Renewable Energy Monitor

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Policy

Germany to provide India 1 billion Euro soft loan for 'Green Energy Corridors'. To facilitate integration of large scale renewable generation capacity addition, a comprehensive scheme including intra-state and inter-state transmission system has been identified as a part of 'Green Energy Corridors'. Intra-state transmission system is being implemented by respective State Transmission Utilities (STU) and inter-state transmission system is being implemented by Power Grid Corporation of India Ltd (PGCIL).

The funding of green energy corridors in both intra and inter -state transmission projects, under the framework of cooperation between the government of India and government of Germany, KfW Germany is providing soft loan to the tune of Euro 1 billion. For inter-state transmission projects pertaining to Part A, B and C of Green Energy Corridor, loan agreement for financial assistance of Euro 500 million from KfW, Germany has been signed by the PGCIL and the projects are likely to be completed by 2018. Further, for implementation of transmission schemes under Green Energy Corridor-Part D, PGCIL has taken loan from ADB.

For intra-state transmission projects under Green Energy Corridor; the states of Tamil Nadu, Rajasthan, Himachal Pradesh, Andhra Pradesh, Gujarat and Madhya Pradesh have signed the loan agreements from KfW, Germany for financial assistance of Euro 76 million, Euro 49 million, Euro 57 million, Euro 68 million, Euro 114 million and Euro 124 Million, respectively. To integrate solar parks with the grid, Ministry of Power assigned PGCIL to implement inter-state transmission scheme for evacuation from 8 solar parks (7200 MW).

India, US launch USD 20 mn funding initiative USICEF. The US-India Clean Energy Finance (USICEF) initiative has been launched to pave the way to mobilise finance and support Indian-distributed clean energy projects. This comes in the backdrop of a commitment made by the US and Indian governments to finance clean energy projects. USICEF will deploy up to $20 million in project preparation support, sourced equally from leading foundations and the Indian Government, to distributed solar power projects under consideration for long-term financing from OPIC.

'USICEF' will help in unlocking OPIC financing and contributing to India's ambitious renewable energy and energy access goals. OPIC (Overseas Private Investment Corp) is US government's development finance institution.

The William and Flora Hewlett Foundation, Good Energies Foundation, the John D. and Catherine T. MacArthur Foundation, and the David and Lucille Packard Foundation have committed funding to USICEF to begin operations, and Climate Policy Initiative (CPI) in Delhi has been selected as secretariat for the initiative.

India leads Spain, UK in wind energy generation; affordable solar panels could cause a clean energy boom. The government is aiming to increase share of clean energy through massive thrust in renewables. Core drivers for development and deployment of new and renewable energy in India have been Energy security, Electricity shortages, Energy Access, Climate change etc. As on 31st October, 2016, Solar Energy Projects with an aggregate capacity of over 8727.62 MW have been installed in the country.

A capacity addition of 14.30 GW of renewable energy has been reported during the last two and half years under Grid Connected Renewable Power. A total of 7060 MW of grid-connected power generation capacity from renewable energy sources like solar (3019 MW) and wind (3423 MW), Small Hydro Power (218 MW), Bio-Power (400 MW) has been added during 2015-16 in the country against target of 4,460 MW. During 2016-17, a total 3575 MW capacity has been added till 31.10.2016, making cumulative achievement 46,327 MW. The Government of India has set a target of 175 GW renewable power installed capacity by the end of 2022. This includes 60 GW from wind power, 100 GW from solar power, 10 GW from biomass power and 5 GW from small hydro power. The target set for the various renewable energy sources for the next three years are capacities in MW:

Set Target :

Source	2016-17	2017-18	2018-19
Solar Power	**12,000**	**15,000**	**16,000**
Wind	4000	4600	5200
Biomass	500	750	850
SHP	225	100	100
Grand Total	**16725**	**20450**	**22150**

** Capacity in Mega Watts (Source: Press Information Bureau)*

Government nod for ratifying International Solar Alliance Agreement. Government gave ex post facto approval to the proposal of MNRE (Ministry of New & Renewable Energy) for ratification of the ISA (International Solar Alliance's) Framework Agreement by India. ISA was launched jointly by the Indian Prime Minister and the France President on November 30 last year in Paris on the sidelines of the 21st Conference of the Parties (CoP) meeting of the United Nations Framework Convention on Climate Change, the ministry said. The ISA will strive to bring together more than 121 solar resource rich nations for coordinated research, low-cost financing and rapid deployment. The foundation stone of the ISA Headquarters was laid at Gwal Pahari, Guragaon in Haryana. India has already committed the required support of operationalisation of ISA. ISA will put India globally in a leadership role in climate and renewable energy issues. It will also give a platform to showcase its solar programmes. The agreement was opened for signature on the sidelines of 22nd CoP meeting at Marrakesh, Morocco. The agreement invokes the Paris Declaration on ISA and encapsulates the vision of the prospective member nations.

