



SURGING AHEAD: SCALING INDIA'S CLEAN ENERGY MARKET THROUGH JOBS AND FINANCING

Increasing energy access, clean energy development, and economic livelihoods are national priorities for India Prime Minister Narendra Modi's new government. As India faces rising fuel prices, threats to energy security, and the impacts of climate change, renewable energy offers a critical solution, which also supports the new government's agenda. India's solar and wind programs have catalyzed rapid growth. **In just four years, India's solar market has grown more than one hundred fold. India is also the world's fifth largest wind energy producer.**



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The clean energy sector is providing much needed energy access while also creating enormous employment opportunities for India's workforce. Highlighting the opportunity a scaled-up clean energy market offers for job creation in India, new analysis by NRDC and the Council on Energy, Environment and Water (CEEW) estimates that solar photovoltaic (PV) projects commissioned in India between 2011 and 2014 created approximately 24,000 full-time equivalent (FTE) jobs. Along with various estimates of job creation in the wind sector, grid-connected renewable energy is estimated to have created nearly 70,000 FTE jobs in India so far.

This analysis also finds that the Indian government and business leaders must overcome financing obstacles to achieve the country's renewable energy goals and reach the full time growth potential of the clean energy sector. Policy support through innovative financing mechanisms and instruments such as green banks and green bonds could help reduce the high cost of renewable energy and scale the market to help power India's future.

INDIA'S SOLAR AND WIND ENERGY MARKET EMERGING QUICKLY

In 2010, as part of its plan to address the country's urgent and growing demand for energy, India's Ministry of New and Renewable Energy (MNRE) launched the Jawaharlal Nehru National Solar Mission (NSM or Mission) to promote grid-connected and off-grid solar energy. The administration hopes to establish India as a global leader in solar energy and to deploy 20 gigawatts (GW) of grid-connected installed solar power—equivalent to the energy capacity of 40 mid-sized coal-fired power plants—and 2 GW of off-grid solar power by 2022.

In just four years, India's solar market has grown more than one hundred fold to achieve more than 2.5 GW of grid-connected installed solar energy (about the same as California), largely driven by national and state policies. With eight years left in the Mission, India is rapidly ramping up its solar installations, presenting an opportunity to increase public support for this potentially transformative energy resource.

India is also the world's fifth largest wind energy producer, with 20 GW of installed wind capacity, also supported by national and state policies. The country boasts a newly estimated wind energy potential of 100 GW, which could make up half of India's current 220 GW of total installed energy. In 2014, the government announced plans in 2014 to launch a National Wind Energy Mission to harness the country's huge potential.

CLEAN ENERGY CREATES LOCAL JOBS

Continued support for renewable energy creates clean jobs and supports the local economy. Renewable energy technologies are more labor-intensive than more mechanized fossil fuel technologies and can provide a tremendous opportunity to create domestic jobs for a young and booming population. Though a dearth of data exists on jobs created by renewable energy in India, the preliminary data show huge job growth potential with **an estimated 70,000 jobs already created**.

NRDC and CEEW's analysis has found unequivocally that renewable energy creates local jobs that drive economic development and provide clean energy. Based on preliminary research and hampered by severe data scarcity, the analysis shows that from 2011 to 2014, **grid-connected solar energy development employed approximately 24,000 FTE workers** during the Mission's first phase solar policies. Similarly, **wind energy development created more than 45,000 jobs by 2012** based on government estimates.

Unlike international markets, Indian companies do not regularly report job numbers, making it difficult to accurately measure job creation. However, the local job opportunities created by renewable energy projects offer a compelling economic rationale for the government and public to support more solar and wind power. To truly realize the potential for employment opportunities from solar energy, Indian industry must strive for greater transparency about the impact of clean energy projects on job creation. It must also collaborate on skills development in order to ensure that progress made toward energy and ecological security also helps India address its need to generate jobs for its rapidly growing workforce.

FOCUS ON JOBS: PROFILES OF SOLAR AND WIND ENERGY PROJECTS

The incoming central government has highlighted energy access, clean energy and job creation as key priorities for the coming years. Solar PV is recognized as creating more jobs per unit of energy produced than any other energy source; thus it potentially represents a much-needed solution to unemployment in the face of India's burgeoning population and young labor force. As India moves toward its 2022 solar target and develops its Wind Mission, the Indian government should consider the employment opportunities created by the solar and wind industries when designing and implementing clean energy policies at the state and national levels.

