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1. INTRODUCTION

India, today is one of the **world's most attractive** renewable energy markets. India's renewable power capacity is the **4th largest in the world**, standing at 136 GW (Nov 2020), which is **36% of its total power capacity**. India's ranking is due to the strong focus of the government on renewable energy as well as appropriate execution of renewable energy projects.

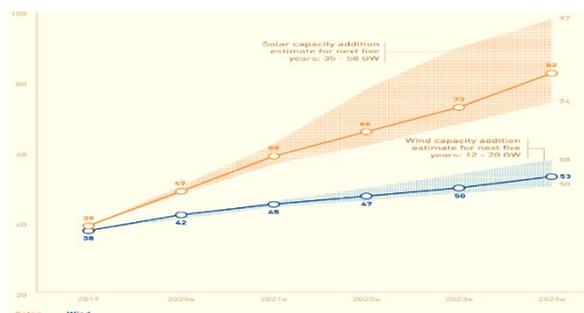
Energy is considered crucial to achieve India's development ambitions, to support an expanding economy, to bring electricity to rural areas, to fuel the demand for greater mobility and to develop the infrastructure needs of an increasing population. [Deloitte in a 2018 report](#) mentions that while energy use in India has doubled since 2000, the energy consumption per capita is only around one-third of the global average and ~240 million people still have no access to electricity, indicating significant growth opportunities.

As India looks to meet its energy demand on its own, which is expected to reach 15,820 TWh by 2040, renewable energy is set to play an important role. For a developing economy like India, power continues to be a valuable and essential commodity. The country is experiencing continuous surge in demand for power.¹

India has prioritised increasing the share of renewable energy (RE) based power generation capacity for several years, the installed renewable energy capacity increased by 226% in the last 5 years. Renewable energy deployment is mainly concentrated in the Southern and Western Indian states (80% of total). Several states such as Tamil Nadu (37%), Gujarat (18%) and Maharashtra (17%) have a much higher share of RE in their generation capacity mix compared to the national share.

As a part of the Paris agreement, India has committed itself to increasing the amount of electricity from clean energy sources to 40% by 2030. In order to meet this objective, the Indian government has set a target of 175 GW renewable power installed capacity by the end of 2022 and 500 GW by 2030. These include 100 GW of solar capacity addition and 60 GW of wind power capacity.

Projected Wind and Solar Capacity in GW



Solar capacity includes utility, rooftop scale and open access

Source : Bridge to India research

¹ Source EY Doing Business

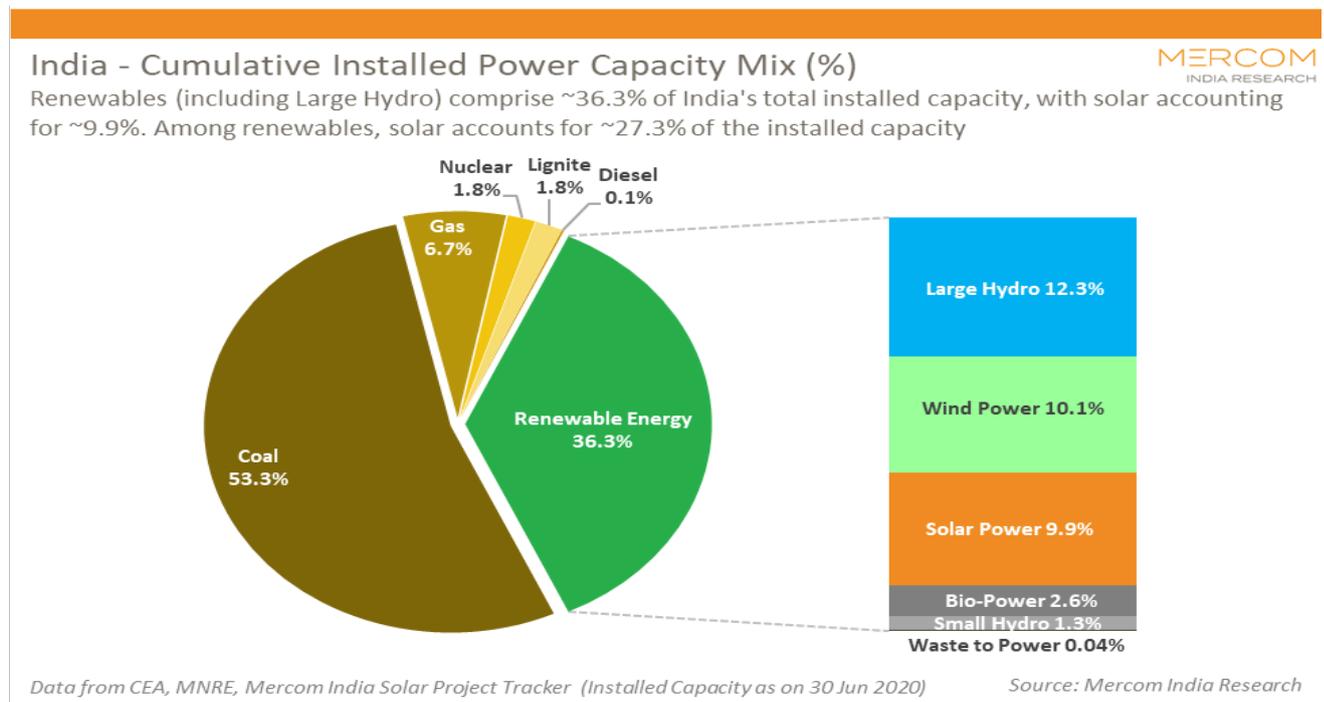
In order to [achieve the renewable energy](#) target by 2022, the government is running one of the largest renewable capacity expansion programs in the world to increase the nation's renewable energy potential. Renewable energy comes under the purview of the [Ministry of New and Renewable Energy \(MNRE\)](#) Government of India (GOI). The main aim of the ministry is to promote, develop and deploy new and renewable energy in the country.

As per MNRE, India's **solar capacity increased** from 2.6 GW (2014) to 28.18 GW (March 2019) while the **wind power capacity** increased by 1.6% in the same period (<https://mnre.gov.in/the-ministry/physical-progress>). In the **hydro power sector**, various projects leading to a total capacity of 682MW are currently under construction.

