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SOLAR ENERGY IN INDIA: STATUS, CHALLENGES AND FUTURE PROSPECTS

Aparna Menon
Student,
Amity School of Economics, Noida

Dr. Namita Kapoor
Associate Professor,
Amity School of Economics, Noida

ABSTRACT

Solar energy is an essential source of renewable energy on earth. As oil costs have gone up and other essentialness sources remain obliged, nations are continuously checking for sheltered, trustworthy, long-haul wellsprings of intensity. In this situation solar vitality ends up being a plentiful vitality source which can be put to utilize. Located in the tropic of cancer region, India receives sunlight for more than 300 days, which gives us the opportunity to utilize this form of energy. Solar in India is a quick growing industry. The solar installed capacity of India as of March 31st, 2020, has become 37.627 GW. The capital cost per MW to fix solar in India is the lowest globally. In comparison to other forms of renewable energy sources, solar power has far more scope with respect to its source of energy which is freely available in abundance and its primary raw materials. India being a developing country should promote the use of solar energy as an economic social path for the sustainable growth of the country. This paper studies the status of Solar Energy in India. The policy mechanisms in India are giving incentives and paving a route to diffuse solar energy system into the energy market of India. This paper will also focus on discussing the various challenges as well as the solar policies taken by the country for better understanding of the system.

Key Words: Solar Energy, Renewable Energy, Sustainable Growth, Development

INTRODUCTION

The changing lifestyle with brisk industrialization has made vitality a key and fundamental item throughout the years. During the latest couple of decades, extending expenses of power with expanding request and decreasing non-sustainable power source reserves have raised various concerns for policymakers, money related experts, and customers. Additionally, existing flexibly chain also speaks to a test of carbon impression as a result of its dependence on oil subsidiaries like coal and oil for producing power. To facilitate the concern, strategy creators around the globe have been searching for some legitimate and down to earth elective information vitality hotspots for power age. They found various decisions like nuclear, wind, sun situated, hydro, biomass, geothermal, and so on. However, many research suggested solar to be the most green and ready option available. The sun can be one of the most conceivable incredible sustainable power sources. Solar energy is a limited energy resources as compared to the long term global energy crisis. The environmental burden and recent energy crisis are getting more and more serious and drawing huge notice to solar energy utilization.

The use of solar energy in India has got prime significance in the current scenario of energy crisis in the nation. India is located in the tropic of cancer area due to which it gets in excess of 300 radiant days which implies, it is our benefit to use this type of energy much as conceivable. As this clean form of energy can be utilized to create power, which is a fundamental need of each person. So it turns out to be imperative to use this energy as wisely as conceivable. Since populace development and financial turn of events of the nation requires enormous vitality that can be made by innovation blend of numerous advances in which solar is the most prominent one. India is both thickly populated and has high sun powered separation, giving an ideal blend to solar in India.

India is starting at now a trend-setter in wind power age. The India Energy Portal assesses that if 10% of the land were used for harnessing sun based essentialness, the introduced sun oriented cut-off would be at 8,000 GW, or around numerous occasions the current total introduced power limit in the country. The government in India has seen the criticality of solar power as one of the legitimate wellsprings of vitality under National Action Plan for Climate Change (NAPCC).NAPCC plans to deduce 15% of its vitality necessities from RE sources continuously 2020. Distinctive methodology measures, for

example, extraordinary expense or fixed toll or feed-in levy (FiT), RPO, extract obligation exception, and delicate credit, have been actualized to achieve the recently referenced objective. RPO is one of the instruments which have been executed by various countries to achieve their eager RE targets. In India, state power authoritative commissions (SERCs) choose the committed substances, which all things considered fuse dissemination organizations, hostage purchasers, and any open-get to customers. By then these SERCs fix a particular degree of intensity use as RPO centres for the recently referenced committed elements. On account of basic cost differentiate in sun powered and non-sun based RE headways, a large portion of the states have thought of their diverse concentrations for sun oriented force.

India's abundant solar power potential provides a clean and attainable replacement for the extremely harmful, polluting and rapidly depleting conventional sources of energy. Development of policies for the viable utilization of solar power can help India emerge as a pacesetter within the global arena. Solar energy generation across the globe has increased substantially during past few years and shares a significant proportion of the total generation in the grid. Research in solar energy is therefore an important focus area for the country.

OBJECTIVE

.To study the current status of solar energy in India in terms of its availability, capacity and development.

I.To analyse the various challenges and future prospects of solar energy in the emerging sustainable energy market in India.

METHODOLOGY

The study is based on auxiliary data. It is both qualitative and quantitative. This paper uses graphical analysis for a better understanding of the current status of solar energy in the states. Excel was used as tool for analysis.

LITERATURE REVIEW

Solar energy is one of the main substitute resource of the world and has an enormous capability of renewable power energy. India has a tremendous potential for creating green power from the sustainable power sources. To advance the efficient power energy, the government of India is promoting numerous plans and schemes for the renewable sources of energy. '***Solar Energy Potential and Future Energy of India: An Overview'*** *written by* ***Santosh Kumar Suman, Jameel Ahamad*** *[2018]* provides an overview of solar energy in India. It reviews the current status of solar energy with respect to its existing limit, alongside historical patterns of solar energy and future capability of an alternate type of solar energy in India. India has an unbalanced power creation. Creation is less and utilization is more. Solar energy is an excellent choice in India to expand power creation. This is likewise generally excellent for our financial development and environmental protection. Policies in India have made venture amicable market in the country for a whole variety of exercises. Local manufacturing and India driven research and development are important to diminish the expense of accomplishing Solar Targets. Solar Energy is a limitless source of energy and our nation likewise give a reasonable environment to this energy yet we need some better plan to build productivity and diminish creation cost. In the renewable power assets, solar energy can play a significant part and can be a colossal source of energy.

