POLITECNICO DI MILANO

PhD in SCIENZE E TECNOLOGIE ENERGETICHE E NUCLEARI / ENERGY AND NUCLEAR SCIENCE AND TECHNOLOGY - 39th cycle

PNRR 118 PA Research Field: CRITICAL RAW MATERIALS IMPACT ASSESSMENT FOR THE ENERGY TRANSITION: THE CASE OF THE MADE IN ITALY SECTORS

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	Within the Energy transition, the role of Raw materials is getting more and more relevant at global level as they are considered strategic in the ecological and digital transition (twinned transitions), aerospace and defense and due to the potentially significant gap between global supply and expected demand. In line with the draft Regulation "Critical Raw Material ACT (CRMA)", dated 16 March, the European Commission outlined objectives and proposed a complete series of actions to guarantee EU access to a secure, diversified, accessible supply and sustainable use of essential raw materials. Critical Raw materials and their trades in the light of a new peer to peer cooperation are also crucial with the EU-AU High level policy dialogue on science technology and Innovation, and in particular to the New AU-EU Innovation agenda and more general the Agenda 2063 of the African Union. Italy needs to align to the EU plan and take steps to develop national programs for the exploration of geological resources: - preparation and mitigation of procurement risks via supply chain monitoring of critical raw materials.

	- improve the sustainability and circularity of essential raw materials. - diversifying the imports considering international trade. Each member states has received the mandate to align to the EU policies via national plan. These plan require the setup of an impact assessment methodology to support the process of implementation of the plan. The approach, designed with MIMIT and including contribution form different ministries, is in line with the DM 118, 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 the 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 the twinned transition (green and digital). This approach is also envisaged within the National Strategy ?Industria 4.0? where the expected impact of the change may lead to an increase in the competitiveness of the national industry.
Methods and techniques that will be developed and used to carry out the research	The research proposes a novel approach to perform scenario analysis, to assess the impact of energy transition in terms of raw materials extraction, coupling Input-Output models with optimisation methodologies to fully quantifying the amount of materials demanded, recycled and extracted to manufacture the capacity requirements at national level and to understand the impact on the energy transition. The model-based part of the research will provide raw data that will be then used to set up a number of quantitative KPI formulated within a Multicriteria Criteria decision framework (MCDF) to evaluate the national

	strategies and inform the policy making process with high quality evidence evidence. The research is multidisciplinary by design since it need to include industrial and technological drivers with the greatest potential impact for the twinned transition and investments needed to support this technological upgrade, within the framework of potential policy interventions designed to comply with the EU regulation and national plans.
Educational objectives	The objectives are 1) to develop an integrated model for Italy connecting different modelling scale and open to international trades; 2) to define a relevant set of KPI and integrate them within a Multicriteria Decision Frame; 3) to analyse the effectiveness of national policies according to the given MCDF
Job opportunities	
Composition of the research group	2 Full Professors 2 Associated Professors 2 Assistant Professors 6 PhD Students
Name of the research directors	Emanuela Colombo

Contacts
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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)	Ministero dell'industria e del Made in Italy
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	Da definire
By number of months abroad	6

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) is available for PhDcandidates; special rates will be applied to selected out-of-town candidates(detailed info in the call for application).

Research period abroad: Our candidates are strongly encouraged (6 months minimum is mandatory) to spend a research period abroad, 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).