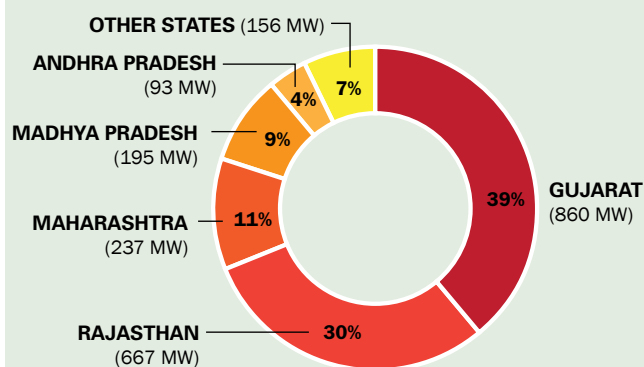
Indian States Leading the Way Towards a Clean Energy Future

The following leading states boast the most installed capacity of renewable energy so far and are primed to benefit from continued policy and financial support, and the resulting local economic impact, of clean energy. All but one of the top five solar leaders are located in the sun-drenched northwest of India. All top five wind leaders are located along India's windy west and southeastern coasts.

SOLAR PV INSTALLED CAPACITY LEADERS

(as of January 2014)*

Gujarat	860 MW
Rajasthan.....	667 MW
Maharashtra	237 MW
Madhya Pradesh	195 MW
Andhra Pradesh.....	93 MW

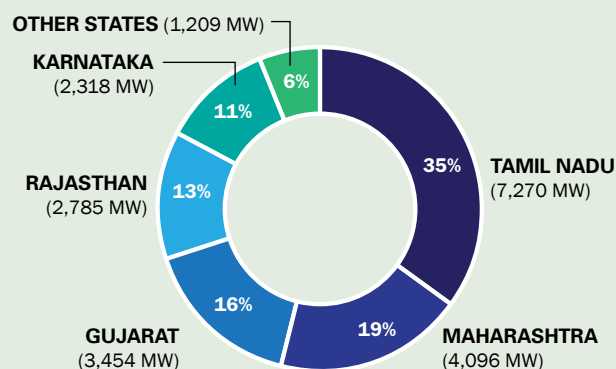


* Government of India, Ministry of New and Renewable Energy, "State wise Installed Capacity of Solar PV Projects Under Various Scheme as on 31.01.2014," <http://mnre.gov.in/file-manager/UserFiles/State-wise-Installed-Capacity-of-Solar-PV-Projects-under-various-Scheme.pdf> (accessed September 4, 2014).

WIND INSTALLED CAPACITY LEADERS

(as of January 2014)**

Tamil Nadu.....	7,270 MW
Maharashtra.....	4,096 MW
Gujarat	3,454 MW
Rajasthan.....	2,785 MW
Karnataka	2,318 MW



** Government of India, Ministry of New and Renewable Energy, "Annual Report 2013-2014," p. 26, <http://mnre.gov.in/file-manager/annual-report/2013-2014/EN/power-renewable.html> (accessed September 4, 2014).



Spotlighting specific clean energy projects shows the positive economic impact of solar and wind energy. **Local communities are key beneficiaries of employment from wind power projects** during the project's operations and maintenance phase. For example, out of a total of 438 FTE jobs created by the Gamesa-Renew Power 85 MW wind power project in Maharashtra, 20 percent of the jobs were generated for local residents in semiskilled and unskilled roles. Kiran Energy's 20 MW solar power plant in Rajasthan demonstrates the huge employment potential of solar power as well.

Additionally, **rooftop solar PV presents a viable alternative to diesel backup power for companies and generates local skilled employment**. Hero MotoCorp, the world's largest motorcycle manufacturer, has already installed an 80 kilowatt rooftop PV project in Haryana, and is looking to add solar PV to other manufacturing facilities.

POLICY AND MARKET SUPPORT CATALYZE CLEAN ENERGY FINANCING

Clean energy development is vital to economic growth in India. Securing affordable financing for clean energy projects remains a chief barrier in scaling renewable energy in India. While the Solar Mission and the forthcoming Wind Mission still face significant long-term financial commitment hurdles, India has already made important strides to attract new domestic and international investors into the market and generate local jobs.