Another paper titled '***Current Status Of Solar Energy In India - A Review'*** by ***Wajahat Khan and Shubaham Patokar*** talked about the situation of solar, for example, in what area the arrangement of solar is best appropriate and what are the benefits and how solar can conquer the issue identified with power. The review paper contained the absolute data and status of sunlight based in India. Solar is quite possibly the most discussed elective fuel sources on the planet today. Enough energy comes from the Sun in an hour that the Globe can give power to

a year. Daylight is an absolutely inexhaustible asset, in contrast to oil, coal, and so forth Sustainable power source like Solar can possibly defeat with the issue identified with power and numerous different things. In the review paper they examined about the Adoption Parameter, similar to what care ought to be taken while embracing solar, Consumer Studies, for example, survey identified with solar and Current Status of

the Solar energy in India. In India the utilization rate is high and for that utilization rate, there is a need of sustainable power sources and its turn of events. The issue individuals are confronting in regards to deficiency of power, it ought to be tackled and the utilization of solar energy ought to be done as it very well may be utilized from numerous points of view. The issue of power can be tackled, if right advance by individuals and individuals' administration is taken.

On similar terms a research article ***Overview of Solar Energy in India*** *written by* ***Venkatakrishnan, G. R. and Dr. Rengaraj, R*** highlight about the requirement for a smoother switch to renewable energy resources from the conventional energy resources and building up an in-fabricated awareness about the need for a difference in energy in the impending future. Lately, the renewable energy markets, ventures, and policy frameworks have developed quickly. Power generation through renewable energy source has acquired more significance because of the barriers looked by conventional energy sources. Generation of solar energy across the globe has expanded considerably during recent years. This paper underlines on solar energy in India. Solar energy generation is focused on only a couple of states in India, hardly, to a degree and serious measures should be taken to adjust the changeability of such generation. The drivers for creating solar energy in India are against atomic, climate change or environmental change concerns which vary from different nations. Thus, when joined with other sustainable energy sources or other conventional energy sources can be utilized in meeting the future interest.

To gauge the improvement of an economy, numerous economists and analysts utilize a unit called the energy demand of the economy. Current numbers anticipate that the demand for basic fuel sources is set to expand three times worldwide in the coming years. Being aware of the worldwide pattern, India has additionally moved towards renewable resources of energy to satisfy its energy needs. India, being a tropical nation, receives a lot of solar energy. Its topography permits numerous districts to get a tremendous amount of solar energy consistently. The solar energy potential that India holds can help the country give a clean and feasible swap for the conventional sources of energy which are polluting, harmful and rapidly decreasing. Advancement of policies for the feasible use of solar energy can assist India with

arise as a pioneer worldwide. ***Outlook on the Indian scenario of solar energy strategies: Policies and challenges*** *written by* ***Gautam Raina and Sunanda Sinha*** gives a broad study of different strategies set up to help accomplish that objective while tending to the different barriers corresponding to the generation of solar energy. A small outline of the present situation of solar energy market is additionally talked about in this paper enrolling different enterprises, both public and private, in the field of development of solar energy in the country. Solar power is a promising way to deal with fulfilling the impending energy needs and tending to the worries for environmental change. The study also includes various suggestions that can help in overcoming various barriers that India faces in developing solar energy.

Another paper titled '***Solar Energy Fundamentals and Challenges in Indian restructured power sector'*** *written by* ***Ashok Upadhyay, Arnab Chowdhury*** gives an outline of specialized, monetary and policy parts of solar energy advancement. The solar energy advancements has encountered exceptional development. The acknowledgment of developing public consciousness of ecological issues technological improvements, the financial

environment and number of policy instruments have encouraged and supported high demand in these technologies. The paper audits the status of solar energy with respect to asset potential, existing limit, alongside historical patterns and future development possibilities of solar energy. Since the expense of power generation from solar is costly and furthermore the power from sustainable resources including solar is weak power, enormous advancement of renewable assets didn't occur and dispersion utilities are likewise least intrigued to buy power from sustainable sources. The paper also review the existing financial and administrative policies to help solar energy advancement, demonstrating how effective these policies are in accomplishing their objectives. There are different specialized, conservative, and institutional hindrances in the development and use of solar energy advances. The paper also involves a review based on studies of future possibilities of solar energy supply under different situations in the rebuilt power sector in India.

The paper written by ***Dr. APV Appa Rao, J Rama Mohan, Dr.L Malleswara Rao, Dr.***

K. Ram Narayana, Ch. Sundar Singh & P Ramakrishna Rao *titled* ***'Solar Energy in India - Present and Future'*** outlines the current energy dilemma and ecological issues that are getting progressively critical and causing tremendous notice to solar energy usage. This emergency and ecological dangers are causing colossal to notice solar energy usage. The use of solar energy in India has got prime significance in the current situation of energy emergency in the country. The paper shows solar power in India as the quickest developing industry and proceeding to build up the solar projects in Tamil Nadu, Rajasthan, Gujarat and Maharashtra. The paper also talks about India's gigantic arrangement for generating solar energy that may satisfy the shortage of generating power as well as contribute to a great extent in Green Energy Production to assist with lessening the climatic changes worldwide. Solar power industry has inspired the Indian culture to a huge financial development opportunity. Investors are determined enough toward this area in the nation accordingly adding to the advancement of economy through three overlay return (for example financially, environmentally and socially). It is vital to help and subsidize the solar energy till it can rival the conventional energy sources.