India is also the host country of the [International Solar Alliance \(ISA\)](#) that was formed on 30 November 2015 in accordance with the Paris Declaration. ISA's objective is to scale up solar energy, reduce the cost of solar power generation, technologies, innovation, research and development, and capacity building. Up to July 2020, 87 Countries have signed the Framework Agreement of the ISA.

India's power sector is one of the most diversified sectors in the world. Sources of power generation range from conventional sources such as coal, lignite, natural gas, oil, hydro and nuclear power to viable nonconventional sources such as wind, solar, and agricultural and domestic waste.

India's installed capacity for power generation as on 31 March 2020 is estimated at around 370.11(GW), with private sector's contribution of around 46.8% of the installed capacity. Fuel based thermal power plants form a major portion (i.e., 62.8%) of the installed capacity, accounting for nearly 230.60 GW of the total installed capacity in the country.



Renewable Energy Sources (MNRE) Installed capacity as on 31.10.2020

Fuel	MW	% of Total
Coal	1,99,595	53.4%
Lignite	6,260	1.7%
Gas	24,957	6.7%
Diesel	510	0.1%
Total Thermal	2,31,321	61.9%
Nuclear	6,780	1.8%
Hydro (Renewable)	45,699	12.2%
RES* (MNRE)	89,636	24.0%
Total	373,436	

* RES (Renewable Energy Sources) include Small Hydro Project, Biomass Gasifier, Biomass Power, Urban & Industrial Waste Power, Solar and Wind Energy.²

2. RENEWABLE ENERGY

2.1 SOLAR ENERGY

India has recently been ranked **5th globally in total solar power deployment.**

India has a vast solar potential of 749 GW for power generation primarily due to its geographical location in the solar belt. In order to harness this potential, the [National Solar Mission](#) was launched in 2010.

The Mission targets installing 100 GW grid-connected solar power plants by the year 2022. Solar power generation is an integral part of PM Modi's aim to deliver 24 (hours)/7(days) of electricity to all citizens by 2022. The MNRE is expected to issue tenders for the realization of 75 GW solar energy in the next 2-3 years.

The government has implemented several measures to ensure that it is able to meet its target of generating solar energy. One of its key flagship programs, [Smart City Mission's guidelines](#) emphasises that 10% of the energy requirement must be met via solar energy. Additionally, all defence establishments in India have been directed to purchase 300MW of solar energy.

² [Source: Power Ministry](#)

The Indian government is currently working on a “Rent-a-Roof” policy aimed to generate 40GW of solar energy via rooftop installations. All Indian Ministries have been encouraged to install solar powered rooftops. The government urges the [development of solar parks](#) in the country.



Solar Panels @ [Embassy of Belgium in New Delhi](#)

2.2 WIND ENERGY / POWER



India has substantial wind energy (on and off shore) potential due to its long coastline of 7200 km and favourable wind conditions. It has been **ranked 4th globally in terms of installed capacity of wind (on-shore) turbine power** with a total installed capacity of **35.6 GW** as on 31st March 2019.

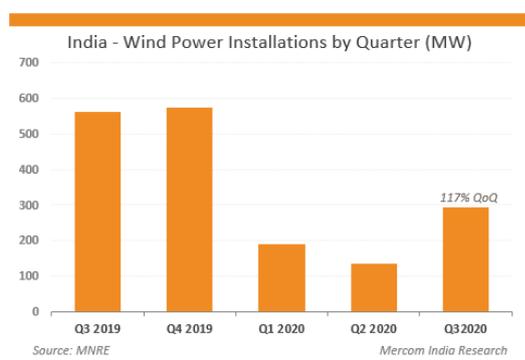
A [study funded by the European Union](#) says that India has a potential total of 70 GW of offshore wind capacity. The major wind power states in India are **Tamil Nadu, Gujarat, Karnataka, Maharashtra and Rajasthan**. The National Off Shore Wind Energy Policy was launched in 2015 but the competitive bidding

for projects started from 2017. Gujarat and Tamil Nadu were identified as the key areas for off shore wind projects, more can be viewed on [Potential of Wind Energy in India by States](#).

The feasibility studies of [Gujarat and Tamil Nadu](#) were conducted by a consortium named FOWIND and **received funds from the European Union** for this project.

The Government is promoting wind power projects in the entire country through private sector investment by providing various fiscal and financial incentives such as Accelerated Depreciation benefit and concessional custom duty exemption on certain components of wind electric generators.

Over 30 international and Indian companies participated in the EOI for development of 1 GW of offshore wind project in Gujarat (State located in West India) in 2017 . However, due to various reasons, the first offshore wind tender seems to be delayed.



By 2030, India aims to generate 30 GW of offshore wind capacity. The biggest obstacle in offshore wind projects remains the lack of a predictable and ambitious regulatory framework that demonstrates a clear and sustainable commitment by the Indian government for the construction of an offshore pipeline that can attract foreign investors. If India wants to realize the offshore ambitions of 30 GW by 2030, it will have to accelerate its work and create the right framework that can offer investors more certainty to invest.

As the offshore projects have a long gestation period, the investments made are expected to yield a good result in the long term only and with subsidy support from the government. These projects will create many high-skilled job opportunities, which is also a focus of the government.

→ [List of Wind Turbine Models & Manufacturers by MNRE](#)

2.3 BIO-FUEL

A Bio Fuel policy was launched in 2009 which primarily focused on the production of ethanol from sugarcane to be mixed with petrol. The principal contributor is the use of bagasse in sugar mill co-generation plants. The current availability of biomass in India is estimated at about **500 million** metric tonnes per year. India has also introduced a policy to instigate low-level biomass co-firing (5-10%) in appropriate power generation facilities. This will serve as a means of offsetting coal use while also valorising agricultural residues that may alternatively have been burned in the field, degrading air quality.

India's 2016 waste management rules provide the basis for stimulating greater exploitation of EfW.

For example, the rules stipulate that states should:

- Procure all electricity generated from EfW projects;
- Support the promotion of using waste in industry when it is available within a 100-kilometre radius;
- Encourage waste segregation and require that nonrecyclable waste of high calorific value be used for energy

Recently, the government announced a [revised version of the Biofuel Policy in 2018](#) (from page 13) which introduces two new categories for the production of biofuels and broadens the scope of materials to be used for biofuel production.