Coupled with successful state-level policies in Gujarat and Rajasthan, the National Solar Mission has been pivotal in making the solar market successful. Key policy instruments (e.g., feed-in tariffs [FiTs], accelerated depreciation [AD], and viability gap funding [VGF]) have been deployed at the

state and national levels. These instruments have been vital to the rapid scale-up achieved by this industry so far and are now ready for adoption more broadly. However, despite increased familiarity and experience from Phase 1, many domestic banks continue to perceive significant risks in solar investments, in part due to information gaps and policy limits, such as sectoral lending limits.

Designing strong policies and programs that attract investment is also essential to scale wind power to reach its staggering potential of 100 GW, breathing new life into India's wind energy market. Fluctuating market investment driven by policy changes—including a recent rollback and then reintroduction of key fiscal incentives such as AD and generation-based incentives—underscores that a stable policy regime is crucial to realizing the country's enormous wind energy potential.

Domestic banks will need to increase loans to renewable energy projects to keep up with financing demand as the market scales up. The Ministry of Finance, Indian Renewable Energy Development Agency (IREDA), National Clean Energy Fund, state governments and domestic banks could **increase domestic lending by piloting both green bank and green bond systems** for solar energy and other clean energy sources. By providing low-cost financing for greater clean energy access and development, these financing mechanisms would help inject new liquidity, reduce the cost of capital, and create revolving funds for future projects.

RPOs and accompanying RECs are currently ineffective because of minimal compliance. In the absence of a well-functioning REC market, the solar industry is missing a key opportunity to attract additional investors. The Central Electricity Regulatory Commission (CERC) must work with MNRE, state regulators, and utilities to **enforce RPO mandates and nurture the REC market**.

CONCLUSION

As India looks ahead to addressing the pressing issues of meeting rising energy demand, increasing energy access, providing livelihoods for a growing population all while addressing the crisis of climate change, supporting increased clean energy must be a top priority for the new Modi government. Demonstrating the huge jobs potential and economic impact makes a compelling case for creating more policy support for the country's solar and wind energy markets. With a lack of affordable and accessible financing hampering these markets during this critical scaling up phase, innovative financing instruments and policies can break through to support market growth. With strong leadership, India can support and enable a needed resurgence in the renewable energy sector to sustainably power its future and help mitigate climate change's worst impacts.

RECOMMENDATIONS TO SCALE CLEAN ENERGY IN INDIA

The overall key recommendations from NRDC and CEEW's analysis are as follows:

- **Boost Financing:** To inject new liquidity and reduce the cost of capital, the Indian government should develop innovative financing solutions, such as green banks, green bonds, and infrastructure debt funds for renewable energy. The government must diligently enforce Renewables Purchase Obligations (RPOs) and support further development of the Renewable Energy Certificate (REC) market to send clear market signals.
- **Report Jobs Data:** Given the importance of employment in the Indian market, increasing the transparency and information about the number of jobs created in the renewable energy sector would strengthen public support and lender confidence in clean energy.
- **Timely Policy Implementation:** Policy delays and unpredictable shifts, such as wind energy's accelerated depreciation policies and long delays in solar policies, have recently slowed solar and wind market growth. Both national and state programs must continue to increase market momentum through timely program implementation, with predictable timelines for guidelines, auctions, and payments.

For more information and to download these reports, please visit:
www.nrdc.org/international/india/renewable-energy-jobs.asp



Reenergizing India's Solar Energy Market Through Financing

www.nrdc.org/international/india/files/renewable-energy-solar-financing-report.pdf



Creating Green Jobs: Employment Created by Kiran Energy's 20 Megawatt Solar Plant in Rajasthan, India

www.nrdc.org/international/india/files/renewable-energy-solar-jobs-kiran-IP.pdf



A Second Wind for India's Energy Market: Financing Mechanisms to Support India's National Wind Mission

www.nrdc.org/international/india/files/renewable-energy-wind-financing-IP.pdf



Making Use of the Roof: Employment Generation from Hero MotoCorp's 80 kW Rooftop Solar Project in Haryana India

www.nrdc.org/international/india/files/renewable-energy-solar-jobs-hero-IP.pdf



Solar Power Jobs: Exploring the Employment Potential in India's Grid-Connected Solar Market

www.nrdc.org/international/india/files/renewable-energy-solar-jobs-report.pdf



Creating Green Jobs: Employment Generation from Wind Energy in India

www.nrdc.org/international/india/files/renewable-energy-wind-jobs-IP.pdf



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