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INDIA'S FIRST MAGAZINE FOR THE HYDROGEN ECONOMY

ENERGY SECURITY THROUGH GREEN HYDROGEN

JAKSON

MR. SAMEER GUPTA
Chairman & Managing Director
Jakson Group

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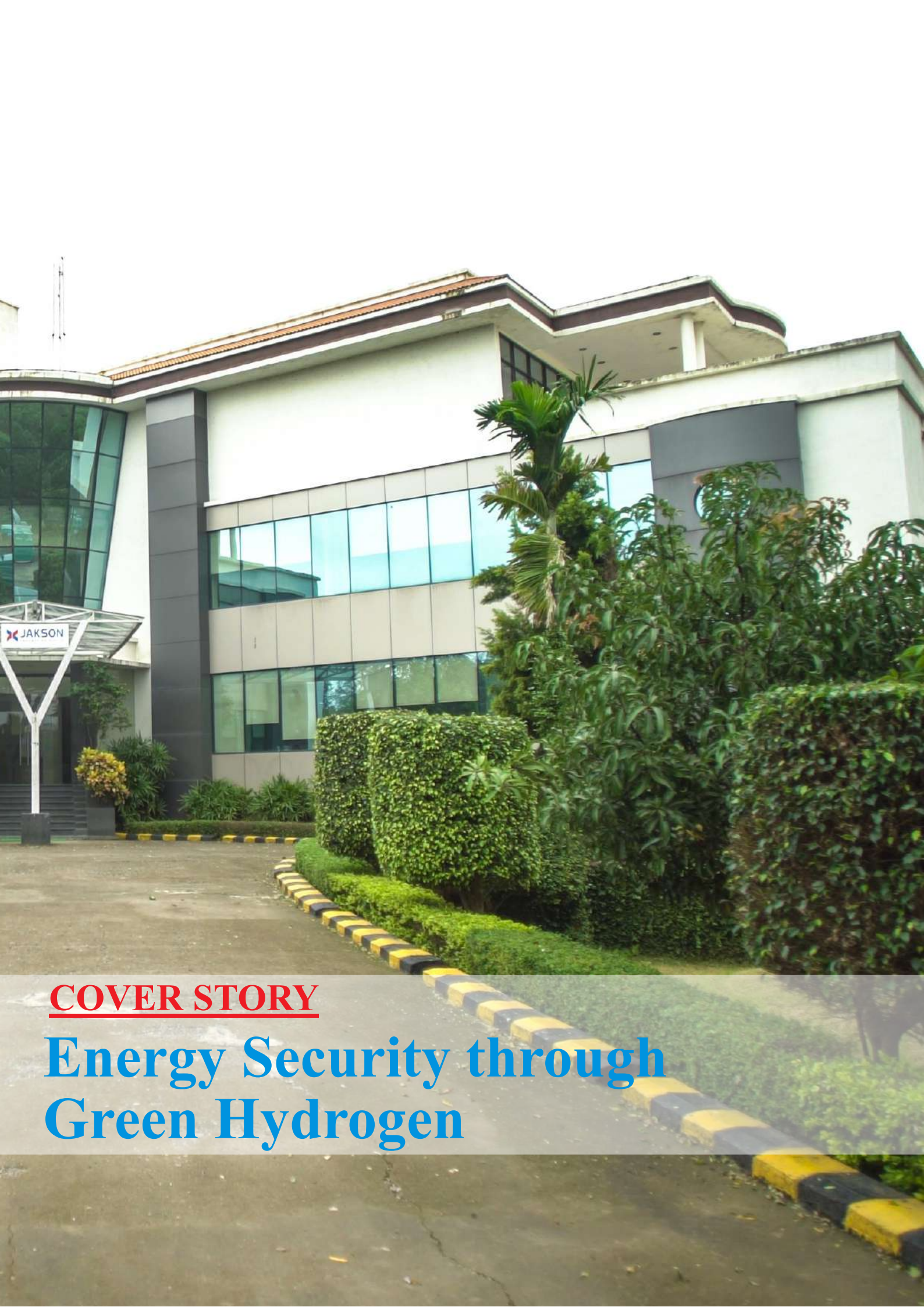

COVER STORY

Energy Security through Green Hydrogen

Mr. Sameer Gupta shares his views about India's hydrogen economy and the way to make India energy independent

FOUNDED in the year 1947, the Jakson Group began its journey as an electrical goods trading company and has grown over the decades to becoming one of the top distributed energy solutions and EPC companies in India.

