

# GREEN HYDROGEN: THE FUEL FOR A SUSTAINABLE FUTURE

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Green hydrogen is a clean and sustainable energy source that has the potential to revolutionize the way we generate and use energy. Unlike traditional hydrogen, which is produced from fossil fuels and releases carbon emissions in the process, green hydrogen is produced through the electrolysis of water using renewable energy sources such as solar or wind power.

As global energy demand continues to increase, green hydrogen is being hailed as a sustainable, scalable energy source with high energy density to meet that demand while also reducing the environmental impact of the current non-renewable energy sources. The fact that green hydrogen can be produced from a wide variety of renewable energy sources is one of its primary benefits. This makes it a highly sustainable fuel source, as it does not rely on finite resources such as fossil fuels.

Additionally, the production of green hydrogen does not produce any greenhouse gas emissions, making it a key tool in the fight against climate change. The versatility of green hydrogen is yet another advantage. It can be used in a wide range of applications, including transportation, heating, and power generation. For example, hydrogen fuel cells can be used to power vehicles, boats, and trains, while hydrogen boilers can be used for heating buildings. Additionally, hydrogen can be used as a storage medium for renewable energy, allowing excess energy to be stored for later use. Despite the many advantages of green hydrogen, several challenges need to be addressed for it to become a major source of energy.



One of the main challenges is the high cost of producing hydrogen from renewable energy sources. Currently, the cost of producing hydrogen from renewable energy sources is significantly higher than the cost of producing hydrogen from fossil fuels. This makes it less competitive with other energy sources and limits its potential for widespread adoption. Another challenge is the lack of infrastructure for producing, storing, and transporting hydrogen and hence making it difficult to produce and transport hydrogen in large quantities and limiting its potential for widespread use.

However, many countries and organizations are investing in the development of green hydrogen technologies and infrastructure, and there are several pilot projects currently underway to demonstrate the feasibility of green hydrogen. Developing countries with superior renewable energy resources are also working towards the production of green hydrogen locally, creating new economic opportunities and increasing energy security by reducing the risk of oil price volatility and supply disruptions.



One such step taken by India in that direction is the introduction of the National Green Hydrogen Mission. This mission aims to promote the deployment of the green hydrogen ecosystem and create new opportunities for innovation and investment across the green hydrogen value chain thus playing a key role in India's energy transition, especially in the decarbonization of the energy sector.

As a result, green hydrogen, which is produced by electrolysis and powered by renewable electricity, is emerging a popular energy source all over the world.

It can further contribute to the decarbonization of industry, transportation, and buildings by producing climate-adaptive power, providing zero-emission process heat, clean mobility options, and hence creating a new energy paradigm that is needed to achieve sustainable climate goals in this crucial phase of the energy transition.

It was during my Master's thesis. I did an internship in the Italian National Agency for Energy and Environment (ENEA), where I learnt about sustainable development and energy, and the nexus between the two. I wrote my thesis in management engineering about it and decided this was the area where I wanted to focus my working life. Fast forward almost 20 years of experience in energy and international cooperation, a PhD in Energy Technology and time spent in private sector, research and intergovernmental agencies, I currently lead the power sector transformation team at IRENA since 2017.

My work at IRENA is to contribute, with my team and in close cooperation with colleagues across the agency and external partners such as the World Economic Forum, in supporting our 166 Member Countries in the energy transition, with a focus on renewable electricity supply and its use to decarbonize the energy sector through green electrons as well as green molecules like hydrogen and its derivatives.

