

Hydrogen & Gas based Mobility Conference 2021



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Via CiscoWebex



Address by Sh. Nitin Gadkari, Union Minister for Roads, Transport, and Highways, Govt. of India.

India is one of the fastest growing economy leading with sustainable and climate neutral developments. We strongly believe that society should be livable, workable and sustainable, all with a focus on ethics, ecology and the environment. India is committed to meet the Paris Climate Agreement and efforts are centered to reduce the carbon emissions by 33% to 35% by 2030. We are also committed to achieving NetZero carbon emission by 2050 as per the vision proposed by the Hon'ble Prime Minister Sh. Narendra Modi. Till now, India has made significant progress towards improving green energy access while increasing the integration of renewable energy and currently India stands at the 5th position for overall installed capacity for renewable energy. With the government's supportive policies, we are set to achieving the targets of 450 GW capacity for renewable energy by 2030. Being the Minister for Road Transport

and Highways, I am responsible for the development highways and road infrastructure across the country, ensuring accessibility and mobility of persons and vehicles with ease, safety and efficiency. We always plan highways in a manner which is integrated and complemented to other modes of transport like rail, waterways, and airways. With the second largest road network in the world, India's road networks carry 90% passenger traffic and 70% logistics of the country, and the transport sector consumes 18% of the energy demand of India. Unfortunately, India's energy demand is heavily import dependent, i.e. 85% for crude oil, 53% for gas, and 24% for coal and we are spending over USD 160 billion on this import annually. This import bill will double for in the next 4-5 years. Further, India is the world's 3rd largest emitter with 3.6 giga tons of CO₂ emitted across all the sectors. These issues have a huge impact on the economy, environment, and human health. We all know that Green Hydrogen is made by using renewable sources to

produce hydrogen, using water electrolysis or other methods. We can use solar or tidal energy for making green hydrogen. We need proven technology and economic viability, and green hydrogen as an energy carrier can replace some of our energy imports and it is a zero-carbon substitute for imports of oil, gas, coal, etc. 70% green hydrogen production costs come from electricity, and surplus energies from renewables can enhance green hydrogen production. In states where the cost of electricity is low, private investments can be encouraged coupled with energy policies to produce green hydrogen. With vast and economically efficient renewable resources in India, we can lead the world in green hydrogen, and can emerge as *electro-state* and thus become energy independent. We can also use solid and liquid waste to make methane which can be converted to bio-CNG, and also explore converting solid waste into green hydrogen towards a clean *Bharat* mission. The global Hydrogen Council has identified India as a net exporter of green hydrogen from 2030 due to cheap renewables tariff. Green hydrogen could

be a power source for energy intensive industries like oil refining, steel, cement, fertilizer, mining, and industrial heating. These industrial sectors can give the scale to bring prices of green hydrogen down which can be a big boost for utilization of green hydrogen in transport to compete directly with fossil fuels. The current price of green hydrogen in India is estimated at INR 880 per kilogram which increases the fuel costs, and for hydrogen-based transport to succeed, green hydrogen prices should come below INR 100 per kilogram, and this can only happen if green hydrogen is produced in a large scale. The government has announced a National

Hydrogen Energy Mission where INR 800 crores has been set aside in the current Union Budget to establish hydrogen-based energy ecosystem in the country. Production of hydrogen and e-fuels is the first steps towards a hydrogen economy. For setting up hydrogen dispensation and production by electrolyzers, the government is supportive of local manufacturing to develop the technology and promote indigenization. As India is a highly cost-conscious market, there are huge expectations of rapid reductions in prices of electrolyzers and fuel cells. To scale-up and keep costs in control, we must have projects ready to use the electrolyzers and fuel cells, thus creating demand which can be ramped up quickly. An Indian company, Reliance Industries, is going to invest INR 75,000 crores into the Indian green energy business. A major part of this investment will be used to build electrolyzers and fuel cells which will significantly boost the country's nascent hydrogen economy. With government incentives, localization of components, market demand, and increased volumes, the overall economics of hydrogen ecosystem is likely to improve. The hydrogen ecosystem can create a USD 20 billion market in India and will enhance domestic job creation. In addition, there is a massive opportunity to create regional hubs for exports of high value green products and EPC services owing to the nascent stage of the industry. Tata motors is already developing hydrogen powered buses which will soon be part of the public

