



# PhD in SCIENCE, TECHNOLOGY AND POLICY FOR SUSTAINABLE CHANGE - 38th cycle

**PARTENARIATO PNRR Research Field: MODELING AND IMPACT ASSESSMENT OF DECARBONIZATION SOLUTIONS FOR THE ITALIAN RAIL TRANSPORT SECTOR**

**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 transportation sector is responsible for 23% of European greenhouse gas emissions: its decarbonization is thus crucial to achieve the zero net emissions target by 2050 set by the EU Green Deal. The Italian railway system is strategic to provide a green and cost-competitive solution for passenger's transport and freight at national level. Increase of the railway capacity, correction of interregional infrastructure discrepancies, enhancement of the high-speed network, system digitization and improvement of the freight transport are expected to have a non-negligible impact on the energy sector, as well as on the other transport vectors (air, road, water and light mobility). Quantitative analysis of decarbonization and energy efficiency strategies such as railway electrification, alternative traction systems and optimal energy delivery in the infrastructure is hence pivotal to identify the most effective solutions in the environmental, social and economic dimensions. These solutions will then serve as reference for the definition of proper policies. The analysis must be conducted through robust, open and integrated modeling tools able to account for the links among the transport vectors and to support the policy-making process through evidence-based results. The research will be conducted as part of the Sustainable Mobility Center (Centro Nazionale per la Mobilità Sostenibile MOST) research project.



	<p>This project research is in the framework CN-MS CENTRO NAZIONALE DELLA MOBILITA' SOSTENIBILE CUP D43C22001180001 Decreto di Concessione D.D. 1033 del 17/06/2022</p> <p>Bando, D. D. 3138 del 12/16/2021 rettificato con D.D. 3175 del 18/12/2021 ?Avviso pubblico per presentazione Proposte di intervento per il Potenziamento di strutture di ricerca e creazione di campioni nazionali" di R&amp;S su alcune Key Enabling Technologies da finanziare nell'ambito del Piano Nazionale di Ripresa e Resilienza, Missione 4 Componente 2 Investimento 1.4 Potenziamento strutture di ricerca e creazione di campioni nazionali di R&amp;S su alcune Key Enabling Technologies finanziato dall'Unione europea - NextGenerationEU</p>
Methods and techniques that will be developed and used to carry out the research	<p><b>Theoretical tools:</b> Linear and Mixed Integer Linear Programming, Constrained Optimization, Multiobjective Analysis, Input-Output Analysis</p> <p><b>Computational tools:</b> programming languages (Matlab, Python, R) and open-source energy &amp; industrial ecology modeling frameworks (Hypatia, MARIO)</p>
Educational objectives	<p>1) to model scenarios of energy demand evolution for the railway sector; 2) to analyze the effectiveness of decarbonization solutions; 3) to assess their impact on the energy sector; 4) to assess interconnections with other transport vectors;</p>
Job opportunities	<p>Researcher or analyst for energy utilities and/or for public or private research centres, R&amp;D departments, international institutions, NGOs.</p>
Composition of the research group	<p>2 Full Professors 2 Associated Professors 6 Assistant Professors 4 PhD Students</p>
Name of the research directors	<p>Prof. Matteo Vincenzo Rocco / Prof. Fabio Inzoli</p>



Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
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Housing - Foreign Students	--
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Housing - Out-of-town residents (more than 80Km out of Milano)	--
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Scholarship Increase for a period abroad	
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Amount monthly	700.0 €
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By number of months	6
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Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
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There are various forms of financial aid for teaching assistant activities.

The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.

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CN-MS

CENTRO NAZIONALE DELLA MOBILITA' SOSTENIBILE

CUP D43C22001180001

Decreto di Concessione D.D. 1033 del 17/06/2022

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