

IT IS CRITICAL FOR INDIA TO TAKE STEPS TO HARNESS THE HYPE OF HYDROGEN. FOR FAR TOO LONG, WE HAVE KEPT FOCUSING ON SUNSET AREAS OF GROWTH

Hydrogen is the next frontier

A DREAM OF a hydrogen economy is neither new nor novel. The hydrogen industry and the energy industry brushed shoulders at multiple points throughout their history. The first demonstrations of water electrolysis to produce carbon-free hydrogen fuel and fuel cells to convert hydrogen to electricity were engineered in the 1800s. Hydrogen was used to fuel the first internal combustion engines. Hydrogen as a rocket fuel took us to the Moon in the 1960s. Despite the early promise, the discovery of cheap oil meant that the hydrogen-based energy economy has largely eluded us—until now.

Unable to make its mark in the energy industry, hydrogen instead has held its own becoming a valuable chemical in itself.

Supplying hydrogen as an industrial feedstock is a major industry now. Hydrogen, used in ammonia fertiliser production, has helped feed a growing global population, which tripled since the 1950s. Hydrogen is also added to fats and oils, and, when combined with liquid oxygen, makes an excellent rocket fuel.

It is critical to understand the different kinds of hydrogen. Grey Hydrogen is hydrogen produced using fossil fuels such as natural gas. Unfortunately, this accounts for roughly 95% of the hydrogen produced in the world today. Next best version is "blue" hydrogen, where carbon emitted during hydrogen production is captured. The carbon-free version is "green" hydrogen, which is produced via renewable energy sources.

Green Hydrogen is currently enjoying unprecedented political and corporate interest, at least 24 countries have now drafted policies or are setting up strategies for the hydrogen economy. An innocuous observer might be puzzled by the sudden global movement towards hydrogen and might ask why hydrogen? And more importantly, why now?

Why Hydrogen?

Hydrogen is versatile. Hydrogen can be used as a chemical feedstock, fuel, or energy carrier and storage, and has many possible applications across industries, heavy-duty transport, power, and buildings sectors. Multi-sectoral applications provide a conducive environment towards an exponential rise in demand and subsequent benefits of scale.

AMITABH KANT & KOWTHAM RAJ VS

Kant is CEO & Raj VS is a young professional (energy sector), Nri Aayog. Views are personal



Hydrogen is abundant. The first element of the periodic table is also the simplest and most abundant element in the universe. It is estimated that 90% of the visible universe is composed of hydrogen.

Hydrogen is familiar. Humans were producing and using hydrogen for years before it was recognised as a distinct element by Henry Cavendish in 1766. Hence, humans have gathered enough experience in handling large quantities of hydrogen, owing to its existing mass-scale applications.

Hydrogen is uniquely clean. The USP of hydrogen is that it can help to decarbonise industrial processes and economic sectors, where reducing carbon emissions is both urgent and hard to achieve. Fertilisers, oil-refining, heavy industry like steel and heavy-duty transport are some examples of hard sectors that likely will need hydrogen to decarbonise.

Green Hydrogen is local. Not many realise that electricity accounts only for less than one-fifth of the energy economy. The rest of our energy needs are fulfilled by solid and liquid fuels—on which we have more than 80% import dependency. Green hydrogen has the potential to replace these imported fuels. In addition, many imported key chemicals like methanol and ammonia can be locally produced utilising green hydrogen, supporting the movement towards *atmanirbhar Bharat*.

In addition, hydrogen does not compete with other technologies like batteries which predominantly serves low-intensity applications like light-duty mobility, electronics, and short-duration power backup.

Why now?

It is important to understand why the

proponents of the hydrogen economy are confident that this hydrogen wave will last. First, utilising dirty hydrogen for powering the economy is not an attractive proposition. But, green power to produce green hydrogen was way too expensive during the previous attempts in setting up the hydrogen economy. With

India's success in reducing the solar prices to as low as ₹1.99/KWh (2.7 cents), green hydrogen can become competitive in the medium term.

In addition, India's ambitious target of 450 GW renewable energy will face challenges brought by a global pandemic and issues in the discom sector—discoms are experiencing price pressure to reduce their costs. In addition,

such high capacity addition of renewable power might lead to grid stability (duck curve) issues leading to wastage and curtailment. Green Hydrogen can enhance the contribution of RE power, and 100s of GW of RE power will be needed to power even a limited scale-up of the green hydrogen economy.

Second, unlike the 1970s, the world has learned to channelise funding and rapidly industrialise new-age cutting-edge clean-tech components in the last two decades. Battery and solar panel prices have tumbled on the back of continuous innovation, investors' appetite, and aggressive scales. A similar learning curve is expected for electrolyzers and fuel cells, which might form the building blocks of the hydrogen economy.

Third, the urgency for global-scale coordinated climate action has never been higher. With countries setting up net neutrality goals and the impending threat of carbon-taxes on almost all valuable exports—corporations that fail to decarbonise their industrial activities might be carbon locked out of the market. India, which is one of the largest

steel and chemicals producers, has to think about reducing its carbon intensity in these high-value sectors from the perspective of attractive export regions, which are increasingly demanding green products. This makes green hydrogen a crucial commodity.

The FY22 Union Budget announced the government's intention to launch a hydrogen mission, which is as futuristic as it is historic. Following are the five essential actions to ensure the launch of hydrogen economy in India

■ To become a global hub for green hydrogen, India should identify high-demand sectors like green ammonia, oil-refining, and heavy-duty transport where initial demand can be catalysed via public incentives.

■ Energy accounts for 70% of the green hydrogen production costs. India should strive to reduce renewable power tariffs for hydrogen production. The US dollar-denominated procurement of green hydrogen or green ammonia might help reduce capital costs. The duties and other actions that might negatively impact RE tariffs should be rationalised to keep the tariffs as low as possible.

■ India should pioneer voluntary purchase mechanisms for green hydrogen embedded products such as green steel or green fertilisers similar to RE100 initiatives, where corporates like Infosys or Google pledged to run completely on green energy.

■ India should strive to incentivise the giga-scale production of green hydrogen components, like electrolyzers, to take advantage of the global demand-supply gap and reduce the local green hydrogen prices.

■ India should identify hydrogen production clusters closer to the renewable parks to utilise near-zero cost excess peak power which can be diverted to hydrogen plants.

Hence, it is critical for India to take steps to harness the hype of hydrogen. For far too long, we have kept focussing on sunset areas of growth, whereas other nations seized opportunities in sunrise areas of growth and forged ahead. India's success in becoming one of the top-5 renewable countries was a remarkable change in direction. It is time for India to step up and seize today's opportunities via the Hydrogen mission for a sustainable and successful tomorrow.