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Changing Green Energy Narrative and Significance of the International Solar Alliance (ISA)

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Introduction

The energy sector of India has long struggled for closing gaps between capacity addition and spiralling demand arising from burgeoning population and expanding industrial base. The severe power blackouts that affected most of northern and eastern India due to collapse of Northern grid in July 2012 was an ugly reminder of the failure on several fronts. Post some major structural and policy reforms since 2014, the sector has shown signs of recovery. But the malaise of the sector goes beyond the demand-supply conundrum. The primarily fossil fuel-based energy mix of the nation has grave implications, primarily—the nation paying hefty import bills and buying decaying environment. The recent cricket match played at the Feroz shah Kotla stadium in the national capital, where images of Sri Lankan players wearing face masks and scenes of them vomiting in the field is probably the most apt depiction of the nadir state of the environment today. The entire issue has made the policy makers and planners realise the indispensable—to switch

Key Points

1. India led International Solar Alliance was launched on November 30, 2015 on the margins of Conference of the Parties (COP) 21 opening ceremony and started on December 06, 2017.
2. The alliance proposes to integrate all the 121 nations geographically located entirely or partially between the Tropic of Cancer and Tropic of Capricorn, which receives approximately 300 days of sunshine every year.
3. The alliance plans to mobilize funds to the tune of $1,000 billion and generate solar power of 1,000 GW capacity by 2030.
4. The world is witnessing unprecedented levels of pollution and rise in surface temperatures. The green energy sector, solar in particular, is undergoing major technology advancement and may soon become ubiquitous. The ISA aims to galvanize the process and address the energy and environmental crises.
5. The alliance shall also enhance India's soft power and has potential to transform her largely inert foreign policy.

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to green energy, and there is a little time to waste. The Minister for Road Transport and Highways Mr. Nitin Gadkari's recent virtual threat to the automakers of switching to electric technology by 2030 or else he shall bulldoze his way through. It was definitely more than mere symbolism. The recent initiation of the International Solar Alliance (ISA), a brainchild of the current dispensation in Delhi, is a giant leap for the nation.

The International Solar Alliance

The Activist India: India in the recent years has been on an activist path in the global arena. It is reflected in various spheres of activities, to name a few—the civil nuclear deal initially with the United States and later with other important players such as Canada, France and Australia, inauguration of the long pending Chabahar Port (Phase I) in Iran, trials of the International North South Transit Corridor (INSTC) which is likely to be operational by February 2018, being a part of the rekindled '*Quad*'' enrollment in the Missile Technology Control Regime (October 2016) and the Wassenaar Arrangement (December 2017) without bowing to the pressures of being an NPT signatory. The most significant being the India led ISA which is also headquartered in India.

The International Solar Alliance (ISA): The alliance seemingly draws its purpose from the UN General Assembly Resolution A/RES/36/193 of 1981. The resolution underlined the need for cooperation among developing countries and mobilization of financial resources for new and renewable sources of energy. The alliance was launched on 30 November 15 by the Indian Prime Minister Mr. Narendra Modi and French President Mr. Francois Hollande. It was done on the margins of the Conference of the Parties (COP) 21 opening ceremony in Paris. The alliance is a treaty-based intergovernmental organization and kicked off on 06 December 2017. The alliance has proposed to integrate all the 121 nations which are geographically located entirely or partially between the Tropic of Cancer and Tropic of Capricorn—the *Sunshine Countries*. These nations are blessed with approximately 300 days of sunshine every year. These countries can potentially harness solar energy in a cost-effective manner if concerted and coordinated effort is made to share the experience.

Most of the Sunshine countries are developing and are largely agrarian-based economies. These countries account for approximately 73%of the world population with a cumulative global Gross domestic product (GDP) of only about 36 percent. These countries consume around 55 percent of world energy while accounting for only about 23 percentof total installed solar capacity. The role of the ISA shall, therefore, be vital in influencing a significant share of the humanity living in modest conditions.

