



Adani plans \$9 bn capex to kickstart green H2 business

Anirudh Laskar
anirudh.l@htlive.com
MUMBAI

The Adani group will spend \$9 billion to build manufacturing and transportation infrastructure for the first phase of its ambitious green hydrogen venture, pivotal to the conglomerate's business aspirations and crucial to the world's third most polluted country's net-zero transition.

Once production gets under way, Adani Group will hire specialized ships to export what will be the world's cheapest green hydrogen and its derivatives to Europe and some Asian countries, three people directly aware of the conglomerate's plans said on the condition of anonymity.

"This is the most decisive entry into green hydrogen being planned by any group in the country," one of the three people said. In the first phase, Adani plans to achieve a capacity of 1 million tonnes per annum (mtpa) of green hydrogen, which is produced by breaking down water in an electrolyzer using renewable power.

Adani Group, through Adani New Industries Ltd, is working

Green game

- \$9 bn** INVESTMENT to start phase-1 of green hydrogen business
- \$4 bn** INVESTMENT on machinery, mfg parts, stacks, etc.
- \$5 bn** INVESTMENT to develop 5GW electrolyzer making capacity
- 7,500-10,000** NEW jobs to be created in Adani green hydrogen business
- 3 mtpa** Adani's total green hydrogen capacity target
- 1 mtpa** Green hydrogen capacity planned by 2030

Source: Mint research, company filings, research reports

on one of the most ambitious green hydrogen projects in India from the Rann of Kutch in Gujarat.

"The group is in the first stage. Around \$4 billion will be invested in setting up the manufacturing components and equipment needed to operate the plants, stacks and balance of plant (BoP) in the production

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Adani plans \$9 bn capex for green H2 biz

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cycle. This is the most critical part of the cycle. Once it is ready, it can support the next two phases, too, with some degree of expansion," the person added.

Adani's potential rivals in green hydrogen include Larsen and Toubro Ltd, Indian Oil Corp. Ltd, Acme group and Oil India Ltd.

Green hydrogen has become the chosen route for many countries' climate roadmaps and net-zero pledges, as they look to eventually stop burning fossil fuels to generate energy or produce other chemicals.

A "stack" is an assembly of electrolyzer-based fuel cells, which acts as a unit that produces electricity. It is the core working element in an electrolyzer-based power plant. A single stack consists of hundreds of fuel cells. The company aims to minimize the cost of green hydrogen equipment by making them in-house as much as possible, the three people said.

The \$9 billion green hydrogen plan includes a \$5 billion



Adani's potential rivals in green hydrogen includes Larsen and Toubro. REUTERS

investment in manufacturing and operating electrolyzers.

"There will be 4-5 different stages. The plan is to quickly develop mtpa in the next 2-3 years and take it up from there to 1 mtpa. During this phase, the full chain for a 5GW electrolyzer manufacturing capacity planned may need an investment of \$4.5-5 billion," the second person said.

An email sent to Adani Group remained unanswered till press time.

The first phase will be based on alkaline electrolyzers, com-

posed of electrodes with a porous separator and an alkaline electrolyte. Alkaline electrolyzers typically have a maximum power input of 30 kW. To produce one kg of hydrogen, at least nine kg of water is required with a total of 50-55 kWh of electrical unit.

At a later stage, Adani plans to manufacture electrolyzers based on anion exchange membrane as well, which has higher operational flexibility and better efficiency as compared to alkaline.

Eventually, Adani Group aims to manufacture over 17.5GW of electrolyzers, according to the three persons.

Adani New Industries, which contributed 9% of the group's total income in FY24, has established 4GW capacity of solar cell and module manufacturing, 2GW of ingot-wafer manufacturing and 1.5GW capacity of wind manufacturing.

The capex also includes building a Balance of Plant (BoP), an auxiliary set-up of machinery and components within a power plant, which is required to keep energy generation stable and safe. This becomes critical since hydrogen is far more explosive than other fuels.

