

**PRIORITIZING RENEWABLE ENERGY IN INDIA: PROGRESS AND
PROSPECTS**

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ABSTRACT

India's transition towards Renewable Energy Sector holds within itself, the path towards sustainable economic development. The ambition of the Indian Government towards energy sector reforms has attracted much international appreciation as the nation continues to reinforce its commitment towards adopting cleaner forms of energy. Statistics reveal that the renewable energy generation capacity of the country has increased by 226% in the past five years. This determination has complemented the country's position in the global fight against climate change. By becoming the signatory to Paris Agreement 2015 and by reinforcing its commitment towards renewable energy in the UN Climate Action Summit 2019, India has presented itself as a hub of renewable energy investments. This transition holds within its womb, the capacity to provide affordable, sustainable & adequate energy. The presence of affordable energy supply is the very foundation of development – social, economic and technological. However, for the dream of renewables to grow, there ought to be a strong legal and regulatory framework. This paper seeks to analyze the regulatory and legal footing of India's energy policy. A comprehensive study will be conducted to see whether the government has laid down parallel domestic legislations and regulations to back their enormous ambitions. Looking ahead of renewables, the nation has not abandoned nuclear energy as a future prospect. The paper will seek to answer as to how the road towards renewables is being laid by the Indian Government and whether these steps point towards India's reduced dependence on fossil fuels? The present state of nuclear energy generation will also be studied in the light of India's growing demand for energy. Thereafter a comparative enquiry between India & Japan will be conducted in the light of this transition towards renewable energy. The main aim of the paper will be to assess what India's outlook towards its Energy Sector truly is.

Keywords: *Renewable Energy, Energy Efficiency, Sustainable Development, Energy Demand, Energy Capacity, Solar Energy, Wind Energy.*

INTRODUCTION

Energy production and energy consumption are the underlying causes of globalization. Despite multiple international conventions and domestic legislations laid down for the protection of environment against the adversities of economic development, environment degradation continues to happen. Constant push towards modernization and industrialization has led to over-exploitation of resources, population boom, heightened pollution levels and depletion of fossil fuels. The harmonization of environment concerns with development activities was first defined in the Brundtland Report of 1987 and thereafter it became an integral part of the environment laws of nations. Conventions were entered into, targets and goals were set for reduction in emissions not once but multiple times. Yet climate change remains to be a priority agenda, globally.

Today, a wave of green energy is riding across the globe. The Paris Accord 2015 brought a distinct change in the international environment law that no other environment convention could possibly implement. The Agreement of 2015 encouraged the nations towards setting up their own Nationally determined contributions (NDCs) in furtherance of their environment protection strategy. Out of the one hundred and ninety Parties who ratified the Paris Agreement, a hundred and eighty eight have presented their NDCs. Out of this number, one hundred and seventy nations mention renewables as their agenda and a hundred and thirty four have expressly mentioned quantified renewable energy targets.¹ This initiative has far reaching consequences than what meets the eye. The targets or NDCs set by the countries can lead to a worldwide renewable energy revolution. With the rising global energy demand, this can prove to be a major milestone in the journey towards sustainable development.

Let us understand the policy initiatives and measures taken by India in furtherance of fulfilling the goals set under the NDCs. This is important because the action towards climate change requires a sincere effort on not just the ground level but in every level of implementation. The

¹ IRENA (2019), *Renewable Energy and Climate Pledges: Five Years After the Paris Agreement*, International Renewable Energy Agency, Abu Dhabi

carbon footprint as high as India's will require harmonisation of interests and collective effort of all state agencies, economic sectors and individual households.

PART I

ROAD TOWARDS RENEWABLE ENERGY

Renewable Energy Sector holds within itself a potential of implementing both economic development and environment protection in a concrete manner. India is presently witnessing what has been claimed to be 'the transition towards a renewable energy sector'. The government of India is making commitments and goals in furtherance of renewable energy development. This paper will dwell upon the recent initiatives and measures taken by the government for making renewable energy as part of the energy sector in India. According to the data released by the Ministry of New and Renewable Energy India, the renewable energy installed capacity of the country has been increased to 226% in the last five years. The Year End Review² released by the ministry revealed that the present installed capacity of Renewable Energy amounts to a total of 84GW that is inclusive of solar, wind, bio energy, hydro and wind & Solar Hybrid. India has set to achieve the target of 175 GW of renewable energy capacity in the coming years³.

