POLITECNICO DI MILANO

PhD in INGEGNERIA GESTIONALE / MANAGEMENT ENGINEERING - 41st cycle

THEMATIC Research Field: INTEGRATING BUSINESS MODEL INNOVATION AND ECONOMIC OPTIMIZATION IN RENEWABLE ENERGY SYSTEMS

Monthly net income of PhDscholarship (max 36 months)
1500.0 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	The global energy transition is reshaping industrial structures, competitive dynamics, and regulatory frameworks. Renewable energy systems—characterized by decentralization, digitalization, and the integration of storage—require not only new technologies but also innovative managerial and economic models. Traditional approaches to value creation in the energy sector, based on centralized production and static tariff schemes, are becoming obsolete. At the same time, existing methods to assess the economic feasibility of renewable projects, such as the Levelized Cost of Energy (LCOE), often fail to capture the complexity of hybrid systems that combine multiple energy sources, storage, and flexible demand. This research aims to bridge these two perspectives by investigating how business model innovation and techno-economic optimization interact in shaping the sustainability and competitiveness of renewable energy ecosystems. The objectives are: - To identify and classify emerging business model archetypes (e.g., platform-based, community-driven, or hybrid models) that leverage digital technologies and storage integration. - To develop and test advanced approaches for incentive design and cost evaluation (extended LCOE, dynamic remuneration schemes) in multi-technology contexts. - To propose an integrated analytical and managerial framework that connects business model configuration, cost efficiency, and policy alignment, supporting both

	firms and institutions in accelerating the clean energy transition.
Methods and techniques that will be developed and used to carry out the research	The project adopts a mixed-method research design, combining qualitative theory-building with quantitative modeling and simulation. - Phase 1 – Literature review and conceptual mapping: a systematic analysis of academic and industry literature on business model innovation, energy economics, and storage integration. This phase will establish the conceptual foundation and identify research gaps. - Phase 2 – Qualitative empirical investigation: multiple case studies and semi-structured interviews will be conducted with energy companies, start-ups, and policy institutions in Italy and Europe to explore how business model innovation and incentive mechanisms co-evolve in practice. - Phase 3 – Quantitative modeling and simulation: development of techno-economic models to extend traditional LCOE formulations, incorporating energy storage, temporal variability, and market dynamics. Optimization and scenario analyses (using Python or MATLAB) will support the evaluation of different configurations and incentive schemes. - Phase 4 – Integration and validation: synthesis of insights into a decision-support framework, validated through expert workshops and pilot testing with industrial partners.
Educational objectives	This PhD project aims to develop a multidisciplinary research profile combining expertise in management engineering, energy economics, and innovation studies. The candidate will acquire: (i)theoretical competences in business model design, sustainability-oriented innovation, and industrial transformation; (ii) analytical and quantitative skills for techno-economic modeling, simulation, and multi-criteria optimization in energy systems; (iii) methodological capabilities in qualitative research (case study design, interviews, cross-case comparison) and mixed-method integration; (iv) Systemic understanding. Through participation in doctoral courses and seminars

	offered by the School of Management the candidate will strengthen their ability to connect managerial theory with technology. The educational path will promote autonomy in research, international collaboration, and the capacity to translate complex technical insights into strategic recommendations for organizations and policy makers engaged in the energy transition.
Job opportunities	Graduates from this research path will be well positioned for academic, industrial, and institutional careers at the intersection of energy transition, innovation management, and sustainability policy.Potential professional opportunities include: 1. Academic positions in universities or research centers focused on energy systems, sustainability management, or industrial economics. 2. R&D and strategy roles within energy utilities, grid operators, and technology providers, where expertise in business model design and economic optimization is increasingly strategic. 3. Consulting and advisory roles for firms and public institutions involved in designing renewable energy projects, incentive mechanisms, and investment strategies. 4. Positions in regulatory agencies, international organizations, and financial institutions, contributing to the development of sustainable energy policies and evaluation frameworks.
Composition of the research group	3 Full Professors 0 Associated Professors 0 Assistant Professors 3 PhD Students
Name of the research directors	D. Chiaroni, V. Chiesa, F. Frattini

Contacts
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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	750.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
The candidate will have full access to a dedicated workstation in the group's open-space research office, equipped with computers and all necessary software tools for data analysis, simulation, and document preparation. Access to institutional databases, scientific journals, and the Politecnico di Milano digital library will also be provided.The PhD candidate will be involved in educational and teaching assistant activities both at the undergraduate and postgraduate levels. At the postgraduate level, opportunities will be available to contribute to courses and seminars offered by the POLIMI Graduate School of Management, particularly in programs focused on energy transition. 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. The interaction with key stakeholders requires a fluent knowledge of the Italian language. **Funding for educational activities: 6.100,00 Euros for three years.**