Ministry of Foreign Affairs

Indian Renewable Energy Market Opportunity Assessment - executive summary

Commissioned by the Netherlands Enterprise Agency

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Indian Renewable Energy Market Opportunity

Solar, Biomass and Hydrogen

Executive Summary

For Netherlands Business Support Office &
Netherlands Embassy, New Delhi

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February 2021

Indian Renewable Energy Market Opportunity

The renewable energy sector in India is growing rapidly. The Netherlands Embassy in New Delhi commissioned a study to map the opportunities in this sector for Dutch companies. The study specifically focused on the areas of solar power, biomass and hydrogen. The key findings of this study are presented in this Executive Summary.

Indian renewable energy market

- Indian Renewable Energy (RE) market has an installed capacity of 91 GW as of December 2020.
- India has the fifth largest RE installed capacity in the world.
- It has been growing at a CAGR of over 15 percent over the past four years, adding 9 to 11 GW every year.
- The Indian RE market has attracted investment of EUR 35 billion over the past 6 years. This is set to grow two-fold with growth in demand for RE.
- The Indian government has set a target of 450 GW of RE capacity by 2030 to meet its Conference of Parties (CoP) and sustainability commitments.
- The Indian government has taken several market-driving measures to support the growth of RE such as setting up large RE parks, centralized procurement and payment security mechanism.
- Indian policy makers have also created an enabling eco-system with measures such as development of green corridors, exemption on inter-state transmission charges for RE and enablement of trading of green electricity.
- Private enterprises are looking to invest in both new technologies (such as hybrid and storage) and in new advancements in established RE technologies (such as solar and wind).

Figure 1: Renewable energy installed capacity (GW), FY17 — FY20

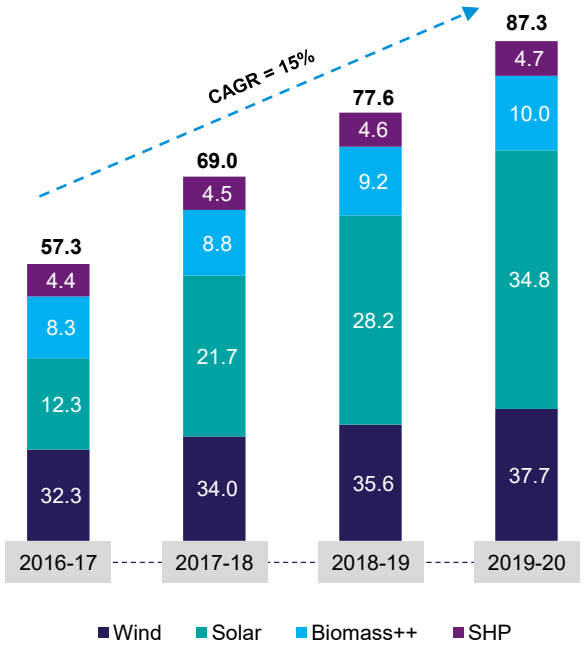
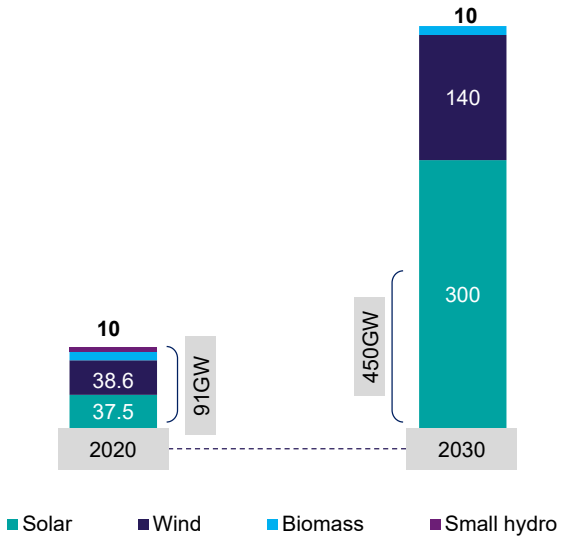


Figure 2: India's 2030 RE target



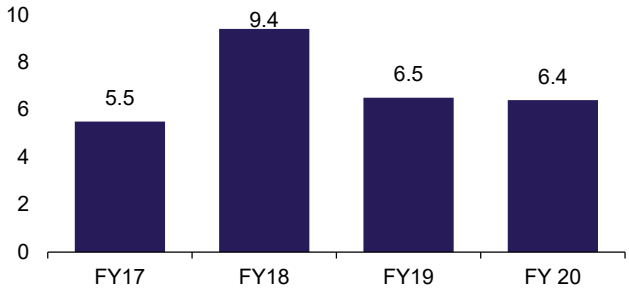
Solar sector

Potential and capacity addition

— India has a potential to set up nearly 750 GWp of solar power based on land availability.