The aim of the government was to achieve 10 GW overall target in 2020 and 8 GW was achieved ([Overview, Potential & Status of Bio Energy in India_State Wise.](#))

2.4 HYDROPOWER

India ranks 5th in terms of total installed hydro power capacity. Till March 2020, the total installed [hydro power capacity](#) stood at 4.7 GW. The National Hydroelectric Power Corporation has highlighted [6 areas which has the potential to generate hydro power](#)- Indus Basin (33,832MW), Ganga Basin (20,711MW), Central Indian River system (4,152MW), Western Flowing rivers of southern India (9,430MW), Eastern Flowing rivers of southern India (14,511MW), and Brahmaputra Basin (66,065MW).

In India, hydro power plants of 25MW or below capacity are classified as small hydro, which have further been classified into micro (100kW or below), mini (101kW-2MW) and small hydro (2-25MW) segments.

3.LEGISLATION

Similar with Belgium, the Constitution of India specifies the distribution of executive and legislative powers between the Union and States. The Central/Union Parliament and state legislatures have concurrent powers to enact laws on 'electricity'. Therefore, both the Union and state legislatures can enact laws on 'electricity'. However, the laws enacted by the Union Parliament will override the laws enacted by state legislature in the event of inconsistency or conflict.

The [Ministry of Power](#) is the administrative department of the government of India primarily responsible for development of electrical energy in the country. The Ministry Of Power is responsible for formulation of policy of the Government of India, administration of the Electricity Act, and planning in relation to thermal and hydropower generation, transmission and distribution of electricity.

The Electricity Act 2003 enacted by the government is the principal legislation on generation, transmission, distribution, trade and use of electricity in India. It also provides an elaborate framework of bodies to administer the activities under the Electricity Act. Among other things, the Electricity Act delicensed generation activities except hydropower.

Setting up a generation plant does not require any licence, However, generating electricity is still subject to the requisite environmental and other approvals relating to construction, development and implementation of the generation plant.

The [Ministry of New and Renewable Energy \(MNRE\)](#) is the nodal agency of the Government of India responsible for promotion of renewable energy, both grid-connected and off-grid. As per the Government of India (Allocation of Business) Rules 1961, the MNRE is entrusted with development and matters related to solar energy, bio-gas units, small hydel power, tidal energy, geothermal energy, etc.

At the state level, the MNRE's schemes are implemented in coordination with nodal agencies or departments for renewable energy. The MNRE has designated different institutes or agencies to implement the schemes such as [Solar Energy Corporation of India Limited \(SECI\)](#) which is a public sector undertaking dedicated to solar energy and [NTPC Ltd.](#)

The Electricity Act, the National Electricity Policy 2005 and the Tariff Policy 2016 (Tariff Policy) encourage private sector participation in renewable energy through measures such as fixing renewable purchase obligations (RPOs) for certain entities which are mandated to comply with RPOs.

Private sector entities are present in the entire value chain of the electricity sector including generation, transmission and distribution of electricity. Private sector entities including foreign investors have set up renewable energy projects and supply electricity to distribution utilities, private consumers or for captive consumption. They account for 94.92 per cent of the installed capacity of the grid interactive power in renewable energy (as of 31 March 2018).

The government is allowing 100% foreign investment through the [automatic route](#) (foreign investment allowed without prior approval of the Government or Reserve Bank of India). Over USD 100 Bn investment has already been made.

For utility-scale renewables India relies on renewable purchase obligations (RPOs), renewable electricity certificates (RECs), accelerated depreciation of renewable energy assets for commercial and industrial users, and most recently on competitive tenders.

The RPOs require distribution companies, energy producers and certain consumers to obtain a share of their electricity from renewable sources. Determination of RPO trajectories and monitoring of compliance are carried out by the State Electricity Regulatory Commissions.

The Renewable Electricity Certificates are used by the obligated entities to meet their RPO requirements. The Central Electricity Regulatory Commission established voluntary RECs in 2010 and allowed their trading in March 2011 to address the discrepancy between the availability of electricity from renewable sources across the regional markets and the demand from obligated utilities and customers to meet their RPOs under the Electricity Act 2003.

Tax benefits

The accelerated depreciation tax benefit for renewable energy plant developers was re-established in 2014 after a two-year long gap and was fixed at an 80% level until March 2017.

As of 1 April 2017 the benefit was lowered to 40%. Users of renewable energy can depreciate their investment in a renewable energy plant at a much higher rate than general fixed assets and can claim tax benefits on the value depreciated in a given year.

The tax benefit is available for several renewable technologies, including flat-plate solar collectors, concentrating and pipe-type solar collectors, solar power generating systems, windmills and related

devices, biogas plant and engines, electrically operated vehicles including battery-powered or fuel cell-powered vehicles, and agricultural and municipal waste conversion devices.

The Ministry of New and Renewable Energy (MNRE) has decided to provide custom and excise duty benefits to the solar rooftop sector, which will lower the cost of setting up as well as generate power, thus boosting growth.

In order to reach the 2022 target, the government launched competitive auctions for solar PV (2010) and wind (2017) with long-term power purchase agreements containing fixed price contracts. The MNRE announced it would tender 25-30 GW annually until end of 2021 to reach the solar PV target of 100 GW by 2022 (in 2019, India had 32.5 GW of installed solar capacity).

Solar Energy Corporation of India implements large-scale central auctions for solar parks and has awarded contracts for 47 parks with over 25 GW of combined capacity. The main idea of solar parks is to provide projects with a “plug-and-play” interface such that developers can focus on other aspects of project development and reduce project risks. The MNRE has recently amended guidelines for competitive bidding with provisions to reduce offtake risk, address revenue shortfall from curtailment and minimise delays related to land acquisition. However, land acquisition, grid integration and connection concerns have caused delays in the SECI auctions.

In this context, February 2017 marked an important step for ensuring the financial viability of off-takers. Solar Electric Corporation of India joined the tripartite agreement between the Government of India, state governments and the Reserve Bank of India. Solar Electric Corporation of India is the counterpart for central auctions of variable renewables and then sells this electricity to Distribution companies via power supply agreements. The tripartite agreement ensures that SECI is compensated for any payment delays from Distribution Companies via a mechanism guaranteed by the Reserve Bank of India, thus making it a low-risk off-taker. The National Thermal Power Corporation (NTPC), which also holds auctions for renewables, is also party to this agreement and thus is a viable off-taker.