'Future Scope of Solar Energy in India' written by ***Bharat Raj Singh and Onkar Singh [2016]*** provides a glimpse into the advantages and enormous extent of producing solar energy in India. The geological area of the nation stands to its advantage for producing solar energy. The explanation being India is a tropical country and it gets solar radiation nearly consistently, which adds up to 3,000 hours of daylight. States like Andhra Pradesh, Bihar, Gujarat, Haryana, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, and West Bengal have extraordinary potential for tapping solar energy because of their area. Since greater part of the populace live in rural areas, there is a lot of extension for solar energy being advanced in these regions. Utilization of solar energy can decrease the utilization of dung cakes and firewood by households in the rural areas. Solar Power Generation alone can provide more than 60-65% of our whole need of power. Subsequently, focus around following likely arrangements of introducing huge undertakings in Rajasthan and Jammu and Kashmir where as in Uttar-Pradesh, Banda locale - is most appropriate area to cater our need of Uttar-Pradesh. Aside from the above, focus is needed around Roof Top Solar Energy Generation that may chop down the need to an excess of each house hold. India has monstrous arrangement for Solar Energy generation that may satisfy the shortfall of generation of power

as well as contribute generally in Green Energy Production to assist with lessening the Climatic Changes around the world.

'Recent developments of solar energy in India: Perspectives, strategies and future goals' written by ***Subhojit Dawnn, Prashant Kumar Tiwari, Arup Kumar Goswami and***

Manash Kumar Mishra [2016] examines the new situation, techniques, accessibility, future potential, strategies and improvement of sun based energy in arising Indian power sector. Power is the most fundamental element of foundation for development in financial matters and government assistance of a country. Advancement for supporting the development of the Indian economy in the current framework is pivotal. The power sector of India is one of the biggest extended power sectors on the planet. Because of the nonstop augmentation in power request step by step, Indian power sector is interfacing some challenges to keep up the harmony between generating power and request with experiencing supply imperatives and deficiencies in power. For keeping up the proportion of generation and request for power, moving from traditional sources to non-conventional sources isn't just a choice, it is a need. The paper additionally discusses how the significance of utilizing solar as a fuel source in India's points of view in not exclusively to generate power, yet additionally to extend energy dependability with thinking about the ecological, social, free and monetary gainful properties. Solar power can likewise give a superior economic situation after effective execution of solar mission for all territories of India, particularly for some lacking states, where the capability of solar energy is generally excellent yet not used till date. The paper presumes that the solar power plays a significant job later on power improvement in India because of the significant activities and commitment of Government of India.

Over the most recent couple of years, the field of Renewable Energy Sources (RESs) is the most pulling in field for analysts to the extent the worldwide demand for power is worried, with numerous advancements, technologies and applications becoming a reality. Solar energy is one of the significant classifications of Renewable sources of energy which will be useful for the practical advancement of India. Solar energy is right now satisfying 5.1% of the total amount of energy need of India which is second most

noteworthy satisfaction by any class of renewable sources of energy. ***'Current Scenario and Future Scope of Solar Energy in India***' written by ***Yogesh Popat , Sourabh Shrivastava and Harshit Saxena*** features the current circumstance and future point of view of usage of solar energy. The paper likewise discusses the endeavours that have been made to sum up the investigation of utilization, current status, and future capacity, obstructions to execution and significant accomplishments of solar energy in various territories of India. The worldwide energy crisis is a significant issue at global level. The entire world is looking towards energy security and ecological insurance by diminishing the reliance on customary petroleum products and solar energy advances are substantiating itself as a best elective source. India has the capacity to satisfy in any event 35-40% of the absolute energy need by solar advancements. India as of late has become a world chief in utilizing solar energy advancements yet there is huge extension in the improvement of the procedures for solar based establishment which needs extraordinary help from government as well as from the youth of the country.

The sources of power production like coal, oil, and flammable gas have added to 33% of worldwide ozone harming substance discharges. It is crucial to increase the expectation of living by giving cleaner and more reliable power. India has an expanding energy interest to satisfy the economic improvement plans that are being carried out. The essential target for sending sustainable power in India is to progress financial turn of events, improve energy security, improve admittance to energy, and relieve environmental change. Economic improvement is conceivable by utilization of feasible energy and by guaranteeing admittance to reasonable, solid, supportable, and present day energy for residents. Solid government support and the inexorably ideal monetary circumstance have pushed India to be one of the top chiefs on the planet's most alluring sustainable power markets. The government has planned

approaches, programs, and a liberal climate to draw in unfamiliar ventures to increase the country in the sustainable power market at a fast rate. It is expected that the sustainable power area can make countless domestic jobs throughout the next years. ***'Renewable energy for sustainable development in India: current status, future prospects, challenges, employment, and investment opportunities'*** written by ***Charles Rajesh Kumar. J and M. A. Majid*** intends to introduce huge accomplishments, possibilities,

projections, generation of power, along with challenges and venture and business openings because of the improvement of renewable power in India. In this review, they have recognized the different snags looked by the renewable area. The proposals dependent on the review results will give valuable data to policymakers, innovators, project designers, financial investors, ventures, related partners and offices, specialists, and researchers.

