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BEYOND TRACKS:

Olivier Loison, Managing Director of Alstom India, on the company's role in propelling India's railway revolution

and optimises plant placement. India's skilled engineering workforce plays a crucial role in implementing renewable energy and green hydrogen projects, offering top-tier EPC services cost-effectively.

The rise of hydrogen as a transformative force in the energy landscape is undeniable. With its versatility, potential for decarbonisation, and growing economic viability, hydrogen is shaping the future of clean energy. With the global energy

sector at its crossroads, it is crucial to understand the role of hydrogen and navigating the dynamic landscape.

As we delve into the growing significance of hydrogen as a sustainable energy carrier, its integration with renewable sources, and its transformative impact on transportation and power generation, we are presenting in-depth conversations with two key players in this sector—Subramanian Chidambaran, Chief Strategy Officer, Cummins India & AK Tyagi, CMD, Nuberg EPC.

and scalability?

Hydrogen storage technologies are critical for hydrogen-based solutions' feasibility and scalability. Hydrogen can be stored in solid forms (adsorbents, hydrides, etc.), as a liquid or gas. Alternatively, it can be immediately converted into another chemical (e.g., ammonia, methanol) and stored. Significant advancements in storage materials are happening in each of these areas.

Currently, hydrogen storage as a gas in the form of ammonia/methanol is the most preferred solution. Each storage solution has its pros and cons. A disadvantage of gaseous storage is the volume of the tanks needed to store the hydrogen, which creates significant challenges for applications like commercial vehicle on-board storage. Solid material-based storage may address this issue but could pose additional challenges regarding the energy required to adsorb and release hydrogen. This space is still evolving.

What is the future of the hydrogen sector? What opportunities and research areas exist?

The future of the hydrogen sector holds significant promise as a key component of the global energy transition towards sustainability and decarbonization. The adoption of hydrogen is dependent on three aspects:

- 1. Technical feasibility:** Ensuring that hydrogen-based technologies are technically feasible and capable of meeting the requirements of various applications. This includes advancements in hydrogen production, storage, transportation, and utilization technologies to make them efficient, reliable, and scalable.
- 2. Economic viability (from a TCO perspective):** This is a crucial aspect for enabling widespread adoption. Factors such as the cost of hydrogen production, infrastructure development, and operation and maintenance costs need to be considered to ensure that hydrogen-based solutions are competitive in the market.
- 3. Accessibility/availability of the fuel (including the required infrastructure):** Access to hydrogen fuel and the availability of infrastructure will play a vital role in enabling wider adoption.

The future of the hydrogen sector hinges on our ability to set ourselves for success in these areas, coupled with fostering public awareness and building a strong positioning for hydrogen as a safe, reliable, and competitive alternative to traditional fuels.

What policies or regulations could benefit hydrogen sector growth and development, in your opinion?

The government's Strategic Interventions for Green Hydrogen Transition (SIGHT) program and PLI schemes are commendable initiatives to boost hydrogen production. However, to fully realize hydrogen's potential, demand must also increase. Encouraging green hydrogen use in industrial sectors, through smart mandates and cost targets, can drive this demand. Similarly, incentives akin to the FAME scheme can promote hydrogen adoption in transportation. A favourable policy environment supporting both production and demand for green hydrogen is crucial for accelerating the hydrogen economy's growth and achieving climate and energy goals. This includes incentivizing industries to transition from grey to green hydrogen, creating market demand, and investing in production, storage, and distribution infrastructure. Such measures can ensure a sustainable and impactful role for hydrogen in the nation's energy landscape.

What's Cummins' vision for hydrogen in renewable energy for manufacturing? How will they contribute to sector growth?

Cummins plays a vital role in the Green Hydrogen value chain, providing electrolyzers and collaborating for specialized storage tanks. Beyond production and storage, we're innovating H2 internal combustion engines and fuel cells, offering sustainable solutions for commercial vehicles. This contributes to decarbonizing transportation and reducing emissions. Cummins is committed to driving green hydrogen innovation, advancing the entire ecosystem, and shaping the future of the global hydrogen economy.





"Hydrogen solutions are central to our growth strategy", AK Tyagi, CMD, Nuberg EPC

What's Nuberg EPC's vision for integrating renewable energy, particularly hydrogen, into existing infrastructure, and its role?

We are committed to leading the transition towards sustainability by integrating renewable energy sources, particularly hydrogen, into existing energy infrastructure. Our focus is on innovating and providing effective energy solutions to contribute to a cleaner, more sustainable world. In this energy transition:

- We develop scalable hydrogen production methods that seamlessly integrate with current infrastructure, facilitating a smooth transition to renewables. Hydrogen produced with renewable energy offers a zero-carbon emission profile and finds applications in transportation, industry, and power generation.

