

A photograph of a wind turbine in a mountainous landscape at sunset. The sky is a mix of orange, pink, and blue, with a few wispy clouds. The mountains in the background are silhouetted against the bright sky. The wind turbine is in the foreground, with its blades extending towards the right. A green semi-transparent box is overlaid on the left side of the image, containing the text.

MARC

MARC Insights - Renewable Energy

2023

Do you want to know more about the Renewable Energy Industry?

MARC's Research expertise can help you unlock full potential of your business by gaining deeper insights on your target market, understand your customer requirements better, know your competition's actions and performance and hence derive the most optimum customer value proposition to make your business a success!

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Introduction

Renewable energy are sources of clean, inexhaustible energy derived from natural sources like sun, wind and water.

Types of Renewable Energy

Solar Energy

Wind Energy

Geothermal Energy

Hydropower

Biopower

Tidal Energy

Fossil fuels still accounted for more than 80 percent of global energy production in 2022 but cleaner sources of energy are gaining ground.

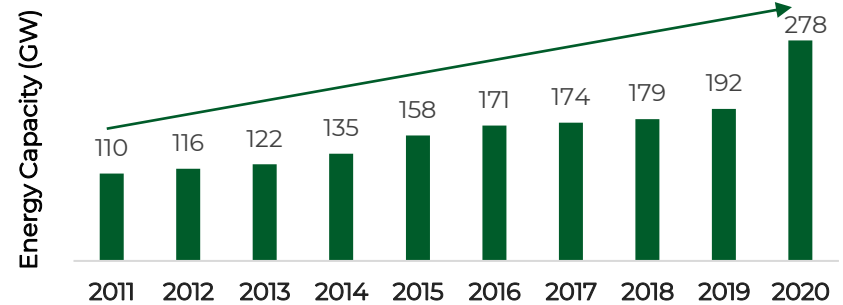
29%



**About 29 percent of global electricity currently comes from renewable sources.*

Source: International Energy Agency

Net Global Renewable Energy Capacity Additions by year (in Gigawatts)



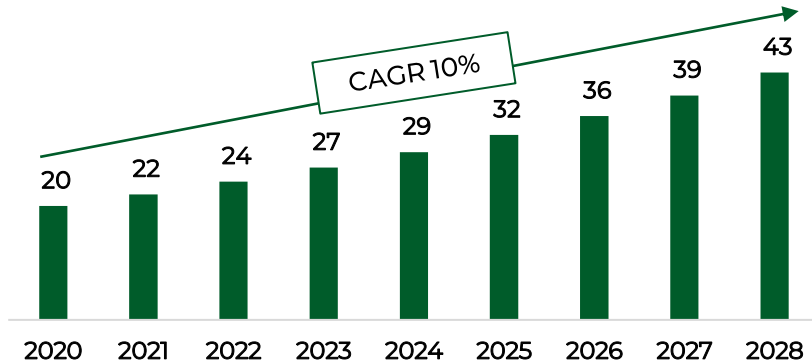
Source: International Energy Agency

The devastating impact of the COVID-19 pandemic has only served to heighten the importance of institutional investors addressing **environmental, social and corporate governance (ESG)** risks.

The continuous evolution of technology in generating green energy for businesses is anticipated to lead to a reduction in reliance on non-renewable sources and an increase in demand for renewable energy throughout the forecast period from 2022 to 2028.

Indian Scenario

Renewable Energy Industry in India
in USD Billion

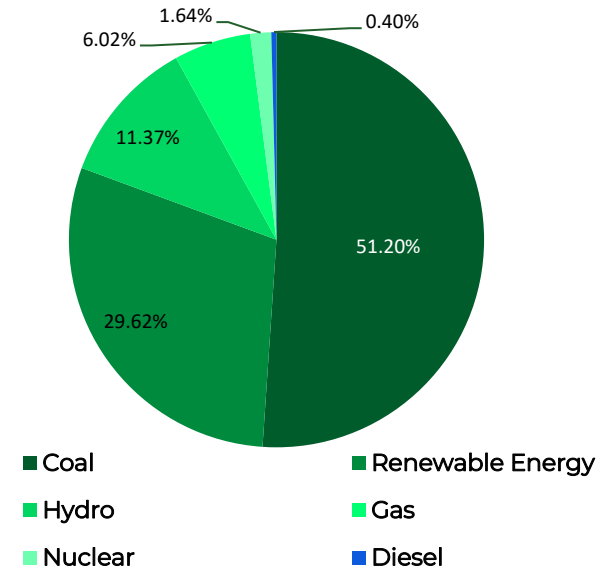


India's energy demand is expected to increase more than that of any other country in the coming decades due to its sheer size and enormous potential for growth and development.