Mr. Sameer Gupta is a second generation entrepreneur who joined the Jakson Group in 1991 and has led its transformation from a small generator manufacturing company to a prominent 'power solutions' company. Sameer is supported by his brother **Sundeep** in managing Jakson Group.

We speak with Mr. Sameer Gupta about his views on India's hydrogen economy.

Could you tell us something about the Jakson Group and what are the goals of the group with regard to climate action

The Jakson Group is almost 75 years old and is known name in India. The Group was founded in Delhi as a distributor of electrical products for global brands and today the Group is led by my brother, Sandeep, and me. We are the second generation in the business, which was started by our father and in 2010, the Group has diversified into Solar and EPC Solutions which includes turnkey contracts for solar, land based projects, etc. When we embarked upon this journey in those days solar was not a viable solution without subsidies but now the cost of solar has come down significantly and thermal power is no longer the cheapest source of power anymore.

The Jakson Group today has four verticals, distributed energy, where we manufacture and sell generating sets as we have a loyal customer base of about 50,000 customers who need energy solutions, and to the same set of customers we also sell solar roof top systems, energy storage solutions based on lithium-ion technology, and for the future we have also started to talk to them about hydrogen fuel cell based solution because in the end the customer is looking for an energy solution and the life-cycle costs which matter to them rather than just CAPEX. Today we have many customers who are looking to invest a lot more money upfront and they are looking for life-cycle costs and not just the initial investments. Even microgrids is a part of our distributed energy vertical, so wherever on-site power is required to solve the customer's energy needs, then this is the business vertical which plays a significant role.

Mr. Sameer Gupta, Chairman & Managing Director, Jakson Group

The second business vertical is manufacturing of solar modules. Our current capacity is about 570 megawatt which we want to scale up to one gigawatt very soon and of course based on the PLI schemes etc. which are there, and we are evaluating whether we should be getting into cells or not because technology is changing fast that is still a matter of debate.

The third vertical is the EPC business where we do solar utility-scaled projects for ourselves as well as for our customers plus we also have expertise in doing jobs for substation transmission, distribution, and railway electrification.

The fourth vertical is IPP, where we have got approximately 250 megawatt of power plants owned by the company and we continue to look out that opportunity's but this has become a very different game altogether but we still continue to look at opportunity's in India or maybe neighboring countries or could be in Africa where you know we can play some kind of role in wearing the IPP hat as well.

That is broadly about the four businesses and we were we were just generating about INR 800 crores in revenue back in 2009-10, and currently our revenues are at about INR 2,500 crores and we don't feel that the strategy

which we have adopted and the opportunity which is there in this field, particularly renewables, our revenue could touch about INR 6,000-7,000 crores within next 3 to 4 years.

What are your plans to reduce the carbon footprint of the Jakson Group?

There are a couple of things I would like to say Ashwini, one is thing is that for the Jakson Group our balance sheet is not the only driving force and we also look at the environmental impact our company has. We have an ESG officer (Environmental, Social, and Governance) who continuously tries to study the impact in a very measurable manner. Talking specifically on the environment side, the green journey which we started long back can be seen in all our infrastructure which is also green. All our buildings, plants, etc. are platinum rated green buildings or at least green buildings if not platinum rated. They are essentially green buildings where we are trying to conserve water, energy, and the environment and will contribute towards the decarbonised world. We are also very clear as a company that by 2050 we have to be carbon neutral, and that is a target we have set for ourselves already. The green energy that we are generating and feeding onto the grid we are getting carbon credits for them and till now we have installed about one gigawatt for various customers which is again indirectly contributing to our carbon neutral journey by helping those customers become green. On the EPC solutions front, we are using solar rooftops, energy storage solutions based on lithium ion, and then at some point of time as hydrogen technology matures, we are also thinking of providing fuel cells as a solution.