ANALYSIS

Solar energy has made some amazing progress in 10 years. Back in 2010, the worldwide market was little and exceptionally subject to subsidy regimes in nations like Germany and Italy. This year there will be more than 115 gigawatts (GW) of solar energy systems introduced across the world, which is more than any remaining technology generated. It is likewise progressively minimal cost, particularly in sunnier districts where it has effectively gotten the least expense type of new power generation. In the coming years, innovation enhancements will guarantee that solar turns out to be considerably less expensive. It could well be that by 2030, solar energy will have become the main wellspring of energy for power creation in a huge piece of the world. This will likewise emphatically affect the climate and environmental change. Going ahead the solar energy industry has clear expense decrease guides, which should see solar oriented expenses splitting by 2030. There is now a move set up towards higher- effectiveness modules, which can produce 1.5 occasions more force than existing, comparatively estimated modules today utilizing an innovation called pair silicon cells. These will have an enormous effect going ahead.

Furthermore, there are creation developments descending the pipeline that will decrease the measures of expensive materials, for example, silver and silicon utilized in the assembling of solar cells, just as advancements, for example, bifacial modules which permit boards to catch solar energy from the two sides. The other significant advancement is around how best to incorporate solar into our homes, organizations and force frameworks. This implies better force gadgets and a more noteworthy utilization of minimal effort computerized advances.

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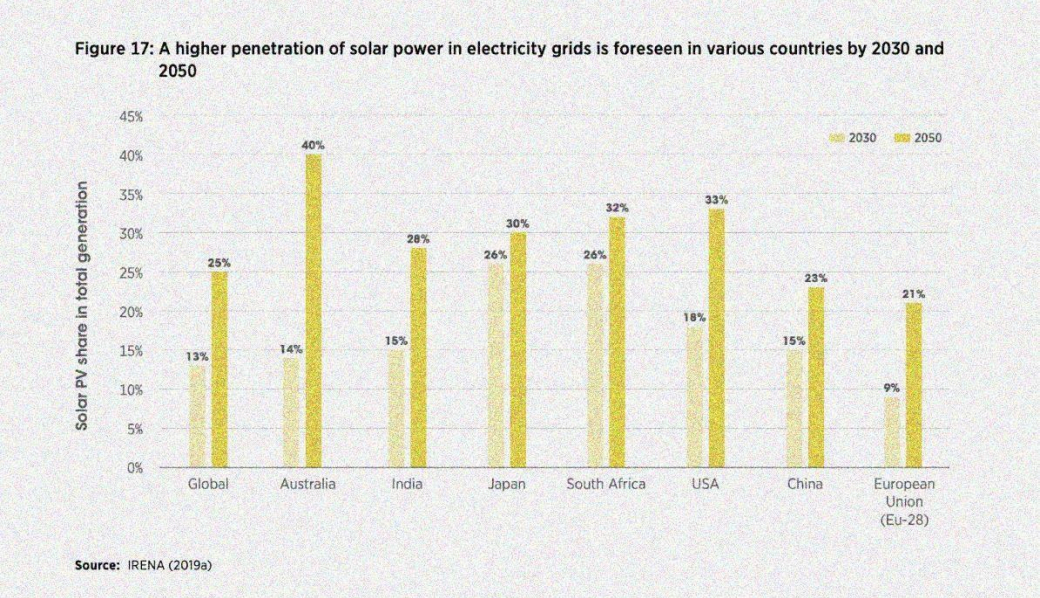


Solar is anticipated to turn into a much more important contributor of the world's energy mix.

- **STATUS**

India is supplied with tremendous solar energy capacity. Around 5,000 trillion kWh each year energy is episode over India's territory region with most parts getting 4-7 kWh per sq. m each day. Solar photovoltaic force can viably be saddled giving tremendous versatility in India. Solar energy additionally gives the capacity to create power on an appropriated premise and empowers quick limit option with short lead times. Off-lattice decentralized and low- temperature applications will be beneficial from a provincial charge point of view and meeting other energy needs for force and warming and cooling in both rustic and metropolitan zones. From an energy security point of view, solar energy is the most secure, everything being equal, since it is richly accessible. Hypothetically, a little part of the absolute episode solar (whenever caught viably) can meet the whole nation's force prerequisites.