India traded 251,000 Renewable Energy Certificates in December, says IEX (Indian Energy Exchange). According to IEX (Indian Energy Exchange) it has traded 17.85 lakh RECs since the beginning of this fiscal (April-December). On 28th December, 2016 a total of 2.51 lakh RECs were traded an increase of over 43 per cent over 17.50 lakh RECs traded in the previous month of the same fiscal. The purchase has been on account of few utilities such as BSES Rajdhani, DVC and BEST Undertaking. Further, obligated captive power and open access consumers also contributed in this trading session, it said. A total of 1,291 participants traded at IEX with 802 participants in non-solar segment and 489 participants in the solar segment. Overall, a total of 3,386 participants are registered in the REC segment at IEX. Of this, 851 are Eligible Entities (RE Generators) 2,516 are Obligated Entities (Discoms, Open Access Consumers and Captive Generators) and 19 are registered as voluntary entities.

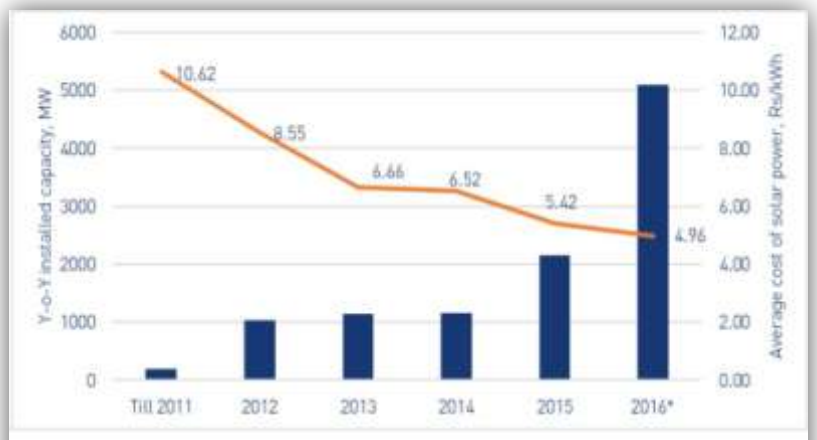
Indiatoday, 15 December 2016| First Post, 27 December 2017| Energy Infra Post , 27 December 2016| The Indian Express, 28 December 2016|EnergyWorld, 29 December 2016|

Solar

Solar energy firm Lightsource to invest Rs 6,500 cr in India in 2-3 years. UK-based Lightsource Renewable Energy will invest Rs 6,500 crore over the next 2-3 years to set up 1000 MW solar energy projects in India. Lightsource recently won a 50 MW solar project in Maharashtra under the Centre's ambitious solar programme. This is the maiden solar project secured by the company in India.

Lightsource has deployed over 2 billion pounds to develop and operate 1300 MW of solar PV plants in the United Kingdom. The company has a number of firsts to its credits such as the Thames Water 6.5 MW plant, the world's first deep water floating solar PV installation or the first large scale solar plant in the island of Ireland, installed in the Belfast International Airport, that saves over 2,345 tonnes of carbon per year.

India's solar power capacity crosses 10,000 MW. India has achieved a major milestone in solar power capacity addition. Cumulative solar capacity, including rooftop and off-grid segments, has crossed 10,000 MW in the country. India is expected to become the world's third biggest solar market by 2017, after China and the US. An average annual capacity addition of 8-10 GW per annum is expected. Utility-scale solar accounts for more than 85 per cent of the total installed capacity. Rooftop solar, so far about 10 per cent of the sector, has also grown at a healthy CAGR of 98 per cent between 2011 and 2015 and is expected to play an increasingly important role in the sector.



Source: BRIDGE TO INDIA research
*estimated
Note: Installed capacity includes capacity across utility-scale, rooftop and off-grid segments.