The reverse auctions, managed by SECI, have led to the accelerated deployment of solar PV at utility scale, while wind auction volumes doubled from 2017 to 2018 . Onshore wind and solar PV auction prices are well aligned and have come down to the lowest levels discovered in India to date – in 2019 around USD - with some bids down to USD 26/MWh for solar and USD 24-28/MWh for wind .

Renewable generators are granted must-run status under the Indian Electricity Grid Code 2010 and various state grid codes and regulations under the Electricity Act 2013. Curtailment is only allowed for reasons of grid security by the State Load Dispatch Centres (not commercial curtailment) and compensation rules are in place.

At the same time, renewable projects that are commissioned through competitive auctions and connect until 2022 directly to the interstate transmission power network are exempt from transmission charges for 25 years. India is investing in transmission across the country, notably through its Green Energy Corridors.

Grid connection policies

Under the Electricity Act, each transmission licensee is required to provide non-discriminatory use of transmission lines, distribution systems or associated facilities to a licensee, consumer or a person engaged in generation. Grant of connectivity and long, medium or short-term open access is governed by regulations issued by the Central Electric Regulatory Commission (CERC) and the respective State Electric Regulatory Commissions (SERCs). Recently, CERC has issued amendments to regulations dealing with the interstate transmission system with the aim of planning and developing an efficient, coordinated, reliable and economical system for the smooth flow of electricity from generating stations to the load centres. The recent amendments specifically include renewable energy developers and operators of solar and wind power parks.

4.PLAYERS ON THE INDIAN MARKET

Some **major investments and developments** in the Indian renewable energy sector are

- SECI's auction in June 2020 conducted for 2 GW of the interstate transmission system (ISTS) connected solar projects (Tranche IX) saw winning bids from Solarpack (Spain); Enel (Italy); Amp Energy (Canada); Eden Renewables (France); IB Vogt (Germany); Ayana Renewable Power (backed by the UK's CDC Group); and ReNew Power (Indian, but backed by Abu Dhabi's ADIA, Canada's CPPIB, Japan's JERA and the US's Goldman Sachs. It delivered India's lowest-yet renewable energy tariff at Rs. 2.36/kWh (\$31/MWh) with zero indexation for 25 years.
- In November 2019, Renew Power, Avaada, UPC, Tata unit won solar projects in 1,200 MW auction of the Solar Energy Corp of India.³

4.1 INTERNATIONAL INVESTORS

Brookfield

Brookfield (CANADA) is reported to be in the process of acquiring a 210MW wind farm from Axis Energy for US\$72m. This would be Brookfield's first direct acquisition in India. In 2017, it acquired SunEdison's 300MW of solar assets in India. Axis Energy's wind assets will take Brookfield's India power capacity to 510MW.

Continuum Wind Energy

Continuum Wind Energy backed by Morgan Stanley Infrastructure Partners, is looking for buyers. Royal Dutch Shell, Norway's state utility Statkraft, and CLP India (China Light and Power) are in a race to acquire Continuum, which has more than 700MW of operational wind assets and a development pipeline of almost 1,700MW.

Enel

The Italian utility's renewable energy arm Enel Green Power owns 170MW of renewable energy capacity in India. In IEEFA's view, the utility is a global transition leader. Its presence and experience in the global market has enabled the power utility to dramatically drive down renewable energy tariffs.

ENGIE

Engie The French power utility made inroads into India's renewable energy market through signing a PPA with SECI for the 100MW Mirzapur solar power plant in Uttar Pradesh in June 2016. In July 2019, the utility announced that its total renewable capacity in India had exceeded 1.5GW.

³ Source : [IBEF](#)

Fortum

The Finnish state-owned power utility started its first solar business in India. In June 2018, Fortum sold part of its Indian 185MW solar portfolio to UK Climate Investment (40%) and Elite Alfred Berg (14%), a Finnish asset manager.

ORIX

A Leading Japanese Conglomerate ORIX, a Japanese financial services and asset management company, owned a 49% stake in a total of 874MW of wind power projects with India's debt-strapped Infrastructure Leasing and Financial Services (IL&FS). ORIX is now looking to buy the final 51% stake in the projects.

ReNew Power

In July 2020, ReNew Power , announced its plans to start manufacturing solar cells and modules in India.. The renewable energy firm will invest 15 -20 billion Rupees to set up a facility which will initially have a 2GW manufacturing capacity.

Sembcorp

Investing Locally in SEIL Singapore based integrated energy player Sembcorp plans to invest more in its Indian subsidiary Sembcorp Energy India Limited (SEIL). The company owns 1.7GW of capacity in India including 550MW under development, as of June 2019.

SoftBank

An Early Mover into India Japan's Masayoshi Son-led SoftBank is investing heavily in India's renewable energy sector through its energy arm SB Energy. The company owns more than 3GW of renewable capacity under development. SoftBank recently invested US\$250m in Ola Electric - an electric mobility service company. Established in 2017, SoftBank has already valued the company at US\$1bn.

4.2 MULTILATERAL INVESTMENT BANKS

AIIB

In July 2019, *the Asian Infrastructure Investment Bank (AIIB)* announced US\$100m loan to L&T Infrastructure Finance Company Limited (LTIF), a subsidiary of L&T Finance Holdings Ltd and a leading non-bank financier of renewable energy in India. The financing marks AIIB's first loan to a non-banking finance company (NBFC). L&T will use this capital to fund solar and wind energy projects in India. Given the power sector stress in India's mainstream public sector banks, NBFC's will play a key role in funding infrastructure projects going forward.

Japan International Corporation Agency

Japan International Corporation Agency (JICA) has executed a US\$700m loan agreement for the 1GW Turga Pumped Hydro Storage project in the Purulia district of West Bengal. The project entails building four reversible pump turbines of 250MW each. Pumped Hydro Storage technology is an extremely important facet of the energy transition as India looks to integrate large amounts of renewable energy into the grid. It allows a further diversification of energy storage systems along with batteries to provide flexible supply capacity.