Adani Group plans to use its own ports on the west coast of India to transport green hydrogen and its derivatives and off-takes to other countries in Europe and Asia by ships that will be specially designed, said the third person.

Adani operates the country's largest private port in Gujarat.

"Transportation of green hydrogen is an elaborate task that needs a separate focus," said the third person, adding the special ships which are being designed may cost \$300-400 million each.

For an extended version of this story, go to [livemint.com](https://www.livemint.com).

Adani Group plans to use its own ports on the west coast to transport green hydrogen to other countries

● HYDROGEN HARVEST

Fraunhofer's semiconducting glass generates H₂ from sunlight

Researchers have created a modular solution with semiconductor coatings to produce clean energy efficiently

M Ramesh

While the concept of using sunlight to split water to produce hydrogen (and oxygen) without the interface of electricity (called photoelectrochemical process) is not entirely new, the German Fraunhofer Institute has come up with its own design, which uses semiconductors. Researchers from the institute have collaborated to create a modular solution that enables highly flexible hydrogen generation and supply solar energy for it.

At the heart of this technology is a tandem PEC module. It's similar to its traditional photovoltaic counterpart, but with one crucial difference: the electricity is not generated for purposes of later electrolysis elsewhere. The entire process takes place in one unit. Caution is needed throughout — since the process results in hydrogen and oxygen, the

structure must be designed to maintain a strict separation between the two elements during generation and after.

“To produce the tandem cell, experts coated standard commercially available float or plate glass with semiconducting materials on both sides,” notes a press release from the institute. When the sunlight hits the glass, one side of the module absorbs the short-wavelength light. Meanwhile, the long-wavelength light passes through the upper layer of glass and is absorbed on the reverse side. The module releases hydrogen on the reverse or cathode side and oxygen on the upper/anode side.

Over the project's three-year term, the Fraunhofer scientists researched and developed high-purity semiconductor materials, which they apply using ultra-gentle coating methods. This allows them to increase the method's hydrogen yield.

“We use the vapour phase to form



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layers that are just a few nanometres thick on the glass. The structures created in the process have a huge impact on reactor activity, in addition to the actual material properties, which we have also optimised,” explains Dr Arno Görne, group manager of Functional Materials for Hybrid Microsystems at the Fraunhofer Institute for Ceramic Technologies and Systems IKTS. The photovoltaic elements linked in the module supply the system with additional voltage — that accelerates activity and boosts efficiency.

The result is a reactor with an active surface area of half a square metre. Separated from the oxygen, it generates hydrogen, which can be captured and quantified. Right now, a single module exposed to sunlight under European conditions can generate over 30 kilograms of hydrogen per year over 100 square metres.

“In terms of the dimensions of the tandem cell, we are limited by the fact that our module splits water directly. But it is also necessary for electricity to get from one side to the other to achieve this. As the module area increases, the rising resistance has an unfavourable effect on the system. Currently, the existing format has proven to be optimal. It is stable, robust and significantly larger than any comparable solution,” Görne notes. The compact elements can be connected as needed without any negative side effects, from a single module to large areas — a significant advantage, the release says.



GOVT DIVESTMENT POTENTIAL AT ₹11.5 LAKH CRORE

SANGEETHA G
CHENNAI, JULY 7

The government has a divestment potential of ₹11.5 lakh crore in central public sector companies, public sector banks and insurance companies at the current market capitalisation.

CareEdge's analysis based on 59 major listed CPSEs and 15 listed PSBs and insurance companies where the government holds more than a 51 per cent stake, finds that the government can achieve ₹11.5 lakh crore through divestment.

The government still retain control over the company's governance by maintaining at least a 51 per cent stake in CPSEs.

This is a little more than twice the total divestment of ₹5.2 lakh crore conducted since 2014. Of this, CPSEs could contribute around ₹6 lakh cr, while PSBs and insurance firms could potentially add another ₹6.5 lakh crore.