Two things are happening as we talk, a lot of research is taking place so that the same diesel gensets which we are manufacturing, can be modified to use hydrogen as its fuel, this is theoretically doable and we are trying to work on the commercials and once that is established I think it's going be a big breakthrough because the same customers who are currently burning diesel, can make some modifications on the gensets and produce power by using hydrogen and this is one significant development which is going to happen in near future and, secondly, I also believe lithium-ion is not a long term solution because as India's objective is to become self-reliant and have energy security, and for meeting both these objectives, to my mind at least, lithium-ion is not going to be a solution because we are going to be dependent on imports since we do not have enough deposits of lithium and the countries in which lithium deposits exist, are not easy countries in terms of carrying out mining operations, or again our dependency would be on China. Therefore, I would say that to actually become *aatmanirbhar* or for energy security for India, we have no other option but to move towards a fuel which we can produce within our country. India does not have sufficient gas reserves, or fossil reserves, or lithium reserves, and the only long-term sustainable option will be hydrogen.

Currently, we have hydrogen which is produced by SMR or other means and if you produce green hydrogen today it will cost about INR 550-600 per kilogram whereas there are technologies which are on the table, at least in the lab environment, and theoretically the cost could come down to close to INR 150-200 per kilogram. The transition in hydrogen is happening much faster than what we had thought in last 18 months and a lot happened on in technologies for stationary power as well as for other applications. If we are able to bring the cost of green hydrogen INR 150 or US$ 2 per kilogram, I think then Green Hydrogen will certainly replace any other fossil fuel because then, at least in terms of cost, fossil fuels and clean hydrogen will be at par and offer similar convenience as fossil fuels. At INR 150 per kg, green hydrogen will be energy equal and it is going to be cheaper than diesel or other fossil fuel. I feel this will be the roadmap which will contribute towards the energy objectives of the country.

India's energy storage market is stated to exponentially increase by 2030. What plans does the Jakson Group have to cater to this market and what role will hydrogen play in this sector?

In the immediate future you know we have seen various situations all over the country and in the world where floods are happening, or some natural disaster is happening which is disrupting the power supply because it has a straight away impact on the transmission & distribution system. In order to prevent such blackouts energy storage solution is going to be in demand almost on an immediate basis, and over the short term this demand will be met by batteries because we do not have any other solution currently since hydrogen is not economically feasible as on date, though lots of pilot projects have already come up. The Jakson Group is participating in various standards including you know places like *Leh* which are distant and remote and where the government wants to try hydrogen as a solution. To my mind in mid-term also it is going to be batteries which is lithium-ion as we need an immediate solution, however, over the long term instead of using lithium-ion for storage, we will start using hydrogen for storage and that

Solar modules manufacturing unit at Noida, Uttar Pradesh

A Genset manufacturing Unit of the Jakson Group

point will only come when the cost of hydrogen comes down, and till that time we will have to probably depend on batteries. Even in the long-term transition towards hydrogen, batteries will still play a significant role in energy storage solutions. I think we are we have already entered into an era of hybrids where the energy solutions for stationary power or mobile applications like the auto sector will depend on various kinds of fuels. Not just the cost of fuels but also their impact on the environment will determine which fuels or energy solutions will dominate the future.

As far as Jakson is concerned, we do intend to get into manufacturing of green hydrogen, however at this point there is no intention on our part to get into manufacturing of electrolysers or fuel cells, but then as an EPC company we will be playing a role in integrating all these solutions and providing our customers in the steel industry, fertiliser industry, oil corporations, or our other customers hydrogen based solutions which can be a good fit along with genset or solar rooftop solution.

