

BOOSTING GREEN HYDROGEN

Relevant for: Environment | Topic: Environmental Degradation - GHGs, Ozone Depletion and Climate Change

Prime Minister Narendra Modi recently announced that India would aim for [net-zero carbon emissions by 2070](#). The announcement was given credence by the country's solar achievements since 2015. India is the only major economy whose policies and actions are on track to limit global average temperature rise below 2°C above pre-industrial levels, as envisioned in the Paris Agreement.

As of now, 75% of India's energy demand is met by coal and oil, including imports. This is expected to increase. Therefore, the synergy between renewable energy and green hydrogen must be tapped to tackle the dependence on fossil fuel and take greater advantage of India's solar capacity. Hydrogen — green hydrogen, in particular — is a crucial weapon in India's arsenal to fight climate change as it improves the long-term energy storage capabilities of renewable energy. The simplest element in the periodic table is also the most promising solution to decarbonise sectors like cement, steel, and refineries. "Hydrogen can provide the lowest-cost decarbonization solution for over a fifth of final energy demand by mid-century — contributing a cumulated reduction of 80Gt of CO₂ — and is thus an essential solution to reach the 1.5°C climate scenario," read a recent statement from the Hydrogen Council. Several major economies which are adopting legislation to reduce carbon emissions are also catalysing global efforts towards transitions to green hydrogen.

A low-carbon source of energy is required to generate hydrogen through electrolysis — the splitting of a water molecule into hydrogen and oxygen. The hydrogen produced is coded with a colour, depending on the method of its production. While hydrogen generated through renewable energy sources is green, it is blue when the carbon generated from the process is captured and stored without dispersing it in the atmosphere. When the carbon is not captured, the generated hydrogen is labelled grey.

Nearly 70% of the investments required to produce green hydrogen through electrolysis goes into generating renewable energy. With India's solar capacity increasing nearly 3,000 times in less than a decade, the cost of solar energy has reached a low of 2 per kWh. This gives India a unique head start in scaling up the use of green hydrogen.

India can reduce its carbon emissions and make a dent in its annual import bills by developing a value chain for hydrogen from its production to its diverse applications, including production technologies, storage, transport and distribution, infrastructure (ports, refuelling stations), vehicular applications, and electricity/gas grid.

Government funding and long-term policies that attract private investments within the standards and a progressive compliance framework are essential to boost green hydrogen. Hydrogen's cross-sectoral capabilities should be exploited according to each sector's cost and ease of adoption. A few key sectors with low transition costs, such as refineries, fertilizers and natural gas, should be mandated to use hydrogen to bring down costs as part of near-term goals. New demand from steel, cement and road mobility should be mandated as part of medium-term goals. Heavy-duty vehicles should receive State and Central incentives. Shipping, aviation, energy storage and solutions towards power intermittency should be mandated to use green hydrogen in the long run.

Enforcing time-bound mid- and long-term policies would inspire the private sector to invest more in green hydrogen and give the boost it requires in its nascent stages. India's current grey

hydrogen production is six million tonnes per annum, which is around 8.5% of global annual production. India should replace this with green hydrogen and reduce dependence on imported ammonia. It should aim to produce 4-6 million tonnes of green hydrogen per annum by the end of the decade and export at least 2 million tonnes per annum. India has already taken the first step with the Indian Oil Corporation floating a global tender to set up two green hydrogen generations units at the Mathura and Panipat refineries.

At present, more than 30 countries have hydrogen road maps and over 200 large-scale hydrogen projects across the value chain. If all the projects come to fruition, total investments will reach \$300 billion in spending by 2030. Governments worldwide have committed to more than \$70 billion in public funding, according to Hydrogen Council, to develop a hydrogen economy. With its abundant and cheap solar energy, India has the upper hand to tap into these investments and lead global efforts in transitioning to green hydrogen.

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Amul's success does not seem to have become a catalyst for similar movements across other agricultural commodities

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