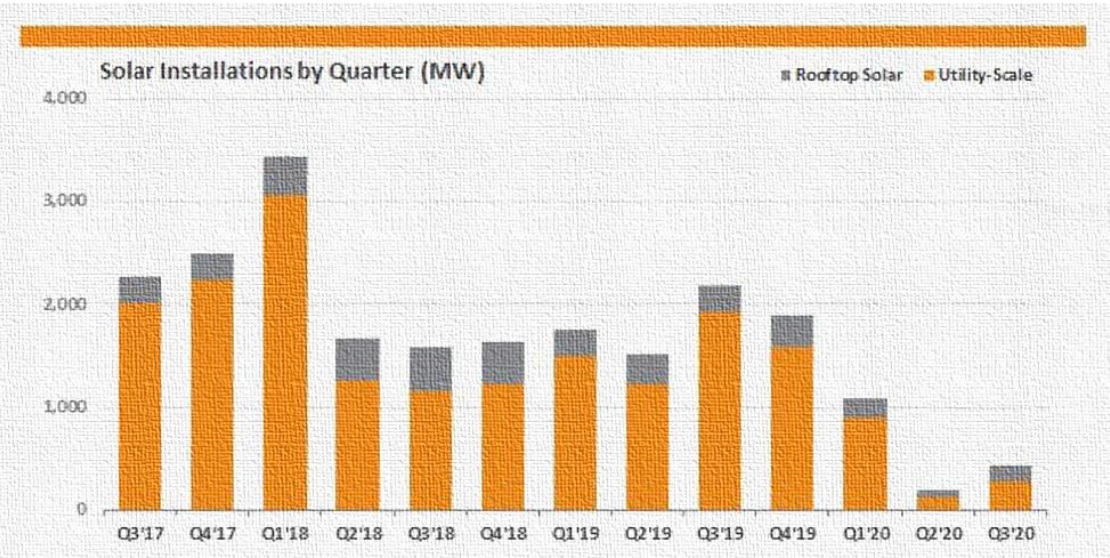
The development of India's solar force limit has been genuinely dramatic, from a microscopic 10 MW solar generation limit in 2010 to 30 GW in 2019. This giant step can be principally credited to decrease in costs and expanded interest for solar energy establishment, sped up by positive government arrangements

en route. The help for solar industry acquired further energy when Prime Minister Narendra Modi declared an increment in India's solar limit focus to 100 GW by year 2022, and furthermore raised a capital appropriation of INR 150 billion as primer help. The solar energy upheaval in India is really in progress, and has given force to a few Indian organizations to upgrade capacities with regards to assembling solar modules, solar module mounting structures, solar force packs, solar generators, solar inverters, and so forth, as well as giving top notch land based solar EPC and housetop solar EPC administrations.

As of late, India accomplished fifth worldwide situation in solar force organization by surpassing Italy. Solar force limit has expanded by in excess of multiple times over the most

recent a long time from 2.6 GW in March, 2014 to 30 GW in July, 2019. As of now, solar energy levy in India is serious and has accomplished network equality. Under Union Budget 2019-20, the Government allotted Rs. 4,272.16 crore (US$ 611.26 million) for grid environmentally friendly power plans and activities, and Rs. 3,004.90 crore (US$ 416.48 million) for the improvement of solar force projects, including framework intelligent, off-grid and decentralized classes. An aggregate of 42 solar energy parks were endorsed to come up by May 2019. The Indian government has set an objective to arrive at 100 GW of solar energy limit by 2022. The expanded limit will assist with meeting one of the objectives as per the Paris environment arrangement. The objective is to make sustainable sources represent 40% of the absolute force generation limit by 2030.

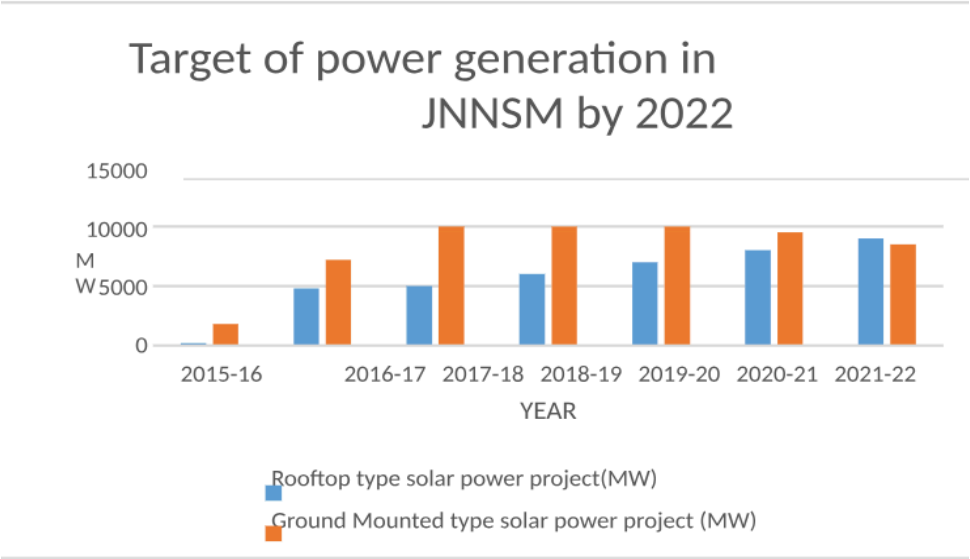
India added 438 megawatts (MW) of solar energy limit in Q3 2020, a 114% expansion contrasted with 205 MW introduced in Q2 2020. Solar establishments were somewhere near 80% year-over-year (YoY) contrasted with 2,177 MW included Q3 2019. Solar establishments in the initial nine months of 2020 added up to 1.73 gigawatts (GW), a 68% decrease contrasted with 5.48 GW included a similar time of 2019. Huge scope establishments totalled 283 MW contrasted with 120 MW in the past quarter. YoY, enormous scope establishment levels diminished by 85% contrasted with 1,932 MW introduced in Q3 2019.