The Indian renewable energy sector is the **4th** most attractive renewable energy market in the world.

Source: Indian Brand Equity Foundation

All India Installed Capacity in Gigawatts
(GW)
(As on February 2023)



Renewable energy now constitutes over half, at 51.20%, of India's total installed capacity in Gigawatts

Source: Ministry of New and Renewable Energy

Indian Scenario

3rd

largest market in the world for new solar photovoltaics (PV) capacity.

4th

largest installed capacity of wind power in the world.

Low-carbon technologies could create a market worth up to

USD 80 Billion

in India by 2030.

India's potential:

India has a commercially viable renewable potential of around **85,000 MW**, which includes wind potential of **45,000MW**, small hydro of **6,000 MW** and **25,000 MW** of biomass/bio-energy.

Further, the country has the potential to generate **20 MW** per sq. km. using solar photovoltaic and solar thermal energy.

India's targets:

India has set a target to reduce the carbon intensity of the nation's economy by less than **45%** by the end of the decade.

India plans to achieve **50%** cumulative electric power installed by 2030 from renewables and achieve **net-zero carbon emissions** by 2070.

The Ministry of New and Renewable Energy (MNRE) set a target to achieve **500 GW** of installed renewable energy capacity by 2030.

Market News

20% to 28%

increase in renewable energy of the world's electrical supply between 2011 and 2021.

2% to 10%

Solar and wind energy share rise between 2011 and 2021

156 Nations

have legislation governing the renewable energy industry

About USD 2.8 trillion is set to be invested globally in energy in 2023, of which more than USD 1.7 trillion is expected to go to renewables, electric vehicles, nuclear power, grids, storage and low-emissions fuels.



Global renewable capacity additions are set to soar to more than 440 GW in 2023. This is equivalent of more than the entire installed power capacity of Germany and Spain combined.



Asia-Pacific region is projected to be the fastest-growing market for renewable energy, with China, Denmark and Germany leading the way.



Why Renewable Energy is the Roadmap to the Future

Emission Free

Renewables do not emit greenhouse gases making them the cleanest, most viable solution to prevent climate degradation.

Abundance

Compared to conventional sources of energy such as coal, gas, oil and nuclear power, clean energies are available in abundance which makes them a sustainable source of energy.

Geopolitical motivation

Russia's invasion of Ukraine has prompted countries to shift to renewables like solar and wind, reducing dependence on costly imported fossil fuels and enhancing energy security.

Sustainable alternative

New renewable technologies have a one-time bearing cost which proves to be subsequently cheaper in comparison to conventional sources. Economies of scale and innovation are resulting in renewable sources of energies becoming a sustainable solution of generating energy.

Challenges in the Industry

Storage

Due to the intermittency of renewable energy sources depending on the weather conditions, India requires huge energy storage technologies to store excess energy when it is produced and release it when needed.

Infrastructure Cost

The transition to renewable energy requires significant initial investments in terms of infrastructure, such as new power grids and transmission lines, energy storage facilities, etc.

Policy and regulatory barriers

There is a lack of clarity on policies and regulations related to renewable energy in India, which can create uncertainty for investors and developers not having proper consultation.

Integration with existing power system

The grid infrastructure is not built to handle large-scale integration of renewable energy, which can lead to stability and reliability issues.

Future Trends in Renewable Energy

Wave Generation:

Power can be generated from the waves that crash on and around the shores of the sea. Tech can be built to harness that power and convert it into energy.

Solar Power from Space:

Energy has so far been generated from solar power from the ground but now with technology, solar power can be harnessed from space to use it on earth.

Enhanced Geothermal Systems:

The process of generating steam by pumping water into hot porous rocks, instead of relying solely on geothermal hotspots like geysers, and steam vents.

Bioenergy with carbon capture and storage (BECCS):

Biomass is burnt to generate energy and the resulting carbon dioxide energy is captured and stored underground to reduce greenhouse gas emission from the atmosphere.

Top 5 Global Companies in Renewable Energy



General Electric Co. (GE)

It is best known for its innovations in power and renewable energy. It has made key strides in development of wind turbines and energy-efficient software.



Iberdrola SA (IBDRY)

The company engages in the generation, distribution, and trading of electricity. It specializes in clean energy, including onshore and offshore wind, pumped hydro, solar photovoltaic, and battery storage.