— The installed solar capacity has increased from 3.75 GW in March-2015 to 37.5 GW as of Dec-2020, which is a ten-fold increase in less than six years.

Figure 3: Solar annual capacity addition (GW), FY17 — FY20



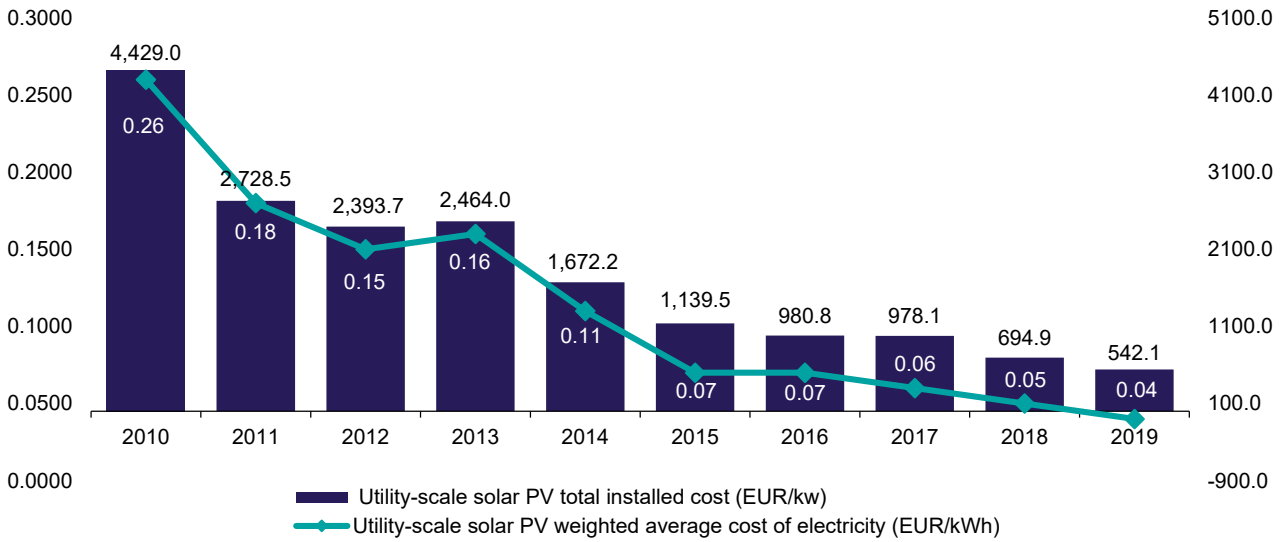
Investment and growth

— The sector has received ample investor interest with a total foreign direct investment of nearly EUR 8.5 billion from April 2000 to September 2020.

— The market is expected to grow at 12 to 18 GW annually in the next few years attracting investments of EUR6 billion to EUR9 billion per year

— Solar tariffs in competitive bids have fallen to INR 2/kWh (2 cents/kWh) in Nov-2020.

Figure 4: Solar power cost trend in India, 2010 — 2019



Government support

— The Indian government has supported solar development by constantly calling for bids, supporting development through establishment of solar parks and developing enabling regulations for grid integration and dispatch.

— The government is supporting the domestic solar manufacturing sector to become self-reliant. In this regard, the basic custom duty has been increased for some products used in the solar value chain to support the efforts of domestic manufacturers.

— In the latest federal budget, the government has set aside INR 10 billion (EUR 114 million) to support the growth of SECI (Solar Energy Corporation of India), the central procurement agency.

— The procurement agencies are exploring several business models such as thermal blending, round-the-clock, hybrid , storage etc.

— Several states have also developed policies with incentives and exemptions to boost the generation of solar in their energy mix.

