

Need Diversified Energy Sources to Overcome Transition Challenges

Team ET

New Delhi: India needs to target a diversified set of energy sources including renewable, thermal, green hydrogen, nuclear, and biofuels to minimise risks associated with energy systems while aiming for low carbon emissions, said the Economic Survey for 2023-24.

The country's energy needs are expected to multiply 2-2.5 times by 2047 to meet the developmental priorities and aspirations of a growing economy, it said. India's renewable energy sector is expected to attract about Rs 30.5 lakh crore in investments between 2024 and 2030, the survey said, citing estimates by Indian Renewable Energy Development Agency.

On the challenges in energy trans-

ition, the survey pointed that the country's heavy reliance on energy imports, mainly petroleum, should not shift to a similar trade dependency on solar panels and critical minerals where supply chains and geopolitics may be more complicated. The survey noted major challenges facing

the country's energy transition are technology, raw materials, availability and access to affordable finance, and availability of land. Supply of land is a major challenge for India, it said, suggesting that it is vital to reckon with the opportunity cost of land and capital being used for renewable

energy. The transition cost could increase with an expected rise in land use for renewable energy projects, and with challenges in availability and access to affordable financing.

Meanwhile, India's green hydrogen production aim is facing constraints on both supply and demand side, the survey said, referring to the cost of production and delivery, and readiness to consume the fuel in traditional industrial processes.

While bringing renewable energy, the focus should also be on actively adopting clean coal technologies, the survey said. It noted that the share of non-fossil sources in installed power capacity has reached 45.4% as of May-end, but coal accounts for nearly 70% of total electric generation and is critical in industries like steel, sponge iron, cement, and paper.

India's Energy Mix in Installed Capacity

| Source | Capacity in GW |
|-------------|----------------|
| Thermal | 243 |
| Hydro | 47 |
| Nuclear | 8 |
| Wind | 47 |
| Small Hydro | 5 |
| Bio | 11 |
| Solar | 86 |

Source: National Power Portal



A new PSU isn't the answer

A lot has been written about India's burgeoning freight costs and what must be done about them. Experts warn that the country, which incurred freight costs of \$85 billion in 2019-20, will see that figure rise to about \$400 billion by 2047. What rankles even more is that all this money is being paid out to foreign shipping companies. So now, public sector undertakings (PSUs) in the fields of gas, oil, coal and fertiliser are being asked to leap into the (for them) uncharted waters of shipping by floating their own shipping company. Once more policymakers seem to be going back to the old and tested remedy for any financial or managerial problem: Start another PSU.

The first point to be considered is whether a new company, whether government or private, will actually result in the reduction of freight costs. The plain answer seems to be a resounding no. Freight is a function of the market and freight rates are determined by the forces of supply and demand. It is true that you will be offered different freight rates depending on whether you access the spot market or go in for a long-term charter. There are pros and cons attached to both. But in either case, a government company is unlikely to offer a lower rate than that dictated by the market.

What upsets most people is that we pay freight to foreign companies in foreign exchange. Critics argue that this money should instead go to home-grown companies flying the Indian flag. These companies too will be paid in foreign exchange but the exchange so earned will come back to the country. With foreign exchange reserves now standing in excess of \$650 billion, it seems a little odd to form a new government company simply because you want to save foreign exchange. It would be more sensible to ask for greater efficiency, lower freight rates, and quicker turnaround time.



MICHAEL PINTO

The other concern would be that India already has a PSU in the shipping sector, which is, in fact (in terms of ships and tonnage owned), the largest Indian shipping company. But for the last several years, the Shipping Corporation of India (SCI) has been on the block for privatisation. For one reason or another, this has been delayed. However, news emanating from official circles after the election results reiterates the government's firm commitment to proceed with the privatisation of SCI. So, why sell one government company and start another one in the same field?

Several commentators have pointed out the difficulties that a new company charged specifically with catering to the import needs of PSUs in the crude oil, fertiliser and gas fields would face. For one, in much of our oil imports, the seller gets to nominate the carrier. There is no guarantee that they will choose an Indian-flagged vessel. In fact, the chances are that they will not, especially if their agents or they themselves own ships. Even if we get the nomination, our crude carrier would have to go on ballast (empty) to the load port, thus making the operation much more expensive.

Uni-directional traffic is, by very definition, uneconomical and would seriously affect the company's bottom line.

