POLITECNICO DI MILANO

PhD in INGEGNERIA GESTIONALE / MANAGEMENT ENGINEERING - 41st cycle

THEMATIC Research Field: DECISION-MAKING UNDER UNCERTAINTY FOR THE ENERGY TRANSITION

Monthly net income of PhDscholarship (max 36 months)
1600.0 In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	Geopolitical and socio-economic uncertainties are putting the European and Global energy transitions at risk. These deep uncertainties affect the analytical assessments underpinning energy and climate policies. For example, the models used to inform energy planning rely on uncertain forecasts and assumptions for future energy demands, macroeconomic indicators, social acceptance, fuel prices, technology costs, and climate scenarios. Due to fundamental methodological, computational, and data challenges, this uncertainty is at best rarely considered in energy planning, which increases the risk of failing to meet urgent climate targets. This makes accounting for uncertainty one of the major unsolved problems in energy planning. The ERC-funded project UNITES contributes to addressing these limitations to enable a new paradigm for long-term energy planning. In contrast to current approaches, UNITES' ambition is a systematic integration of uncertainty in energy-climate models to enable a robust and timely energy transition. The project will result in three fundamental contributions: (i) theoretical developments to consider different types of uncertainty in energy planning models; (ii) data to quantify and characterize input uncertainties; (iii) AI methods to streamline the complex outputs of uncertainty studies into interpretable policy decisions.
Methods and techniques that will be	This highly interdisciplinary project leverages methods

developed and used to carry out the research	This highly interdisciplinary project leverages methods from energy modeling, operations research and decision support. The goal is developing novel methods for modeling, optimization under uncertainty and decision-making for energy systems planning. More specifically, the project activities include (i) developing cutting-edge optimization and AI methods to consider uncertainty in energy system models; (ii) characterizing and accounting for the uncertainty associated with the planning of future energy systems using Bayesian statistics methods; (iii) modelling and assessing the impact of uncertainty in the European energy transition, with unique opportunities for outreach and impact. Additionally, the project will involve the assessment of the environmental impact of the energy transition using life cycle assessment, and the impact of social acceptance.
Educational objectives	The main educational objectives of the research project are the following: - Develop the ability to perform original and independent research (research idea definition, literature review, methodology development, results analysis and presentation, scientific writing). - Gain experience with the development of optimization models and their application to energy systems planning; machine learning and AI methods; knowledge of energy technologies. - Learn to support decision-makers in the energy transition; - Enhance interdisciplinary competencies by integrating energy modeling, operations research, data analysis, and decision support methods.
Job opportunities	The opportunities for a PhD graduate in this research area are: •Academic positions in energy systems, modeling, data science and operations research; •Energy modelers in energy utilities, TSOs, energy consulting firms; •Policy advisors in public agencies, regulators, and

	international organizations (e.g., International Energy Agency, European Commission); •Sustainability / Climate Neutrality Leaders in large corporations.
Composition of the research group	0 Full Professors 1 Associated Professors 0 Assistant Professors 0 PhD Students
Name of the research directors	Stefano Moret

Contacts
stefano.moret@polimi.it; moret.stefano@gmail.com

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents	--

Scholarship Increase for a period abroad	
Amount monthly	800.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

We are looking for a proactive and highly motivated candidate, with a MSc degree in aquantitative discipline (such as engineering, physics, or mathematics). Candidates should have a strong background in quantitative modeling (mathematical modelling and optimization are an asset), energy systems and/or programming (e.g., Python, AMPL). A professional command of English (both written and spoken) is mandatory. Furthermore, you enjoy working in a dynamic and international environment with other doctoral students and postdoctoral researchers.To perform this research, PhD candidates will have access to state-of-the-art computational capabilities, and will be in contact with leading experts at Politecnico di Milano and internationally. The candidates are encouraged to contribute to teaching activities in the Department.

For the overall development of their capabilities, PhD candidates will work on sinergical projects to favour empirical data collection and network development for their career. Projects will give candidates the opportunity to work in groups (peers and other senior professors).

If coherent with the development of their doctoral program, the PhD candidate will have the opportunity to be involved in: teaching activities, tutoring to master students, tutoring to PhD

candidates for administrative processes.

Funding for educational activities: 6.500,00 Euros for three years.