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Status and Utility of Solar Energy at Haryana in India

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Abstract – India is the largest hub of solar energy production. Many advantages of solar energy as compared to other energy sources. Therefore the Ministry of national renewable energy (MNRE) in India offers a lot of projects and make beneficial policy to promote solar energy production. In India, many states have a lot of potentials to produce solar energy. Haryana state is included in five in India for the energy production in solar. In this paper, we are focus on solar energy production and installed capacity with different projects like roof solar, off-grid and on-grid, etc. Gather the information on Haryana state in the area of solar energy production and survey regarding how many solar projects working in the state.

Keywords - Renewable energy, Solar Park, Grid-connected and solar power.

1. INTRODUCTION

Nowadays, as renewable energy sources square measure dwindling, the past ten years became progressively necessary to the value of solar energy instrumentation. It's undoubtedly able to become economical within the coming back years and evolve into higher technology concerning price and applications. Each day the world is over daylight (about 1366W). It's a limitless supply of energy that comes at no price. The most advantage of alternative energy over alternative standard power generators is that solar electrical phenomenon (PV) Solar cells are often regenerated directly into alternative energy with the utilization of Solar cells [1].

An oversized quantity of analysis work has been done to integrate the alternative energy method by developing Solar cells/panels/modules with high conversion. The most important advantage of solar electricity is that it's out there to the final public for complimentary and in large quantities compared to the value of assorted fossil fuels and oils over the past ten years [2]. In addition, alternative energy needs less hand than ancient energy generation technologies. Solar radiations are often regenerated into Solar cells (photovoltaic cells) directly into electricity. In such cells, a tiny low electrical voltage is created once the light hits the junction between a metal and a semiconductor (such as silicon) or two completely different semiconductors.

The energy created by one electric cell is sometimes concerning two watts. However, by connecting giant numbers of individual particles, many thousands or thousands of kilowatts of electricity are often generated within the type of solar-panel arrays, either in solar energy plants or in giant domestic arrays. The energy potency of current electrical phenomenon cells is simply 15 to 20 %, and since the intensity of radiation is low at the beginning, giant and dear assemblies of such particles square measure needed to provide moderate electricity [3]. In this paper, we are focus on solar energy production and installed capacity with different projects like roof solar, off the grid and on the grid, etc. Gather the information on Haryana state in the area of solar energy production and survey regarding how many solar projects working in the state.

2. AVAILABILITY OF SOLAR ENERGY IN INDIA

Republic of India has the third quickest growing alternative energy program within the world (only for China and also the United States). In 2017 alone, Republic of India developed a record 9,255 MW of alternative energy with 9,627 MW of solar comes [6-8]. Republic of India sent off its National solar Mission in 2010 underneath the National Action organize on temperature change with plans to supply 20 GW by 2022. This objective was accomplished four years before its lapse. In January 2018, Republic of India exceeded the put in solar capability of twenty GW [9-12].

In January 2015, Indian Prime Minister Narendra Modi stepped up to the plate and stretch out solar capability to 100 GW by 2022 the full sustainable power capacity would be 175 GW. This goal is bold given the worldwide put in solar capability of 177 GW of that solely a pair of 5 GW is put in Republic of India [13]. The Modi government is progressing to bid on a minimum of 77 GW of further alternative energy capability by March 2020, to achieve the 100 GW put in solar capability target by 2022 [14]. A complete of 1.2 GW of alternative energy was tender for the primary week of a pair of 18 and 20 GW of alternative energy tender, that wasn't auctioned once in 2018. A number of giant grid-scale solar parks are operational, a few of that embrace the world's largest.

Kurnool Ultra Mega solar Park with a capability of 1,000 MW, the Kamuthi alternative energy Project with a capacity of 648 MW, and 345 MW Charam solar Park, Gujarat sunlight based Park 480 MW Bhadla solar Park with an extended capacity of 2,255 MW and a consolidated ability of 605 MW. [15] In July 2017, Indian Railways coached trains with top side solar to power the lights, fans and displays within the coaches[16].Fowl International flying field, the 17th most active in Republic of India, is that the first to be totally battery-fueled by elective energy, and works 1,000 flights each week. Additionally the U.T. of Diu runs altogether on elective energy.

