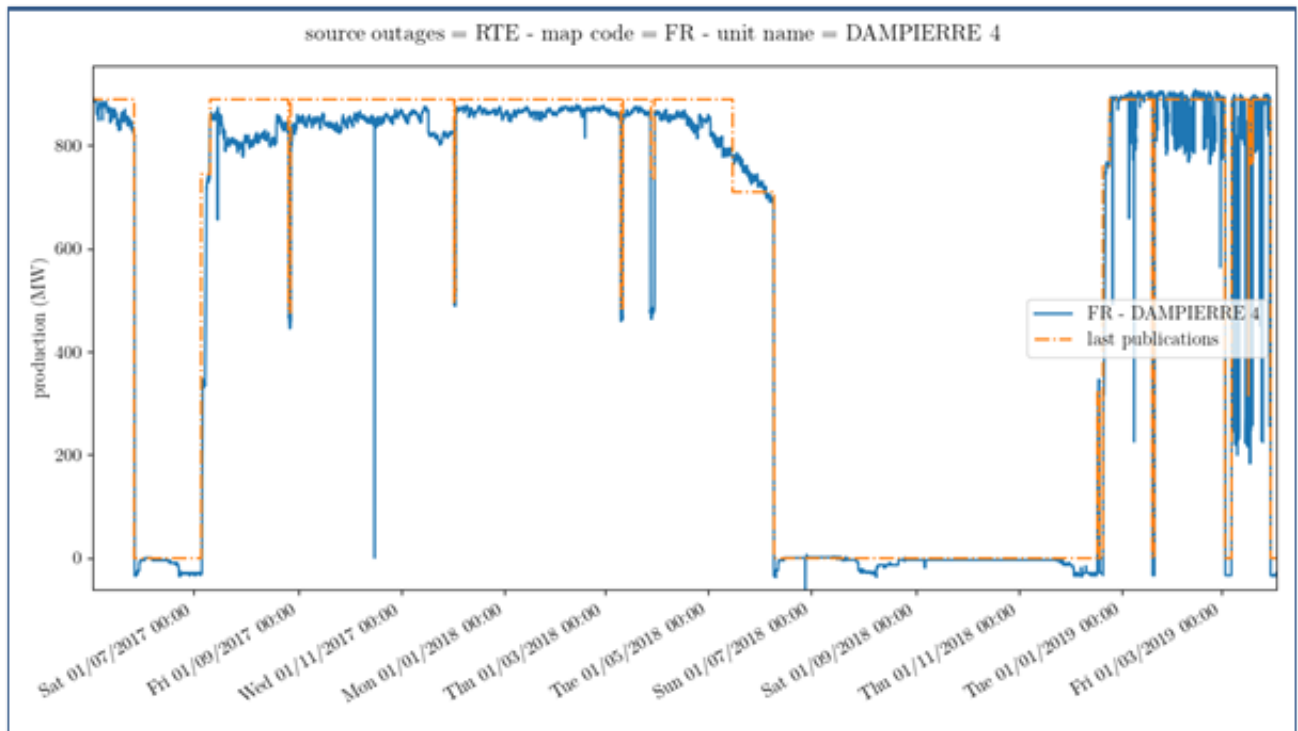IV.1.2.`/_scripts/multiplots/main_transparent_production.py`



**Figure 13 - Announced and observed production powers of a given unit**