Focus Areas: The alliance plans to mobilize funds to the tune of $1000 billion and generate a total solar power capacity of 1000 GW by 2030. The alliance is the first specialized global agency of its kind. As per *the Sustainable Development Goal (SDG)—7 of the UN World Summit on Sustainable Development of 2002 "By 2030, ensure access to affordable, reliable, sustainable and modern energy for all"*. Keeping this at its core, the alliance has defined its key focus areas, which are as follows:

- Promote solar technologies and investment in the solar sector to enhance income generation for the poor and the global environment.
- Formulate projects and programmes to promote solar appliances.
- Develop innovative financial mechanisms to reduce the cost of capital.
- Build a common knowledge e-Portal.
- Facilitate capacity building for promotion and absorption of solar technologies and R&D among member countries.

As per the working paper of the alliance, it shall not duplicate or replicate the efforts that others organizations in related fields of work, such as International Renewable Energy Agency (IRENA), Renewable Energy and Energy Efficiency Partnership (REEEP), International Energy Agency (IEA), Renewable Energy Policy Network for the 21st Century (REN21), United Nations bodies, bilateral organisations and so on, which are currently engaged in it. But will establish networks and develop synergies with them and supplement their efforts in a sustainable and focused manner.

Objectives: The stated objective is to create a collaborative platform for increased deployment of solar energy technologies to enhance energy security and sustainable development, improve access to energy and opportunities for better livelihoods in rural and remote areas and to increase standard of living.

The Governance Structure: The ISA's proposed governance structure would consist of an Assembly, a Council and a Secretariat. This governance model shall remain subject to member countries' deliberations and suggestions in upcoming days. The Assembly will provide guidance, direction and advice to the Secretariat for undertaking the activities. ISA's detailed statute is currently being developed.

ISA Secretariat: The Government of India will support ISA by hosting its Secretariat for an initial period of five years and thereafter, it is expected to generate its own resources and become self-financing. On January 25, 2016, the foundation stone for the proposed Headquarters of the ISA was laid at Gurgaon, and its interim Secretariat was inaugurated.

This India-led alliance nudges the orientation of India's foreign affairs. By so far inward looking, Nehruvian era *NAM*-guided isolationism has given a way to pragmatic nation-centric approach coupled with the *Vasudhaev Kutumbakam* philosophy. The ISA is an amalgamation of both and the green energy sector is also amidst a global revolution.

The Grey Areas and Influence of Green Energy

Global Warming

Greenhouse Gas Emission: The gravest issue that stares at the planet today is global warming, caused by excessive emission of greenhouse gases. There are several sources for these emissions. The energy sector alone, however, accounts for more than two-thirds of the emissions. The phenomenon of global warming has potential for creating worst forms of disasters. It has already led to the retreat of continental glaciers on all continents and reduction of permafrost in polar, subpolar and mountainous regions. The snow cover in the Northern Hemisphere and floating ice in the Arctic Ocean have decreased. The impacts of El Nino and La Nina have increasingly led to disastrous impacts everywhere. There would be problems in the coastal areas, where the rising sea level shall submerge several islands. The global surface temperature, as per the present emission growth, is projected to rise between 3.3 and 3.9°C by 2100 which may be catastrophic.

Global Efforts: Efforts are being made to limit these emissions, primarily the CO_2. The defining moment was the Kyoto Protocol of 1997 by developed countries agreeing an overall reduction of emissions of greenhouse gases to 5.2 percent below 1990 levels for the period 2008/12. Although it was not realized fully, it got the ball rolling. Following suit, a pledge was made by 195 countries during the COP21 UN Climate Change Conference in Paris in December 2015 for restricting the global average temperature to 1.5–2°C by 2025. The majority of countries submitted

the Intended Nationally Determined Contributions (INDCs). The countries also made a joint agreement to achieve zero emissions between 2050 and 2100.

Influence of Renewable Energy

As the energy sector contributes the most to global warming, switching to renewable energy is likely to resolve the issue. As per the International Renewable Energy Agency (IRENA) COP21 rethinking Energy report of 2015, renewable energy can resolve the time-bound temperature stabilization by following two ways:

- The Renewable Energy can deliver half of all the emission reductions needed to keep temperature rise below 2°C. Energy efficiency measures can deliver the rest.
- Renewables and efficiency are the only technologies that can be deployed fast enough and at sufficient scale to close this gap in time.