HPCL asked to pay ₹25L for man's death in cylinder blast

Bengaluru: Eight years after an LPG cylinder explosion at their residence in Vasanthapura, south Bengaluru, claimed the life of a 37-year-old man, the Karnataka State Consumer Disputes Redressal Commission has ordered oil major Hindustan Petroleum Corporation Ltd (HPCL) to pay the bereaved family an enhanced compensation of nearly Rs 25 lakh, aside from Rs 1 lakh for deficient service and Rs 50,000 towards litigation costs, reports **Vindhya Pabolu**.

The man's 32-year-old wife, who sustained 33% burns in the blast, died in 2022.

On March 17, 2016, a malfunctioning LPG cylinder exploded, when a mechanic sent by HPCL's distributor Sugam Enterprises was attending to it. The blast caused critical injuries to Alamelamma's son Manjesh and daughter-in-law Padma. While Manjesh died a few days later, Padma succumbed to the burns on Nov 15, 2022, during the pendency of the case proceedings before the consumer court.

Padma, Alamelamma and her grandchildren Vishal Raj and Ankitha lodged a complaint against HPCL, its chief regional manager, Sugam Enterprises, and United India Insurance Co Ltd. Arguing that all the parties named were responsible for the malfunctioning cylinder and the subsequent damage, the family claimed Rs 95 lakh as compensation.

While HPCL and its regional manager did not file their statements, its distributor remained ex parte.

In its recent verdict, the consumer forum held that the Rs 5.4 lakh compensation initially provided was inadequate, considering the damages and losses faced by the family, including the medical expenses and loss of income. The court enhanced the compensation to over Rs 25 lakh.

India may rent oil storage in Southeast Asia for reserves

ISPRL is looking at Singapore, Japan, South Korea for strategic, logistical, economic viability

Rituraj Baruah
rituraj.baruah@livemint.com
NEW DELHI

State-run Indian Strategic Petroleum Reserves Ltd (ISPRL) is considering taking storage space on rent in southeast Asia to store crude oil. It is looking in particular at Singapore, Japan and South Korea for their strategic, logistical and economic viability, said two people in the know of the developments.

Commercial viability and accessibility would be key to deciding where to store the oil. The move is in line with achieving India's energy security.

"In order to increase its strategic reserves, India has been looking at various models, including hiring capacities abroad. Locations which would be finalized need to be commercially viable in terms of accessibility," the first person said, adding that it would have to be ensured that the renting charges are reasonable and do not surpass transportation costs.

This is not the first time India is considering storing crude outside the country. In 2020, India and the US had signed a memorandum of understanding cooperation in strategic petroleum reserves operation and maintenance, including exchange of information and best practices.

A joint statement had said the two



The move will help India achieve the IEA criteria of ensuring oil stock levels equivalent to not less than 90 days of the country's net imports.

HT

sides "discussed the possibility of India storing oil in the US Strategic Petroleum Reserve to increase their nation's strategic oil stockpile."

"There are sites in Japan, South Korea and Singapore which are being considered. However, it will have to be seen how viable are they and things would have to work out," said another person in the know of the latest developments.

Queries sent to ISPRL, the petroleum ministry, and the embassies of Japan, Singapore and the Republic of Korea in New Delhi remained unanswered till press time.

The second person said that among the oil-rich West Asian countries, the reserves in the United Arab Emirates may be looked at as they are better-located than those in other countries in the region, given that they are not beyond the Strait of Hormuz which has been under attack amid the ongoing turmoil in the region.

ISPRL has an existing crude storage capacity of 5.3 million tonnes, including 1.33 million tonnes in Visakhapatnam (Andhra Pradesh), 1.5 million tonnes in Mangaluru and 2.5 million tonnes in Padur (both Karnataka). India is building 6.5 million tonnes of storage at Chan-

dikhol in Odisha and Padur.

Strategic petroleum reserves can be used in times of supply disruption or emergency such as war or a global geopolitical situation.

The Abu Dhabi National oil Company (ADNOC), the national oil company of the UAE, joined Phase-I of India's SPR programme and has stored 5.86 million barrels of its crude in Mangalore. In 2018, it signed another MoU with ISPRL to explore storing ADNOC crude oil at ISPRL's underground oil storage facility at Padur, which has a 2.5 million tonne capacity.

