ENERGY EMERGENCY

THERE IS NO SECOND OPINION THAT THE WORLD NEEDS TO RELY LESS ON FOSSIL FUELS FOR ENERGY. BUT REACHING THAT MILESTONE IS A LONG JOURNEY. BUT GETTING THERE WILL REMAKE THE WORLD'S LARGEST ECONOMIC SECTOR INTO ONE THAT IS MORE SUSTAINABLE, SECURE AND AFFORDABLE FOR EVERYONE. A LOOK AT THE ENERGY EMERGENCY AND THE SOLUTIONS AT HAND – WITH INDIA IN PERSPECTIVE

BY **SUJATHA VISHUNRAJ**

INDIA ENERGY OUTLOOK 2021 SAYS THAT INDIA is a major force in the global energy economy. Energy consumption has more than doubled since 2000, propelled upwards by a growing population – soon to be the world's largest – and a period of rapid economic growth. Near-universal household access to electricity was achieved in 2019, meaning that over 900 million citizens have gained an electrical connection in less than two decades.

India's continued industrialisation and urbanisation will make huge demands of its energy sector and its policy makers. Energy use on a per capita basis is well under half the global average, and there are widespread differences in energy use and the quality of service across states and between rural and urban areas. The affordability and reliability of energy supply are key concerns for India's consumers.

The world is following a one-sided approach by focusing solely on the supply of energy, not enough on demand.
Kim Fausing, President & CEO, Danfoss

Energy security, decentralization of energy resources, and mainstreaming of circular economy are the primary benefits.
Kishan Karunakaran, CEO of Buyofuel

INDIA & COP PROCLAMATIONS

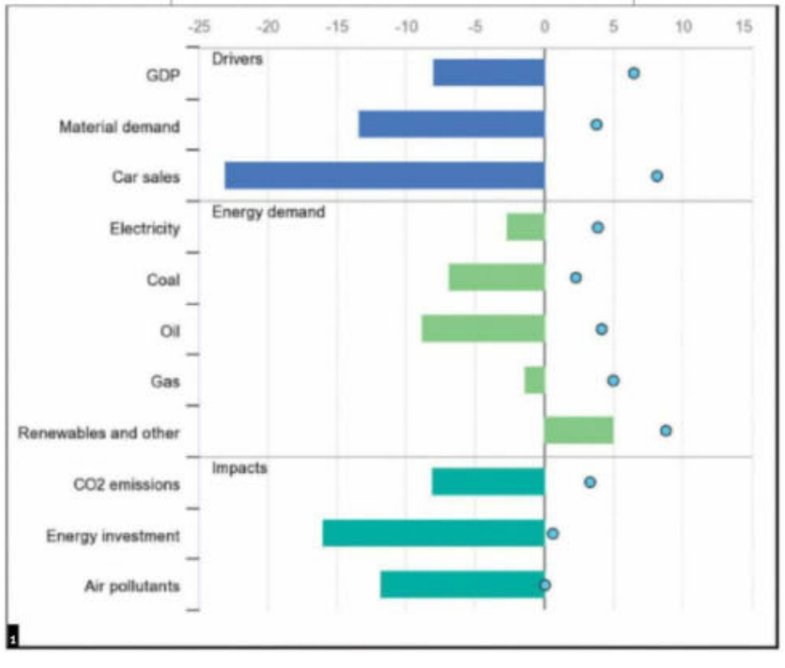
At the 26th COP-26 summit in Glasgow, the Indian Prime Minister presented his five-point agenda – while delivering the 'National Statement'. These include raising non-fossil fuel based energy capacity of the country to 500 GW by 2030; meeting country's 50 percent energy requirements using renewable energy sources; reducing the total projected carbon emission by one billion tonnes by 2030; reducing carbon intensity of the economy to less than 45 percent by 2030; and achieving net zero emissions by 2070. According to a brief paper by Global Strategic Communications Council (GSCC), the commitment of 500 GW non-fossil fuel capacity will effectively increase India's installed non-fossil capacity from 40 per cent to more than or equivalent to 60 per cent by 2030.