“We will make a suggestion to the government that whatever concessions we are offering to electric vehicles, we will offer the same to green hydrogen vehicles also.”
- Nitin Gadkari

transport system. Indian Oil and NTPC have already issued tenders in the green hydrogen field, and we encourage other PSUs to come forward and become a part of this hydrogen revolution. UK and Germany have developed a train running on hydrogen fuel technology which is noiseless, pollution-free and carries 300 passengers in air-conditioned coaches and runs at a speed of 150 kmph. We could also think of dedicated mini-metro rails and broad-gauge metro lines which can be powered by hydrogen. KPIT Technologies has developed a prototype car running on indigenous fuel cells. India can be seen as a next exporter of

hydrogen to European, south-East Asian countries, and African nations, therefore, building local infrastructure is very important. Start-ups and SMEs can play an important role in innovation and quick development whereas established companies can provide large-scale manufacturing base. The time is right for the government to tap the demographic dividend of the country and start serious planning for the human resource need of this sector and a panel could be formed to offer an M. Tech course in hydrogen and related subjects at Indian Institute of Petroleum and IITs. Policy clarity is very important and the industry should not be confused between battery and fuel cells and each has its distinct markets. The immediate focus is to build world-class technologies for hydrogen transport over the next 5 - 10 years and India should build fuel cells and storage tanks which are sustainable and suitable for Indian temperatures and conditions. In the world, there is only one company, Du Pont, which controls the Nafion membranes technology. India has to create an alternate technology to achieve *aatmanirbhar Bharat* in fuel cell technologies. Hydrogen blended CNG, H-CNG, is also going on and this will help the transport sector to learn how to handle hydrogen. It is also true that hydrogen infrastructure will need to adopt more stringent safety measures. I sincerely hope that all these initiatives would bring a revolution in the transport sector and will support

and encourage a clean and green energy ecosystem in the country. The government is supportive of the all-round and inclusive developments and collective efforts of all stakeholders will bring improvement in climate resettlement. The industry needs to explore collaborations with international research agencies and to develop a global platform for communication and exchange of ideas. Innovation, entrepreneurship, science and technology, necessary skills, etc. can be termed as knowledge, and conversion of this knowledge into wealth is the future. One of the important subjects in the *aatmanirbhar Bharat* vision of the Prime Minister, is hydrogen and alternative fuels.



Shri Gajendra Singh Shekhawat
Minister of Jal Shakti

Excerpts of the address:

We are all aware that the biggest challenge for India is the trade deficit. We are importing energy to the tune of INR 10,00,000 crores. Globally whenever there was an opportunity for transformation in the field of power, the atomic energy for the first time, we were the last to board the bus; then solar came where we do not have sufficient manufacturing capacities, and then came hydrogen. We are all aware that hydrogen is the future of energy, and this is the time to act to become a global leader in this new age energy dynamics. Hydrogen is not new, we have been using the gas in several industries across India, however, the hydrogen is not produced from clean sources. Green hydrogen is the key to clean energy and in India, the cost of solar power is reducing drastically, but the lowest cost of solar is in Saudi Arabia of

just INR 0.76 per unit. We should take a key lesson from Saudi Arabia, whose Minister of Energy said that they are no longer just an oil exporting nation, but an energy exporting nation, that a nation so well endowed with oil is looking at hydrogen. So India, definitely needs to gear up to adopt this clean fuel ecosystem and transform our energy outlook and turn the tables. Hydrogen can not only be used in the power industry, but also in mobility, energy storage, industrial processes. We are all working to improve storage of energy, and batteries are not a workable solution for India. Decentralization of hydrogen production, near the areas of primary consumption and I see in the future that each and every existing petrol station having its own electrolyser and hydrogen refueling stations for vehicles. The Prime Minister's vision of *aatmanirbhar Bharat* can only be achieved by electrifying the economy and a combination of renewables and hydrogen is the only way forward.