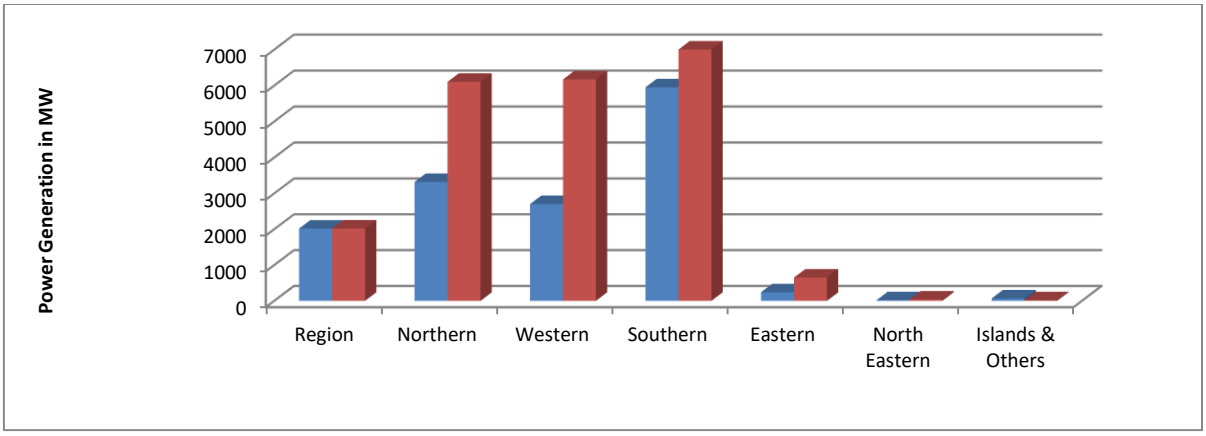

Fig. 1 Production of solar power in different regions of India

Solar energy is that the quickest growing trade in the Republic of India. By 31st March 2020, the country's solar put in capability had reached 37,627GW. The Republic of India has an all-time low opportunity cost per power unit globally for putting in place an Alternative energy plant. India has found around 42 solar-powered parks to deliver land for the advertisers of sun-oriented plants. Over the ten years finishing 31 March 2020, the Republic of India amplified its invested elective effort ability from 161 MW to 37,627 MW multiple times. The photo-voltaic capability put in in Andhra Pradesh by thirty-one Oct 2019 is three, 231 MW. NTPC in agreement in 2015 to line up a 250 MW NP Kunta ultra Mega Solar park Project close to Kadari in Ananthapur District in association with AP Trans Co. In Oct 2017 the one thousand MW Kurnool extremist Mega solar Park was engineered, turning into the most important alternative energy plant in the world at the time. In August 2018, bigger Visakhapatnam sent off the 2 MW Mudassarlova Reservoir Grid-Connected Floating solar-powered projects, the most significant functional drifting sunlight-based PV project in the Republic of India.

By 2022, the state has set an objective of 4.2 GW of elective energy (remembering for 1.6 GW of sunlight based rooftop top) because of its ability is at least 330 radiant days Bhadla sun oriented Park, with a total put in capacity of 245 MW, is that the biggest plant inside the world by March 2020. The sole pinnacle kind of solar thermal power station (2.5 MW) in the Republic of India is found in Bikaner locale. In March 2019, the state had an all-time low tariff / a pair of.48 / kWh for putting in place 750 MW of alternative energy plants within the state [17]. In January 2018, the govt of the Republic of India announced the setting up of a $ 350 million solar Development Fund to finance solar comes. Prime Minister Narendra Modi, whereas addressing the globe Economic Forum Annual Meeting in Davos in 2018, requested that the Republic of India invest within the region to push alternative energy and facilitate business. At the announcement of the Paris COP21 climate summit, Modi's bold arrange was extremely sceptical and also the government's strategy of boosting renewable energy by hoping on a competitive bid to cut back prices couldn't be achieved. However, in 2016–2017, new renewable energy became less expensive than existing coal-fired plants in Republic of India. As of January 2018, 65th of coal power generation in Republic of India is being sold at serious rates, at a better rate than new renewable energy bids. Tenders for India's coal-fired power plants are declared, and eightieth of the new coal-fired power plants are closed or cancelled.