GIZ

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), a German development agency, actively operates in India and provides financial and technical assistance for renewable energy projects. The traditional multinational development banks such as the World Bank, its financial services arm the International Finance Corporation (IFC), and the Asian Development Bank (ADB) have always been involved in thermal power and transmission infrastructure projects. However, recognising the global pivot to cleaner energy technologies, the development banks have decided not to invest in coal-fired power assets globally going forward.⁶ This move is expected to redirect funds towards clean energy projects in India. ADB intends to deploy US\$3bn annually by 2020 in new low emissions lending across Asia.

KFW

KFW, the German state-owned development bank, has been supporting India in its energy transition through investments in renewable energy and grid enhancement projects. In 2011, KFW provided concessional financing and technical assistance to commission the 125MW Sakri Solar Power Plant in the Dhule district of Maharashtra. KFW is continually looking to support energy storage and energy efficiency projects in India.

4.3 TOP INDIAN COMPANIES AND CONGLOMERATES IN RENEWABLES

[ACME GROUP](#)

ACME is one of the largest solar power developer with cumulative capacity of more than 5500+ MWp solar photovoltaic power projects across the country.

[ADANI RENEWABLES \(ADANI GROUP\)](#)

The latest ranking of global solar companies by Mercom Capital ranks the Adani Group as the #1 global solar power generation asset owner in terms of operating, under construction and awarded solar projects. Adani's renewable energy portfolio exceeds the total capacity installed by the entire United States solar industry in 2019 and will displace over 1.4 billion tons of carbon dioxide over the life of its assets.

The group is one of the most fully integrated solar players in the world, manufacturing solar cells and modules, undertaking project development, construction, financial structuring and owning and operating its assets through its robust internal asset management platform

[AVAADA](#)

Having wind and solar projects throughout India.

[AZURE POWER](#)

Azure Power was India's first private utility scale solar plant, a 2 MW plant in a small village in Awan, Punjab and since then has become one of the largest solar power developers in the country with a 7GW+ pan-India portfolio.

[HERO FUTURE ENERGIES](#)

HFE is a heavyweight in India with 1.3GW installed renewables capacity and 1.5GW under construction in both the domestic and overseas market. Active in wind energy & grid-connected solar as well as rooftop solar projects.

[INOX RENEWABLES](#)

Inox Wind is India's leading wind energy solutions provider servicing IPPs, utilities, PSUs, corporates and retail investors. It is a fully integrated player in the wind energy market with three state-of-the-art manufacturing plants in Gujarat, Himachal and Madhya Pradesh with a cumulative manufacturing capacity of 1,600 MW.

[NTPC LTD](#)

NTPC Limited, India's largest energy conglomerate, is an Indian Public Sector Undertaking, engaged in the business of electricity generation and distribution natural gas exploration, production, transportation and distribution.

[RENEW POWER](#)

ReNew Power is India's leading renewable energy IPP (Independent Power Producer) in terms of total energy generation, with a capacity of overall 10.3GW of wind & solar power assets in India.

[SUZLON ENERGY](#)

Suzlon is India's leading renewable energy solutions provider offering a total solutions package to its customers that covers the entire spectrum of wind energy projects. According to reports, it is planning to capture about 30 per cent of the 20GW of wind capacity likely to be commissioned by 2021.

[TATA POWER](#)

Tata Power, together with its subsidiaries & joint entities, has a generation capacity of 12742 MW of which 30% comes from clean energy sources. The company has the distinction of being among the top private players in each sector of the value chain including solar rooftop and value-added services.

[TORRENT POWER](#)

Torrent Power is into generation, transmission, distribution of power, manufacturing and supply of power cables, and a proven track record of implementing large power projects. The company is the most experienced private sector player in Gujarat.

[VIKRAM SOLAR](#)

In April 2020, Vikram Solar bagged a 300 megawatt (MW) solar plant project for US\$ 250.39 million from National Thermal Power Corporation Ltd (NTPC) under CPSU-II scheme in a reverse bidding auction.

4.4 OTHER FOREIGN COMPANIES

[Enercon](#) In India, Enercon runs its operations under the Banner [Wind World India](#).

[Envision Group](#)

[Equinor](#)

[GEF Capital](#)

[GE Wind Energy Limited](#)

[Hitachi](#)

[Shell](#)

[Siemens Gamesa Renewable Energy](#) Wind projects located in Karnataka and Tamil Nadu

[Van Oord](#)

[Vestas Power Solutions](#)

[ZF Wind Power](#)

5. IMPORTANT INDIAN ORGANISATIONS

[CENTRE FOR SCIENCE AND ENVIRONMENT \(CSE\)](#)

CSE works as a think tank on environment development issues in India, poor planning, climate shifts and advocates for policy changes and better implementation of the already existing policies. CSE uses knowledge-based activism to create awareness about problems and propose sustainable solutions.

[INDIAN RENEWABLE ENERGY DEVELOPMENT AGENCY LIMITED \(IREDA\)](#)

IREDA is a Non-Banking Financial Institution under the administrative control of MNRE In promoting, developing and extending financial assistance for setting up projects relating to new and renewable sources of energy and energy efficiency/conservation.

[INDIAN WIND ENERGY ASSOCIATION - National Institute Of Wind Energy \(NIWE\)](#)

NIWE established in 1998 by MNRE is an autonomous research and development institution to serve as a technical focal point for the deployment of wind power. It brought out the EOI for development of the 1st 1000 MW commercial offshore wind farm in India, off the coast of Gujarat.

[INDIAN WIND TURBINE MANUFACTURERS ASSOCIATION \(IWTMA\)](#)

IWTMA promotes and harnesses wind energy for an all-inclusive sustained growth-now and in the future. It strives towards high efficiency in energy generation through the best technologies and cost efficiency through large volume.

[INTERNATIONAL SOLAR ALLIANCE \(ISA\)](#)

ISA is a treaty-based international intergovernmental organization. ISA aims at mobilizing more than USD 1000 billion of investment needed by 2030 for the massive deployment of solar energy. Established by Prime Minister Narendra Modi and President of France Francois Hollande on November 30, 2015, ISA's objective is to scale up solar energy, reduce the cost of solar power generation through aggregation of demand for solar finance, technologies, innovation, research and development, and capacity building.