Some key themes can be observed in the growth of the Indian solar market so far. Among the states, Tamil Nadu has the highest installed capacity, followed by Rajasthan,

Andhra Pradesh, Gujarat, Telangana, Madhya Pradesh and Punjab. These seven states collectively accounted for more than 80 per cent of total installed capacity as of mid-November 2016. Some of the larger power consuming states such as Maharashtra and Uttar Pradesh are way behind in the sector.

Renewable energy firm ACME Cleantech raises Rs500 crore. Delhi-based renewable energy and telecom solutions company ACME Cleantech Solutions Pvt. Ltd has raised Rs500 crore from Piramal Enterprises Ltd. The investment in ACME was done by Piramal Enterprises's Structured Finance Group, which provides structured mezzanine funding to companies in various sectors, especially in infrastructure. ACME currently has a total portfolio of around 1.5 gigawatts (GW) of solar energy projects.

Of this, around 600 megawatts (MW) is operational and 400MW is under various stages of construction. The firm has signed power purchase agreements for another 500MW. By the end of 2016-17, the company aims to have an operational portfolio of 1GW. ACME has solar power projects in Telangana, Andhra Pradesh, Punjab, Gujarat, Madhya Pradesh, Odisha, Bihar, Uttar Pradesh and Chhattisgarh. According to the ACME website, it plans to build a portfolio of 7.5GW by 2019.

Adani to spend $300 million on two solar plants in Australia. Adani Group has secured land to build two solar farms in Australia, together worth A$400 million ($300 million) as part of a five-year drive to construct 1,500 megawatts of solar energy plants in the country. Adani, India's biggest solar power producer and top coal-fired generator, said it would build a 100-200 MW solar farm in Moranbah in the east of Australia, one of the towns worst hit by the global slump in coal mining over the past four years. Construction is due to begin in mid-2017 and is expected to take about a year. The second solar farm will be in Whyalla, a town in South Australia stung by the collapse of steel maker Arrium, with construction of the 120-150 MW plant due to begin in late 2017.

Centre ayes 3 mega solar plants in Maharashtra. The government of India has sanctioned three solar ultra mega power projects in Maharashtra. One of them will come up in Vidarbha while the other two will be in Marathwada and Khandesh. An eleven member committee under principal secretary(energy) had been set up to identify the sites for these plants. The installed capacity of each of these plants would be 500MW, the biggest challenge before the state government was providing land at affordable rates to the private investor. A 500MW solar plant will require 2,500 acre land and hence the land cost is an important parameter. The state government is promoting solar energy in a big way. It has allowed private individuals and organizations to set up solar power plants in their premises for their own consumption.

ReNew Power to set up solar rooftop for Indian Railways. ReNew Power Ventures, a renewable energy development company, won bids for 5 MW solar installations across various locations for the Indian Railways. The company will be investing close to Rs 35 crore in these projects which will supply energy to Railways through a 25-year power purchase agreements. This is the first set of allocations by Indian Railways to any company under PPA mode. Out of the total 5 MW allocation under various zones, 1 MW has been allocated by North Central Railway division for Allahabad & Kanpur, 1 MW has been allocated by South Western Railway division for Bengaluru & Hubli. Another 1 MW has been allocated by East Coast Railway division for Vishakhapatnam and 2 MW has been allocated by South Eastern Railway division for Kharagpur, Adra, Chakradharpur and Jamshedpur. Installations will be carried out to a large extent on station buildings, railway offices, workshops amongst other building premises. In total, these projects will generate more than 7 million units of power annually and offset over 6000 tonnes of carbon emissions every year. The transaction will also result in significant saving in energy cost for Indian Railways without any investment.

Infosys produces solar power at Rs2.85/kWhr, plans expansion. The company has 6.6 MW of ground mounted solar capacity (and another 600 kW on the roofs) at its Hyderabad facility. The cost of generation of electricity, averaged over 20 years, works out to Rs2.85, Infosys' Executive Vice-President, Mr U Ramadas Kamath, said. Infosys is now onto adding another 3.5 MW in the same area the plant would yield generation of 1.9 million kWhr of electricity per MW of capacity. The 6.6 MW, set up in December 2015, is a mix of both poly-crystalline and thin film, the two predominant technologies used in the manufacture of solar modules. It bought thin film modules from the Japanese company, Solar Frontier, and polycrystalline from the Taiwanese company, BenQ, 40 per cent of the plant is fixed tilt, while the rest use trackers that enable the panels keep facing the sun all the time.