Would you care to comment about the energy storage solutions based on hydrogen for the defence forces in remote areas and the recent initiative by NTPC for setting up a hydrogen production facility at *Leh* ?

Regarding the NTPC green hydrogen initiative, these are just pilot projects launched by NTPC and these are very small projects and once they see success, there is no reason why they will not fast track these projects. NTPC is a large company and has a major responsibility and commitment towards preserving the environment, and we will see this shift will happen swiftly, and not only NTPC, but corporations like NTPC will also come out in a much bigger manner and quantity over next few years.

Any defence solution is essentially a distributed energy solution because we do not have transmission systems in the remote areas as you rightly said and again the view is similar that it will currently be batteries. The costs of electrical units generated from diesel gensets is extremely high in remote areas can go as high as INR 70 per unit because of transportation report. Therefore, even if we move to battery straight away this cost can come down significantly. However, these are going to be short and mid-term solutions. A lot of research is happening where there are companies with which we are in touch where portable energy solution models that are small and based on hydrogen are being developed. In these systems the input is only water, and the output is power and the unit can be as small as 15 kW, 20 kW, or 30 kW, and to put it in perspective, they are just as big as a working desk. The essential work which is happening is on designing of the electrolyser because essentially you need them to be as little and compact as possible and a lot of technological advancement has already happened for solving the challenge of retail applications of electrolyser.

To my mind all this will happen and it is only a function of time so maybe in 3-5 years down the road retail electrolysers will be a great thing not only from our GDP standpoint but of course from protecting the environment as well.

In tackling the challenges of energy transmissions, intermittency, and grid stability, where do you see hydrogen technologies in use?

As I have already said, that in a few states due to recent floods, etc. the electricity transmission system totally broke down and this necessitates the usage of backup systems, especially on the transmission points where the substations are located. On an immediate basis it is going to be a BESS (Battery Energy Storage System) however, over the long term it will be hydrogen, and yes, grid stability is an issue as we pump in more intermittent power be it from solar or wind, there will be a need to strengthening the grid by ensuring backup energy storage solutions. Energy storage currently has two options: battery or hydrogen, and again as I said, hydrogen is the only fuel which will help us move towards being energy independent.

Once hydrogen technology matures, we will see its usage across all energy transmission systems and for grid stability. What you need to understand is that in India, it has been barely 1-2 years when the industry has started talking about hydrogen, and in such a short time we have already seen pilot tenders coming out, so to my mind the speed at which we are trying to adopt hydrogen technologies is tremendous. I think over a short period of time you will see pilot tenders coming out even on the transmission side based on hydrogen as a storage solution, and that's a natural transition which will happen.

A BESS Storage system by Jakson

An EPC Project at Togo, Africa

Solar IPP project at Bap, Rajasthan

The Jakson Group has a strong partnership with Cummins which has just joined the Hydrogen Council and Indian companies like Indian Oil and Reliance Industries are also members of the Council. Do you see the Jakson Group joining the Hydrogen Council, a global CEO-led council for the advancement of hydrogen technologies?

Currently there are 2-3 things, one is, talking of Cummins, there is a technology under development where existing diesel engines can be modified and hydrogen can be used as fuel for running these engines which will be a game changer for the entire auto industry and for the genset industry. Then, Cummins globally has done a lot of work on hydrogen already, on the electrolyser side as well as fuel cell side, and they are a technology company and they have always been global leaders in terms of making the right investments at the right time. They take steps to ensure their leadership position does not change and as far as any kind of energy solution is concerned. We are expecting a lot more innovation to happen at Cummins on the hydrogen, electrolysers, and fuel cells. By the way for one of the projects of NTPC Ltd. where Jakson participated in the bids, we have quoted for fuel cells which we come from Cummins USA.

Currently, Jakson Group is a member of World Economic Forum where we participate in discussions on the future of energy very actively. To be honest, we have not yet made any efforts to be a part of the Hydrogen Council, but yes, we would consider becoming a part of this Council in future.