On 16 June, *Mint* reported that the Centre is in discussions with Norwegian energy giant Equinor to secure its participation in India's strategic petroleum reserves (SPR), as part of efforts to enhance the energy security of the world's third-largest energy consumer.

The move to look for capacities for oil reserves abroad will also help India achieve the International Energy

Agency's (IEA) required criteria of ensuring oil stock levels equivalent to not less than 90 days of the country's net imports.

In a report in January, S&P Global had noted that India's total petroleum storage capacity is much lower than the levels held by some member nations of the IEA, and rising geopolitical risks and an anticipated growth in refining capacity are prompting the country to accelerate efforts to expand storage.

5.3 Mt
The ISPRL's existing crude storage capacity

6.5 Mt
Storage being built at Chandikhol in Odisha and Padur.

NexGen Energia Plans to Invest ₹15k cr in Green Diesel, CBG Pumps

Press Trust of India

Noida: Green energy solutions company NexGen Energia plans a ₹15,000 crore investment to open 5,000 green diesel and compressed biogas (CBG) pumps in the country over the next 10 years.

The Noida-based company recently inaugurated its first CBG pump in Mau district in Uttar Pradesh, marking its entry to execute engineering, procurement, and construction (EPC) services in the clean energy sector.

"The company's commitment to clean energy goes far beyond this single pump. Plans are afoot to



open a total of 5,000 green diesel and CBG pumps across the country in multiple phases over the next 10 years, with each pump costing around Rs 3 crore. In this manner, we are set to invest ₹15,000 crore in the green energy sector," NexGen Energia chairman Piyush Dwivedi said.

"This initiative will create around 5,000 new entrepreneurs and provide direct and indirect employment to over 10 lakh people. Our goal is to make India self-reliant in the green energy sector, thereby reducing fuel imports by about 30 per cent," Dwivedi said.

He said the company's vision goes beyond merely providing clean fuel as it is actively working to build a robust infrastructure to facilitate a sustainable future for transportation in India.

NexGen Energia to open 5,000 'clean' fuel pumps

PTI
feedback@livemint.com
NEW DELHI

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The Noida-based company recently inaugurated its first CBG pump in Mau district in Uttar Pradesh, marking its entry to execute engineering, procurement, and construction (EPC) services in the clean energy sector.

"The company's commitment to clean energy goes far beyond this single pump. Plans are afoot to open a total of 5,000 green diesel and CBG pumps across the country in multiple phases over the next 10 years, with each pump costing around ₹3 crore. In this manner, we are set to invest ₹15,000 crore in the green energy sector," NexGen Energia Chairman Piyush Dwivedi told *PTI*.

"Furthermore, this initiative will create approximately 5,000 new entrepreneurs and provide direct and indirect employment to over 10 lakh (million) people. Our goal is to make India self-reliant in the green energy sector, thereby reducing fuel imports by about 30 per cent," Dwivedi said.

He said the company's vision goes beyond merely providing clean fuel as it is actively working to build a robust infrastructure to facilitate a sustainable future for transportation in India.

"This significant expansion is expected to attract a substantial investment into the Indian economy, which will spur significant economic growth," the chairman added.

नेक्सजेन की 10 साल में 15,000 करोड़ रु. निवेश करने की योजना



एजेंसी ■ नोएडा

हरित ऊर्जा क्षेत्र की कंपनी नेक्सजेन एनर्जिया ने अगले 10 साल में देश में 5,000 ग्रीन डीजल और संपीडित बायोगैस (सीबीजी) पंप खोलने की योजना बनाई है। कंपनी इसके लिए 15,000 करोड़ रुपए का निवेश करेगी। नोएडा स्थित कंपनी ने हाल में उत्तर प्रदेश के मऊ जिले में अपने पहले सीबीजी पंप का उद्घाटन किया, जो स्वच्छ ऊर्जा क्षेत्र में इंजीनियरिंग, खरीद और निर्माण (ईपीसी) सेवाओं

