Supporting the implementation of long-term energy system models: towards a Typical Energy Year approach

Master thesis proposal at the Marine Offshore Renewable Energy Lab Department of Mechanical and Aerospace Engineering Politecnico di Torino

---

Recommended profile:
Electric Engineering, Energy Engineering, Mechanical Engineering

Topics involved:
Energy system modelling, Python programming

Contact references:
PhD student - Caterina Carà (caterina.cara@polito.it)
MOREnergy Lab Supervisor - Giuliana Mattiazzo (giuliana.mattiazzo@polito.it)

Proposal description

Multi-year energy system models are generally used to study the medium- to long-term transition to a clean and affordable energy supply. Nevertheless, time-series of power demand and renewable energy sources are generally maintained constant along the years, despite their considerable variation in real world. In this view, some approaches have been proposed to make use of the consolidated "Typical Meteorological Year", which consists in the study of time-series over several past years and to the identification of representative months. However, such approach exclusively takes into account meteorological time-series. The thesis work aims to study the state-of-the-art of the above mentioned field and develop a new methodology for the identification of a "Typical Energy Year", capable of highlighting the most suitable representative periods (e.g. months, weeks) taking into account the productivity of renewable energy sources and the variability of power consumption. The developed methodology will be applied to the case study of the energy transition of a small italian island.