Indian solar tariffs have virtually born in recent months. Germany, China and Republic of India ought to simply cross over. The goals he set for himself within the 2015 Paris Agreement. Republic of India currently expects to attain twenty % of its power generation from fossil-free energy sources by 2022, eight years sooner than scheduled.

Fig 1 has been shown the production of solar power in different regions of India. This graph shows how we are increasing our solar production day by day. In 2010 total production of solar energy in India is 161MW. In 2011 it increase to 461 MW and the production of solar energy in India increases yearly. In the end of the year 2018, the production of solar power is 21651 MW. In which Karnataka state is on top with the production of 5000 MW. In Karnataka with the installation of Pavagada solar park, the production of solar power goes to 28181MW in the end of 2019. Pavagada solar park is the largest solar park in the world with a production of 2050MW. From this graph, we observe how much solar power produces in different regions of India. From this graph, we observe that the southern region is more produce the solar power.

3. AVAILABILITY OF SOLAR POWER IN HARYANA

By 2022, the state has set a target of 4.2 GW of alternative energy (including one 6 GW of the solar rooftop as a result of its capability is a minimum of 330 sunny days. Haryana is the fastest developing state in alternative energy with an associate degree put in and commissioned capability of 73.27 MW. This includes 57.88 MW for the financial year 2016-17. Proclaimed in 2016, Haryana solar-based power Policy provides farmers with a 90th grant for solar-powered water pumps that offers concessions to sunlight based road lighting, home lighting arrangements, solar water heating schemes, and solar cooking utensil schemes, for brand spanking new residential buildings larger than five hundred sq. yards (420 m^2), no building set up is needed for a allow to put

in three-dimensional to five solar capability, and a price of Rs. ten lakhs are created accessible to residential property house owners.

In December 2018, Haryana set a 48.80 MW solar capability, and in the Gregorian calendar month of 2019, Haryana tender for three hundred MW of grid-connected alternative energy, and a further sixteen. MW tender for the canal's high alternative energy. Table 2 has been shown the solar projects of Haryana in different districts. A lot of solar production is occurring in Haryana. We observe that a total of 348.1(MW) capacity of solar power is produced in Haryana and Sirsa is the only district that is producing 100(MW) solar power [18].