The problem really is that, with about 1,500 large vessels, the Indian fleet is still very small. In niche areas like containers, for example, it is almost non-existent. Experts agree that a country with a sufficiently large tonnage under its belt is usually able to secure lower freight costs. The very size of the fleet ensures that market forces work in its favour. The only question is whether the larger fleet should come solely through state investment.

One largely forgotten initiative that the government took to grow the fleet as far back as in 1959

was the establishment of the Shipping Development Fund (SDF). The SDF extended loans at highly concessional rates to shipowners to help them acquire ships. From its inception until it was wound up in 1987, the SDF extended loans to the tune of ₹1,452 crore to the shipping industry, of which nearly half went to the private sector. The effect of the loans provided by the SDF was almost magical. From a size of 0.75 GRT in 1959, the Indian fleet reached close to 6 million GRT by the end of the 1970s.

With a little fine-tuning, this method could be tried again. This time, lending for this scheme should come from banks, while the government's contribution should only be to defray the interest costs to the shipowner. Not only does this ensure a much lower budgetary outlay, but project appraisal is now with the bank that has the necessary expertise to do this rather than the government that does not. This should greatly reduce the incidence of bad loans.

Other reforms could include scrapping the preference given to small enterprises owning only one ship. During industry downturns, these single-ship companies often become the first casualties, and their lack of other assets makes recovery difficult. The policy should prioritise those most likely to succeed regardless of their size. It should also ensure that the choice of which yard to buy from must be left entirely to the shipowner. It must not insist on ships built only in Indian yards or with Indian raw material like steel or electronics or engines. The objective of the scheme is to grow the flag and not to support local shipyards or suppliers.

The Golden Age of Indian fleet expansion has never been repeated, and subsequent growth has been tepid. Of course, there are also other reasons at play, but for policymakers the moral of the story is that starting a new PSU is not necessary to expand the fleet. A sound financial policy that supports all owners, private and public, is likely to be more effective.

The writer is former shipping secretary, Government of India

FINE PRINT

Navigating energy transition with energy security



CHANDNI RAINA & RITIKA BANSAL

Energy, with its strong positive correlation to every conceivable aspect of development, such as economic growth, access to education, improved health, availability of water, nutrition, infrastructure, and even life expectancy, can, as the phrase goes, 'move mountains'.

The vision to achieve Viksit Bharat@2047 and to do so in a manner consistent with the announcement to be Net Zero in GHG emissions by 2070 underscores the urgent need for India to transition to greener forms of energy or 'Energy Transition'.

This means shifting from traditional, polluting energy sources like coal to cleaner, renewable sources like solar and wind. At the same time, we must ensure safe, reliable, and improved access to energy at reasonable prices to facilitate economic growth and achievement of the developmental priorities of a country or 'Energy Security'.

A recent report by the Principle Scientific Adviser, Government of India and IIM Ahmedabad (<https://tinyurl.com/4764d2na>) estimates India's energy demand to double by 2040. IEA estimates show that India leads global energy demand growth in every World Energy Outlook (WEO) scenario.

The European Union consumes 34,888 kWh per person, while the UK and the US have per capita levels of 28,501 kWh and 77,028 kWh, respectively, while India consumes only 7,586 kWh per person. Indeed, India's energy consumption would need to appreciate significantly during the Amrit Kaal, a period of rapid economic growth, to power economic growth, meet the SDG commitments and achieve all-round prosperity.

This growth must be in line with MISSION LiFE, a national initiative for sustainable development and energy efficiency.

So far, India has pursued a dual approach towards this objective, focusing on phasing in renewable sources of energy and improvements in energy efficiency.

Both have been hugely successful, with non-fossil fuel's share in installed electricity capacity at 45.4 per cent and a reduction in the emission intensity of GDP by 33 per cent in 2019 compared to 2005.

Specific policy and regulatory interventions such as the Energy Conservation Building Code, Shunya labelling programme, Standards and Labelling programme, star rating of appliances, among others, including fuel composition, promotion of an ecosystem that supports electric vehicles and measures to promote energy-efficiency pump sets in agriculture, will play a vital role in enabling further reduction in the emission intensity (@Economic Survey 2024-25).

Even so, more than 80 per cent of India's current energy demand is met through fossil fuels.

The intermittency of renewable energy sources (due to the dependence on the sun and wind) and the lack of viable battery storage technologies (that would have allowed energy storage to tackle intermittency) are inherent limitations, requiring coal to remain essential to ensure power grid stability.

The associated costs, therefore, increase the price of a 'round-the-clock' energy supply through renewable sources. Further, the high opportunity cost of scarce land resources required for renewable energy must be factored in as renewable power capacity is scaled up.