Constellation Energy Corp. (CEG)

It provides a variety of energy sources, including electrical, nuclear, and natural gas services to business, residential, and public sector customers.



NextEra Energy (NEE)

NextEra Energy that operates power plants and provides wholesale power to retail and municipal electricity providers, industrial corporations and power cooperatives.



Vestas Wind Systems

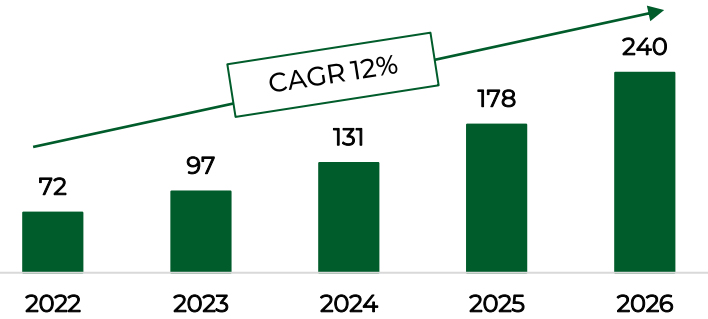
Vestas Wind Systems develops, manufactures and installs wind turbines in countries across the globe. The company also operates a service segment that provides service contracts, spare parts, and related activities.

Source: Investopedia

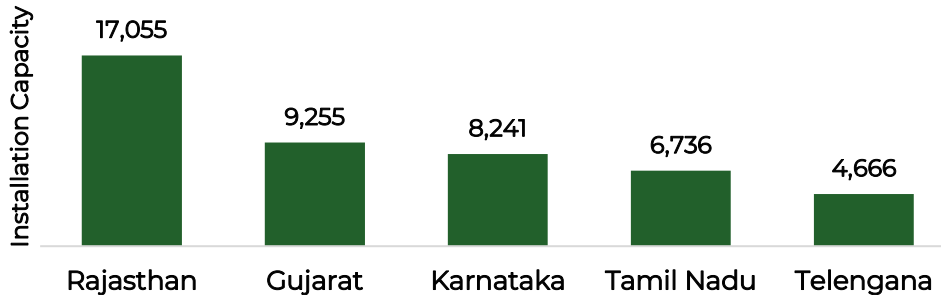
Solar energy

- **National Solar Mission** was launched in India in 2010. The target set was to develop **20GW** by the end of 2020. This has however been crossed long back as there has been heavy activity in this sector since then.
- For next year i.e., CY2023, about **14 GW** of new utility-scale solar projects and **2.8 GW** of rooftop/onsite solar projects are expected to be commissioned.

India Solar Power Market in USD Billion



Top 5 States in Solar Installation Capacity in Mega Watts (MW)



**India's rank in terms of solar power production in 2022*

Source: Ministry of New and Renewable Energy

Wind Energy

The cumulative installed wind power capacity stood at **42.63 Giga Watts (GW)** in FY 2023 and is expected to reach **52.48 GW** by FY 2027, growing at a CAGR of **5.84%** during the FY23 - FY27 forecast period.

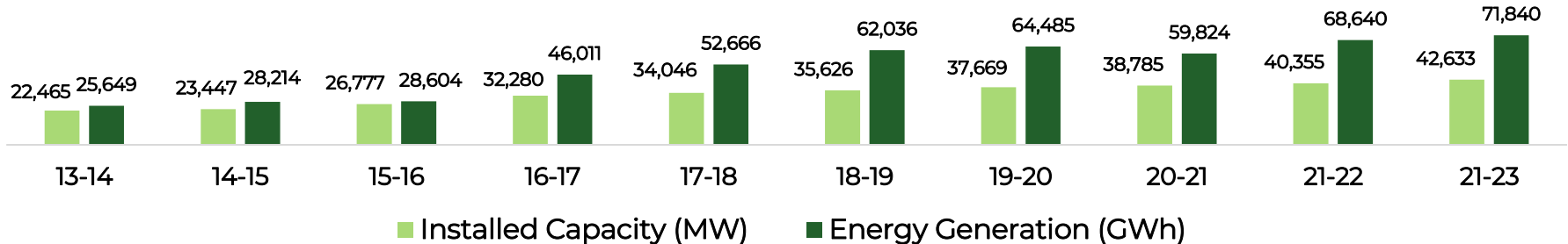
Onshore Wind Resource

Onshore wind resources in India are concentrated mainly in the five western and southern states of Tamil Nadu, Karnataka, Maharashtra, Andhra Pradesh and Gujarat.