Many companies have welcomed the PM's announcement and pledge and has made their own commitments towards this goal. Kamal Bali, President and Managing Director, Volvo Group India, said in an interview with MT that, "Within Volvo, we have a new business area, namely Volvo Energy, dedicated to accelerating Group's electrification and sustainability journey. Additionally, we now have various collaborations & partnerships to ensure our future ambitions in our target areas are realised. These include energy storage (batteries), charging stations, hydrogen and automation, among other areas." The production facilities in Bangalore for Volvo trucks and Volvo Construction Equipment, are already powered with 70% renewable energy and the company hopes to take this to 80% by 2025 as well as reduce their CO2 footprint by 80% by that year.

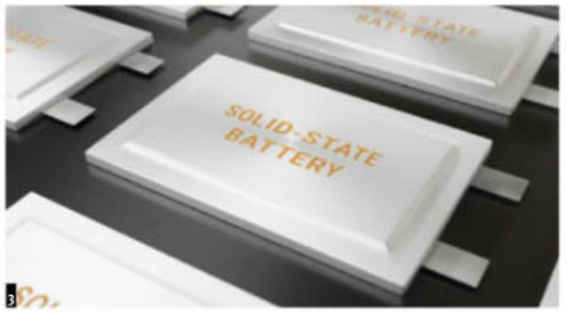
THE RENEWABLES:

Over 80%of India's energy needs are met by three fuels: coal, oil and solid biomass. Coal has underpinned the expansion of electricity generation and industry, and remains the largest single fuel in the energy mix. Oil consumption and imports have grown rapidly on account of rising vehicle ownership and road transport use. Biomass makes up a declining share of the energy mix but is still widely used as a cooking fuel. Over 660 million Indians have not fully switched to modern, clean cooking fuels or technologies.

Natural gas and modern renewable sources of energy have started to gain ground. The rise of solar PV in particular has been spectacular; primarily because of the huge resource potential, and with policy support and technology cost reductions have quickly made it the cheapest option for new power generation. According to Kishan Karunakaran, Founder & CEO of Buyofuel, "Renewables will not replace fossil fuels for baseload sources of electricity over the next 10 years. Initially renewables like biofuels will be a supplementary fuel for baseload source of electricity, after about 10-15 years, renewables will start replacing fossil fuels even for baseload source of electricity as societal, technological and regulatory progress will make renewables more economically viable as compared to fossil fuels."



Raman Bhatia, Founder & Managing Director, Servotech Power Systems Ltd, has a different view on this. "According to a prevalent misconception, some forms of renewable energy require an equivalent level of backup power from fossil fuel facilities because they do not produce baseload power. But this is just plain false. Even if it isn't used to supply baseload electricity, renewable energy can be used to replace some higher-carbon energy sources in the grid and reduce overall greenhouse gas emissions from power generation. Hydroelectricity and other baseload renewable sources can be added on top of intermittent renewable sources to produce 10–20% of our electricity. Even if wind and other intermittent renewable energy sources continue to grow quickly, it will be more than ten years before storage of those sources is required. Concentrated solar thermal, which directs solar radiation onto a collector using a series of mirrors or lenses, is one of the more promising renewable energy sources. This kind of technology is capable of capturing and storing energy in molten salt, pressured steam, phase-change materials, or pure graphite."



ISSUES LIMITING SECTOR'S GROWTH:

"Currently infrastructure as in existing infrastructure is the biggest limiting factor for biofuels and almost all renewable energy. The current existing infrastructure is all developed for fossil fuels like coal and petroleum products, and any switch to biofuels or other renewable fuels requires significant disruption to existing infrastructure, as most renewable fuels are more successful and sustainable on a decentralized model, while coal and fossil fuels are more sustainable on a centralized model. Once the infrastructure is in place for biofuels and other renewable energy, then biofuels and renewable energy will grow exponentially," says Kishan.

