POLITECNICO DI MILANO

PhD in SCIENZE E TECNOLOGIE ENERGETICHE E NUCLEARI / ENERGY AND NUCLEAR SCIENCE AND TECHNOLOGY - 38th cycle

PNRR_351_PUBBL_AMMIN Research Field: MODELING CONSISTENT ENERGY TRANSITION SCENARIOS BASED ON INTEGRATED ENERGY AND ECONOMIC FRAMEWORKS

Monthly net income of PhDscholarship (max 36 months)
€ 1400.0 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	We live in an extremely complex and interconnected world. Recently, the series of unexpected global challenges including first the Covid-19 crisis and then Ukrainian war, have been changing global geopolitical priorities in the energy sector with a risk of undermining the efforts taken towards the energy transition. It is therefore more crucial then ever to identify sustainable and realistic long-term energy transition pathways, based on three fundamental pillars: (1) technical feasibility, (2) compliance with national economic and financial equilibria and (3) social justice, with a particular attention to jobs¿ creation. Moreover, bearing in mind the exogenous character of this transition, long-term planning is mandatory and the role of governments in the transition is crucial in two ways: by boosting investment increase in productivity, GDP and jobs creation and by adopting price instruments, like carbon pricing, as a regulatory scheme This approach, designed with IRPET, is in line with the DM 351, Art 7 and refers to the CUN area 09 "Ingegneria industriale e dell'informazione" and aims basically at **increasing the capacity of the Public administration to inform policy making process with state of the art and evidence based tools**At regional level, the strategic **Plan of Recovery and Resilience (PNRR),** the **National Strategy of Intelligent Specialization (SNSI) and the**

	National Operative Programme (PON Action IV.5), are almost asking for scientifically grounded strategies to comply post-covid recovery policies with a green transition. This approach is also envisaged within the **National Energy Plan for Research (PNR 2021-2027),** where innovative methods for energy planning and for the assessment of its impacts on the socio-economic system, the environment and resilience to climate change are considered central for the national future research in the sector.
Methods and techniques that will be developed and used to carry out the research	The research proposes a novel approach to perform scenario analysis, able to provide consistent pathways and to investigate the above-mentioned gaps. The study aims at identifying the **technological drivers** with the greatest potential impact and the **investments needed** to support this technological upgrade, within the framework of currently stated **policy interventions** designed to accelerate the green recovery.In line with this objective, the research aims at developing a suite of innovative and integrated modelling frameworks, able to derive **consistent energy transition scenarios at nation-wide scale, useful to support the Italian PNRR policy for the post-covid emergency recovery.**The key feature of the proposed model is the integration between the Stock-Flow Consistent and the Bottom-Up Engineering models, both structured upon Input-Output datasets with a common regional and sectoral breakdown. This approach provides a set of robust outputs, meaning that each module generates results that are "sensible" to what happens in the other, considering structural changes in the economy induced by technological changes and vice-versa.
Educational objectives	The prospective competences and educational gains of the candidate are: • Ability to setup and use energy system models and Stock-Flow Consistent models. • Capability to integrate such models by selecting appropriate variables and including relevant feedbacks.

	• Ability to quantify the impact of energy transition pathways for Italy at regional level.
Job opportunities	Energy/Economic Analyst for energy utilities and/or for NGOs and international organization or public institutions. For example: • Governmental and Regional authorities and agencies • Energy and petrochemicals organizations (e.g. ENI, ENEL) • International agencies (IEA, IRENA, ...) • Academic international institutions active in this field (e.g. AACHEN, KTH, ETH)
Composition of the research group	2 Full Professors 2 Associated Professors 2 Assistant Professors 3 PhD Students
Name of the research directors	Matteo Vincenzo Rocco

Contacts
Matteo Vincenzo Rocco (matteovincenzo.rocco@polimi.it)

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	Istituto Regionale Programmazione economica della Toscana (IRPET). Villa la Quiete alle Montalve, Via Pietro Dazzi, 1. 50141 Firenze (Italia)
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	-
By number of months abroad	0

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

Educational activities:
Financial aid per PhD student is available for purchase of study books and material, funding forparticipation in courses, summer schools, workshops and conferences, instrumentations andcomputer, etc. The amount is about Euro 5700.

Teaching assistantship:
Availability of funding in recognition of supporting teaching activities by the PhD student. Thereare various forms of financial aid for activities of support to the teaching practice. The PhDstudent is encouraged to take part in these activities, within the limits allowed by the regulations.

Computer availability:
Individual use.

Desk availability:
individual use.

Accommodation in Politecnico's Residences (http://www.residenze.polimi.it)
Available for PhDcandidates; special rates will be applied to selected out-of-town candidates(detailed info in the call for application).

Research period in other institutions:
Our candidates are strongly encouraged (6 months minimum is mandatory) to spend a research period in Public Administration institution, joining high-level, research groups in the specific PhD research topic, selected in agreement with the Supervisor.
An increase in the scholarship will be applied for periods up to 6 months (approx. 700 euro/month - net amount).