

**FUELING THE FUTURE: GREEN HYDROGEN'S PROMISE  
AND PITFALLS IN INDIA'S ENERGY TRANSITION**

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*A project report submitted*

*in partial fulfillment of the requirement for the award of the  
degree of*

**MASTER OF ARTS**

**IN**

**ENVIRONMENTAL ECONOMICS**



**May 2025**

**MADRAS SCHOOL OF ECONOMICS**

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## ABSTRACT

*The global calls for decarbonisation are strengthening due to climate change, which eventually leads to the exploration of alternative renewable energy sources that have multiple end-use applications. In the deep search over the years, Green Hydrogen is gaining traction around the globe, considering its ability to decarbonise hard-to-abate sectors, consequently placing itself as a “Multipurpose fuel”. While there is tons of research on green hydrogen around the world, this study involves multiple dimensions of investigation, starting from the technoeconomic assessment of green hydrogen projects announced in India, moving to the environmental implications of green hydrogen and its nexus, and eventually proposing Nature Inclusive Design policy for India to avoid Ecosystem conflicts. This study reveals crucial insights into the green Hydrogen landscape in India. Firstly, the announced subsidy under NGHM is only sufficient till 2028 for the BAU(2.26MMT/y) scenario, posing setbacks to the NGHM target scenario(5MMT/y) and announced projects. Secondly, Green hydrogen wins the water consumption and climate change goals. In contrast, after a certain threshold of Green Hydrogen capacity, Expansion can pose threats to Ecosystem services, considering its compounded land requirements for input sources, where most of the grey hydrogen requires less land, and primary input sources are imported. India has scarce biocapacity when compared to other countries; green hydrogen and its associated input renewable energy sources can cause land use competition in the long run. To avoid further damage to the ecosystem and land use competition, a Nature Inclusive design policy for renewable energy deployment is proposed for India and requires immediate attention from policymakers to make the green hydrogen transition a win-win situation for both the Ecosystem and climate change.*

**Keywords:** Green Hydrogen, Energy Transition, Techno-economic assessment, Ecosystem services, Environmental impact, Environmental Policy

**JEL Codes:** Q28, Q42, Q43, Q48, Q51, Q57, Q58, O3