Maharashtra, Haryana, and Uttar Pradesh were the top three states for solar capacity additions

National Institute of Solar Energy has surveyed the Country's solar energy capability of around 748 GW expecting 3% of the waste land region to be covered by Solar PV modules. Solar has assumed a focal position in India's National Action Plan on Climate Change with National Solar Mission as one of the key Missions. Public Solar Mission (NSM) was dispatched on eleventh January, 2010. NSM is a significant activity of the Government of India with dynamic cooperation from States to advance environmental feasible development while tending to India's energy security challenges. It will likewise comprise a significant commitment by India to the worldwide exertion to address the difficulties of environmental change. The Mission's goal is to set up India as a worldwide innovator in solar by making the strategy conditions for sun powered innovation dissemination the nation over as fast as could really be expected. The Mission targets introducing 100 GW framework associated solar plants

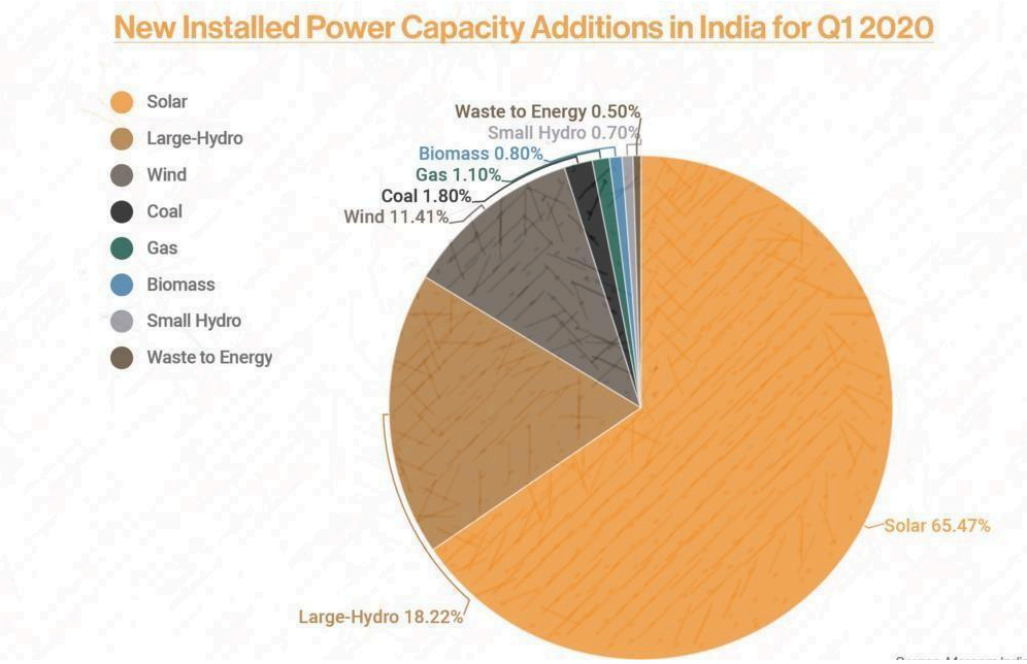
constantly 2022. This is line with India's Intended Nationally Determined Contributions(INDCs) focus to accomplish around 40% total electric force introduced limit from non-petroleum derivative based energy assets and to lessen the emanation power of its GDP by 33 to 35 percent from 2005 level by 2030.



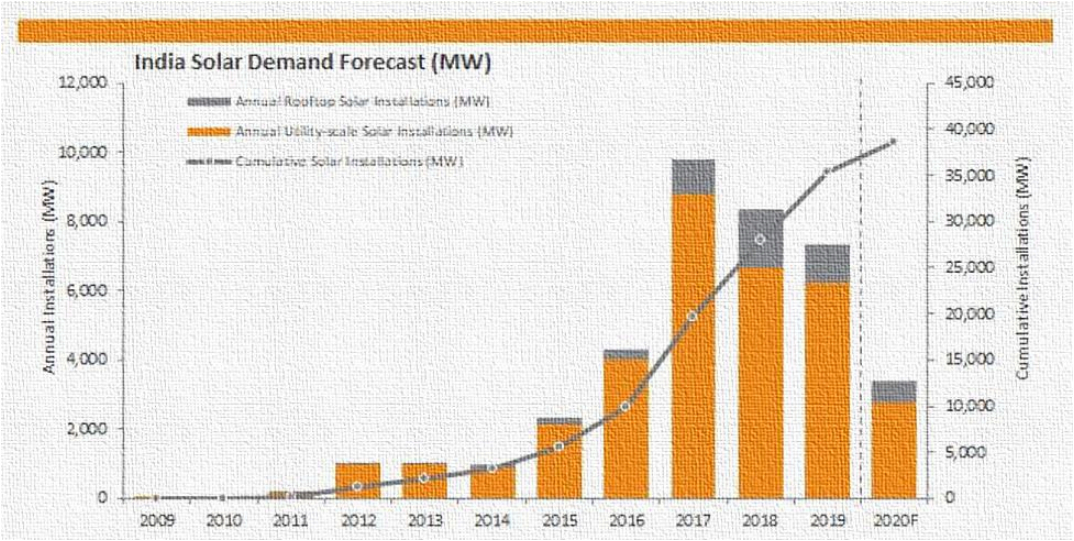
Using a three-stage approach, the aim of the mission is to set up India as an overall pioneer in solar energy, by making the methodology conditions for solar energy advancement dispersion in the country as quick as could truly be anticipated. The Mission had adopted up a three-stage strategy. Stage I (2009-13), Phase II (2013-17) and Phase-III (2017-22). The targets may be higher ward on the availability of worldwide resources and development move. The current objective is to consolidate 40 GW housetop and 57 GW through medium and enormous scope framework associated solar plants. By this movement, India can see itself getting a standout amongst other country of the world in generating solar energy.