As far as the international commitment towards greener forms of energy is concerned, there are numerous conventions that emphasize on climate change and sustainable development. However, the most recent of all is the Paris Agreement of 2015.

I. INTERNATIONAL COMMITMENTS:

India expressed its commitment towards greener forms of energy in the Paris Agreement of 2015. It was adopted by a total of 196 countries.⁴ The treaty essentially emphasises and reaffirms the global fight against climate change and sustainable development whilst promoting environment integrity. It also focuses on the targets of nations to reduce Greenhouse gases. One unique feature of the Paris Agreement is the Nationally Determined Goals (NDCs). All the member states are obligated to prepare and communicate the NDCs on an international front. The document pertaining to India's Intended NDCs submitted to the UN Framework Convention

² Ministry of New and Renewable Energy (2020,) *Renewable Energy Sector Makes rapid Strides in 2019*, PIB, India

³ United Nations, *India plans to produce 175 GW of renewable energy by 2022, Partnerships for SDGs Global Registry* (Jan 02, 2021 10:04AM) <https://sustainabledevelopment.un.org/partnership/?p=34566>

⁴ UNFCCC, *The Paris Agreement*, (Jan 02, 2021 11:04AM) <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

on Climate Change speaks of adopting cleaner forms of energy and mentions strict goals that are to be achieved which include *inter alia* Reduction in GDP emissions by 35% by 2030, Increasing the share of electric power installed capacity around 40% cumulative from non-fossil-fuel-based energy resources by 2030⁵. As part of its renewable energy goals, India has entered into International Solar Alliance (ISA) whose main aim is to create a global market system to avail the benefits of solar power and promote green energy. The alliance focuses on helping member states with funding issues, risk assessment and mitigation strategies and procurement of technology⁶. The Indian government is also working in collaboration with UN agencies to facilitate the implementation of green energy. The states of Assam and Odisha are working in collaboration with UNDP and the International Fund for Agricultural Development (IFAD) on renewable energy interventions. The United Nations Industrial Development Organization (UNIDO) and the UNICEF are working very closely with India on implementing solar energy in primary health centres all over the country.⁷ As far as multilateral agreements are concerned India has entered into multiple agreements with powerful nations for the promotion of Renewable Energy. The country on 6th of March 2019 entered into cooperation agreement with Denmark with regard to offshore wind Energy. The national Institutes of Solar Energy of India and France have signed an MOU in March 2018. SECI & CEA entered into two MOUs. There is an implementation agreement between Germany and Indian Ministry of New and Renewable Energy.⁸

II. MOVE TOWARDS GREEN ENERGY:

Going back a little in time from the Paris Agreement, the 11th Five Year plan had already incorporated the commitment of increasing access to cleaner and greener forms of energy and exploiting the solar and wind energy capacity of India to its fullest.⁹ Since then, the nation has

⁵ Krishan Dhawan, *Staying On Track From Paris: Meeting India's Climate & Energy Goals* Krishan Dhawan, Shakti Sustainable energy foundation, (Dec 01, 2020 12:34PM) https://shaktifoundation.in/wp-content/uploads/2017/02/Monograph_Shakti_FINAL.pdf

⁶ Ministry of New & Renewable Energy, *International Solar Alliance*, <https://mnre.gov.in/isa/>

⁷ UN, *Energy, Environment And Resilience, United Nations in India*, <https://in.one.un.org/un-priority-areas-in-india/energy-environment-and-resilience/>

⁸ Lok Sabha, *R & D in the field of Renewable Energy Unstarred Question No 2429, Ministry of New and Renewable Energy, GOI* (Dec 30, 2020 4:44PM) <http://164.100.24.220/loksabhaquestions/annex/173/AU2429.pdf>

⁹ *Planning Commission of India, Eleventh Five Year Plan (2007–2012), Vol I Inclusive Growth Oxford University Press, 2008, page 207*

only moved forward in its quest for generation of green energy. The country has started experiencing some noticeable and large-scale renewable energy investments. A close look at the estimates reveal that the Solar power capacity of the country has increased by more than 11 times in the last five years from 2.6 GW to 30 GW.¹⁰ Wind is the second abundant renewable source available for India after solar power. The statistics of the ministry of renewable energy state that India has the fourth highest wind installed capacity in the world measuring 35.6 GW till 2019.¹¹ The speed at which India is working in the field of renewable energy is quite commendable. It shows that there is a high degree of inclination towards greener and cleaner energy forms. The government has passed various policy measures, schemes and incentives to promote the acceptance of renewable energy power generation at grass root level. Existing laws have also been amended to incorporate this expansion. Let us understand the same in detail.