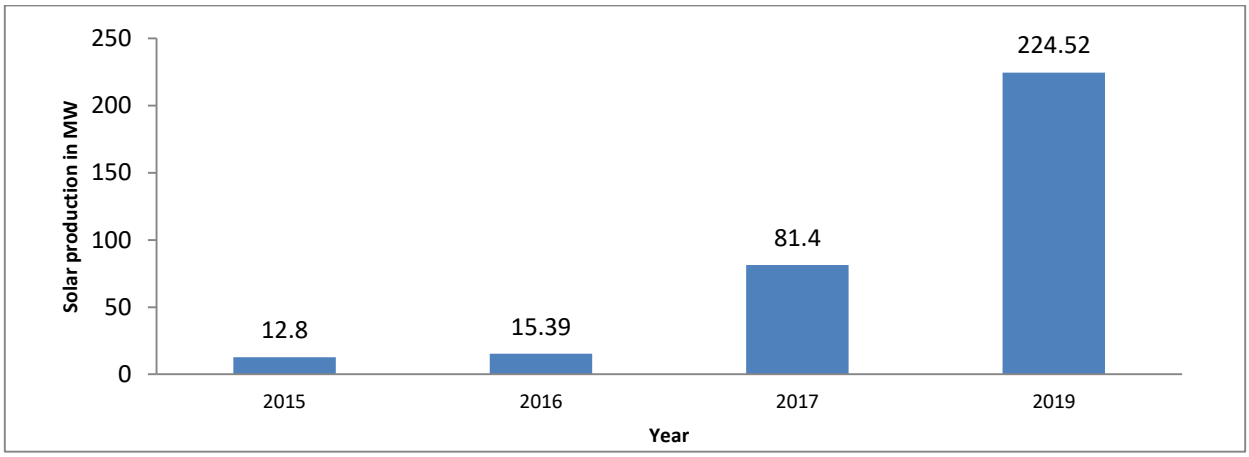

Fig. 2 Solar production in Haryana

The yearly solar energy production in Haryana has been shown in Fig. 2. It has been observed that solar energy growth is increases day by day or yearly in Haryana. Solar Power generation in 2015 is 12.8 MW, which now increase to achieve the target of 2022Govt of Haryana, the state of Haryana has set an objective of 3200 MW of alternative energy to be generated by the year 2021-22. The current put in and commissioned star capability of the state is 73.27 MW.

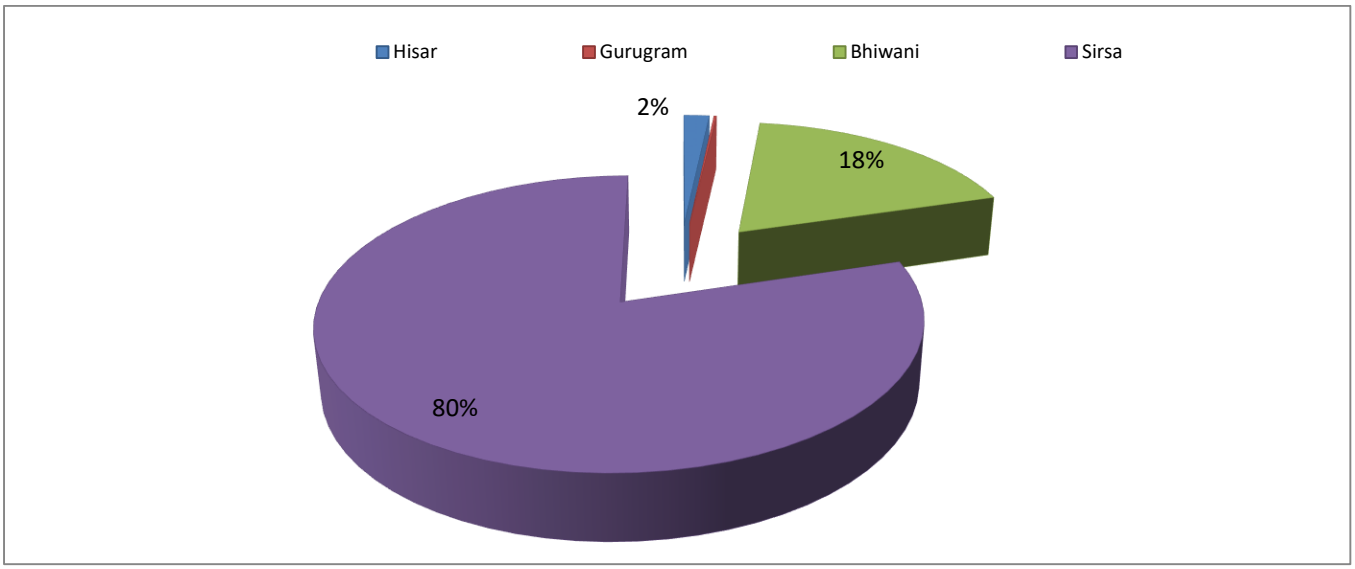

Fig. 3 Solar Power generation in 2019

Fig 3 has been shown that the new solar plant installation in the year 2019 which is maximum in the north part of Haryana. At the end of the year 2019, 80% of total production is installed in the Sirsa district.

