



**SEMINAR**

***Joint Planning of Hydrogen and Power  
Infrastructure for a Low-Carbon Energy  
System: A European Case Study***

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The transition to decarbonized power systems is among the most complex challenges for energy planners today. In this context, integrating green hydrogen into future energy systems presents a promising pathway for reducing greenhouse gas emissions while meeting energy demands. This work presents a generation capacity expansion model that optimizes the deployment of hydrogen infrastructure, including electrolyzers, compressors, storage systems, and pipelines. The model explicitly accounts for the costs of pipeline installation and compression, aiming to meet both hydrogen and electricity demands efficiently. To address uncertainties in these demands, a stochastic programming approach is employed. A realistic case study based on the European energy system is used to test the proposed formulation. The results provide power and hydrogen-related investment decisions by country, as well as the inter-country flows of electricity and hydrogen.