III. IMPORTANCE OF ENERGY SECTOR FOR INDIA:

The energy sector has gained importance more recently than ever. Why so? Because it is a fuel for growing economies. The one thing that makes the economy running is energy. Mere building of factories, hospitals, cities and homes do not suffice development unless until it is given perpetuality. This can only be achieved when there is an easily accessible and affordable supply of energy is inevitable. The energy sector powers the transportation, construction, Information Technology as well as manufacturing which is why it directly impacts the economy of a country. The advancement in energy sector holds a greater significance for India. According to the United Nations, India will singlehandedly contribute 1/4th of the projected rise in global energy demand by 2040.¹² There is no doubt about the rising energy demands of the Indian nation. The primary objective of renewable energy reforms is to make it easily accessible and affordable to those are deprived of basic energy access. The energy demand in India is set to achieve a contribution of 30 per cent to global energy demand growth to 2035.¹³ The targets that are being set by the government of India are both long term and short term. The statistics provided by the Ministry of New & Renewable energy state that till 29th February 2020, the total installed

¹⁰ Ministry of New & Renewable Energy, Solar Energy, Government of India, <https://mnre.gov.in/solar/current-status/>

¹¹ Ministry of New & Renewable Energy, Solar Energy, Government of India, <https://mnre.gov.in/wind/current-status/>

¹² UN, Energy: Clean, Affordable And Efficient, United Nations in India, <https://in.one.un.org/unibf/energy/>

¹³ DFAT, India Economic Strategy To 2035, AU (Dec 11, 2020 3:32 PM)
<https://www.dfat.gov.au/geo/india/ies/pdf/chapter-7.pdf>

renewable energy capacity in the country was 132.45 GW.¹⁴ The Government has also set a target to install 175 GW of renewable energy capacity in the country by the year 2022. The renewable energy mix is to consist of 100 GW from solar, 60 GW from wind, 10 GW from biomass and 5 GW from small hydro power. Moreover, 21% of the total electricity demand of the country is to be met by renewable energy sources in the year 2021-22 and 24% by 2026-27.¹⁵ As far as the cost of renewable energy is concerned the expert committee of Niti Ayog states that the cost of Renewable Energy is very likely to decrease in the coming years.¹⁶ Until then, the government of India has resorted to various policy measures for easy establishment of renewable energy projects. These measures have a three fold impact, *firstly*, awareness and promotion of renewable energy that induces encouragement in the sector and *secondly*, the fulfillment of the goal of 175GW of RE capacity in the country and *thirdly*, to reduce the costs of the energy generated from renewable energy sources. Beyond this, there is a latent object also- to increase investments in the economy. These measures hold vital significance for India as they compliment its International Commitments towards the environment and act as a catalyst for economic growth. Hence, it is inevitable that these policy measures are analysed in detail.

IV. PROMOTIONAL MEASURES BY THE GOVERNMENT OF INDIA

In order to support its ambition of giving renewable energy a substantial share in the energy sector, the state has had considerable involvement in formulating favorable environment for the flourishing of the renewable energy sector. The government of India has formulated multiple policies, incentives, schemes and measures to encourage the use of renewable energy. Let us understand them one by one. The measures by the state enumerated as under are strictly according to the data given by the government of India. The data pertains to the answers given by the minister of New and Renewable energy in the Lok Sabha and the same has been published as a document of the ministry. Before we begin, it is important for us to understand that we need to analyse the same step by step in a particular order. This will enable us to appreciate the data in an efficient manner. We have discussed in the previous part of the paper that the government has

¹⁴ Lok Sabha, Renewable Energy Production Target Unstarred Question No 4144, Ministry of New and Renewable Energy, GOI (Dec 31, 2020 4:40PM) <http://164.100.24.220/loksabhaquestions/annex/173/AU4144.pdf>

¹⁵ Lok Sabha, Electricity Demand met by Renewable Energy Sources Unstarred Question No 785, Ministry of New and Renewable Energy, GOI <http://164.100.24.220/loksabhaquestions/annex/173/AU784.pdf>

¹⁶ Niti Ayog (2015), Report of Expert Group on 175GW of Renewable by 2022, (Jan 1, 2020 3:00 PM) <https://niti.gov.in/writereaddata/files/175-GW-Renewable-Energy.pdf>

set both short term and long terms targets to increase the share of renewable energy in the energy sector of India. After the setting of targets, the next thing that needs to be taken care of is the funding and finance.