Strategic investments in Research and Development are crucial for a smooth transition to low-carbon development strategies. These investments will identify and deploy viable low-emission and clean technologies such as Carbon Dioxide Removal (CDRs), Bioenergy with CO₂ Capture & Storage (BECCS), Carbon Capture, Utilisation and Storage (CCUS), and coal gasification.

The urgency for technological innovation requires an active collaborative effort between industry and prominent national-level public and private educational institutions. Collaboration in technology with other countries could also support domestic efforts.

Energy transitions have never been achieved within a single generation and certainly not globally as is being attempted now. The West's quiet burial of the principle of 'Common but differentiated responsibilities and respective national capabilities' while pursuing energy-guzzling technologies like Artificial Intelligence makes it doubly harder for developing countries like India. Unlike the developed countries that have already reached higher per capita energy consumption and carbon emissions, India's task is to scale up its energy consumption and move to greener sources as it does so.

Therefore, India's economic growth will rely on various energy sources, including fossil fuels, albeit with cleaner coal technologies. Given India's legitimate growth aspirations, its approach to 'Net Zero' demands an approach that recognises and incorporates fiscal, banking, social, and employment implications.

Further, it must address the challenges posed by resource scarcity and technological limitations. With domestic financial resources as the mainstay, access to global financial resources at an affordable cost will remain a critical piece of the strategy.

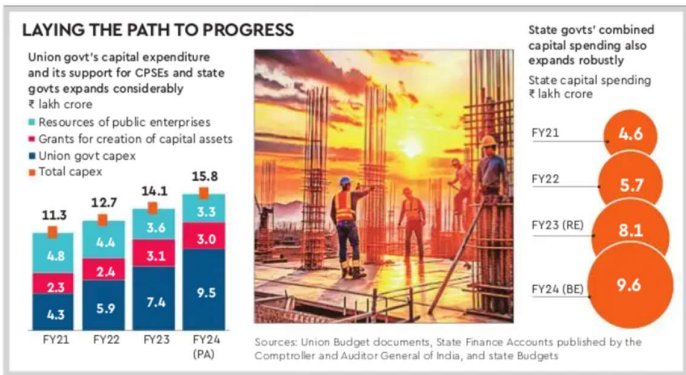
The authors belong to the Indian Economic Service and are with the Department of Economic Affairs, Ministry of Finance. The views are personal



\$26.5
BN Net foreign direct investment (FDI) that came to India in the 2024 financial year

₹15.8
TRN Centre's total capex in the infrastructure sector and support to CPSEs and states

\$44.5
BN Repatriation of investment in FY24. The figure stood at \$29.3 billion in FY23



India's green mobility goals face complex hurdles

Alisha Sachdev

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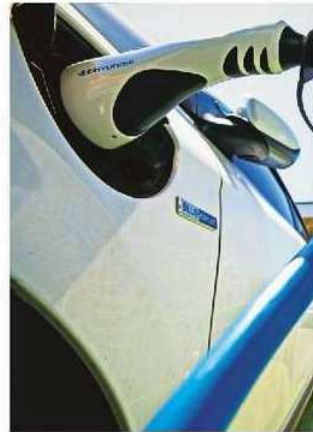
NEW DELHI

In its commitment to green mobility, underscored by the Economic Survey 2024, the Indian government calls for a multifaceted approach to shift from traditional fossil fuels to electric vehicles (EVs). India has pledged to reduce its greenhouse gas emissions by 33-35% from 2005 levels by 2030, increase non-fossil-fuel-based electricity to 40%, and increase forest cover to absorb more carbon dioxide.

Achieving these targets necessitates a delicate balance between policy alignment, technological advancement, and addressing economic and environmental implications, the survey said.

According to the survey, it is crucial to align India's electric mobility policy "with the optimal energy mix of traditional and renewable sources". Ensuring grid stability, developing affordable storage technologies, and evaluating the role of nuclear energy are pivotal to making electric mobility pervasive. However, these advancements come with significant challenges.

India's dependence on critical-mineral imports, particularly from China, poses a substantial risk to its green mobility ambitions. These minerals are essential for manufacturing EVs and other renewable-energy technologies. The opportunity cost of land and capital, the potential impairment of bank balance sheets owing to stranded assets, and the fiscal



The Economic Survey batted for a multifaceted approach to green mobility. **BLOOMBERG**

implications of transitioning from fossil fuels to EVs are other critical factors that need thorough examination, it said.