The Renewable Energy is already contributing significantly, it accounts for more than 22% of total electricity generation, thereby reducing total power sector emissions. As per the REC Solar EMEA GmbH Analysis of June 2016, the solar energy itself can close 25 percent of the cumulative CO_2 equivalent gap. The other 75 percent will be contributed by wind, hydro, biomass, nuclear and high-efficiency gas power plants.

Setbacks for the Fossil Fuel Industry: The world is growing more assertive in restricting consumption of fossil fuel. Recently, France passed a Bill to end fossil fuel and natural gas exploration by 2040. Various European countries are bracing for dumping of fossil fuel-based automobiles, for which India has also set a target of 2030. The global giant *Shell* announced in 2016 that it was stopping its drilling for oil in the Arctic. In October last year, then US president took a historic decision by rejecting the Keystone XL oil pipeline, citing the need to keep fossil fuels in the ground.

The Demand Supply Conundrum

In India there are approximately 200 million people without access to power. The NITI Aayog's Report of December 2015 on "175 GW RE by 2022" states that India's (then) 275 GW of installed electricity generating capacity is significantly higher than 140 GW of peak demand. The coal-based generation capacity alone is higher than its peak demand. The reasons for poor state of the energy sector though are coal supply shortages, high level of transmission and distribution losses and poor financial health of utilities. Also, unlike domestic coal, the price of imported coal is unregulated. These fundamental problems in the power sector are hampering the efficient use of the existing system to even meet the grid-connected demand.

Apart from poor state of supply, there is a rampant load shedding which has forced people to resort to private, costly and dirty solutions such as diesel generators, which pose both health and environmental concerns. The estimated energy requirements of India are set to get doubled by 2021/22 to that of the levels of 2011/12, thereby, making the overall mess monumental.

The only solution for the monumental mess is the renewable energy, the potential for which is vast and remains largely untapped. Recent estimates show that India's solar potential is greater than 750 GW and its announced wind potential is 302 GW (actual could be higher than 1000 GW). The India Energy Security Scenarios 2047 show a possibility of achieving a high of 410 GW of wind and 479 GW of solar PV by the year 2047. The renewable energy, if garnered to its potential, can anchor India's overall energy needs. The other significant benefit from switching to the

renewable energy is reduction of burden on the exchequer. India's coal imports alone in 2014/15 were a mammoth 212 million tons at over Rs 1 lakh crore. This necessitates ramping up of the green energy infrastructure which currently is at a nascent stage. As per the 12th Five-Year Plan, the Planning Commission had estimated that the infrastructure development of energy sector alone shall require more than a trillion US dollars; this bill shall see a quantum leap if the investment requirements of renewable energy are included. These expenses, however, shall be compensated in long-run by falling import bills and stemming depletion in health of citizens.

The Solar Energy

Solar Energy Revolution

In the quest for energy sources with less carbon footprint the world has embraced solar energy in an unprecedented way. The overall renewable energy power generating capacity saw its largest annual increase ever in 2016, with an estimated 161 GW of capacity addition. Total global capacity was up nearly nine percent compared to 2015 to almost 2,017 GW. China alone was home to more than 25% of the world's renewable energy power capacity—totaling approximately 564 GW. The solar PV saw record additions and, for the first time, accounted for more additional capacity than did any other power generating technology. Solar PV represented about 47 percent of newly installed renewable power capacity in 2016, and wind and hydropower accounted for most of the remainder, contributing 34 and 15.5percent, respectively. The gallop was fuelled by overall decline in coal production, relatively, low global prices for oil and natural gas. Also, significantly higher subsidies for the renewables continued, which flows from the various international commitments to phase out fossil fuel subsidies. Such as the 2009 commitments by the G20 and by the Asia-Pacific Economic Cooperation (APEC)—by the end of 2016 committed by more than 50 countries.

