

Topic: Renewable growth analysis and visualization

Background

The mitigation of dangerous climate change and meeting the climate targets under the Paris agreement will require rapid decarbonisation of energy systems. A transition to cleaner power is already underway across Europe, led by deployment of wind and solar power. But are these technologies growing fast enough? Is their growth consistent with climate targets? Do current policy efforts, particularly following the Russo-Ukrainian war, mean an acceleration of growth?

In order to answer these questions, it is important to measure how fast the use of these technologies is expanding in different European countries and evaluate whether this pace is going to be sufficient to meet various targets such as the recent REPowerEU initiative to increase the EU's 2030 target for renewables from the current 40% to 45%.

Project description

The project focuses on analysing the growth of solar and wind power in various countries in Europe. The students will use a set of mathematical growth models to empirically measure the speed and dynamics of renewables growth in order to determine how fast these technologies have grown historically and how far along the technological adoption curve they are currently. As a result of the project they will be able to update the [POLET renewables deployment visualisation tool](#).

As a second step, the project will compare the trajectories based on the growth models with REPowerEU targets for renewable electricity. Will the targets be met if all countries stay on their existing trajectories? What would need to realistically happen and in which countries for the REPowerEU targets to be met?

Additionally, students may focus on adding features to the visualisation tool and/or analysing how the addition of newer data affects previous estimates of the deployment speed.

The group members will have a chance to learn about the growth of solar and wind power, global diffusion of renewable technologies, EU renewable targets, as well as data processing and visualisation techniques.

Methods

Through the project, students will learn to locate, update, process, analyse, and visualise quantitative data. They will use existing R scripts to fit various growth models (e.g. logistic and Gompertz models) to time-series of wind and solar use data and determine the main growth parameters such as the maximum growth rate and the current growth stage (whether the growth is accelerating, stable, or close to the saturation level). These parameters will be subsequently used to update the [POLET renewables deployment visualisation tool](#). Students will also retrieve the REPowerEU targets for renewable

electricity and quantitatively analyse how fast renewables would need to grow in different European countries for the targets to be met.

Students may further contribute to improving the visualisation tool by building additional features using the Shiny R package.

Target group

The target group are the Global Systems students, TKGBS. In general, familiarity with programming is expected. Practical experience with the R statistical programming environment is desirable, given that the curve-fitting code and visualisation tool are both built with it. It is also expected that the students will be sharing their programming knowledge and skills with other group members. Students are expected to be proficient in English as it will be the language of supervision.

This project is appropriate for 1 group of 4-6 students.

Supervisors and contacts

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