The survey also highlighted the substantial environmental and monetary costs associated with the life-cycle of renewable-energy infrastructure, such as solar panels and wind turbines, which require significant land and periodic replacements and could thus create enormous waste problems.

The transition to EVs is likely to affect various sectors, including the freight revenues of Indian Railways, which rely heavily on transporting coal. The phasing out of coal-fired plants and the shift from internal combustion engine vehicles to EVs will also affect tax revenues from the sale of petrol and diesel, posing additional economic challenges to both the union and state governments, the Economic Survey said.

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India's dependence on critical-mineral imports poses a substantial risk to its green mobility ambitions



IOC equips Indian Navy with green hydrogen fuel cell bus

NEW DELHI: In a significant milestone towards promoting sustainable, eco-friendly transportation solutions, IndianOil has handed over a state-of-the-art green hydrogen fuel cell bus to the Indian Navy. This landmark event was marked by the signing of a Memorandum of Understanding (MoU) between IndianOil and the Indian Navy to pioneer the deployment of hydrogen fuel cell technology for heavy-duty e-mobility.

In the presence of Admiral Dinesh K Tripathi, Chief of Naval Staff, S M Vaidya, Chairman, IndianOil and senior officials of IndianOil and Indian Navy, the MoU was exchanged between Vice Admiral Deepak Kapoor, Controller of Logistics, Indian Navy and Dr Kannan Chandrasekaran, Executive Director, IndianOil at the Nau Sena Bhawan, New Delhi.

It is pertinent to mention here that IndianOil is currently operating 15 fuel cell buses in Delhi-NCR and Gujarat, accumulating a total mileage of 300,000 kilometres, where each bus is expected to run at least 20000 kms.

This initiative aims to promote hydrogen and fuel cell technology for heavy-duty e-mobility, positioning the Indian Navy as a pioneer in evaluating this technology in collaboration with IndianOil, the premier energy company of India. **MP05T**

रिलायंस का नया बिजनेस सोलर, बैटरी स्टोरेज के लिए प्रोजेक्ट शुरू किया

मुंबई | रिलायंस इंडस्ट्रीज ने जामनगर में अपनी सोलर सौर और बैटरी ऊर्जा भंडारण परियोजनाओं का पायलट प्रोजेक्ट शुरू कर दिया है। कंपनी इस वर्ष के अंत में 9.6 गीगावाट मॉड्यूल का उत्पादन शुरू करने वाली है। मुकेश अंबानी के नेतृत्व वाला यह समूह अपने नए एनर्जी बिजनेस के तहत 5,000 एकड़ में विशाल गीगा कॉम्प्लेक्स का निर्माण कर रहा है। इसमें 1000 करोड़ डॉलर (करीब 83,600 करोड़ रुपए) से अधिक का निवेश किया जाएगा। मामले से जुड़े लोगों ने यह जानकारी दी। ग्रीन एनर्जी बिजनेस में रिन्यूएबल

एनर्जी और हाइड्रोजन जैसी नई एनर्जी शामिल है। इनसे कंपनी के विकास के अगले चरण को आगे बढ़ाने की उम्मीद है। हालांकि रिटेल और डिजिटल जैसे कंज्यूमर-ओरिएंटेड बिजनेस अभी भी विकास के चरण में हैं, लेकिन दोनों ने एक स्थिर स्थिति प्राप्त कर ली है। ये दोनों बिजनेस अपनी रफ्तार से आगे बढ़ेंगे। वित्त वर्ष 2025-26 की बिक्री के आधार पर नुवामा रिसर्च द्वारा नए एनर्जी बिजनेस का मूल्यांकन 1.67 लाख करोड़ रुपए आंका गया है, जो रिलायंस इंडस्ट्रीज के कुल बिजनेस का 12% है।

बायोगैस प्लांट से दो भाइयों ने निकाला समृद्ध और लाभकारी पशुपालन का रास्ता

निहाल सिंह • जागरण

नई दिल्ली: दिल्ली के दो किसान भाइयों ने बायोगैस प्लांट से समृद्ध व लाभकारी पशुपालन का ऐसा रास्ता निकाला है, जो देशभर के पशुपालकों के लिए नजीर है, क्योंकि उसमें सफल सहकारिता का भी मिश्रण है।



