



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

THEMATIC Research Field: DEVELOPING AND TESTING LIQUID HYDROGEN STORAGE TECHNOLOGIES FOR MOBILE APPLICATIONS

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 to develop conceptually and test experimentally technologies to store, pressurize and vaporize liquid hydrogen. These technologies are meant for mobile applications, like airplanes, trains, and trucks.

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 s model, either in inhouse codes or commercial software, for the accurate description of the processes involving in the liquid hydrogen storage, pressurization, and evaporation. 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. About the experimental activities, the technologies will be tested at the Laboratory of Energy Conversion and Storage (LabX) of Politecnico di Milano. The technologies will be designed, manufactured internally or externally, 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 liquid hydrogen handling technologies 2. simulate on-design and off-design processes, in particular related to the dynamics of liquid hydrogen 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 liquid hydrogen technologies 2. liquid natural gas and hydrogen distributors 3. universities and research centres 4. energy authorities
Composition of the research group	5 Full Professors 7 Associated Professors 7 Assistant Professors 40 PhD Students
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: Economic awards up to Euro 2500 (gross amount) per year will be recognized to the PhD candidate in case of significant contributions in the research project, subject to the evaluation of the research director.