Offshore Wind Resource

There are not yet any offshore wind turbines installed in India – but the seeds of activity are underway. Offshore wind has some inherent advantages such as a large wind resource, higher wind speeds than onshore wind and more clarity over land tenure.

Wind Power Installed & Generation Capacity in India



Source: renewablesindia.in

*MW: Megawatts, GW/h: Giga watts/hour

Bio- Power

About **32%** of the total primary energy use in the country is still derived from biomass and more than **70%** of the country's population depends upon it for its energy needs.

Plants like *Jatropha Curcas*, *Neem*, *Mahua* and other wild plants are identified as the potential sources for biodiesel production in India.

750 Million

metric tonnes is the estimated availability of biomass in India per year

Factors driving growth of Bio-power generation in India

Government Initiatives

Government initiatives such as biomass power & cogeneration program along with the revised policy for biomass utilization have promoted technologies for the optimum use of the country's biomass resources.

Investments

Attractive investments from foreign green companies and technological advancements are also contributing to driving the biomass market in India.

Financial Incentives

The Ministry of New and Renewable Energy provides central financial assistance in the form of capital subsidy and financial incentives to the biomass energy projects in India.

Geo-thermal Energy

India is blessed with good potential for geothermal energy and is considered to have Low(<than 100 Degree C) to medium (100-200 Degree C) enthalpy regions.

Surveys done by Geological Survey of India in 2017 have earmarked **340** hot springs within temperature range of 34 degree to 98-degree C.



The government has promised to provide a capital subsidy of up to **30%** for industrial geothermal projects.



India plans to build a major geothermal power plant in Arunachal Pradesh just across the border from where China is setting one up.



The Ministry of New and Renewable Energy provides incentives for geothermal energy research, design, development, and demonstration (RDD&D)

The major potential areas for geothermal energy in India

Province	Surface Temp (in Celsius)	Reservoir temp (in Celsius)	Heat Flow (milli watts per m sq.)	Thermal Gradient (Kelvin per mt.)
Himalaya	>90	260	468	100
Cambay	40-90	150-175	80-93	70
West Coast	46-72	102-137	75-129	47-59
Sonata	60-95	105-217	120-290	60-90
Godavari	50-60	175-215	93-104	60

Hydroelectric Power



** India's rank globally in terms of installed Hydropower capacity as of 2022*

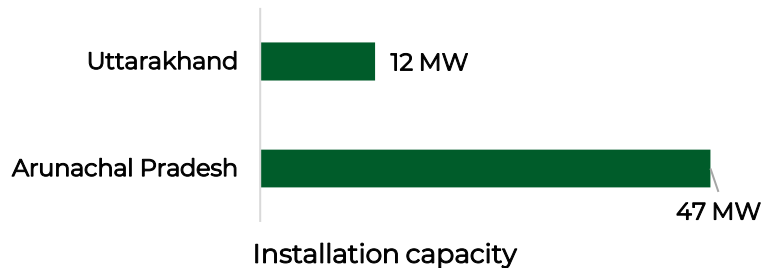
46,000 MW

India's installed utility-scale hydroelectric capacity as of 31st March 2021

1,45,000 MW

India's hydroelectric power capacity at 60% load factor.

Indian States with highest Hydropower potential



In March 2019, the government approved targeted measures to promote hydropower development in India. This included:

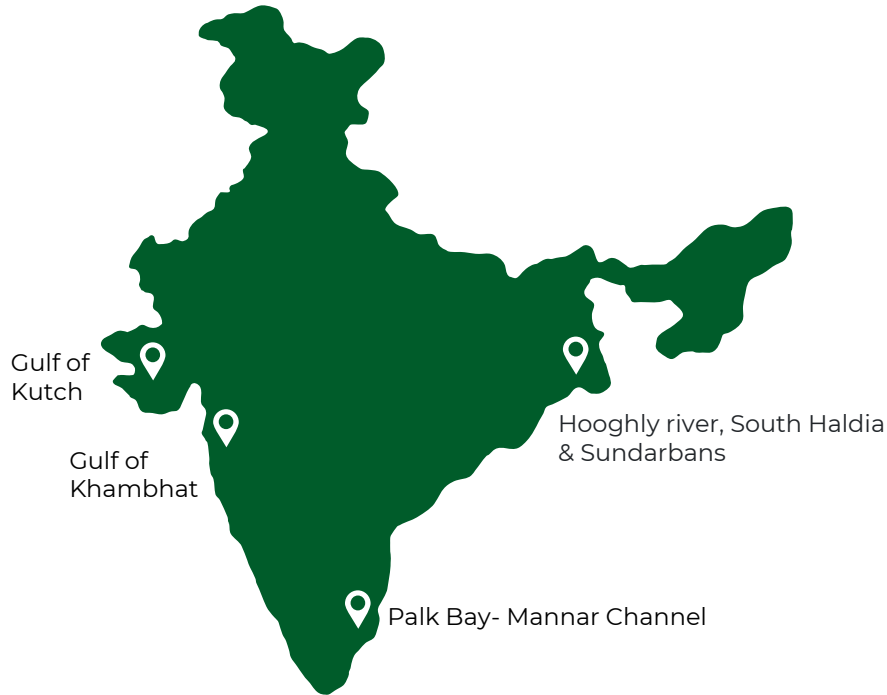


Inclusion of large hydro power projects as RE sources (until then only projects of **less than 25 MW** capacity were considered RE sources)



Budgetary support for funding flood moderation component of hydropower projects on case-to-case basis for enabling infrastructure i.e., roads and bridges on case-to-case basis.

Tidal Energy



**Potential areas with low/medium tidal wave strength*

Source: Ministry of New and Renewable Energy, DristiIAS

8,000 MW

India's Tidal power potential

Tidal energy is still in Research & Development (R&D) phase and has not been implemented on a commercial scale in India.

The earlier efforts for harnessing tidal power in 2014 were not successful due to high capital cost ranging from Rs. 30 crore to Rs. 60 crore per MW.

Challenges



Unpredictable environmental conditions



Low turbine efficiencies and high turbine costs



Unavailability of grid connections at potential sites and lack of experience

Clean Technologies: Green Hydrogen

Process:

Green Hydrogen refers to hydrogen produced through the process of electrolysis, which uses renewable energy sources such as solar or wind power to split water molecules into hydrogen and oxygen which does not generate carbon emission.

Green Hydrogen fuel will help decarbonize sectors of the economy that are difficult to electrify, such as heavy industry and aviation.

The Green Hydrogen pathway can be a key enabler for India's aspirations of building a low-carbon and self-reliant economy.

The India Green Hydrogen Market is projected to grow at a CAGR of almost **20%** during the forecast period, i.e., **2025-30**

End Users:

1. Power Generation & Energy Storage
2. Automotive & Transportation
3. Mining
4. Refineries & Petrochemicals
5. Others (Food & Beverage, Steel, Cement Industries, etc.)

The National Green Hydrogen Mission will build capabilities to produce at least **5 Million Metric Tonne (MMT)** of Green Hydrogen per annum by **2030**.

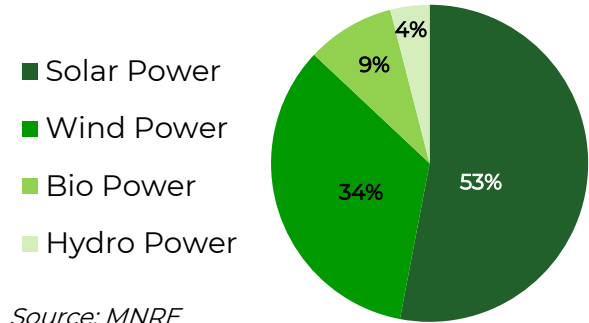
The mission aims to make India a leader in technology and manufacturing of electrolysers and other enabling technologies for Green Hydrogen.

Key Developments in India

Solar capacity installations in India decreased by 8% in FY2023 to **12,784 MW**. However, the wind installation jumped significantly by 105% to **2,276 MW**.

In March 2023, about **USD 2.57 Billion** was invested in the Renewable Energy sector by private players which has brought forward increased competition among players and immense growth led by the private sector.

Cumulative Installations
(As of February 28th, 2023)