The lockdown circumstance has facilitated in many parts of the country, and financial action has continued consistently. The country's solar energy industry is giving indications of recuperation with expanded action contrasted with the past quarter. Nonetheless, the business actually has far to go. A few undertaking cutoff times have moved to Q4 2020, and the charging dates for countless ventures have been delayed to the main portion of 2021. India actually has a powerful enormous scope solar task improvement

pipeline of 44.7 GW, with another 34.6 GW of undertakings offered and forthcoming sale toward the finish of Q3 2020. Housetop solar energy establishments represented 155 MW in Q3 2020, an increment of 82% contrasted with 85 MW introduced in Q2 2020. YoY, roof establishments declined 37% contrasted with the 245 MW included Q3 2019. The most noticeably awful is by all accounts over for the housetop market, and installers are detailing serious rivalry with different organizations competing for similar business and pushing costs down.



The commercial and industrial (C&I) section overwhelmed the Indian solar roof market in Q3 2020 and represented a 95% piece of the overall industry. The Covid pandemic has caused C&I clients to understand that going solar energy is perhaps the most ideal approaches to reduce down operational expenses and keep their organizations above water during these difficult occasions. A new report gauge roughly 3.3 GW of solar energy establishments in 2020 as the majority of the activities booked for authorizing in the second 50% of 2020 were moved to the primary portion of 2021.



There has been a noticeable effect of solar energy in the Indian energy situation during the most recent couple of years. Solar based decentralized and conveyed applications have profited a great many individuals in Indian towns by meeting their cooking, lighting and other energy needs in a climate agreeable way. Solar sectors in India has arisen as a huge part in the network associated power generation limit throughout the long term. It upholds the public

authority plan of reasonable development, while, arising as an indispensable piece of the answer for meet the country's energy needs and a fundamental player for energy security.

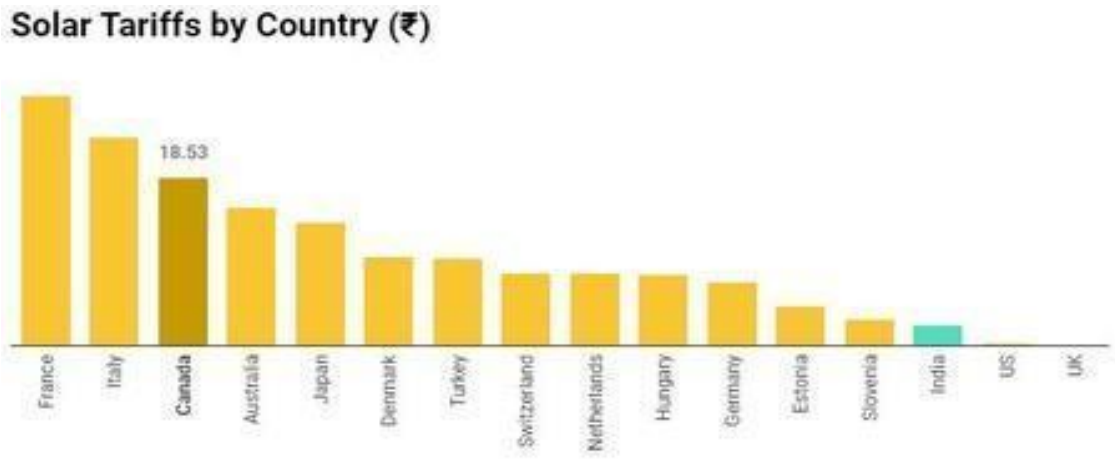
CHALLENGES

Advancement in solar innovation gives more open energy productive outcomes and can help extend business. The inconveniences tormenting India's solar sector are both large scale and underlying in nature. Extensively, issues with GST, COVID-19 and the slowdown in the economy that went before the pandemic are to be faulted for the solar slump.

There are issues inside the area too - from both the demand and supply sides.

Supply Side Dilemma

Solar force providers' principle grievance includes the country's extremely inexpensive levies, which are among the universes most reduced. (Duties hit as low as ₹2.36/unit in July this year.)



Data for latest year on record, converted to ₹ from $ based on exchange rate as on September 7th 2020.

Source: OECD

Lower duties are uplifting news for shoppers however wrecking for energy organizations. State governments' demand that organizations offer capacity at modest costs harms these organizations' overall revenues and adversely influences centre on quality and development. This additionally makes banks hesitant to loan to these organizations, since they are uncertain of benefit maintainability. This assumption has simply irritated because of the Covid pandemic, which has seen all moneylenders fix their satchel strings. What is more upsetting is some state governments reneging on their legally binding commitments or needing to revise their Power Purchase Agreements (PPAs) with power providers when duties fall further. Such choices by states like Karnataka, Andhra Pradesh and Punjab jeopardize the guidelines based system and would perpetually repulse financial backers, home-grown and unfamiliar the same.

Power providers likewise face different issues like inaccessibility of land, the long and confounded land securing measure, lacking transmission foundation and so forth.

Demand Side Barriers

The issues looked by distribution companies are a well-established story, and are not restricted to the inexhaustible area. These include:

1. Binding concurrences with non-solar energy makers - these will in general be long haul responsibilities, so if distribution companies make the progress to clean energy simple and consistent they would need to keep paying their commitments to these organizations while not creating any income from non-solar power sources. It's a no- win scenario for these companies.
2. Stressed monetary records - mounting obligation and the absence of liquidity to address them.
3. Old and maturing foundation.
4. Lack of talented man-force, which the sustainable area requires.
5. General operational failures.