Funding and Incentives: The state has initiated various means for gathering of funds to encourage investment and fulfil the financial requirements in order to achieve the goal of 175GW. One of the major steps towards the same is the Partial Risk Guarantee Fund for Energy Efficiency. It has been launched by the Bureau of Energy Efficiency wherein a committee consisting of major banks and financial institutions of the country¹⁷ has been set up. This committee is entrusted with the task of providing loans to projects that are energy efficient. In return, the bureau has guaranteed for a cover of 50% of the loan or ₹10 crore per project. Another major step taken by the government is the establishment of IREDA who is responsible for promoting, developing and extending financial assistance for projects relating to new and renewable sources of energy and energy efficiency/conservation.¹⁸ If we look at the FDI inflow the data released by the Department for Promotion of Industry and Internal Trade the FDI equity inflow in renewable energy sector in the last five years was (in US\$ Million) 4826.65¹⁹ Renewable energy is already covered under priority sector lending. As per present guidelines of Reserve Bank of India loans up to a limit of Rs. 15 crore for renewable energy projects are covered under priority sector lending and this limit is Rs. 10 lakh for individual households.²⁰ Easy access to loans and investment becomes a major catalyst in encouraging projects. Facilitation of projects by the government builds up a faith in the system. It is the first step towards achievement of the NDCs.

Other incentives introduced: The government in order to promote and further encourage the use of renewable energy has introduced new mechanisms in the market. One such instance is the Renewable Purchase Obligation(RPO). It is a mechanism by which the State Electricity Regulatory Commissions are obligated to purchase a certain percentage of power from

¹⁷ Union Bank of India, State Bank of India, Punjab National Bank, YES Bank, Indian Overseas Bank, Central Bank Of India, HDFC Bank, NABARD, Power Finance Corporation and IIFL

¹⁸ Lok Sabha, Investment In Renewable Energy Sector Unstarred Question No 785, Ministry of New and Renewable Energy, GOI (Jan 1, 2020 12:30PM) <http://164.100.24.220/loksabhaquestions/annex/173/AU3030.pdf>

¹⁹ Lok Sabha, Foreign Investment In Renewable Energy Sector Unstarred Question No 3181, Ministry of New & Renewable Energy (Jan 1, 2020 12:30 PM) <http://164.100.24.220/loksabhaquestions/annex/171/AU3181.pdf>

²⁰ Lok Sabha, Renewable Energy Capacity In Rural Areas Sector Unstarred Question No 3175, Ministry of New & Renewable Energy (Jan 1, 2020 3:20 PM) <http://164.100.24.220/loksabhaquestions/annex/171/AU3175.pdf>

renewable energy sources. It is a means to create demand for renewable energy. Renewable Energy Certificates(REC) on the other hand are aimed at addressing the mismatch of renewable energy resources in the States and their RPO requirements. Obligated entities (which includes DISCOMs, Open Access Consumers and Captive power producers) can fulfil their RPOs by purchasing RECs.²¹ The Pat scheme Perform Achieve and Trade is another innovative policy measure taken by the government. It was launched under The National Mission for Enhanced Energy Efficiency. The energy Intensive Industries²² called as Designated Consumers are given specific targets for energy savings for a period of three years. The non-compliance to that target will attract penalty not exceeding rupees 10 lakhs under Clause 1A, section 26 of the Energy Conservation Act 2000.²³ This will ensure strict adherence to energy efficiency.

Building the infrastructure: The government has made some serious efforts in building the infrastructure for renewable energy. The government has commenced the Development of Ultra Mega Renewable Energy Power Parks- a major step undertaken to increase capacity building of Renewable energy. The country has recently witnessed an increase in solar energy farms. The scheme advocates for easy land access to project developer and smooth development of transmission infrastructure. Public Sector Undertakings such as NTPC & NHPC have proposed to set up mega renewable energy parks of around 42,000 MW in various states.²⁴ The ministry has undertaken to provide a Central Financial Assistance (CFA) of up to Rs. 20.00 lakh per MW or 30% of the project cost.²⁵ The solar parks are developed in collaboration with the State Governments and their agencies, CPSUs, and private entrepreneurs.²⁶ As far as the wind energy and wind solar hybrid parks are concerned, the scheme titled “Development of Wind Parks/ Wind-Solar Hybrid Park” was codified by the government wherein 11 GW wind power and 1.44 GW wind-solar hybrid were awarded through competitive bidding process.²⁷ Another important

