

PROJECT TITLE: Predict + optimize for renewable energy scheduling to tackle climate change

Project Supervisor:

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Project keywords:

Climate change, smart grid, energy forecasting, optimization

Proposed start date: 1 July 2022

Project description

One of the most important challenges to tackle climate change is the decarbonisation of energy production with the use of renewable energy sources such as wind and solar. A challenge here is that renewable energy cannot be produced on demand, but the production depends literally on when the wind blows and when the sun shines, which is usually not when demand for electricity is highest. Storing energy is costly and normally associated with loss of energy. Thus, with having more and more renewable energy in the grid, it becomes increasingly important to forecast accurately both the energy demand and the energy production from renewables, to be able to produce power from on-demand-sources (e.g., gas plants) if needed, to shed loads and schedule demand to certain times where possible, and to optimally schedule energy storage solutions such as batteries. A nowadays common setup is a rooftop solar installation and a battery, together with certain demand flexibilities. In this project, we need to forecast the electricity demand, the renewable energy production, and the wholesale electricity price, to be able to schedule the charging and discharging of the battery, and to schedule the schedulable parts of the demand (when to put the washing machine, when to use the pool pump, etc.) then optimally. In this way, we can charge the battery with overproduction of solar energy and use power from the battery instead of power from the grid when energy prices are highest, as well as schedule demand according to energy availability.

Work schedule:

5-7 weeks: desk work at home (with up to 2 weeks: desk work at university)

1 week: report, presentation or poster

Candidate requirements

The student is required to have a strong programming skill and a background in statistics, machine learning, electrical engineering, physics, or related areas.