को बढ़ावा देने की उसकी प्रतिबद्धता को दर्शाता है। नेक्सजेन एनर्जिया के चेयरमैन पीयूष द्विवेदी ने बताया, स्वच्छ ऊर्जा के प्रति कंपनी की प्रतिबद्धता इस एक पंप से कहीं आगे तक जाती है। अगले 10 वर्षों में कई चरणों में देशभर में कुल 5,000 ग्रीन डीजल और सीबीजी पंप खोलने की योजना है। प्रत्येक पंप की लागत लगभग तीन करोड़ रुपए होगी। इस तरह, हम हरित ऊर्जा क्षेत्र में 15,000 करोड़ रुपए का निवेश करने के लिए तैयार हैं।



नेक्सजेन की निवेश योजना

नई दिल्ली। हरित ऊर्जा क्षेत्र की कंपनी नेक्सजेन एनर्जिया ने अगले 10 साल में देश में 5,000 ग्रीन डीजल और संपीडित बायोगैस (सीबीजी) पंप खोलने की योजना बनाई है। कंपनी इसके लिए 15,000 करोड़ रुपये का निवेश करेगी। कंपनी ने हाल में उत्तर प्रदेश के मऊ जिले में अपने पहले सीबीजी पंप का उद्घाटन किया, जो स्वच्छ ऊर्जा क्षेत्र में इंजीनियरिंग, खरीद और निर्माण (ईपीसी) सेवाओं को बढ़ावा देने की उसकी प्रतिबद्धता को दर्शाता है। कंपनी के चेयरमैन पीयूष द्विवेदी ने बताया, "स्वच्छ ऊर्जा के प्रति कंपनी की प्रतिबद्धता इस एक पंप से कहीं आगे तक जाती है।"

नेक्सजेन एनर्जिया की 10 साल में 15,000 करोड़ रुपए का निवेश करने की योजना

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नेक्सजेन एनर्जिया की 10 साल में 15,000 करोड़ का निवेश करने की योजना

नोएडा, (भाषा)। हरित ऊर्जा क्षेत्र की कंपनी नेक्सजेन एनर्जिया ने अगले 10 साल में देश में 5,000 ग्रीन डीजल और संपीड़ित बायोगैस (सीबीजी) पंप खोलने की योजना बनाई है। कंपनी इसके लिए 15,000 करोड़ रुपये का निवेश करेगी। नोएडा स्थित कंपनी ने हाल में उत्तर प्रदेश के मऊ जिले में अपने पहले सीबीजी पंप का उद्घाटन किया, जो स्वच्छ ऊर्जा क्षेत्र में इंजीनियरिंग, खरीद और निर्माण (ईपीसी) सेवाओं को बढ़ावा देने की उसकी प्रतिबद्धता को दर्शाता है। नेक्सजेन एनर्जिया के चेयरमैन पीयूष द्विवेदी ने पीटीआई-भाषा को बताया, स्वच्छ ऊर्जा के प्रति कंपनी की प्रतिबद्धता इस एक पंप से कहीं आगे तक जाती है। अगले 10 वर्षों में कई चरणों में देशभर में कुल 5,000 ग्रीन डीजल और सीबीजी पंप खोलने की योजना है। प्रत्येक पंप की लागत लगभग तीन करोड़ रुपये होगी। इस तरह, हम हरित ऊर्जा क्षेत्र में 15,000 करोड़ रुपये का निवेश करने के लिए तैयार हैं। उन्होंने कहा कि इस पहल से लगभग 5,000 नए उद्यमी तैयार होंगे और 10 लाख से अधिक लोगों को प्रत्यक्ष और अप्रत्यक्ष रूप से रोजगार मिलेगा। द्विवेदी ने कहा, हमारा लक्ष्य भारत को हरित ऊर्जा क्षेत्र में आत्मनिर्भर बनाना है, जिससे ईंधन आयात में लगभग 30 प्रतिशत की कमी आएगी।