India's North-Eastern states have a lot of small hydro-power projects, however, these units are not connected to the national grid and are unable to transmit power and, therefore, are underutilized. How can a microgrid based on hydrogen and other systems utilize this untapped

potential and accelerate the economy of these states?

I would say that not only the North eastern states of India, but in many other parts of the country and even the world for that matter, there is a lack of availability of transmission and distribution systems. Jakson Group has partnered with a couple of companies who are in providing a microgrid solution in these far-off places which includes not only the North East, but many parts of the country. The Jakson Group has designed and developed on-site energy solutions in these remote areas, and we have also designed the complete microgrids based out of solar and we are working on a few such projects in Africa as we speak. Small hydro projects in the North East will have to work on a hybrid solution, where only hydro will also not be a possible solution to my mind but a hybrid of hydrogen, battery, or even diesel generating set could be designed for an ideal solution to provide round the clock power for these areas where we do not have an transmission or distribution system. There is a huge potential huge in using hybrid microgrid solutions using various sources of power not only for the North-East, but for many parts of India and also in many parts of the world.

What are your views on the remarks made by the Prime Minister during his speech on Independence Day about Green Hydrogen?

Under the leadership of Hon'ble Prime Minister, India can lead the world in area of Green Hydrogen. Adoption of Green Hydrogen can make India truly "*AatmaNirbhar*" and has the potential of making India free from usage of fossil fuel which will lead to fast tracking our climate change goals. This sincerity of the leadership will surely result in true Independence of our Country.

Can you broadly tell us the future plans of Jakson Group in exploring clean energy solutions in India and abroad?

As I have said, we are looking at a strategy to double our revenues in the next three to four years and this will be done by offering several products and solutions. A significant part of the products and solutions are contributing towards the green journey and in last 1-2 years we have also moved across geographies, and even though we were not present out of India just two years ago, today we have finished a solar project in Africa, and we are about to sign a second project in Africa. We are exploring the SAARC countries including Bangladesh, Sri Lanka, where the Indian government is also funding clean projects and promoting green energy. We are a part of the International Solar Alliance and our goals are aligned with their vision. We continue to explore partnerships and collaborations between governments and industry to advance the green energy economy in many areas across regions. All I can say is that Jakson will have a significant presence both on the solar side and on the hydrogen side. We are committed to solar, battery-based energy storage solutions, and hydrogen. In a short time forward, you will see our presence a lot more in these three areas.

What are your expectations from the National Hydrogen Energy Mission?

My personal view is that the PLI scheme (Production linked Incentive) should be applied for manufacturing of all equipments which will be required for producing hydrogen, it could be electrolyser, fuel cells, storage tanks, etc. The PLI Scheme should be available across the value chain, and it can be a big opportunity because this can boost SME sector. In the broad spectrum, usage of hydrogen by the industry like steel, fertilizers, ammonia, refining, etc. will be a part of the policy likewise production of green hydrogen will also be a part of the policy because eventually India would need to move towards production of green hydrogen rather than looking at just grey or blue hydrogen. ■

Jakson showcased its innovative engineering capabilities by successfully integrating solar panels on the roof of 50 coaches of ***Indian Railways***. It was a complex design and engineering challenge to integrate solar panels on the roof of coaches that run up-to speeds of 120 km per hour. Each single coach was installed with twelve high efficiency polycrystalline solar panels.

These solar panels were fitted on the rooftop using specially designed U-channels that were welded to the body of the coach. So far 50 coaches have been successfully integrated with solar panels and currently undergoing rigorous performance tests by the Indian Railways.

The generated power will be used to power lights and fans inside the coaches for use by the passengers. On completion, this solar PV project will help Indian Railways to offset 221 tonnes of CO_2 emissions and also achieve significant savings in diesel costs.

According to its Vision 2020 document, the Indian Railways plans to meet 10 percent of its energy needs from solar and outlined plans to set up 1000 MW of solar capacity in the country. The successful execution of this project opens up a big opportunity for Jakson and the overall solar industry.