TABLE 2 LIST OF SOLAR PROJECT INSTALLATION IN DIFFERENT DISTRICT OF HARYANA TILL 2019 [18]

Sr. No.	Name of Solar Plant	Capacity (MW)	Type of projects	Site of installation	Status
1	M/s Orbit Resorts Limited	7.5	Solar Project	Vill. Balasar, Sirsa	Final connectivity already issued & solar plant is in plant is in operation.
2	M/s Merino Panel Products Ltd	5	Solar Project	Vill Burak Balsamand, Distt Hisar	Final connectivity already issued & solar plant is in plant is in operation.
3	Skycity Hotels Private limited	0.5	Solar Project	District Gurugram	Final connectivity issued
4	M/s Asain paints Limited	5	Solar Project	Vill. Bhera, Bhiwani	Final connectivity issued
5	M/s Goodrich Carbohydrates	2.5	Solar Park	Vill. Rupana, District Bhiwani	Final connectivity issued to rays Power Expert Pvt. Ltd. (Solar Park) for 10.1 MW
6	M/S Blow Packaging (India Pvt Ltd.)	1.3			
7	M/s Kamna Industries Pvt Ltd.	0.3			
8	M/s Dorset Industries Pvt. Ltd.	1			
9	M/s KRBL Ltd.	2			
10	M/s G.S. Spinning Mills	1			
11	M/s Garg Spinning Mills	1			
12	M/s Bhartiya Spinners	1			
13	Amplus sun Solutions Pvt. Ltd.	50	Solar Project	Vill. Khanak, Tosham, Distt –Bhiwani	Final connectivity issued
14	Anath Solar Power Maharashtra Pvt. Ltd.	100	Solar Project	Vill. Nuhiyanwali-Ramnagar, Tehsil - Debwali, Distt – Sirsa	Final connectivity issued
15	Greenyana Solar Power Pvt. Ltd.	20	Solar Project	Kuranganwali, District - Sirsa	Final connectivity issued
16	Avaada Green HN Project Pvt. Ltd.	50	Solar Project	Mithisurena, District - Sirsa	Final connectivity issued
17	CMES Power-2 Pvt. Ltd.	50	Solar Park	Vill. Nuhiyanwali-Ramnagar, Tehsil - Debwali, Distt – Sirsa	Final connectivity issued
18	LR Energy GCPP Sirsa	10	Solar Project	Dudhianwaali, District - Sirsa	Final connectivity issued
19	LR Energy GCPP Sirsa	20	Solar Project	Tosham, District – Bhiwani	Final connectivity issued
20	Greenyana Solar Power Pvt. Ltd.	20	Solar Project	Loharu, District – Bhiwani	Final connectivity issued
	TOTAL	348.1			

4. MERITS OF SOLAR ENERGY

- Solar energy is freed from pollution and doesn't unleash greenhouse gases once installed.
- Reduction in reliance on foreign oil and fossil fuels.
- Cloudy Renewable clean energy, which is obtainable daily of the year, even on cloudy days, generates some electricity.
- No maintenance within the variety of solar panels for thirty years.
- Solar panel makers, solar installers, etc. can produce jobs and facilitate the economy.
- Additional powers are often sold-out back to the facility company once the grid is interrupted.
- The ability to remain off the grid if enough electricity is obtainable for the / house/building.
- Use the battery to store further energy for nightlong use.
- Models are rising aesthetics to create solar additional versatile than older models; this suggests printing, flexible, solar shingles, etc.
- Trench isn't needed as a result of it should or might not be on the point of the situation of the solar installation.

5. DEMERITS OF SOLAR ENERGY

- High initial prices for materials and installation and high ROI (however, with solar price reduction over the last ten years, solar has become costlier each day)
- There is not any want for extra space although 100% capability
- No alternative energy in the dark, thus an oversized battery bank is needed
- Power DC steam-powered devices are pricey
- Not manufacturing solar panels to scale back prices and materials additional expeditiously (this is setting out to change)
- Solar steam-powered cars don't have an equivalent speed and power as regular gas steam-powered cars (which additionally begin to change)
- Low solar output in winter.