In recent paper published by Dr Fatih Birol, Executive Director, International Energy Agency & Amitabh Kant, (ex) CEO of NITI Aayog takes a look at very pertinent points in this direction. The paper says, "India faces a number of pressing near-term challenges. The sharp increase in commodity prices has made energy less affordable, and tight markets are increasing energy security risks. There is still a lack of reliable electricity supply for many consumers. Financially ailing electricity distribution companies are impeding the urgent transformation of the sector." The paper also suggests, "India already has a numerous policy measures in place that – if fully implemented – could address some of these challenges by accelerating the shift to cleaner and more efficient technologies. India's robust energy efficiency programme has been successful in reducing energy use and emissions from buildings, transport and major industries. India is also laying the groundwork to scale up important emerging technologies such as hydrogen, battery storage, and low-carbon steel, cement and fertilisers."

FACTORS DRIVING RENEWABLE ENERGY INVESTMENT:

Kishan puts it in three points:

- **Societal:** The pressure from within for the decision makers of private sector and the end consumers of major brands to move to cleaner alternatives and towards Net-Zero
- **Technological:** The availability of data everywhere and individual technological progress across all biofuel technologies making the renewable energies economically competitive as compared to fossil fuels
- **Regulatory:** The policies like the biofuel policy, net-zero targets, green energy policy etc. by Indian

Energy from renewable sources,can be stored and released needed, thanks to crucial technology like battery storage systems. Due to their special ability to quickly absorb, hold, and re-inject electricity, they aid in increasing the flexibility of the energy system.
Raman Bhatia, Founder & Managing Director, Servotech Power Systems Ltd.

Primarily of all the solutions to accelerate India's green transition that exists in the world today, energy efficiency is the fastest, the easiest, and the most impactful. It can deliver nearly 40% of the total emission reductions needed for us to reach net zero target.
Ravichandran Purushothaman, Danfoss India

1. Percentage change in key indicators for India in 2020 compared with 2019

2. For or hydrogen to make a significant contribution to clean energy transitions, it needs to be adopted in sectors where it is almost completely absent, such as transport, buildings and power generation.

3. A solid-state battery has the potential to improve most of the concerns with present-day Li-ion

As technology advances, many types of all-solid-state batteries are projected to hit the market. The first will be solid-state batteries with graphite anodes, providing better energy performance and safety. Lighter solid-state battery solutions based on a metallic lithium anode should become commercially accessible over time. **Sunil Gandhi**, CEO of JLNPhenix Energy

government and International agreements and net-zero policies enforced internationally also create a big and robust market for renewable energy

Renewable electricity is growing at a faster rate in India than any other major economy, with new capacity additions on track to double by 2026. The country is also one of the world's largest producers of modern bioenergy and has big ambitions to scale up its use across the economy. The IEA expects India to overtake Canada and China in the next few years to become the third largest ethanol market worldwide after the United States and Brazil.

Raman adds, "Monitoring key investment factors will be crucial for investors as renewable energy continues to expand and become more established. These variables are significant because they draw attention to both current investment trends and the corresponding legal concerns, such as governance, disclosure, and fiduciary obligations. Green bonds were developed particularly to fund projects that benefit the environment. The Climate Bonds Initiative has produced reports that show the market for green bonds is now significantly undervalued. The fact that most investment projects do not qualify as green bonds partly stem from the absence of official guidelines for defining what constitutes "green" in the financial sector. These voluntary recommendations consistently prove to be highly beneficial in bridging the reporting gap for businesses and investors."