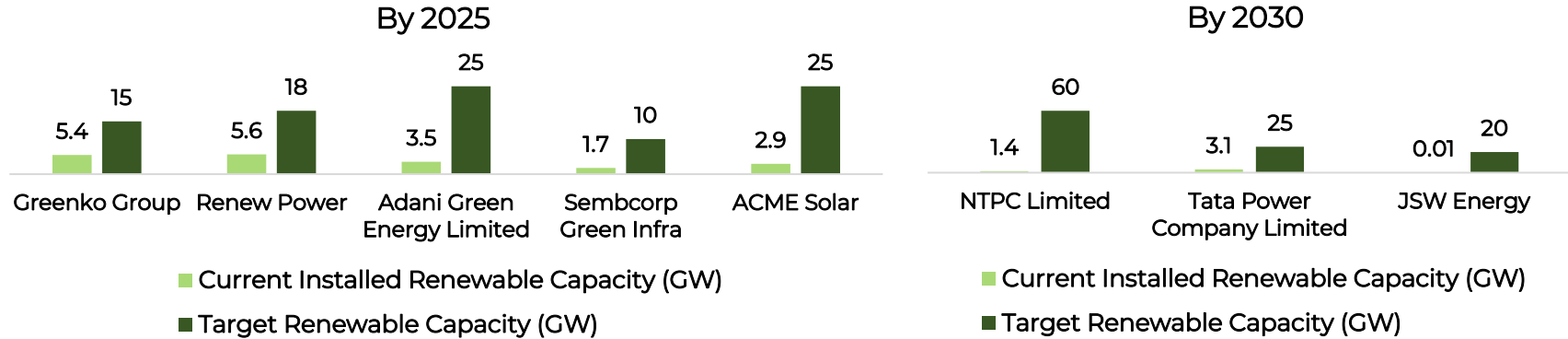
Source: MNRE

Prominent Developments in India

- **Promotion of Pumped Storage Projects:** The Ministry of Power has released draft guidelines to support pumped storage projects, essential for grid stability as India targets 50% renewable energy in its energy mix by 2030.
- **Waiver of ISTS Charges for Hydro Power:** The Ministry of Power has announced a waiver of ISTS charges for hydro power projects awarded and signed before June 30, 2025, to promote hydroelectricity generation.
- **IREDA's New Status:** The Indian Renewable Energy Development Agency (IREDA) has been granted 'Infrastructure Finance Company' status, enabling it to enhance renewable energy financing and access a wider investor base.

Key Developments in India

Current and Targeted Renewable Capacity of Major Private Players



*GW: Gigawatts

Drivers for Private Sector's Shift to Renewables in India

- **Energy Security:** Coal shortages and export bans exposed energy supply vulnerabilities, pushing the private sector towards renewables.
- **Price Stability:** High coal prices during shortages highlighted the volatile nature of fossil fuels, driving interest in renewables with predictable costs.
- **Sustainability Goals:** Renewable energy aligns with sustainability targets, appealing to environmentally conscious private players.

Source: Economics Times

Current Government Policies & Incentives

National Renewable Energy Act: The Ministry of New and Renewable Energy (MNRE) drafted a National Renewable Energy Act in 2015. The purpose of the legislation is to create a framework for the development, promotion, and regulation of renewable energy sources.

National Offshore Wind Energy Policy: The National Offshore Wind Energy Policy was developed in 2015 to support the growth of offshore wind energy in India. The strategy is anticipated to establish a regulatory framework for the development and financing of offshore wind energy projects.

Green Hydrogen Mission: The government has announced a Green Hydrogen Mission to encourage green hydrogen production and consumption in the country. The mission aims to achieve a target of 1 GW of green hydrogen capacity by 2022 and 10 GW by 2030.

KUSUM Scheme: The Kisan Urja Suraksha evam Utthaan Mahabhiyan (KUSUM) scheme was launched in 2018 to promote the installation & development of solar pumps and grid-connected solar power projects in rural areas. The Pradhan Mantri Kusun Yojana 2023 is an extended and amended version of the scheme initiated on March 8, 2019, now extended until March 31, 2026, with the aim of promoting broader adoption of solar energy solutions among farmers.

Future ahead for India

India is expected to face a rising energy demand owing to its growing population and the potential for further growth and development, necessitating the fulfillment of this demand through low-carbon and renewable energy sources.



Sustainable development is only possible when there is a nationwide adoption of sustainable energy by ensuring access to affordable, reliable, sustainable energy to every citizen of the country.



It can be anticipated that there will be increase in the use of solar energy as the cost of solar modules are declining with the advancement of technology.



Renewable energy is becoming popular and preferred around the world, with many Countries, including India setting targets to transition to 100% renewable energy in the coming decades.



MARC Forecast

1. Green Energy Surge

Corporate entities have begun to incorporate ESG factors when considering renewable energy initiatives.

Organizations are committing to 100% renewable energy or net-zero carbon emissions.

2. Use of AI and Big Data


Innovations in cloud computing, virtual power plants.

Power consumption forecasting and predictive maintenance of renewable energy sources.

3. Rise of Green Hydrogen

Emergence of international agreements and initiatives promoting the use of green hydrogen

Technological advancements and cost reduction in electrolysis processes for green hydrogen production



Ever wondered if your business is performing to its full potential or if it is in-tune with the industry?

