ENERGETICS

ENEA - Optimization models for the hydrogen technologies in the national Energy System

Funded By	ENEA - Agenzia Nazionale per le Nuove Tecnologie, l'Energia e lo Sviluppo Economico Sostenibile [P.iva/CF:00985801000]
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Context of the research activity	Evaluation of the techno-economical competitiveness and development potential of the hydrogen technology in the future energy system. The modeling technique should combine an Energy System Optimization Model to a model for the electricity dispatchment.
Objectives	The PhD activity aims at studying the effects of the possible penetration of hydrogen production and consumption technologies in the perspective of the energy system sustainability, with a focus on the flexibility potential for the power sector decarbonization. After the review of the available energy system models including hydrogen among energy commodities, the research activity will be focused on the development of a proper techno-economic characterization for hydrogen technologies and on the analysis of the possible future role of hydrogen in the energy system, both inspired by capacity expansion and operational dispatch approaches. The study of the competitiveness of hydrogen consumption technologies in the end-uses (industry, transport and buildings) and investigation of efficient sector coupling options (power grid flexibility, injection into natural gas infrastructures and synthetic fuel production) is also foreseen, together with the assessment of the environmental benefits related to the development of hydrogen technologies. A suitable modeling strategy to consider the effect of hydrogen exploitation on social sustainability, energy security and critical materials dependence is also to be considered.
Skills and competencies for the development of the activity	The candidate should have a know-how in energy system optimization models, also from the TIMES family, and should be skilled in energy scenarios analysis. A background in environmental engineering is also welcome.