[NATIONAL INSTITUTE OF SOLAR ENERGY](#)

National Institute of Solar Energy (NISE) as an apex institute of the Ministry of New and Renewable Energy (MNRE), in the area of solar energy is undertaking activities related to research & development, testing, certification, standardization, skill development, resource assessment and awareness in the field of solar energy and associated technologies.

[SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO ENERGY](#)

Sardar Swaran Singh National Institute of Renewable Energy is an autonomous Institution of the Ministry of New and Renewable Energy, Govt. of India, to conduct state of the art Research, Design and Development activities in all the areas relating to new and renewable energy sources (especially in bio-energy), energy needs in rural areas, including human resources development at all levels, postdoctoral research and research leading to commercialization of the new and renewable energy technology.

[SOLAR ENERGY CORPORATION OF INDIA \(SECI\)](#)

The company is responsible for implementation of a number of schemes of MNRE, major ones conducting auctions and the VGF schemes for large-scale grid-connected projects under JNNSM, solar park scheme and grid-connected solar rooftop scheme, along with a host of other specialised schemes such as defence scheme, canal-top scheme, Indo-Pak border scheme etc.

[TERI - THE ENERGY AND RESOURCES INSTITUTE](#)

TERI is a research institute in New Delhi that specializes in the fields of energy, environment and sustainable development. VITO works in close collaboration with TERI in some projects.

[THE MINISTRY OF NEW AND RENEWABLE ENERGY \(MNRE\)](#)

The Ministry of New and Renewable Energy is a ministry of the Government of India that is primarily responsible for R&D, international cooperation, promotion, and coordination in renewable energy sources such as wind power, small hydro, biogas, and solar power.

6. TRADE FAIRS & CONFERENCES

[3RD GLOBAL RE-INVEST EXPO](#)

November 26 to 28 2020, New Delhi
Held virtually, recordings available on site.

The Indian Ministry of Ministry of New and Renewable Energy ([MNRE](#)) organized the virtual [3rd Global RE-Invest India-ISA Partnership Renewable Energy Investors Meet & Expo](#) from 26 to 28 November 2020. The global event deliberated upon strategies for development and deployment of renewables. It highlighted India's renewable energy potential and the Government's efforts to scale up capacity to meet the national energy requirements. In accordance with the theme of the conference, the topics of discussion focused on the various sectors of renewable energy- solar, wind (onshore and offshore), hydro, bio-energy/bio-fuels, smart grid technologies and storage solutions.

At this platform, the EU launched the India-EU [Clean Energy and Climate Partnership Dashboard \(CECP\)](#), setting out the activities from the EU and the Member States in the area of Climate Change and Energy. Re-Invest Session on EU-India Cooperation on Renewable Energy →: <https://www.cecp-eu.in/events/post/re-invest-session-on-eu-india-cooperation-on-renewable-energy-with-a-focus-on-offshore-wind>

[RENEWABLE ENERGY INDIA EXPO](#)

15-17 September 2021, Greater Noida by Informa Markets

Note : Largest event in this sphere held in India

[WINDERGY INDIA 2021](#) - 4th edition of Wind Power

15-17 April 2021, New Delhi

[INDIA WIND ENERGY FORUM \(IWEF\)](#)

14-15 November 2019, New Delhi

[2ND INTERNATIONAL CONFERENCE ON LARGE SCALE GRID INTEGRATION OF RENEWABLE ENERGY IN INDIA](#)

4-6 September 2019, New Delhi

Policy, Market And Regulatory Interventions – Abstract Papers On Grid Intervention

7. CHALLENGES OF RENEWABLE ENERGY SOURCES: GLOBAL PLUS INDIA-SPECIFIC

Renewables in India are different from renewables deployed in the U.S., Europe, etc. and understanding these differences is key to viable policies. The triad of “usual” challenges of renewables remains in India, such as :

- (1) intermittency/variability;
- (2) location-specific potential (concentrated in areas sometimes away from consumers or the grid);
- (3) higher costs.

Key factors likely to shape the scope of this sector :

- Complex tender designs
- Mixed financing environment
- Manufacturing prospects
- Tariffs to go down gradually

However, there are specific differences and needs that demand deeper analysis for the long-run viability of renewable energy. Making renewables viable for producers is possible if the producers are paid well, but in Indian context it is very difficult for the rest of the system to handle that. Because of pricing subsidies as well as high losses (both technical and commercial, i.e., theft), utilities already lose on average about a rupee, if not more, per kilowatt hour sold.

One of the typical calculations that power systems operators do is estimate how much renewable power the grid can handle. Typical figures from elsewhere are in the range of 20-30 percent, with more requiring significant investments in transmission or Peaker plants.

In India the grid is very weak and unstable, and instead of having a reasonable reserve margin (typically 15-20 percent in the west), there is a shortfall in the grid, officially in the range of 5 percent or so, but actually much higher.

Even the Grid Code is modest, recommending (but not mandating) only a 5 percent margin. The grid is kept afloat through massive “load-shedding” (feeder-level cut outs of supply). Such load shedding even impacts options like rooftop solar, since grid-tie inverters are designed to switch off during

outages or faults, for safety reasons. But if the grid is down so much, then the economics of rooftop solar takes a massive hit due to non-supply of power.

There are other technical reasons why the Indian grid is weak, including lack of ancillary services (systems designed to keep the grid stable, instead of just pricing kilowatt-hours), and even a lack of time-of-day pricing for bulk procurement of power.

There are few peaker plants (which would operate only some 5-10 percent of hours in a year), since there isn't sufficient incentive for these. Without incentives for plants that can ramp up (or down) quickly but may not get used much, it will be difficult for the grid to handle 20 percent renewables. Even worse, the types of plants capable of fast ramping are limited in near-term growth in India—hydropower (due to land and social/environmental challenges) and natural gas (due to supply constraints).⁴

A simple illustration of a problem peculiar to India.