मदनपुर खादर, डेरी कालोनी निवासी संदीप सिंह व मंदीप सिंह ने बायोगैस प्लांट लगाकर न सिर्फ गोबर व चारे से नालियों व सीवर को जाम होने से बचाया है, बल्कि उससे गैस बनाकर बिजली और गैस मद में हर माह तीन से चार लाख रुपये की बचत कर अपनी डेरी को आत्मनिर्भर बनाया है।

इस प्लांट से उनके साथ 30 डेरियों के संचालक भी जुड़े हुए हैं। स्थिति यह है कि न सिर्फ उनकी,

बल्कि आसपास के उन सभी 30 डेरियों का बिजली बिल शून्य हो गया है। साथ ही प्लांट के गैस का उपयोग कर गैस सिलेंडरों का भी उपयोग बंद कर दिया है। इसी तरह प्लांट से निकल रहे सूखे व तरल कचरे को बेचकर पशुओं के चारे का भी इंतजाम कर ले रहे हैं।

कुछ डेरियों के मालिक संदीप बताते हैं कि दोस्त की सलाह पर उन्होंने बायोगैस प्लांट लगाने का निर्णय लिया और इससे संबंधित कंपनियों से संपर्क शुरू किया। वर्ष 2021 में एक करोड़ की मदद से दोनों भाइयों ने यह प्लांट लगाना शुरू किया। साथ ही आसपास की डेरियों से भी सहयोग के लिए संपर्क साधा। आसपास 200 डेरी उद्योग हैं। वर्ष 2022 में संदीप का यह प्लांट चालू हो गया, जिससे अब तक गैस व बिजली मद में 72 लाख रुपये की सीधी बचत कर चुके हैं। इस प्लांट से प्रतिदिन 10 टन गोबर से 1,000 यूनिट बिजली और 330 किलो

• बिजली और गैस मद में प्रति माह हो रही तीन लाख रुपये की बचत

• प्लांट से निकले खाद को बेचने से चारे का भी खर्चा हुआ आधा



मदनपुर खादर डेरी कालोनी में स्थापित बायोगैस संयंत्र में बनाई गई नाली से प्रत्येक डेरी से गोबर पानी के साथ आता है, इससे बायोगैस व बिजली का निर्माण होता है। इससे कालोनी में 30 डेरी में बिजली और गैस की आपूर्ति हो रही है • विपिन शर्मा

प्लपीजी तैयार होती है, जिसे डेरी संचालकों को गोबर देने के बदले बांट दी जाती है। संदीप कहते हैं कि अब दूसरे डेरी संचालक भी इस संबंध में उनसे राय ले रहे हैं।

पशुओं को नहलाने और फर्श धोने में उपयोग पानी का हो रहा है सदुपयोग: वे बताते हैं कि बायोगैस प्लांट के लिए पानी की जरूरत होती है, जिसके लिए उन्होंने पशुओं को नहलाने और

उनके स्थान को धोने में इस्तेमाल होने वाले पानी के उपयोग की योजना बनाई। इसके लिए आसपास की डेरियों से प्लांट तक पाइप लाइन बिछाई है।

किसानों को मिल रहा है जैविक खाद, चारा हुआ सस्ता: प्लांट से गैस और बिजली बनाकर उससे बचत तो की जा रही है, साथ ही उससे निकलने वाली सूखी और तरल खाद किसानों को देकर पशुओं के लिए सस्ता चारा मिल जा रहा है। संदीप सिंह बताते हैं कि फरीदाबाद, नजफगढ़ व बल्लभगढ़ समेत आसपास के जिले के किसानों से पशुओं का चारा आता है। उसके बदले वे अपने खाली वाहन में डेरी से सूखी और तरल जैविक खाद ले जाते हैं। इससे उन्हें दो फायदे होते हैं एक तो चारा 30-40 प्रतिशत कम दाम पर, साथ ही जैविक चारा मिल जा रहा है, जिससे उनकी भैंसों भी सेहतमंद हैं और दूध अधिक दे रही हैं। वहीं, कुछ किसान सीधे उनसे

जैविक खाद खरीदते हैं।

भैंसों को नहलाने में फागर के प्रयोग से हो रही पानी की वचत: बायोगैस प्लांट से संदीप और मंदीप पर्यावरण संरक्षण के साथ स्वच्छता में सहयोग कर रहे हैं। उनकी कोशिश जल संरक्षण की भी है। संदीप सिंह ने बताया कि प्रकृति की ओर से दी गई चीजों का अत्यधिक दोहन उसे खत्म कर रहा है। ऐसे में जरूरी है कि सीमित और कम उपयोग किया जाए। इसलिए पशुओं को धोने में इस्तेमाल पानी का बायो प्लांट में सदुपयोग करने के साथ पशुओं को नहलाने और उन्हें ठंडा रखने के लिए फागर का इस्तेमाल कर रहे हैं।