6. CONCLUSION

Most people are aware of renewable and non-renewable energy resources. Solar power has become increasingly a lot of common because of its economic advantage. On battery backup, solar power will even offer electricity 24 hours, even on cloudy days and at midnight. This paper has been discussed the world-wise production of solar energy with different projects. It has been observed that India's capability to produce large power through the solar energy sector. Also find that how many projects and the solar energy potential in the state of Haryana. It is observed that the district of Sirsa has 80% potential and installed capacity of solar energy projects (like roof solar projects, water pump solar projects, and on/off grids solar projects) in the state of Haryana.

REFERENCES

[1] IEA: Global Installed PV Capacity Leaps to 303 Gigawatts, greentechmedia, EricWesoff, April 27, 2017.
[2] 2016 Snapshot of Global Photovoltaic Markets, International Energy Agency, 2017
[3] "Global Market Outlook for Solar Power 2015-2019" (PDF). www.solarpowereurope.org.
[4] Solar Power Europe (SPE), formerly known as EPIA – European Photovoltaic Industry Association. Archived from the original (PDF) on 9 June 2015. Retrieved 9 June 2015.
[5] Snapshot of Global PV 1992-2014" (PDF). Iea-pvps.org. International Energy Agency — Photovoltaic Power Systems Programme. 30 March 2015. Archived from the original on 30 March 2015.
[6] CSP Has Fallen By The Wayside – But May Come Back Big By 2020". CleanTechnica. 27 February 2014.
[7] India Achieves 20 Gigawatts Solar Capacity 4 Years Ahead Of Initial Target | CleanTechnica". Cleantechnica.com. Retrieved 2018-02-09.
[8] 10 Trends That Will Shape the Global Solar Market in 2018". Retrieved 2018-02-06.
[9] "Cheap Renewable Are Transforming the Global Electricity Business - The Energy Collective". The Energy Collective. 2018-02-16. Retrieved 2018-02-21.
[10] "India achieves 20 GW solar capacity goal four years ahead of deadline". Businesstoday.in. Retrieved 2018-02-04.
[11] "Physical Progress (Achievements)". Ministry of New and Renewable Energy, Govt. of India.. Retrieved 22 September 2017.
[12] "India's installed solar capacity reached 6,000 MW in 6 years". News. The Economic Times of India. 26 May 2016. Retrieved 27 May 2016.
[13] "India's Modi raises solar investment target to $100 bln by 2022". Reuters. 2015-01-02. Retrieved 2018-02-04.
[14] "India launches solar-panelled train that will save 21,000 litres of diesel a year". The Independent. 2017-07-19. Retrieved 2018-02-11.
[15] Muralidhar Nayak Bhukya1, Manish Kumar , Akshat Kant and Punit , "Renewable Energy: Potential, Status, Targets and Challenges in Rajasthan" , Journal of Physics: Conference Series 2021
[16] M. Kumar, A. Kant, P. Kaktan, R. Bishnoi and K. Upadhyay, "Arduino Based System to Prevent Vehicle Accidents," 2021 International Conference on Design Innovations for 3Cs Compute Communicate Control (ICDI3C), 2021

[17] M. Kumar, A. Kant, R. Bishnoi, P. Punit, S. Bhardwaj and K. Upadhyay, "Environmentally Friendly Power: Potential, Status, and Challenges in Jharkhand," 2021 International Conference on Design Innovations for 3Cs Compute Communicate Control (ICDI3C), 2021
[18] S. Arandhakar, A. Kant and M. N. Bhukya, "Implementation of Convolutional Neural Network for Speed Control of BLDC Motor," 2021 International Conference on Design Innovations for 3Cs Compute Communicate Control (ICDI3C), 2021
[19] List of Solar power projects report 2019, Department of New & *Renewable Energy* , Government of *Haryana*/HAREDA Available: http://www.hareda.gov.in/en/search/node?keys=List+of+solar +projets