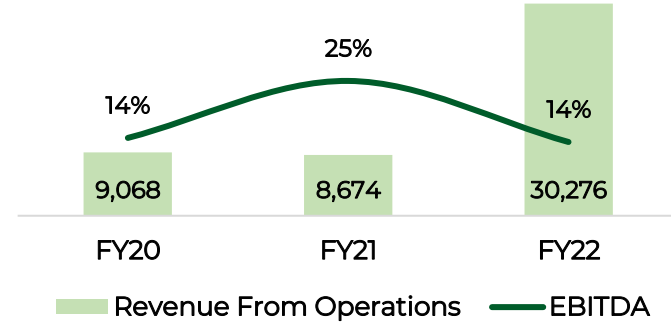
MARC's detailed and comprehensive analysis of your business performance, as well as of your competitors and their strategies and how your own business is performing against the industry benchmarks, all of this with MARC's personalized recommendations.

Note: Financial figures used in the following section of the report are fictional and are used to represent MARC's capabilities.

Profit & Loss Snapshot

P&L Snapshot (Company X) Particulars (in USD Thousands)	Actuals			Common size			Variance	
	FY20	FY21	FY22	FY20	FY21	FY22	FY21	FY22
Revenue From Operations	9,068	8,674	30,276	100%	100%	100%	-4%	249%
Consumption	5,465	3,855	23,588	60%	44%	78%	-29%	512%
Expenses	-	-	-					
Employee Benefit Expenses	850	923	979	9%	11%	3%	9%	6%
Operations & Maintenance Expen	46	79	160	1%	1%	1%	72%	102%
Transmission Charges	92	86	140	1%	1%	0%	-6%	63%
Lease Rents	104	161	135	1%	2%	0%	54%	-16%
Other Expenses	1,208	1,414	1,168	13%	16%	4%	17%	-17%
EBITDA	1,303	2,156	4,106	14%	25%	14%	65%	90%
Finance Costs	559	628	523	6%	7%	2%	12%	-17%
Depreciation & Amortisation	480	558	681	5%	6%	2%	16%	22%
Other Income	72	179	419	1%	2%	1%	147%	135%
EBT	337	1,148	3,321	4%	13%	11%	241%	189%

Source: Market Research & MARC Analysis

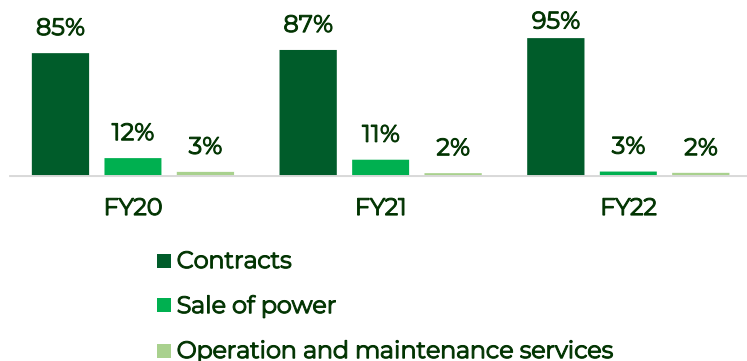


Consumption Cost stood high at 78% in FY22 which increased from 44% in FY21. This decreased the Gross profit margins from 56% to 22% from FY21 to FY22 respectively. Basis on competitor analysis average COGS (Cost of goods sold) stood at 32%.

- The Revenue from operations is further bifurcated into Sale of power, Operation & maintenance service and Contracts. It is observed that in FY22, Revenue from operations increased drastically from USD 8,674 thousands to USD 30,276 thousands due to the sharp rise in revenue from contracts, introduction of new categories of projects and government initiatives and support.
- Employee Benefit expenses and Other Expenses as a % of total revenue decreased from 11% and 16% respectively in FY21 to 3% and 4% respectively in FY22.
- The EBITDA margin in FY22 decreased to 14% from 25% despite the increase in revenue. This was due to the sharp rise in consumption.

