SAE « Description et Prévision de séries temporelles »
Fiche Mission

The **U.S. Energy Information Administration** (**EIA**) is a principal agency of the U.S. Federal Statistical System responsible for collecting, analyzing, and disseminating energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment. EIA programs cover data on coal, petroleum, natural gas, electric, renewable and nuclear energy. EIA is part of the U.S. Department of Energy. (source Wikipedia)

Among the hundreds of time series that can be found on the IEA website, we are interested in those describing the production of electricity between 2001 and 2022 (i.e. 22 full years of observation). These are monthly data broken down by type of electricity production: coal, petroleum liquids, petroleum coke, natural gas, other gases, nuclear, conventional hydroelectric, wind, utility-scale solar, geothermal, biomass. For all these times series, the unit is: thousand megawatt/hours.

As a member of the team of statisticians analyzing these data, you will be assigned one of these time series. You will need to:

- Show the trend of the series, using a filter of moving averages and the regression curve of the annual averages.
- Calculate and plot seasonal coefficients; give the decomposition of the series.
- Plot and comment the seasonally adjusted series; plot and comment the boxplots of the residuals.
- Make a forecast of electricity production for the year 2023, using three different methods.
- Redo the three forecasting methods for the year 2022, using data from 2001 to 2021. Calculate the mean square error of forecasting for each of these three methods.

You will have to give a synthetic report (about 10 pages) including an introduction and a conclusion. All graphs and indicators must be commented. The report must be submitted in French, with a summary in English at the end of the document.