Germany is touted as a model for rooftop solar programs. India gets some 20+ percent more sunlight, and labour costs are lower. But that would only bring the cost of such systems down from about Rs. 20/kWh to perhaps Rs. 13/kWh, still some four times higher than the average household tariff. Much more importantly, Germany and other countries are solving an energy (kWh) problem—India is still working to solve the capacity (kW) problem. Solar does not contribute in the evening, which is when India's peak demand occurs (driven by lots of small residential and commercial users). Thus, even if India adds 20 GW of solar, it still needs 20 GW of additional capacity to meet its peak, and the picture is almost as bad for wind because of its strong seasonality.

There is another dimension, one that impacts policies – the role of the state-level distribution utilities (which are the real decision-makers when it comes to renewables). In almost all states, the steps utilities have taken toward renewables have been top-down imposed, whether through state policy, or regulatory requirements, or even a renewables portfolio obligation (RPO). Talking to many utilities or power distribution companies, they ask a tough question: Why should I encourage an unpredictable and non-dispatchable source of power that costs much more than my average supply costs, but offers a Plant Load Factor (PLF, aka capacity utilization factor) close to 20 percent (coal plants easily operate at 75-80 percent PLF)? Of course, utility cost calculations are based on them having older and "cheaper" generation stations in the state, which offset the costs of more expensive "external" power (whether from Central Generation Stations like NTPC or private producers).

When we factor in the price of new generators, especially coal (which is often imported), renewables don't look as expensive anymore. Plus, the cost of fossil fuels is only rising, not to mention subsidies or preferences given to fossil fuels, let alone costs of externalities such as pollution or even carbon. This is why, among other reasons including large scope for growth, employment, and perhaps exports, renewables should be pursued.⁵

⁴ Source : [Brookings.Edu Blog](#).

⁵ Source : [Live Mint](#)

8. IMPACT OF COVID -19 ON ENERGY SECTOR

According to consulting firm Bridge to India, the overall power demand in 2020 has reduced by 25-30% due to the slowdown of manufacturing activities in the industrial sector. It has been estimated that this decline in demand with reduced collection along with an expected slow recovery will adversely impact stressed distribution companies (DISCOM) with a cash gap of around INR 400 Billion (€4.5 billion).

India's renewable energy sector has been highly affected in these unprecedented times due to force majeure conditions. Bridge to India states that due to the pandemic, India witnessed a loss of 2-3 GW of capacity addition in 2020. Under these circumstances, the sector is struggling with contraction in demand, restrictive working practices, higher working capital and payment delays.

9. PLANS TO BOOST INDIA'S RE SECTOR

Government initiatives

Some initiatives by Government of India to boost India's renewable energy sector are as follows:

- In August 2020, the government announced plans to offer land near its ports to companies for building solar equipment factories.
- India plans to add 30 GW of renewable energy capacity along a desert on its western border such as Gujarat and Rajasthan.
- Delhi Government decided to shut down thermal power plant in Rajghat to develop it into a 5,000 KW solar park
- The Rajasthan Government, in its Budget 2019–20, exempted solar energy from electricity duty and focussed on the utilization of solar power in its agriculture and public health sectors.
- A new hydropower policy for 2018–28 was drafted for the growth of hydro projects in the country.
- The Government of India has announced plans to implement a US\$ 238 million National Mission on advanced ultra-supercritical technologies for cleaner coal utilisation.
- The Ministry of New and Renewable Energy (MNRE) has decided to provide custom and excise duty benefits to the solar rooftop sector, which will lower the cost of setting up as well as generate power, thus boosting growth.

Lifting Manufacturing Sector

- Global companies are invited to participate in the bidding process to set up mega-manufacturing plants in India, especially in solar and renewable energy sectors (Union Budget 2019).
- 25% of sourcing for government projects will be from the MSMEs
- Thrust to renewable energy – 128 Mn USD for wind power, 418 Mn USD for solar power and 70 Mn USD for the green energy corridor.

- More than \$42 billion has been invested in the country's renewable energy sector since 2014 and by 2022, the renewable energy sector is projected to attract investments pegged at USD 80 billion.⁶

The Ministry of New and Renewable Energy has been taking various steps to aid the Covid-19 impacted renewable sector. It seeks to give a major push towards setting up clean energy equipment manufacturing parks. Tuticorin Port Trust, Madhya Pradesh and Odisha have already expressed their keen interest. The objective is to attract **investments by companies that are shifting base from China**. These hubs will produce equipment like silicon ingots and wafers, solar cells and modules, wind equipment and ancillary items like steel frames, inverters, batteries etc. Presently, about 85 per cent of solar cells and modules in India are imported⁷.

⁶ Source : Dezan Shira & Associates

⁷ [Hindu Business Line Article](#)

10.OPPORTUNITIES FOR FLEMISH COMPANIES

India is becoming a preferred destination for investment in renewables, with nearly \$64 billion investment made in the renewable energy sector in the past six years. [PM Modi in his speech at RE-INVEST](#) said that he wants to make India a global manufacturing hub in the renewable energy sector.

“India is focusing on innovative bids for supplying 24x7 power from renewables, solar-wind hybrid projects have been successfully explored. The demand for domestically-manufactured solar cells and modules is expected to be around 36 GW over the next three years.”⁸

With its long coastline and favourable wind conditions, India is a promising country to develop offshore wind energy. Offshore wind energy is highly specialized and this industry will initially rely on technical know-how and support from European companies.

Recently at Re-Invest, the EU launched the India-EU [Clean Energy and Climate Partnership Dashboard \(CECP\)](#), setting out the activities from the EU and the Member States in the area of Climate Change and Energy. This dashboard provides an overview of the activities, projects and programmes by the EU and EU Member States in India in the area of the clean energy transition and climate action.

Study : Supply Chain Study for Offshore Wind in India funded by European Union

Link : https://www.cecp-eu.in/uploads/documents/events/Supply_Chain_study_for_off-shore_wind_in_India.pdf

The following study which gives insight on the booming solar energy sector with respect to operation and maintenance, can be useful for Flemish companies, as it was done by persons having knowledge of both European and Indian markets.

Study : Operation & Maintenance -Cooperation Between EU & IN Specialists

Author : Solar Power Europe

Link : <https://www.solarpowereurope.org/india-edition-operation-maintenance-best-practice-guidelines/>

- Solar parks are built on a big scale procuring panels mostly sourced within India but due the fast growth of solar parks, the solar panels are also imported.
- Due to the historical low bids, the parks have to be built in a very efficient and cost effective way. The quality of the parks has to be high, independent of the price bidden for per kWh. Standardization can help to lower the cost.
- The maintenance and operation of a solar parks is of major importance as the life cycle should be around 25 years. The market in the EU is more mature than the Indian market. EU has learned from mistakes made in the past.

