



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

THEMATIC Research Field: HYDROGEN STORAGE SYSTEMS FOR THE STATIONARY APPLICATION AND FOR THE MOBILITY SECTOR

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	In the energy transition from a fossil-based to a renewable-based infrastructure, hydrogen is receiving greater and greater attention as a clean energy vector. The penetration of hydrogen in the market is still limited, due to various technical, political, and economic challenges. Hydrogen storage is one of the main difficulties to address in order to push the development of a hydrogen economy. The objective is the numerical analysis and the experimental verification of absorption-based hydrogen storage technologies for stationary applications, like residential houses and condos, as well as in the mobility sector for refuelling fleets of trucks, buses, ferries, and trains.
Methods and techniques that will be developed and used to carry out the research	The work will require both numerical and experimental activities. About the former one, the work will cover the development and an inhouse code for the accurate description of the processes involving in the absorption-based hydrogen storage system, likely in a hybrid configuration with a pressure tank, and the connected facilities. The main goal is to design both the system as well as the control logic, in particular one small-scale system to be tested experimentally. The challenge is to meet high hydrogen demands in terms of flow rate and quantity. About the experimental activities, absorption-based hydrogen storage systems for mobility applications



	will be tested. The laboratory at Politecnico di Milano involved is the Laboratory of Energy Conversion and Storage (LabX). The system will be designed, acquired, installed, tested, and eventually updated for improvements.
Educational objectives	<p>Upon completing the research, the PhD candidate will learn to:</p> <ol style="list-style-type: none"> 1. describe mathematically and numerically the hydrogen absorption process 2. simulate on-design and off-design processes, in particular related to the dynamics of hydrogen storage systems 3. learn the steps for the design of a new product 4. execute factory and laboratory tests
Job opportunities	<p>Upon completing the degree, the PhD candidate will effectively apply for the following occupations:</p> <ol style="list-style-type: none"> 1. manufacturers of hydrogen technologies 2. natural gas and hydrogen distributors 3. universities and research centres 4. energy authorities
Composition of the research group	<p>3 Full Professors 6 Associated Professors 8 Assistant Professors 14 PhD Students</p>
Name of the research directors	Gianluca Valenti

Contacts	
<i>Gianluca.valenti@polimi.it</i>	

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	750.0 €
By number of months	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. This amount is equal to 10% of the annual gross amount, for 3 years.

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.

Awards: Awards may be recognized on an yearly basis to the PhD candidate if participating to industrial contracts.