The pandemic and lockdowns have just exacerbated the situation. Demand for energy is lower currently because of diminished financial action, workplaces staying shut and millions telecommuting. Additionally, numerous purchasers have not had the option to cover their power bills or have postponed doing as such as of late.

Way forward

India is at the cusp of a solar insurgency, the government has effectively set a yearning objective to accomplish 100 gigawatt (GW) by 2022. Remembering the objective, Indian states have effectively begun sloping up their introduced solar and wind fuelled capacity.

Policy initiatives

Government of India has dispatched different plans to generate solar power in the nation like Solar Park Scheme, VGF Schemes, CPSU Scheme, Defence Scheme, Canal bank and Canal top Scheme, Bundling Scheme, Grid Connected Solar Rooftop Scheme and so on. Different policy measures attempted included affirmation of direction for Renewable Purchase Obligation (RPO) including Solar, Waiver of Inter State Transmission System (ISTS) charges and misfortunes for between state offer of wind and solar power for undertakings to be appointed up to March 2022, Must run status, Guidelines for acquirement of solar influence however levy based serious offering measure, Standards for sending of Solar Photovoltaic

frameworks and gadgets, Provision of rooftop top solar and Guidelines for advancement of keen urban communities, Amendments in building bye-laws for compulsory arrangement of rooftop top sun based for new development or higher Floor Area Ratio, Infrastructure status for sun based ventures, Raising tax exempt sun oriented securities, Providing long tenor advances from multi-horizontal offices, and so forth.

The Ministry of New and Renewable Energy (MNRE) is the nodal organization liable for innovative work in environmentally friendly power, to guarantee energy security, increment the portion of clean force, accessibility, access, reasonableness and energy value. The MNRE dispatched the JNNSM alongside the Pradhan Mantri Urja Suraksha Uttan Mahabhiyan Yojana (PM-KUSUM) for grid connected solar agricultural pumps, Suryamitra skill development programme by the National Institute of Solar Energy (NISE), for Solar Energy venture's establishment, activity and support; National Wind – Solar hybrid policy, Atal Jyothi Yojana to give solar street light frameworks to public use and Solar change of India (SRISTI) plot for solar rooftop projects. 29 states and 7 union territories have informed grid connectivity regulations with arrangement for gross/net metering yet on-the-ground execution stays inconsistent. Service of New and Renewable Energy has endorsed INR 50 billion ($ 750 million) subsidizing for 30% capital sponsorship for solar rooftops for private and institutional purchaser fragments. Furthermore, up to 30% endowment is additionally accessible for government projects. Government is required to turn into a significant demand hotspot for solar housetop in the coming years. The Government of India, with help from multilateral monetary foundations, for example, Asian Development Bank, The World Bank and New Development Bank has reserved US $ 1,470 million of concessional credit lines for the solar rooftop based market. Four states and UT's – Uttar Pradesh, Haryana, Chandigarh and Chhattisgarh – have embraced these guidelines up until this point.

SUGGESTIONS

With enormous potential in the solar energy area, India ought to invest wisely in new and arising solar innovations through solid monetary estimates that incorporate green securities, clean energy reserves and institutional advances. There is a need to advance R&D especially in sustainable power storage innovation and tackle administrative obstacles in execution of such endeavours. India should likewise make proactive strides towards plan of an effective Solar PV Waste Management and Manufacturing

Standards Policy for supportable waste administration, to make it a genuinely green energy source. India will likewise use on the Ministry of External Affairs' New and Emerging Strategic Technologies (NEST) Division to take part in innovation discretion and arrange innovation administration to support India. The setting up of the "Engaged Technology Group" is one more positive development to guarantee maintainability of the advancements being built up that is fundamental to guarantee 'Atmanirbharta' for the new India that we as a whole try to live in.

We additionally notice a lot of chances which will shape the focal point of the business for the times ahead. Moving on from the normal plain-vanilla tenders to Hybrid, Peak-Power and Round-The-Clock offers is totally the privilege directional methodology. Accomplishment of the underlying offers has guaranteed that such tenders will be the following development boondocks. The sacred goal of firm, schedulable and dispatch capable force accessible at alluring duties will, at that point, be accomplished and Solar will assume a vital part in it. Besides, trader power deals could be another road which can release outstanding development in the Solar Power area in India. Synergistic methodology among every one of the partners to smoothen the couple of forthcoming unpleasant edges and smoothing out the chance regions will guarantee that the Sun keeps on sparkling more brilliant on the Solar Power Utility Sector in India!

CONCLUSION

The solar industry is continually developing, characterized by quick mechanical changes, innovations and upgrades. Selection of these novel innovations will additionally cut

down costs and soon enough, solar will be the standard force hotspot for the vast majority of the total populace. This will, thus decidedly affect the climate and environmental change also. The equivalent is valid for solar plant segments like PV boards, which are consistently moving towards higher-efficiencies, essentially because of progress in solar cell innovation.

The future of solar energy industry in India and globally seems, by all accounts, to be very certain and energizing. While there has been gradual progressions in the current solar innovations, specialists all

throughout the globe are dealing with various activities like solar paints, bio-solar cells, remote solar force transmission, solar energy harvesting trees, and so forth. In spite of the fact that a couple of years away, these forefront innovations, some of which are being field tried at present, not just can possibly alter the solar industry, but can also add to change our viewpoint about outfitting solar energy.

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