Ideally the market for Flemish companies could be in the following :

- In standardization, which will help in keeping the cost low.
- Use of advanced software to monitor the parks (instead of people, especially in Covid times). In EU, all parks are monitored through software which is more accurate as compared to humans. In India 10 to 12 people do the monitoring of one park.

⁸ [Financial Express](#).

- India offers a huge potential for knowledge transfer as foreign companies expertise will be required to support every aspect of the engineering and development of the offshore wind industry. More on → [Outlook for European Companies Study by European Union](#)

11. CONCLUSION

The pace of renewable energy growth has slowed in India, but positive outcomes in recent auctions suggest there remains plenty of appetite among domestic and foreign investors to build renewable infrastructure.

Policy-related headwinds and a collapse in electricity demand due to the Covid-19 crisis have disrupted India's renewable energy capacity tendering and commissioning process.

But despite these setbacks, renewables are proving resilient with investment capital available for new projects with favourable risk-return profiles, says Kashish Shah, Research Analyst at the Institute for Energy Economics and Financial Analysis (IEEFA).⁹

The future of renewable energy in India is in solar and wind power as they come closest to meeting the three energy consumer priorities: **reliability, affordability, and environmental responsibility**. For foreign companies wanting to enter India, there are more opportunities in solar energy, as it will take considerable time for offshore wind energy to be profitable.

12. LINKS TO STUDIES / REFERENCES

Study : Supply Chain Study for Offshore Wind in India
Author : European Union
Link : https://www.cecp-eu.in/uploads/documents/events/Supply_Chain_study_for_off-shore_wind_in_India.pdf

Study : India Wind Outlook towards 2022 : Looking Beyond Headwinds
Author : Global Wind Energy Council (GWEC) & MEC Intelligence
Link : <https://gwec.net/india-wind-outlook-towards-2022-looking-beyond-headwinds/>

Study : India 2020 Energy Policy Review
Author : International Energy Agency (IEA)
Link : <https://niti.gov.in/sites/default/files/2020-01/IEA-India%202020-In-depth-EnergyPolicy.pdf>

Study : Towards A Clean Energy Economy Post-Covid-19 Opportunities For India's Energy & Mobility Sectors
Author : NITI Aayog and Rocky Mountain Institute
Link : https://niti.gov.in/sites/default/files/2020-06/India_Green_Stimulus_Report_NITI_VF_June_29.pdf

Study : India-EU Clean Energy and Climate Partnership (CECP) project

⁹ Source : [Energy Economic Times](#)

- Author** : European Union
Link : <https://www.cecp-eu.in/> <https://www.cecp-eu.in/external-links> (Links to Organisations)
- Study** : From 0 to 5 GW Offshore Wind for Gujarat and Tamil Nadu 2018 - 2032
Author : European Union & GWEC, FOWIND Project
Link : <https://mnre.gov.in/img/documents/uploads/88434488c99b46969eda9a0e3e3e2a.pdf>
- Study** : Tariff Policy Resolution (from Page 23 including Renewable Sources)
Author : Gazette Notification by Ministry of Power
Link : https://powermin.nic.in/sites/default/files/webform/notices/Tariff_Policy-Resolution_Dated_28012016.pdf
- Study** : Evolving Energy Landscape in India – Opportunities for Investments
Author : Deloitte
Link : <https://www2.deloitte.com/content/dam/Deloitte/in/Documents/energy-resources/in-enr-the-evolving-energy-landscape-india-april-2018-noexp.pdf>
- Study** : India 2020 - Energy Policy Review
Author : International Energy Agency
Link : <https://www.iea.org/reports/india-2020>
- Study** : Operation & Maintenance -Cooperation Between EU & IN Specialists
Author : Solar Power Europe
Link : <https://www.solarpowereurope.org/india-edition-operation-maintenance-best-practice-guidelines/>
- Study** : Renewable Energy
Author : IBEF (Indian Brand Equity Foundation)
Link : <https://www.ibef.org/download/Renewable-Energy-May-2020.pdf>
- MOU** : MOU Between MNRE & BELGIUM
Link : <https://mnre.gov.in/img/documents/uploads/0a3201447fef46939cb9733c0b6ee19f.pdf>
- MOU** : List of all International Memorandums with MNRE
Link : <https://mnre.gov.in/international-relations/memorandums>

References / Important Links

[Ministry of New and Renewable Energy \(MNRE\)](#)

[PM'S address at 3rd RE-INVEST Expo](#)

<https://www.ibef.org/industry/renewable-energy.aspx>

<https://www.cecp-eu.in/events/past-events/renewable-energy>

https://regridintegrationindia.org/wp-content/uploads/sites/14/2019/11/5A_2_RE_India19_030_paper_Shah_Birendrakumar-1.pdf

<https://www.lexology.com/library/detail.aspx?g=6efdf930-f5f5-44c8-a4b3-54cf1de07b94>

[https://uk.practicallaw.thomsonreuters.com/w-012-2860?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-012-2860?transitionType=Default&contextData=(sc.Default)&firstPage=true)

<https://mnre.gov.in/img/documents/uploads/ecebf2e42ab94c66872bbfc5b5c87b2a.pdf>

<https://www.prayaspune.org/peg/publications/item/327-grid-integration-of-renewables-in-india.html>

<https://economictimes.indiatimes.com/industry/energy/oil-gas/india-to-install-2-9-gw-wind-capacity-in-2019-report/articleshow/71576014.cms>

<https://www.livemint.com/companies/news/icra-downgrades-around-1-9-gw-of-wind-and-solar-power-projects-11571230295647.html>

<https://economictimes.indiatimes.com/industry/banking/finance/ilfs-completes-wind-power-units-sale-to-orix-for-rs-4800-crore/articleshow/71635522.cms>

<https://energy.economictimes.indiatimes.com/news/renewable/govt-plans-tenders-for-storage-to-smoothen-clean-energy-supply/79457566>

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