- Our team leverages advanced technologies such as FEED, ERP, and engineering software to optimize hydrogen production efficiency through renewable-powered water electrolysis processes.
- We ensure compatibility of hydrogen systems with current infrastructure to minimize disruptions and maximise asset utilisation.
- Collaboration with industry partners, government bodies, and research institutions helps establish standards and practices for integrating hydrogen into the energy mix.
- Safety and efficiency are paramount. We adhere to strict safety protocols to prevent accidents and continuously improve processes for safe and efficient hydrogen handling.
- Advocating for supportive policy frameworks, we promote the adoption of hydrogen and other renewables to propel the energy transition forward.



How is Nuberg EPC positioning itself for greater control over the hydrogen value chain through standardization and industrialization?

We are reshaping the hydrogen industry's value chain through standardization and industrialization, driven by our robust internal capabilities and commitment to sustainable design. At our Nuberg Technology & Innovation Centre, we pioneer process technologies for large-scale industrial applications worldwide. Recently, we successfully implemented India's first commercial-scale hydrogen compressor storage and fueling station, showcasing our comprehensive engineering services. Supported by our 115,000 sqm fabrication facility in Gujarat, we facilitate standardization crucial for hydrogen project industrialization. As a leading process equipment manufacturer, we specialize in designing, manufacturing, and commissioning various heavy process equipment.

Hydrogen, with its versatility, potential for decarbonisation, and growing economic viability, hydrogen is shaping the future of clean energy.

Can you elaborate on Nuberg EPC's strategic vision for hydrogen solutions, their role in company growth, and impact on green energy transition?

We recognise hydrogen as more than just an energy carrier; it's integral to the transition to green energy. Our dedication to advancing hydrogen solutions reflects our commitment to innovation and environmental stewardship. Hydrogen solutions are central to our growth strategy, aligning with global efforts to reduce carbon emissions and promote energy independence. Investing in hydrogen technologies expands our market reach and contributes to a resilient and sustainable energy ecosystem. The impact of our hydrogen solutions extends beyond our organisational growth; they accelerate the industry's shift towards green energy. Our projects, like India's inaugural Green Hydrogen fueling station, set industry benchmarks, showcasing hydrogen infrastructure's feasibility and scalability in line with the Atmanirbhar Bharat initiative. Our strategic vision is to lead the green energy transition, leveraging hydrogen solutions as a key driver for growth and sustainability.

What challenges and opportunities do you predict in integrating hydrogen, into existing infrastructure, and how does Nuberg EPC tackle them?

Integrating renewable energy sources, notably hydrogen, into current infrastructure presents challenges and opportunities. Challenges include technological adaptation and cost-

effectiveness, while opportunities include reducing carbon footprints and fostering economic growth. We tackle these challenges through R&D investments, focusing on innovation and standardisation. By collaborating with stakeholders and emphasizing seamless integration, we aim to overcome hurdles and maximize opportunities. Our goal is to drive a significant impact on the industry's transition to green energy, contributing to a sustainable future for all stakeholders.

Could you outline recent achievements or projects by Nuberg EPC in hydrogen solutions, showcasing its green energy impact?

Nuberg EPC recently achieved a significant milestone by launching India's inaugural commercial-scale hydrogen refuelling station in Panipat. This pioneering endeavour represents a pivotal stride towards cultivating a greener energy landscape, offering a refuelling hub for hydrogen-fuelled vehicles.

The Bio-Ethanol Project for IOCL in Panipat showcases the company's commitment to utilising renewable resources like bioethanol, derived from organic materials, as a viable alternative to traditional fossil fuels.

Nuberg EPC spearheaded India's largest Chlor-Alkali Green PVC project with Adani Group. This ambitious venture, boasting a daily capacity of 2200 tons, employs a 100% sodium hydroxide (NaOH) process in Gujarat's Mundra region.

What are your plans for advancing hydrogen solutions and sustainable energy initiatives in India and globally?

We collaborate internationally with governments and businesses to bolster India's green energy objectives, striving to mainstream sustainable energy through cost-effective, scalable, eco-friendly hydrogen solutions. India aims to lead in green hydrogen production, targeting 10% of global demand by 2050 through its National Green Hydrogen Mission, supported by a \$2.3 billion investment. This initiative positions India as a green hydrogen exporter, aiding its journey towards net-zero emissions while addressing climate change and fostering sustainable development. International partnerships underscore India's role in the global green hydrogen economy, emphasising the importance of sustainable energy for global advancement. Our endeavours align with India's energy sector transformation, leveraging green hydrogen to propel us towards a sustainable future. ■