Key opportunities

— Opportunities for collaboration are present across the entire solar value chain and companies are specifically interested in areas such as new and efficient manufacturing technologies, integrated PV structures, EPC and O&M solutions, digital operations.

— While currently the majority of the power is sold to utilities under long terms PPA, the corporate PPA market has been opening up driven by sustainability and cost considerations and is likely to see growing traction in future. Prospects differ from state to state based on regulatory and implementation environment.

— Solar rooftop is also poised to takeoff with adequate government support and the current capacity in the country is around 5.6 GW.

Waste to energy sector

— India has a potential to generate 5.7 GW of electricity from waste, the current installed capacity is 317 MW.

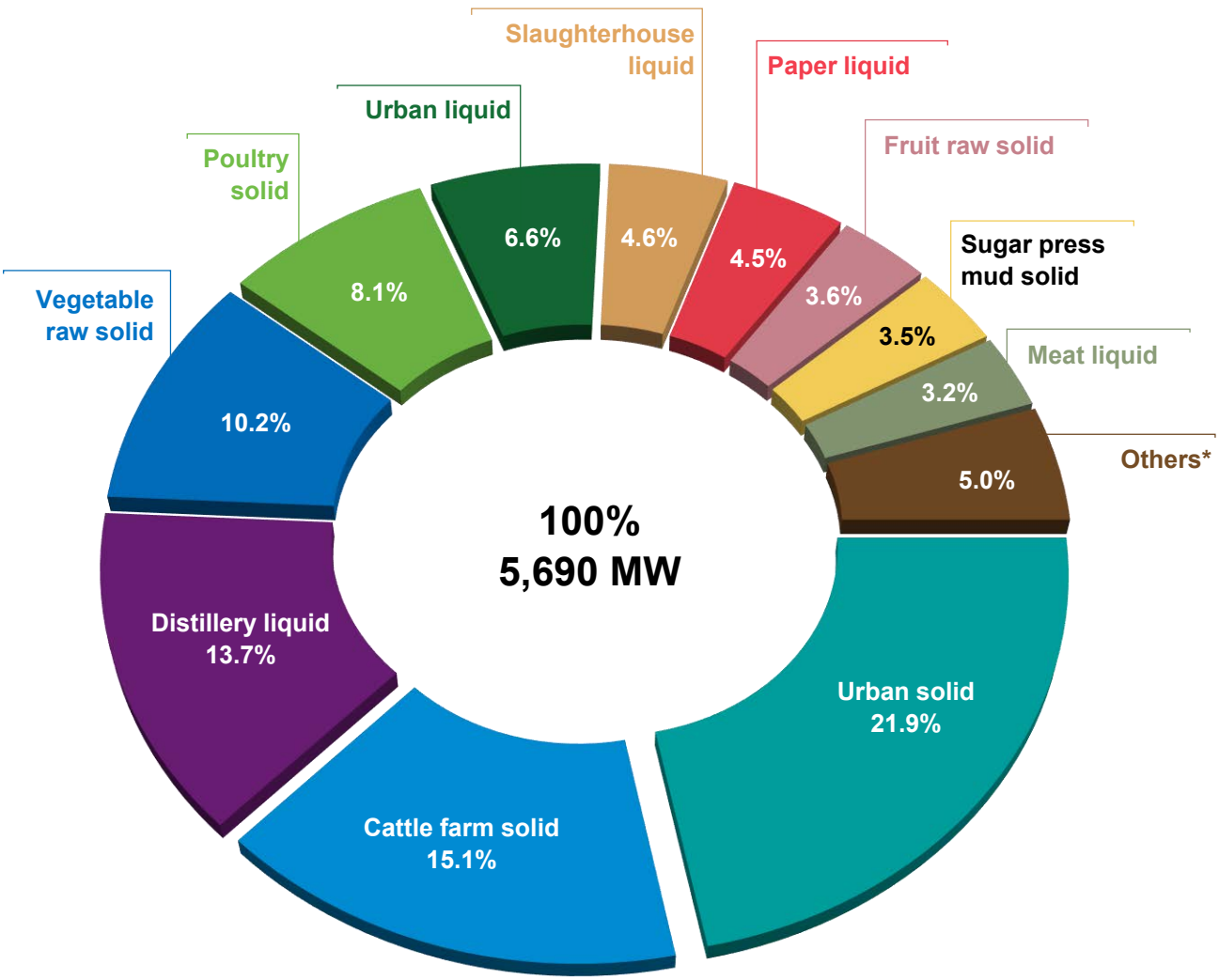
— Challenges exist in collection, segregation and conversion technologies.