India unveils the world's largest solar power plant. The country is on schedule to be the world's third biggest solar market in 2017. The facility in Kamuthi, Tamil Nadu, has a capacity of 648 MW and covers an area of 10 sq km. This makes it the largest solar power plant at a single location, taking the title from the Topaz Solar Farm in California, which has a capacity of 550 MW.

- **India just unveiled images of what could be the world's largest solar plant.**
- **The plant, in Kamuthi, Tamil Nadu, comes with a capacity of 648 MW and covers an area of 10sqm/km. It also bears the capacity of charging its own solar panels.**
- **The plant was built in 8 months and is cleaned everyday by a robotic system.**
- **Furthermore, when in full swing, the plant is capable of producing electricity for 150,000 homes.**
- **The cost of this project was $$679m (Rs 46,535,570,550).**
- **With this, India's total installed capacity of solar plants has nudged across the 10 GW mark.**

(Text Source: The Economic Times, 30 November 2016)

The solar plant, built in an impressive eight months and funded by the Adani Group, is cleaned every day by a robotic system, charged by its own solar panels. At full capacity, it is estimated to produce enough electricity to power about 150,000 homes. The project is comprised of 2.5 million individual solar modules, and cost $679m to build. The new plant has helped nudge India's total installed solar capacity across the 10 GW mark, according to the research firm Bridge to India, joining only a handful of countries that can make this claim. As solar power increases, India is expected to become the world's third-biggest solar market from next year onwards, after China and the US.

Solar power tariff touches record low of Rs 3 a unit. Solar tariff has fallen to an all-time low of Rs 3 per unit, which was quoted by Amplus Energy Solutions in an auction for rooftop solar power conducted by SECI (Solar Energy Corporation of India). According to statement Amplus won the bid under the 500 MW rooftop grid connected scheme in different states floated by SECI. The Rs 3 per unit or USD 4 cents tariff is unprecedented in Indian rooftop solar sector that has drastically reduced pricing dynamics, it said. Uttarakhand, Himachal Pradesh and Puducherry will get solar at Rs 3 per unit, while others such as Karnataka, Madhya Pradesh and Maharashtra will get solar power at Rs 5.56/unit, Rajasthan at Rs 5.38/unit, Haryana at Rs 5.76/unit and Punjab at Rs 6.20/unit. The capacities bagged by Amplus under this bid are Maharashtra (3MW), Rajasthan (2MW), Punjab (2MW), Karnataka (2MW), Haryana (2MW), Himachal Pradesh (1MW), Madhya Pradesh (1MW), Uttarakhand (0.5MW), Puducherry (0.5MW) and Chandigarh (0.5MW).

The India Express, 14 November 2016| The Hindu Business Line, 18 November 2016| Mint, 25 November 2016| Reuters, 25 November 2016| The Times of India, 26 November 2016| The Economic Times, 28 November 2016| The Hindu Business Line, 29 November 2016| Aljazeera.com, 30 November 2016| The Indian Express, 30 November 2016|

India's ReNew Power raises $74 million in green bonds. According to ReNew Power Ventures, non-convertible debentures worth Rs 500 crore (US$74 million) were issued to investors. The bonds issue has been certified by the Climate Bonds Initiative. The funds raised through the green bonds will be used exclusively for setting up two wind energy projects in the state of Madhya Pradesh. ReNew Power Ventures is among the largest renewable energy IPPs in India. The company claimed to be the first renewable energy developer in India to achieve 1 GW of operational assets. The company has seen several fund raising rounds over the last few years as it looks to develop 6.5 GW of solar power and 5 GW of wind energy capacity over the next 4-5 years.

India simplifies rules for approval of wind turbines. India has taken a crucial decision to increase competition among wind turbine manufacturers as the country prepares to hold the first-ever competitive auction in the wind energy sector. The MNRE announced that it has disbanded a committee that approved the wind turbine models for sale in the Indian market. Until now, turbine manufacturers were required to share the details of any new product that they planned to sell the model in the market. The committee included representatives from the IWTMA (Indian Wind Turbine Manufacturers Association), the IWPA (Indian Wind Power Association) and the MNRE-affiliated, Chennai-based NIWE (National Institute of Wind Energy). As per the amended procedure, manufacturers will only have to share the product details with the ministry through an online portal. The Ministry shall then take the final decision on approval for sale. Approval shall be subject to the turbine model meeting international specifications.