Mr. Amitabh Kant
CEO, Niti Aayog

Excerpts of the address:

Electricity dominates the public discourse on energy economy. On the other hand, electricity contributes only 18% of India's total energy demand. The rest 82% comprises different forms of energy such as biomass, coal, oil, and gas. Unfortunately, our energy sector is heavily import dependent, and the volatility in the prices of such imported fuels, especially crude oil and natural gas creates huge impact on the import bill, which is close to USD 160 billion, and this will double over the next decade. India will overtake the EU as the world's third largest energy

consumer by 2030 as per the IEA. India will also account for the biggest demand growth over the next two decades, this is a challenge, but it also creates new opportunities for growth. India has the potential to completely reimagine its energy economy that is suitable to the current demand of clean energy and sustainable products. Green hydrogen is made by splitting water using renewable power. Over time green hydrogen as an energy carrier can replace some of the energy imports of India. This is feasible by locally utilizing India's record low renewable power prices. Global Hydrogen Council has in a recent study classified India as a net exporter of green hydrogen from 2030 due to cheap renewable tariffs. Hydrogen is also a chemical feedstock in the existing global market of about 70 million tons. India already consumes about 8.5% of the global hydrogen demand which is made by reforming import dependent natural gas. Wind and solar can provide the electricity to power homes and EVs but green hydrogen could be an ideal power source for energy intensive industries like refining, steel, cement, fertilizer, heavy mobility, and industrial heating. India is the world's 3rd largest emitter of carbon dioxide across sectors and green hydrogen will play a major role in our energy transition. Some countries with rich gas and petroleum reserves are also pushing for a green hydrogen economy, as it opens up a new market for them. On the other hand, India with limited local hydrocarbon resources and huge renewable potential, can become a major producer of green hydrogen on account of the low solar prices. Green hydrogen is also critical to meet India's target of 450 GW of renewable energy capacity by 2030. It is critical to understand that every 1 GW of green hydrogen from electrolysis will require 3 GW of renewable power. So, the potential is huge. Green hydrogen is a sunrise industry and will facilitate Indian entrepreneurs capture new avenues of growth. Locally produced green hydrogen can attract high value green industries like green steel, green chemicals, and usher in green production in India. Localization of electrolyser production and EPC of green H₂ projects could create USD 18-20 billion green technology in India and will enhance domestic job creation. In addition,

there is a massive opportunity to create regional hubs to export high value green products owing to the nascent stage of the industry. So, what should India do to build a global scale green hydrogen industry? For hydrogen transport to succeed, green hydrogen prices should come down to USD 1.5/kg and this can only happen if green hydrogen is produced at a scale. Industrial sectors, refining, fertilizer units, etc., can provide the initial scale to bring the prices down, and once the prices are down, then hydrogen-based transport can compete with diesel transport which can happen by 2030. For heavy long-distance trucks, i.e., 400-500 km range, marine, and aviation, green hydrogen can be used in India. For 2 and 3 wheelers, light vehicles and LCVs, batteries are a better option. Green hydrogen is good for decarbonizing industry, heavy vehicles, and buses. The immediate focus of transport is to build world class technologies and create hydrogen corridors for piloting hydrogen transport for the next 5-10 years. As far as industry is concerned, it should announce ambitious targets for green hydrogen and utilizing capacities by 2030 on similar lines as the 450 GW target for renewables. We believe India has the potential to reach 60 GW of electrolyser capacity in an ambitious scenario. India should plan to roll out the PLI scheme for manufacture of electrolysers to leverage the huge global bottlenecks in electrolyser supply chains. Secondly, we need to mandate mixing of green hydrogen in existing hydrogen utilization, like refining and fertilizers depending on the viability gap and mandate new greenfield projects with hydrogen applications like oil refining and fertilizers. Thirdly, India should focus on building a vibrant hydrogen products export industry such as using green steel in a phased-wise manufacturing program. Fourthly, India needs to build stronger alliances with South Korea, Japan, and Singapore for exporting green hydrogen to help them reach their goals of NetZero emission economy. Fifthly, capital costs contribute significantly to green hydrogen costs to produce hydrogen and Dollar linked contracts should be explored in this sector as it was done for oil & gas. Green hydrogen is the future of energy for heavy industries in India. It has the potential to rapidly reduce our imports and create new high value green exports and catalyze India's transition to be a global climate leader.