The COP: The 2015 Paris Agreement of the UN Framework Convention on Climate Change (UNFCCC) formally entered to force at the 22nd COP in Marrakesh, Morocco in November 2016. Renewable energy figured prominently in large portions of the INDCs. At the COP22, leaders of 48 nations that constitute the Climate Vulnerable Forum jointly committed to work towards achieving 100 percent renewable energy in their respective countries.

Employment Prospects: Consequent to the growth in the renewable energy markets, the related employment also expanded substantially during 2016. The number of jobs in renewable energy sector crossed 11 million jobs worldwide a majority of which were in Asia.

Genesis of Solar Power Growth: In the year 2000, total global installed solar capacity was a meager 1.3 GW, whereas in 2014 the annual global addition itself was 40 GW (EIPA 2014/18 and Solar Power Europe 2015/19). This turn of course of the solar power industry started somewhere around 2008/09, when the solar power industry's demand for polysilicon picked up and raced ahead of the electronics industry. Along with the capacity addition, falling prices augur well for the sector. The bids for the solar power have been on downwards slope, and new record low bids were set in 2016, with bidding in some markets below $0.03/kWh. Argentina, India, Chile, Jordan, Saudi Arabia, South Africa and the UAE all saw very low bids for the solar PV. The advancement in technology in solar and other green energies also played a key role; the same is deliberated in the next paragraph.

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... of the International Solar Alliance (ISA)

Advancements in Green Technology

In the recent years, there have been significant advancements in renewable energy technologies. It includes innovations in solar PV manufacturing and installation and in the cell and module efficiency and performance, improvements in wind turbine materials and design. Similarly, renewable energy hybrid projects which combine two or more renewable power technologies are being built/ developed in several countries, including India, Australia, China, Morocco and the US.

Among the private firms, SolarWorld (Germany) and REC Solar (Norway) have been among the big players that upgraded production lines to Passivated Emitter Rear Cell (PERC) technology. Various PV module manufacturers are progressively increasing the number of busbars to reduce internal electrical resistance, as well as reducing barren spaces on modules to enhance light trapping. Also, in order to pool-in stand-alone energy grids, several plans to interconnect them or to build *'super-grids'* are being worked upon.

Power Storage Technology: Approximately 15 percent of renewable power is lost globally due to lack of adequate storage technology availability. Storage is an essential to make renewable energy viable. The tech-giant Tesla is currently working on building the largest lithium-ion storage system in the world in Australia. Siemens and AES are working on a JV which focuses on energy storage system development and marketing. Alphabet, Google's parent firm, is also working on an alternative to the lithium-ion battery system—its Malta Project is working on a prototype of a system that uses salt and a hydrocarbon fluid, such as antifreeze, to transform electricity into air and vice versa. There are other alternatives also being worked upon. A new battery that uses glass instead of liquid electrolytes is being claimed to have at least three times the energy density of other lithium-ion batteries.

The Solar Energy Juggernaut: The advancements in technology as discussed coupled with an upsurge in investments aided addition of 75 GWdc of solar PV capacity worldwide in 2016—equivalent to the installation of whopping 31,000 solar panels every hour. More solar PV capacity was installed in 2016 than the cumulative world capacity five years earlier. For the fourth consecutive year, Asia eclipsed all other markets, accounting for about two-thirds of global additions. The top five markets, viz. China, US, Japan, India and UK accounted for about 85 percent of additions. By the end of 2016, every continent had installed at least 1 GW of capacity, at least 24 countries had 1 GW or more of capacity, and at least 114 countries had more than 10 MW capacity installed. Although Asian countries added capacity at the best pace, the leaders for the solar PV capacity per inhabitant remained such as Germany, Japan, Italy, Belgium and Australia.

Solar Power Sector of India

Energy Mix: The energy mix of India is primarily fossil fuel-based. The total installed power capacity of India currently is approximately 330 GW, of this coal-based power itself accounts for around 65 percent at 215 GW; while solar-based power accounts for a meager 4.5 percent at 15 GW. The overall renewable energy power state is at 60 GW, less than 18 percent. Also, as far as capacity addition of the renewable energy is concerned there is a stark difference between various parts of the country. The eastern and northern states lag behind substantially with less than five per cent of all India commissioned capacity.

