

Progetto di Ricerca e Piano di Attività

Title: SISTEMI ENERGETICI PER LA PRODUZIONE DI IDROGENO VERDE DALLA REAZIONE DI MATERIALI METALLICI CON L'ACQUA

ENERGY SYSTEMS FOR GREEN HYDROGEN PRODUCTION BY MEANS OF REACTION OF METAL WITH WATER

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Research project and Plan of activities

As part of a research activity carried out by the Energy Systems Research Group at the Department DIN of the University of Bologna, in collaboration with other regional institutions in the framework of a PRFESR project named MetalH₂, the research grant will be focused on advanced technologies of Energy System for production of green hydrogen. In particular, low-carbon solutions based on the exploitation of residuals of metals as special fuels in advanced energy conversion devices will be explored. The concept of aluminum combustion integrated with hydrogen production will be investigated. The general aim of the research project is also focused on the design of a prototypal test bench, in order to assess and validate the idea in laboratory scale.

As part of the plan of activities, the first step of investigation will consist in a deep analysis of prior experimental realizations of the concept and in a study of the problems, in order to define new boundary conditions. The specific research activity carried out by the research grant will include modelling the full energy system and of the main components of the system, in order to optimize the required steam flow for the special metal combustor in study. The numerical activities of the project can be based on commercial software for energy system lumped-parameter modelling approach, integrated with thermochemical fluid property database utilization and development of user-defined routines. Various plant layouts and arrangements of the involved steam cycle will be assessed. The modelling activity will cover performance prediction, under variable input and load conditions, of the system and of components. A part of the study will be also focused on the design of the steam generation unit for the test bench implementation, that will be carried out in collaboration with the other partners of the project, in order to realize a prototypal device.

The candidate for this position holds a degree in energy/mechanical engineering. Research experience with an industrial background and lab practice can be also useful. Capabilities and skills on thermodynamic modelling and tools as Matlab, Thermoflex, Aspen or similar will be considered.