



Boosting green hydrogen

- 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

LOOKING TOWARDS HYDROGEN



National Hydrogen Mission

- to make India a global hub for the production and export of green hydrogen

India spends over Rs. 12 million annually for energy requirements

Green hydrogen production to help replace energy imports





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.

Net ZERO by 2070:

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

Grey hydrogen	Blue hydrogen	Green hydrogen
Split natural gas into hydrogen and CO ₂	Split natural gas into hydrogen and CO ₂	Split water into hydrogen by electrolysis powered by water or wind
CO ₂ emitted in the atmosphere	CO ₂ stored or reused	No CO ₂ emitted

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.

Advantages of Hydrogen:

- 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.

30.11.2021

Tuesday



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2. Hydrogen is also the most promising solution to decarbonise sectors like cement, steel, and refineries.
3. 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.
4. Several major economies which are adopting legislation to reduce carbon emissions are also catalysing global efforts towards transitions to green hydrogen.

India has a headstart:

1. 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.
2. 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.
3. 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.

Solutions

1. Government funding and long-term policies that attract private investments within the standards and a progressive compliance framework are essential to boost green hydrogen.
2. 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.
3. 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.

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4. Shipping, aviation, energy storage and solutions towards power intermittency should be mandated to use green hydrogen in the long run.
5. 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.

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. 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.

The infographic features the PIB logo and the hashtag #AatmanirbharBharatKaBudget. It is divided into two main sections: 'Takeaways for RE Sector in Budget 2021' and 'National Hydrogen Mission'. The left side includes illustrations of wind turbines, solar panels, and a battery. The right side lists seven major activities envisaged for the hydrogen mission.

Takeaways for RE Sector in Budget 2021

National Hydrogen Mission

Major Activities envisaged

- Creating volumes and infrastructure
- Demonstrations in niche applications (including for transport, industry)
- Goal-oriented Research & Development; facilitative policy support
- Putting in place a robust framework for standards and regulations for hydrogen technologies
- Envisages generation of hydrogen from green power sources
- Aims to develop India into a global hub for manufacturing of hydrogen and fuel cells technologies
- The Government of India will facilitate demand creation in identified segments. Possible areas include suitable mandates for use of green hydrogen in industry such as fertilizer, steel, petrochemicals etc



Regulation, not ban

India should regulate the trading of virtual currencies through monitored exchanges.

Chronology:

1. The Government is set to introduce legislation that would if passed, officially proscribe such currencies.
2. Its concerns appear to be the risks associated with cryptocurrencies, including their potential use for money laundering and financing of illegal activities.
3. The risks investors and consumers face in dealing with these so-called currencies, given that they are neither 'a store of value nor are they a medium of exchange', and the ostensible threat they pose to financial stability, are also key factors.
4. The Centre and the RBI's deep disquiet with cryptocurrencies notwithstanding, there has been an exponential jump in investment in virtual currencies, especially after the Supreme Court last year struck down an RBI notification barring financial entities from facilitating customer transactions related to virtual currencies.
5. Industry estimates now peg cryptocurrency holdings in India at about ₹40,000 crores, held by about 15 million investors, and advertising trends show an upsurge in ads promoting brands associated with an investment in virtual currencies.

Across the world:

1. The pandemic has accentuated the global embrace of all things digital and investment in the technologies enabling cryptocurrencies including blockchain, appear to be no different.
2. Canada, Japan and Thailand permit the use of virtual currencies as a payment method, with some jurisdictions regulating them as a digital asset, and others as a commodity.
3. Canada and the U.S. closely monitor virtual currency activity to ensure they do not run afoul of laws on financial crimes, with the former also earning tax revenue on transactions.
4. All things given, India should eschew the temptation to join China in proscribing virtual currencies and instead aim to tightly regulate their trading through monitored exchanges and earn revenue.
5. Simultaneously, it should expedite the RBI's pilot of the Central Bank Digital Currency so as to offer an alternative to cryptocurrencies.