²¹ABPS Infrastructure Advisory Private Limited (2009), *Report On Development of Conceptual Framework For Renewable Energy Certificate Mechanism for India Ministry of New and Renewable Energy*, (Dec 15, 2020 2:03PM) <https://mnre.gov.in/img/documents/uploads/3538e292967048c8b78f6db30bc2720e.pdf>

²² *Energy Conservation Act 2001 Schedule List Of Energy Intensive Industries And Other Establishments*

²³ Shakti Sustainable energy foundation, *The PAT Scheme: Analysis, Insights and Way Forward*, (2014) (Dec 11, 2020 12:34PM) <https://shaktifoundation.in/wp-content/uploads/2014/02/The-PAT-scheme-Analysis-Insights-and-Way-Forward1.pdf>

²⁴ Ministry of New and Renewable Energy (2020) *Renewable Energy Sector Makes Rapid Strides in 2019*, PIB, India

²⁵ Ministry of New & Renewable Energy, *Schemes*, (Dec 20, 2020 4:00PM) <https://mnre.gov.in/solar/schemes>

²⁶ *supra*

²⁷ Ministry of New & Renewable Energy, *Concept Note for development of Wind Par/Wind-Solar Hybrid Park*, No. 238/75/2017-Wind, (Dec 20, 2020 3:12PM) <https://solarquarter.com/wp-content/uploads/2020/11/concept-note.pdf>

scheme launched was the Grid-Connected Rooftop Solar (RTS) Programme. The target of renewable powered that is to be powered by solar energy is 100GW by 2022 out of which 40,000 MW is to be achieved through Rooftop Solar (RTS) power plants.²⁸ Rooftop solar installations unlike the huge power plants be installed on the roofs of buildings. They can be installed in both commercial and residential buildings and have the benefit of providing alternative source of energy. They can provide energy to areas that are not yet connected to the grid such as remote locations and areas where the terrain makes it difficult to set up power stations and lay power line.²⁹ The programme will be solely implemented through DISCOMs.³⁰ Presently, the Government is implementing Phase-3 of the Off-Grid Solar PV Applications Programme for setting up of Solar Street Lights, Solar Lamps/Lanterns and Solar Power Packs and Solar Home Lighting System.³¹ Herein, we can notice that proper initiatives are being taken to increase the installed capacity of renewable energy in India. This is also a progress towards India's NDCs.

State and Rural Area Participation: In the pursuit towards renewable energy, the states and rural areas have also been given due importance. State Nodal Agencies (SNAs) are administrative agencies that have been set up in States and Union Territories for the promotion of renewable energy in the country. They are primarily responsible for implementation of various renewable energy programmes in the country which includes identification of beneficiaries and project sites, facilitation for obtaining various statutory clearances required, technical supervision and regular monitoring of projects being implemented, submission of project completion reports etc.³² As far as installation of RE capacity in rural areas is concerned, various schemes have been launched by the government. Under the Atal Joti Yojna (AJAY), over 1.97 lakh Solar LED street lights have been installed in rural areas of Uttar Pradesh, Assam, Bihar, Odisha, Jharkhand, Madhya Pradesh, Uttarakhand, Rajasthan and Gujarat³³ and over 1.09 crore LED street lights

²⁸ Ministry of New & Renewable Energy, *Grid Connected Solar Rooftop Programme In India, EU – India Technical Cooperation Project* (Nov 17, 2020 4:00PM) <https://solarrooftop.gov.in/notification/Notification-24012017.pdf>

²⁹ Ministry of New & Renewable Energy, *Schemes*, (Dec 20, 2020 4:00PM) <https://mnre.gov.in/solar/schemes>

³⁰ Ministry of New & Renewable Energy, *Office Memorandum (2019), Guidelines on implementation of Phase – II of Grid Connected Rooftop Solar Programme*, (Nov 28, 2020 4:21PM) <https://mnre.gov.in/img/documents/uploads/7ccd3b4b3bb94a51af516e2ee4fdede3.pdf>

³¹ Ministry of New & Renewable Energy, *Off-Grid*, (Dec 24, 2020 12:32PM) <https://mnre.gov.in/solar/solar-offgrid#:~:text=Under%20Phase%20DIII%20of%20the,Scheme%20of%20Ministry%20of%20Power.>