— Incineration is the most widely used technology, pilots are being deployed for pyrolysis and gasification technologies.

— Several municipalities are exploring waste to energy solutions of small size to address the waste generation problem.

— Opportunities exist for players across the value chain from collection to energy generation.

Figure 5: Energy potential of India through urban and industrial waste (%), as of December 2019



Biomass sector

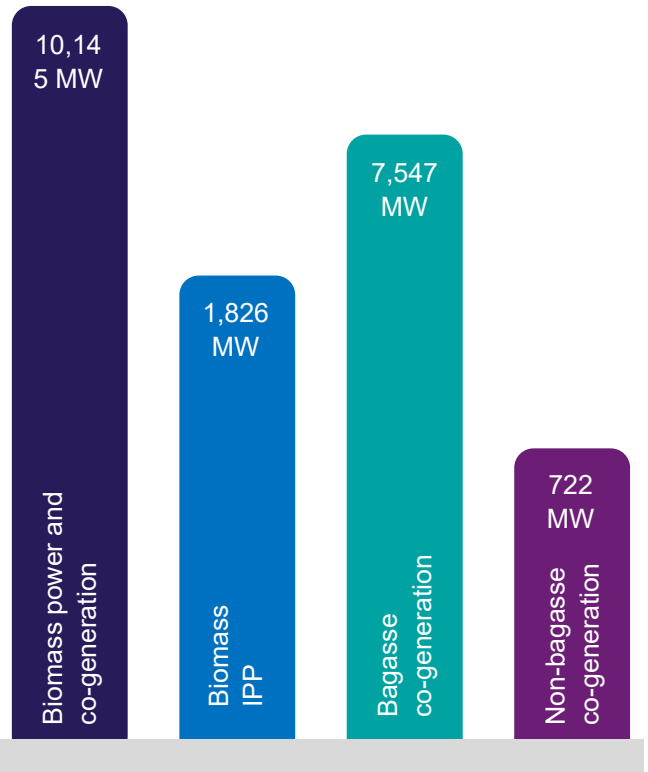
— The agriculture sector contributes nearly 17percent to the Indian economy and employs nearly 50 percent of the Indian work force making biomass one of the most important sources of energy for India.

— With a potential of over 25 GW of power generation, nearly 10 GW of capacity has been installed as of Dec-2020.

— The government has initiated a number of programmes for the promotion of efficient technologies.

— Torrefaction technology is gaining traction with several thermal power plants using biomass pellets in their operations.

— Cost-effective technologies around palletization and gasification which also address the stubble burning problem would be attractive to Indian companies as areas for future collaboration.



Hydrogen sector

— India is to launch Hydrogen Energy Mission for generating green hydrogen in this financial year.

— Demand for hydrogen could increase from 6 MT annually to 28 MT per year by 2050.

— India is targeting hydrogen blending of up to 15 percent in CNG.

— End use industries such as methanol production, ammonia manufacturing is also seeing an increasing demand for green hydrogen.

— Several energy companies (oil marketing companies, conventional power generators, RE developers) are looking at exploring partnerships across the hydrogen value chain.

What you can expect in the full report

The full report includes detailed information on the opportunities in the renewable energy sector in India, such as:

— Overview of Indian power sector with focus on renewable energy, including the main decision makers and policy developments, and current state of affair in different states.

— Key drivers shaping the renewable energy market, as well as challenges in the sector

— Current status, government support, business models, opportunities and outlook for four sub-sectors: solar, biomass, waste to energy and hydrogen.

— Analysis of states supportive to investments in renewable energy.

— Potential opportunities and collaboration experience along with brief profile of key RE players

The full report is available at the Netherlands Enterprise Agency/RVO.

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This publication was commissioned by the ministry of Foreign Affairs.

Publicationnumber: RVO-030-2021/RP-INT

NL Enterprise Agency is a department of the Dutch ministry of Economic Affairs and Climate Policy that implements government policy for Agricultural, sustainability, innovation, and international business and cooperation. NL Enterprise Agency is the contact point for businesses, educational institutions and government bodies for information and advice, financing, networking and regulatory matters.

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