Senvion wins its first wind contract in India for over 500 MW. Senvion, a global manufacturer of wind turbines, has concluded its first contract in India for the supply of 220 Senvion turbines totaling more than 500 MW. The order was placed under a firm framework agreement with one of the large Indian IPPs. The turbines will consist of turbines from the recently acquired Kenersys portfolio. Turbines are planned for installation starting in Q4 2017 until 2019, with commissioning of the first site by 2017 end.

NTPC, India's largest power producer, enters wind energy market. NTPC Limited recently announced that it will set up its first wind energy project after months of an aggressive and continued push into the solar power market. According to the company, a 50 megawatt (MW) wind energy project will be set up in the western state of Gujarat. The project shall be executed by Inox Wind Energy Limited. The project is expected to require a total investment of Rs 323.35 crore.

Clean Technica, 25 November 2016| Planetsave, 30 November 2016| Windpower Engineering&Development, 19 December 2016| CleanTechnica , 23 December 2016

IIT team finds how to raise biofuel yield from water hyacinth. Scientists at Indian Institute of Technology Kharagpur have unlocked the secret to ramp up yields of biofuel sourced from commonly found aquatic weeds such as water hyacinths. In a new study published on December 1 in Nature Scientific Reports, researchers have shown that this weed which contains up to 50 per cent hemicelluloses can now be used as an economic and abundant source of biofuel.

Prof Saikat Chakraborty, faculty member at the Department of Chemical Engineering and lead researcher of the Bioenergy Research Group at IIT Kharagpur and co-author Mr Sajal Kanti Dutta have uncovered the pore-scale phenomena that result in "fourfold increase in the yields of fermentable sugars and bioethanol" from hemicelluloses. The author said that it turns out that three quarters of the soluble sugars we obtain for generation of bioethanol are produced from the pore-scale reactions. So increasing the polymer's porosity and degrees of swelling will enhance the deconstruction of hemicelluloses from plant walls, thus increasing bioethanol.

Record production of ethanol may cut fuel bill. Sugar mills recorded the highest ever production of ethanol of more than 110 crore litres during 2015-16 crop year, over 50% more than what was produced during the previous year. According to food ministry officials, this resulted in achieving 4.4% ethanol blending in petrol, which was almost double of 2014-15.

The Government has set a target of increasing this blending of ethanol in petrol to 10% in its bid to reduce import of crude oil. Ethanol is produced from sugarcane molasses. Blending of ethanol in petrol helps in saving fuel, and consequently foreign exchange.

India Launches Biofuel-Run Bus Service. NMC (Nagpur Municipal Corporation) launched the Aapli bus service, India's first green bus service, in Nagpur, which includes five buses that will run on ethanol biofuel. Mr Nitin Gadkari, the Union Minister for Road Transport and Highways, aims for Nagpur to be the first city to have all of its buses powered by biofuel through the addition of new green buses and the conversion of existing diesel-run buses. During the launch event at Yeshwant Stadium, Mr Gadkari stated the plan was to produce ethanol from molasses, rice, wheat straw, and bamboo using manufacturing facilities in each of the six districts of the Nagpur division.

Rs 600-crore bio-ethanol plant to tackle burning of stubble. Deputy Chief Minister of Punjab Mr Sukhbir Badal laid the foundation stone of the Rs 600-crore first bio-ethanol plant to be set up in Tarakhanavala village, Punjab. The bio-ethanol plants to check pollution from North India and help farmers in increasing their income as these plants would run on stubble to be purchased from them by the plant managements. The plant would consume a minimum of 400 tonnes of paddy straw daily for producing 100 kilolitres of ethanol. It would be enough to meet at least 26 per cent of the total ethanol requirements of the state. The project, which would generate employment for 1,200-1,300 people of the area, would create additional annual revenue of Rs 19-20 crore for farmers.

Karnataka state transport's big Make in India push, inducts 25 biodiesel buses. The KSRTC (Karnataka State Road Transport Corporation) inducted 25 Scania buses that run completely on biodiesel. Mr Rajender Kumar Kataria, MD KSRTC, believes that using biofuel not only promotes the local industry but also cuts down on pollution by up to 70 per cent. The 25 new buses have been deployed on the Bengaluru-Kundapur, Bengaluru-Bidar, Bengaluru-Tirupati and Bengaluru-Chennai routes, with no changes in fare.

India Live Today, 5 December 2016| The Times of India, 12 December 2016|The National Law Review, 16 December 2016| The Tribune, 26 December 2016|Indiatoday, 27 December 2016