Need for Reorientation: There needs to be major policy reorientation and investment boost to change the narrative. India's Intended Nationally Determined Contribution (INDC) commitment to the COP tries to do exactly that. It pegs the target of achieving 40 percent of the total installed power

generation capacity on nonfossil fuel resources by 2030. Which includes the target of 100 GW of solar power capacity addition of by 2022, which is subdivided as: 60 GW of land mounted grid-connected solar power and 40 GW of rooftop grid interactive solar power. In terms of the Compounded Annual Growth Rate (CAGR) of 55 percent required to meet targets, the goal that India has set for herself is the highest in the world. This changes everything. It is bound to attract investments and shall stimulate R&D.

Transformation Under Way: The INDC commitment of India may seem herculean to achieve but is not impossible if the progress made in recent years is taken to account. India is already the 5th largest in terms of power generation capacity and ranks 3rd in terms of electricity production. The renewable energy sector is also fast emerging. Wind energy is currently accounting for approximately 54 percent of total installed capacity, with a plan to double the wind power capacity to 60 GW by 2022. India has also made substantial gains in terms of solar power capacity addition. It started with 3 MW in 2008 and has now reached close to 15000 MW. India added about 4.1 GW in 2016 (up from 2 GW in 2015) and added approximately 5.2 GW in 2017. The Government of India is preparing a *'rent a roof'* policy for supporting its target of generating 40GW through rooftop projects. The GoI has already delicensed the electrical machinery industry and also allowed 100 percent foreign direct investment (FDI) in the sector, and is now planning to invite bids for the largest solar tender in the world, for installing 20 GW of solar power capacity.

The State Governments are also playing vital roles with sixteen States already notifying their solar power policies. In recent times, a competition of sorts has spurred among them. Tamil Nadu overtook long-time frontrunner Rajasthan for cumulative capacity. Gujarat was the first to come up with solar panels atop canals and is being emulated elsewhere also. The 10 MW solar-canal-top project in Vadodara was inaugurated by the UN Secretary Ban-Ki-Moon in Jan 2015. States are also experimenting with concept of harvesting solar power in fields. This involves farmers leasing out land to discoms to install solar plants, while the farmers continue to cultivate their lands and also get 30–40 percent profit sharing in power generation.

Kurnool Ultra Mega Solar Park: With 900 MW of the 1000 MW already commissioned at the Kurnool Ultra Mega Solar Park and the remaining to be fully operational soon, it has already become the largest Park outpacing the Kumathi Solar Power Project in Tamil Nadu and Topaz Solar Park in California.

Recently, Madhya Pradesh laid the foundation for its largest Solar Park at Rewa of 750 MW capacity. The state is now planning to set up another mega solar park that aims, to pip China, to be the world's largest solar park with an installed capacity of 1050 MW.

Conclusion

The world is polluting and decaying fast, with limited resources left to support the needs of humankind that seem to be infinite. The narrative has to change. While the crisis is of colossal proportion, it is still at reversible state. There are very few low hanging fruits left, like the meat industry which is a major contributor of greenhouse gas emission and has to be managed by lifestyle adaptation. Also, dependency on produces of deforestation has to be addressed and massive afforestation drives need to be undertaken. The more arduous task is that of transforming the current energy mix to entirely renewable energy-based. As enumerated, a lot of work is already under way or in development stage. The International Solar Alliance is arguably the most potent tool for the job and currently is at

nascent stage. As they say, a job well begun is half done—the planners of the alliance, especially India and France, need to ensure that their foundations are dug deep to usher seamless expansion and operationalisation. The energy sector is highly disruptive in nature and shall keep the alliance on its toes to adapt with time and reform continuously to remain relevant. While it is a global initiative its ramification are profound for India too. Apart from resolving her energy crisis, the alliance shall also give legs to her largely inert foreign policy and is likely to guide India to a more revisionist global approach, which is also expected from a country of India's size and strength

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