



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

PNRR 118 PA Research Field: STRATEGIC DEPENDENCIES OF MADE IN ITALY SECTORS ON CRITICAL RAW MATERIALS FOR THE ENERGY TRANSITION WITHIN GLOBAL VALUE CHAINS

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

The European Council, highlighting that “Achieving strategic autonomy while preserving an open economy is a key objective of the Union”, invited the Commission to “identify strategic dependencies, particularly in the most sensitive industrial ecosystems, and to propose measures to reduce these dependencies, including by diversifying production and supply chains, ensuring strategic stockpiling, as well as fostering production and investment in Europe”. These elements are all relevant for the industries that are engaged in the energy transition : either from the demand or the supply side. The assessment of strategic dependencies involves not only the identification of dependencies, but also an assessment of whether they are of a strategic nature that leads to a vulnerability for the EU, taking into account the risks such dependencies may represent to the EU’s core strategic interests, being the Green Transition the first priority of the EU commission. Thus, the European Commission documents strategic dependencies and capacities (2021, 2022) maps EU’s strategic dependencies at the level of specific products/industries so as to identify potential risks related to supply chain disruption. So called Made in Italy sectors are not immune from strategic dependencies on critical resources and raw materials. There are different types of shocks that play a role when assessing the impact of



	dependencies. Such shocks can be supply-related (e.g. a given supplier within a value chain no longer producing or delivering certain goods and services, or in reduced quantities; or the country where the supplier is based imposing certain export restrictions) as well as demand-related (e.g. a sudden important drop in EU or global demand for goods and services, or a sudden global rise in market demand for certain goods or services) and they can have multiple origins (man-made, natural, etc.). Scarcity of resources (e.g. related to critical raw materials and or energy) is also an important element to be taken into account when considering the impact of dependencies and shocks. Among the core indicators used there are the concentration of foreign imports, the importance of extra EU imports in total demand and the substitutability of extra EU imports with EU supply. The research aims to: -generate a better understanding of the external stressors and shocks that derive from dependencies on critical resources and raw materials within GVCs (thus threatening local supply chains and security) with special regards to the energy transition - develop innovative solutions and evidence-based recommendations to reduce dependencies and enhance resilience of the industrial ecosystems as far as critical material for the energy transition is concerned (especially those related to Made in Italy sectors).
Methods and techniques that will be developed and used to carry out the research	The identified themes will be analyzed by adopting conceptual and empirical lenses. In fact, the research will: - apply novel methodologies to identify and monitor critical dependencies for Italian sectors (with a focus on the Made in Italy sectors) within global value chains. For example, the research will adopt the indicator recently proposed by Benigno et al (2022), i.e. the Global Supply Chain Pressure Index (GSCPI) that combines a wide range of publicly available high-frequency information on transportation costs, shipping rates and manufacturing indicators (such as delivery times, backlogs and inventories), and methodologies - like the SCAN (Supply Chain Alert Notification) relying on trade data to assess the ex ante systemic risk of disruption (Amaral et al.,



	2022) and bottlenecks (Celasun et al., 2022) - identify new product-process technological innovations that could help alleviate the most critical strategic dependencies (e.g. those related to critical raw materials), in line also with the “Action Plan for Circular Economy” (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A98%3AFIN). The empirical analysis will be conducted by relying on patent data (Source: Patstat) to identify innovations associated to improving product durability, reusability, upgradability and reparability; increasing products' energy and resource efficiency; increasing recycled content in products, while ensuring their performance and safety; enabling remanufacturing and high-quality recycling; developing substitutes for critical raw materials.
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 [LP1] [LP1]Possiamo lasciare gli stessi
Job opportunities	
Composition of the research group	2 Full Professors 1 Associated Professors 3 Assistant Professors 3 PhD Students
Name of the research directors	Lucia Piscitello, Emanuela Colombo

Contacts
Lucia Piscitello, lucia.piscitello@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)	--



(more than 80Km out of Milano)	--
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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)	Minisero 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 for participation in courses, summer schools, workshops and conferences, instrumentations and computer, etc. The amount is about Euro 5700.

Teaching assistantship: Availability of funding in recognition of supporting teaching activities by the PhD student. There are various forms of financial aid for activities of support to the teaching practice. The PhD student 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 PhD candidates; 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).