Key Metrics (1/2)

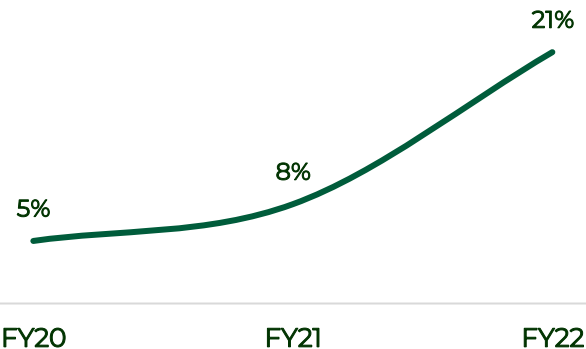
Segment Wise Revenue Analysis



Source: Market Research & MARC Analysis

- Company X generates revenue through the Sale of Power, Operation and Maintenance services and Contracts.
- Contracts contribute the highest % to total revenue and have witnessed an increasing trend YoY from contributing 85% to revenue in FY20 to 95% in FY22.
- Sale of power as a % to total revenue decreased from 12% in FY20 to 3% in FY22, whereas Operation and maintenance services revenue as a % to total revenue has remained relatively constant.

Return on Capital Employed

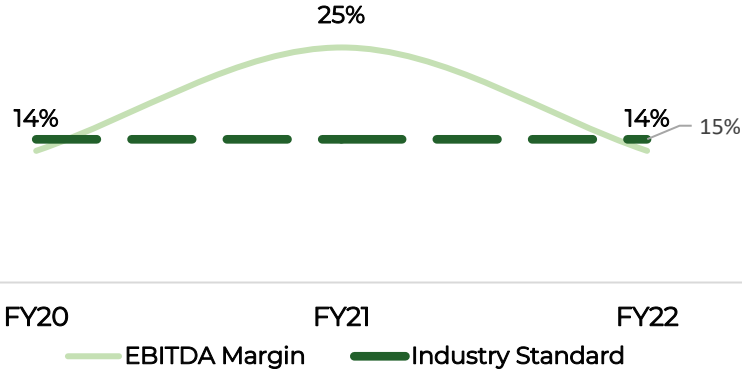


Source: Market Research & MARC Analysis

- Return on Capital Employed (ROCE) is an efficiency ratio and indicates the relative profitability of companies after taking into account the amount of capital utilized.
- The company's ROCE has witnessed an increasing trend from 5% in FY20 to 8% in FY21 and further to 21% in FY22, thereby indicating improved capital efficiency.

Key Metrics (2/2)

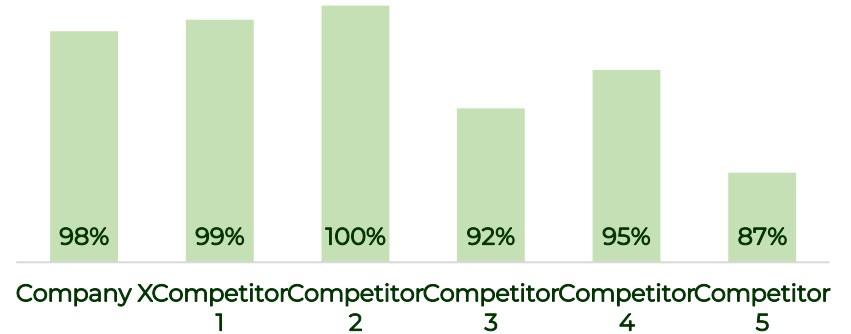
EBITDA Margin



Source: CSIMarket and MARC Analysis

The industry standard for renewable industry is 15.23%. Average EBITDA Margin for the period under review of the company stood at 16% and has been above the industry benchmark.

Grid Availability



Source: Market Research & MARC Analysis

- Grid availability refers to the percentage of time that the power distribution system is operational and able to supply electricity to consumers. It takes into account any interruptions or failures in the transmission and distribution network that may result in power outages.
- It is observed that Competitor 2 stands out with a grid availability of 100%, while Competitor 5 has the lowest grid availability at 87%. A higher grid availability percentage indicates a more robust and stable grid infrastructure.

Competitor Analysis

Particulars	Company X	Competitor 1	Competitor 2	Competitor 3	Competitor 4	Competitor 5
Debt to equity	0.26	0.16	0.02	1.75	2.05	0.14
Current ratio	1.23	2.6	1.65	2.22	0.99	0.91
Interest Coverage Ratio	7.36	1.31	2.79	2.47	1.88	10.16
Assets Turnover	0.8	0.24	0.12	0.96	0.02	0.75
Inventory Turnover	1.89	0.80	0.20	6.29	0.40	8.58
EBITDA Margin	14%	16%	2%	3%	45%	7%
Operational Capacity	500 MW	250 MW	320 MW	150 MW	417 MW	250 MW
Grid Availability	98%	99%	100%	92%	95%	87%

Source: Market Research & MARC Analysis

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