Building decentralized, distributed and local micro-grids for decarbonization electrification challenge (IDEAL4GREEN)

The objective of the MSCA Doctoral Networks 2023 IDEAL4GREEN project aims at pioneering decentralized energy solutions to meet global decarbonization targets through innovative microgrid technologies. The IDEAL4GREEN project addresses the urgent challenges of climate change and the global shift towards sustainable energy systems. It focuses on developing and integrating microgrids, which are crucial in managing the variability of renewable resources and achieving decarbonization targets,

The National Technical University of Athens, founded in 1837, is Greece's oldest technical university and a leader in engineering, architecture, and applied sciences. Renowned for academic rigor and innovative research, NTUA has significantly influenced Greece's economic and industrial development. Its Electric Power Division focuses on electric power engineering, offering courses, laboratory work, and research in renewable energy, high-voltage systems, and energy planning. This Division operates flexibly, uniting four autonomous laboratories to drive advancements in electric power education and research.

PROTASIS Engineering & Consulting S.A., founded in Athens in 2002, specializes in power systems consulting and system integration for protection, control, monitoring, and automation. With expertise in renewable energy integration, microgrids, smart metering, e-mobility, and cybersecurity, PROTASIS delivers innovative engineering solutions, adhering to international quality and sustainability standards.

NTUA will hire one Doctoral Candidate to on the project: “Building decentralized, Distributed and Local micro-grids for Decarbonization Electrification challenge” (IDEAL4GREEN), offering a training program that covers various aspects, such as advanced technical skills and collaborative communication, critical thinking, problem-solving, and adaptability. The doctoral candidate will work to develop his/her doctoral thesis in a partner institution. The topic below is for NTUA in collaboration with Protasis S.A.

Doctoral Candidate 10 (DC 10) Topic: Developing novel control strategies ensuring cybersecurity

Objectives: Development of advanced control methods, such as data-driven and model-agnostic approaches. Evaluating cooperative strategies in microgrids and multi-microgrids is crucial. Exploring a unified control that combines hierarchical layers in microgrids using decentralised techniques improving microgrid performance. Further research is also needed on challenges from cyber-attacks and developing preventive measures based on the threat.

Specific objectives:

1. To develop an advanced hierarchical control mechanism that ensures reliable and balanced energy distribution within the microgrid by orchestrating the interactions between primary, secondary and tertiary control levels to enhance stability and optimise energy flow.

2. To formulate and validate resilient strategies that enable the microgrid to quickly adapt and recover from various disruptions, such as grid failures and cyber-attacks, and ensure the continuity of critical functions and services under adverse conditions.

3. To establish and validate robust cybersecurity protocols and mechanisms to effectively protect microgrid systems from potential cyber threats.

4. The implementation of strategic hierarchical control techniques that take into account complex aspects such as energy efficiency, load balancing and renewable energy integration, maintaining reliability and resilience standards.

Responsibilities

The Doctoral Candidates will actively participate in comprehensive training programs aimed at enhancing both technical and transferable skills. This includes workshops, seminars, and conferences that cover areas such as advanced control systems, resilience strategies, and economic planning for microgrids. Additionally, each Doctoral Candidate will collaborate closely with industry partners through 18-month secondments, where they will apply their research in real-world industrial settings, gaining hands-on experience and refining practical solutions for energy systems. The Doctoral Candidates will also contribute to project reporting, provide regular updates on their research progress, and ensure project milestones are met. Their findings will be communicated and disseminated, e.g. through presentations at international conferences and contributions to peer-reviewed publications.

Required qualifications and experience

- **Education:** Master's degree or equivalent in the areas of studies such as engineering, energy, and electronics that permits the access to the doctoral studies.
- **Excellent academic records**
- **Professional experience:** valuable professional experience
- Strong ability to manage multiple duties simultaneously, prioritizing tasks and meeting deadlines

- Experience in preparing technical reports and presentations on energy matters
- Good communication and interpersonal skills
- Excellent knowledge of written and spoken English (Level C1-Advanced), preferable knowledge of other languages, such as Greek
- Very good working knowledge of computer programming languages such as MATLAB, Simulink, C++, Python, etc.
- Familiarization with Real Time simulation techniques, experience in RTDS/OPAL RT highly desirable
- Familiarization with ML/AI techniques highly desirable?
- Familiarization with Control and Optimization Techniques highly desirable.
- Familiarization with cybersecurity in Operational Technology (OT) networks highly desirable.

Information about the project

The objective of the MSCA Doctoral Networks 2025 IDEAL4GREEN-project aims at pioneering decentralized energy solutions to meet global decarbonization targets through innovative microgrid technologies.

- The IDEAL4GREEN -project addresses the urgent challenges of climate change and the global shift towards sustainable energy systems. It focuses on developing and integrating microgrids, which are crucial in managing the variability of renewable resources and achieving decarbonization targets. The project aligns with the EC's commitment to carbon neutrality by 2050 by empowering energy communities and optimizing local supply and demand. The project proposes a comprehensive doctoral training network aimed at developing skilled engineers with interdisciplinary and intersectoral expertise. This network diverges from conventional university-based research, maintaining strong industry links and emphasizing practical implementation. IDEAL4GREEN consists of 8 beneficiaries and 11 partner organizations, recruiting 15 Doctoral Candidates (DCs) to undertake research on microgrids' planning, design, operation, control, and impact assessment.
- The research encompasses innovative frameworks and methodologies for integrating microgrids and transforming traditional grids into sustainable energy systems. The Doctoral Candidates will engage in a mix of academic and industrial experiences, including secondments and networking meetings, ensuring their exposure to both theoretical knowledge and practical skills.

Contract conditions for each partner institution

Employment type: Full-time
Project office location: Athens Greece
Contract duration: 3 years
Information: Dr Aris Dimeas adimeas@power.ece.ntua.gr

This is a fixed term position for **3 years with a start date at the beginning of September 2025**. **Applicants should not have resided in Greece for more than 12 months in the 36 months prior to the recruitment date**.

Please forward your application until **30/04/2025,** to **NTUA** to the email: adimeas@power.ece.ntua.gr including the following information:

1. CV in the English language
2. Motivation letter
3. Degree certificates
4. Training certificates
5. Reference letters (minimum 2 letters)
6. Applicants should not have resided in Greece for more than 12 months in the 36 months prior to the recruitment date

Due to the large volume of applicants, we can only contact short-listed candidates for interviews. In addition, short-listed candidates will be asked to bring certified copies of their diplomas and work certificates.

The National Technical University of Athens is an equal opportunity employer and welcomes applications from all interested groups without any discrimination of age, race, nationality, or gender!