



Internship: Fast and Robust Security Constrained AC Optimal Power Flow – Track machine learning

At TenneT, you will have the opportunity to carry out your graduation research in an environment where you can make a real impact. As a student intern in System Operations & Market Development team, you will work on relevant and current challenges related to AC Optimal Power Flow (OPF) calculations.

OPF calculations play an important role in facilitating efficient transport of electric power. In the simplest definition, OPF involves determining operating setpoints for controllable assets in the grid such as generators, shunts and transformers that lead to minimal operational costs while satisfying demand and operational constraints. As the electricity grid is predominantly based on Alternating Current (AC), the underlying physics of the grid is non-linear making the AC-OPF problem non-linear and possibly non-convex. Hence, solving the AC-OPF problem is non-trivial, computationally expensive and prone to divergence. Furthermore, when security constraints are imposed over time, solving the AC-OPF problem can become prohibitively slow. This stimulates the use of approximate methods that compromise on accuracy for speed.

The project involves developing a fast and robust calculation framework for solving security constrained AC-OPF problems for the Dutch transmission grid along two tracks – mathematical optimization and machine learning.

Your contribution to TenneT

This graduation project is along the machine learning track where you will:

- Review the current literature landscape on solving OPF problems using machine learning.
- Train Graph Neural Networks (GNNs) to speed up security constrained AC-OPF calculations.
- Build on an internally developed module that trains GNNs for performing AC power flow calculations.
- Design a calculation framework that is fast and robust enough to be used close to real-time grid operation.
- Investigate convergence problems.

You will be supported by the ODINA team, where you will have plenty of room to work independently and collaborate with colleagues.

Your profile and background

Your profile

- Currently enrolled in a master's program in one of the following or a related field: computing sciences, mathematics, machine learning, physics, engineering.
- Good programming skills in Python, knowledge of libraries for deep learning is a plus.
- Knowledge on power flow analysis or network calculations is helpful, but not a must.
- Interest in the energy transition is a big plus.
- Curious, eager to learn, and proactively seek contact when needed.
- Enjoy working collaboratively and are open to feedback.

Additional information

What do we offer you?

- A monthly gross internship allowance of 500 euros based on a 40-hour work week
- Travel and remote working allowance
- Hybrid working: we enjoy working together at the office, but working from home is also possible
- A laptop provided by TenneT for the duration of your internship

The position may get unpublished earlier, so don't hesitate to apply!

Our offer



We are family friendly and flexible



Health - your basis



Modern working environment



Attractive remuneration and social benefits



Personal development

Our recruiting process

In our online-application-form you can apply within only some minutes as long as this job is posted. Afterwards we screen your application and get back to you as soon as possible. Our selection process consists of one interview only.

[Optional Lead/Head: and one assessment center.]

For further questions regarding the recruiting process please contact:

[RECRUITER FIRST & LAST NAME]

People | Talent Acquisition

[RECRUITER E-MAIL]

This will be our challenge

Operate is responsible for the end-to-end operation of the Dutch electricity grid and ensures security of supply, system stability, and market facilitation in the Netherlands and across Europe. Operate makes sure the lights stay on 24 hours a day, 365 days a year. Their goal is to provide our customers tomorrow with the same reliability they enjoy today.

For questions relating to the position:

[HM or DELEGATE FIRST & LAST NAME]

[HM or DELEGATE DEPARTMENT | TEAM]

[HM or DELEGATE E-MAIL]

AI and more about TenneT

Since we use AI as part of our recruiting process, we would like to create transparency and clarity at this point. The AI serves exclusively as a supporting and recommending tool to make our processes even faster and more efficient. At no time are automated decisions made.

TenneT is a leading European grid operator. We are committed to providing a secure and reliable supply of electricity 24 hours a day, 365 days a year, while helping to drive the energy transition in our pursuit of a brighter energy future – more sustainable, reliable and affordable than ever before. In our role as the first cross-border Transmission System Operator (TSO) we design, build, maintain and operate over 25,000 kilometres of high-voltage electricity grid in the Netherlands and large parts of Germany, and facilitate the European energy market through our 17 interconnectors to neighbouring countries. We are one of the largest investors in national and international onshore and offshore electricity grids, with a turnover of EUR 9.2 billion and a total asset value of EUR 45 billion. Every day our 8,300 employees take ownership, show courage and make and maintain connections to ensure that the supply and demand of electricity is balanced for over 43 million people.

Lighting the way ahead together

<https://careers.tennet.eu/careers/JobDetail/114795>