École Polytechnique Fédérale de Lausanne
Distributed Electrical Systems Laboratory
EPFL-STI-DESL-ELL, Station 11, CH-1015 Lausanne

http://desl-pwrs.epfl.ch

Student project proposal

Project title
A Carbon Content Estimation Framework for EPFL's Grid Electricity Imports

Project type ☐ MSc thesis ☐ BA semester project ☒ MSc semester project

Project responsible and e-mail
Enea Figini – enea.figini@epfl.ch

Project description
This project aims to create a framework for estimating the carbon content of electricity imported by EPFL. By merging public electricity market data with local factors, the framework will provide accurate carbon footprint estimates. This effort contributes to EPFL's sustainability goals and informed energy decision-making.

Tasks of the student

- Data Integration and Analysis:
  Gather, analyze public electricity data to understand EPFL's electricity sources and carbon content.
- Local Factors Incorporation:
  Identify local factors impacting carbon content, integrating EPFL's context into the estimation framework.
- Framework Development and Testing:
  Design and validate a framework using public and private data for accurate carbon content estimation of EPFL's electricity.

Requirements

- Familiarity with electricity generation methods, energy sources (renewable and non-renewable), energy markets (wholesale, ancillary services, …), grid operations and sustainability concepts.
- Proficiency in data analysis techniques, including data preprocessing, exploratory data analysis, and statistical methods for modelling and estimation.
- Proficiency in programming languages (ideally Python or Matlab), proficiency in code management using Git.

Literature

[1] Baowei Li, Yongshua Song, and Zechun Hu, "Carbon Flow Tracing Method for Assessment of Demand Side Carbon Emissions Obligation." 2013.
[2] Bo Tranberg, Olivier Corradi, Bruno Lajoie, Thomas Gibon, Iain Staffell, and Gorm Bruun Andresen, "Real-Time Carbon Accounting Method for the European Electricity Markets." 2019.
[3] Fleschutz, Markus Bohlayer, Marco Braun, Gregor Henze, and Michael D. Murphy, "The Effect of Price-Based Demand Response on Carbon Emissions in European Electricity Markets: the Importance of Adequate Carbon Prices." 2021.
[4] Imran Khan, "Greenhouse Gas Emission Accounting Approaches in Electricity Generation Systems: A Review." 2019.