BATTERY & ENERGY:

Sunil Gandhi, CEO of JLNPhenix Energy, writes about another green energy source - the battery. Batteries have long been an important design element in everything from portable tools to computers and mobile phones, as well as uninterruptible power sources and satellites. Every technology improvement tends to prioritise battery capacity. While researchers worked to enhance battery technology, electronics continued to evolve rapidly, necessitating ever-increasing quantities of energy and power. However, it wasn't until the introduction of electric vehicles that manufacturers began to examine the value of batteries in providing a better range, improved dependability, and lower prices. Size and weight are just as crucial in the EV market as cycle life.

The Li-ion battery will have the greatest impact on growth, given its wide range of applications and further development potential. Currently, among all cutting-edge storage technologies, lithium-ion battery technology provides the best degree of energy density. The vast selection of cell designs and chemistries allows for fine-tuning performance parameters like quick charge or temperature working windows. Li-ion batteries have several advantages, including low self-discharge and long lifespan and cycling capabilities, with thousands of charging and discharging cycles.

Solid-state batteries represent a technological paradigm shift. As technology advances, many types of all-solid-state batteries are projected to hit the market. The first will be solid-state batteries with graphite anodes, providing better energy performance and safety. Lighter solid-state battery solutions based on a metallic lithium anode should become commercially accessible over time.

Li-ion batteries have dominated the market for decades, but as the need for high-density, long-life, and low-cost batteries grows, the competitive environment for solid-state batteries is getting congested. This is fantastic news for battery research and development, as this is what is required to bring solid-state batteries onto the market rapidly. Several materials and concepts are now being investigated and show substantial growth. As a result, once manufacturing catches up, as it has with liquid electrolyte Li-ion batteries, technical breakthroughs will propel it even further. This means that materials and design techniques will likely be tweaked in the next few years, pushing battery capacities forward.

WAY FORWARD

As IEA puts it, "India's energy transition needs to benefit its citizens, and well-designed policies can limit the potential trade-offs between affordability, security and sustainability. As a large developing economy with over 1.3 billion people, India's climate adaptation and mitigation ambitions are not just transformational for India but for the entire planet."

A journey has begun but patience will be crucial in the next few years for the technology to mature commercially and for grid scalability to be effective enough to enable high-transmission industries to switch to green energy.

4.Nuclear power and hydropower form the backbone of low-carbon electricity generation.

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MOVING THE BIG, THE HEAVY, AND THE WIDE

EVER WONDERED HOW LARGE AND HEAVY FORMAT MACHINES ARE MOVED? THE LOGISTICS OF MOVING HEAVY EQUIPMENT IS FASCINATING AND FULL OF CHALLENGES.

BY **SUJATHA VISHUNRAJ**

HEAVY MACHINERY IS A VITAL PART OF MANY INDUSTRIES, and without it, the development of certain sectors and services would not be the same as it is today. How do you move a machine tool the size of a house from one location to another? Transporting heavy equipment and machinery can be a challenging task. This giant cargo can easily weigh hundreds of tons. When a piece of machinery needs to be transported to another location across the city, province, or country, it can seem impossible.

The shipment of machinery makes up a significant part of the transportation and logistics industry. Each job is paired with a specialised method in order to ensure the heavy equipment is safely transported to its destination. The load and size of the machinery being transported decide the shipping method used for transportation. However, the transportation of heavy machinery compared to general or more concise machinery is very different.

WHAT QUALIFIES AS HEAVY CARGO?

Nimbus Logistics, an ODC and Heavy transport specialist with more than four decades of experience transporting Super Heavy and Super ODC cargo explains this point further. Nilesh Agarwal, Chief of Business Development at Nimbus Logistics, in his blog defines ODC as, "If a truck with a loading platform length of 20 feet is loaded with cargo like TMT bars of length 22 feet, then the TMT bars qualify as ODC. This definition is valid for length and width but what about the height? A cargo being higher than the body of the vehicle doesn't make it dangerous. Hence for height we need to define the limits for defining ODC. In CMVR *(Section 93, Sub Section 2, Page No 68)*, Indian

1. There are several things to consider in preparation for moving heavy equipment. Planning and logistics are the key to safe transportation of heavy equipment.