एमसीडी के प्रयास नहीं हुए सफल: ऐसा नहीं कि दिल्ली की अन्य डेरियों में बायोगैस प्लांट नहीं हैं। एमसीडी ने पीपीपी माडल पर प्लांट लगाए हैं, लेकिन वे कई कारणों से सफल नहीं है। अब एमसीडी इससे संबंधित नीति में बदलाव की तैयारी में है।

इंडियन ऑयल ने भारतीय नौसेना को ग्रीन हाइड्रोजन ईंधन सेल बस से सुसज्जित किया

वैभव न्यूज ■ नई दिल्ली

इंडियन ऑयल ने सुदृढ़, पर्यावरण-अनुकूल परिवहन समाधानों को बढ़ावा देने की दिशा में एक महत्वपूर्ण कदम उठाते हुए, भारतीय नौसेना को एक अत्याधुनिक हरित हाइड्रोजन ईंधन सेल बस सौंपी है। हेवी-ड्यूटी ई-मोबिलिटी के लिए हाइड्रोजन ईंधन सेल प्रौद्योगिकी के प्रयोग में अग्रणी बनने के लिए इंडियन ऑयल और भारतीय नौसेना के बीच एक समझौता ज्ञापन (एमओयू) पर हस्ताक्षर किया गया। यह एक ऐतिहासिक क्षण था। नौसेना प्रमुख एडमिरल दिनेश के त्रिपाठी, इंडियन ऑयल के अध्यक्ष एस एम वैद्य और इंडियन ऑयल तथा भारतीय नौसेना के वरिष्ठ अधिकारियों की उपस्थिति में, नई दिल्ली के नौ सेना भवन में वाइस एडमिरल, दीपक कपूर, भारतीय नौसेना के लॉजिस्टिक नियंत्रक और इंडियन ऑयल के कार्यकारी निदेशक डॉ. कन्नन चंद्रशेखरन के बीच समझौता ज्ञापन का आदान-प्रदान किया गया। भारतीय नौसेना के नौसेना प्रमुख एडमिरल दिनेश के त्रिपाठी ने इस अवसर पर अपने विचार साझा करते हुए कहा, इंडियन ऑयल और भारतीय नौसेना के बीच साझेदारी



विश्वास के अटूट बंधन पर बनी है। हम हाइड्रोजन बसों में से एक का परीक्षण करेंगे और बड़ी संख्या में पर्यावरण-अनुकूल परिवहन को तैनात करने के लिए उत्सुक हैं। भारतीय नौसेना को अपने भागीदार के रूप में चुनने के लिए मैं इंडियन ऑयल को धन्यवाद देना चाहूंगा। यह बस हमारे आदर्श वाक्य भारतीय नौसेना - युद्ध के लिए तैयार, विश्वसनीय, एकजुट और भविष्य के लिए तैयार बल+ को सुशोभित करेगी। इंडियन ऑयल के अध्यक्ष एस एम वैद्य ने इस पहल के बारे में उत्साह व्यक्त करते हुए कहा, आज, भारतीय नौसेना के लिए इस उन्नत ग्रीन हाइड्रोजन ईंधन सेल बस के माध्यम से स्थिरता और पर्यावरणीय प्रबंधन की हमारी साझा खोज में यह

प्रयास एक महत्वपूर्ण मील का पत्थर हैं। साथ ही नवाचार और हरित प्रौद्योगिकी के प्रति हमारी प्रतिबद्धता का प्रतीक है। उन्होंने आगे कहा, हम कल की जरूरतों को पूरा करने वाले नवोन्मेषी, दूरदर्शी समाधानों के साथ अपने रक्षा बलों का निरंतर समर्थन करते हैं। इंडियन ऑयल हरित हाइड्रोजन और ईंधन सेल प्रौद्योगिकियों को आगे बढ़ाने में अग्रणी रहा है।

यहां यह उल्लेख करना उचित है कि इंडियन ऑयल वर्तमान में दिल्ली-एनसीआर और गुजरात में 15 ईंधन सेल बसें चला रहा है, जो कुल 300,000 किलोमीटर का माइलेंज देती हैं, जहां प्रत्येक बस के कम से कम 20000 किलोमीटर चलने की उम्मीद है।