³² Lok Sabha, *Promotion Of Renewable Energy By SNAs Unstarred Question No 2981*, Ministry of New & Renewable Energy (Jan 1, 2020 12:30 PM) <http://164.100.24.220/loksabhaquestions/annex/171/AU2981.pdf>

³³ Ministry of Power, *Energy Efficiency Services Ltd., ATAL Yojna*, (Jan 5, 2020 12:30 PM) <https://www.eeslindia.org/ajay.html>

have been installed in Gram Panchayats.³⁴ More recently Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM) was launched in 2019 with the primary objective of establishing renewable energy plants in rural areas. The scheme provides for Installation of 10,000 MW of Grid Connected Renewable Energy Power Plants by farmers with a fixed capacity of 500MG to 2 GW on uncultivable land. The DISCOMs are then encouraged to purchase power for which they are given incentives. The Government of India and the states have promised to provide financial support up to 30% each of the cost of establishing solar Agriculture power pumps. The government also launched a specialised scheme for biogas named New National Biogas and Organic Manure Programme according to which clean cooking fuel for kitchens, lighting along with thermal and small power needs of farmers/dairy farmers, individual households are taken care of.³⁵ Inclusion of rural areas is integral for the transition towards RE sector. The majority of areas that are deprived of access to energy come under the rural areas of the country. The installation of solar power can ensure an uninterrupted and affordable supply of energy for daily needs of the population in rural area. Additionally, continuous supply of energy will lead to economic development and rise in living standards.

Major challenges & Redressal: The aforementioned data shows us that the government is moving towards renewable energy one step at a time whilst simultaneously ensuring that the whole nation works in harmony to attain the goals as specified in the NDCs. However, the energy sector is experiencing a huge transition. And it cannot be expected to have a smooth implementation. The government has faced multiple problems as well. The Report by the Central Electricity Authority published in August 2020 reveals a long list of solar and wind energy projects that are stuck or severely delayed due to various reasons such as land acquisition delay, COVID- 19, interstate transmission/evacuation infrastructure and financial closures.³⁶ But that's not all. Other problems such as hesitation on part of DISCOMs for towards the purchase of Renewable Energy Power and delay in payments by DISCOMs payment to Renewable energy generators. Further, there is delay in adoption of the tariff arrived at through competitive bidding

³⁴ Ministry of Power, Energy Efficiency Services Ltd., Street Lighting National Programme, (Jan 5, 2020 2:30 PM) <https://www.eeslindia.org/slmp.html>

³⁵ Ministry of New & Renewable Energy, New National Biogas and Organic Manure Programme (Jan 10, 2021 11:24AM) <https://biogas.mnre.gov.in/about-the-programmes>

³⁶ Report of under construction Renewable Energy Projects(2020), Central Electricity Authority (Ministry of Power), (Jan 10, 2021 11:24AM) <https://img.saurenergy.com/2020/08/underconstruction.pdf>

process by some of the State Electricity Regulatory Commissions are some of the problems faced by the renewable energy sector.³⁷

In order to address these issues, the state has resorted towards mitigative measures. For instance, the Inter State Transmission System (ISTS) charges have been waived off in order to reduce the cost of renewable energy generation, purchase of RPOs is mandatory and implementation of Green Energy Corridors project for setting up large scale transmission lines across the country that will ensure easy evacuation of renewable energy.³⁸ Going a step further, the government also introduced dispute Resolution Mechanism for wind/solar projects in case of any unforeseen issues that are likely to arise. The Ministry has also taken an effort to monitor the progress and implementation. It has devised means for physical verification by State implementing agency, Periodic inspection by the officials of Ministry of New and Renewable Energy as well as third party evaluation.³⁹

V. LEGAL FRAMEWORK:

As far as the legal regime for renewable energy is concerned, it consists of the Electricity Act 2003 and the National Tariff policy. Section 86(1)(e) of the Electricity Act 2003 confers duty on the State Commissions to promote cogeneration and generation of electricity from renewable energy sources. Further, by the virtue of powers under Section 3 of the in accordance with the provisions of the Electricity Act⁴⁰, the National Electricity Policy 2005 (NEP) and the Tariff Policy 2016 (Tariff Policy) were codified for the development of the power sector. The primary objective of formulating the policies were to ensure optimal utilisation of natural resources. Cause 5.12.1 for the National Electricity Policy advocates for the urgent need to promote electricity generated from Non-conventional sources of energy as they are the most environment friendly. The clause also states that the cost of energy can also be reduced by promoting competition within such projects. Under the National Tariff Policy (NTP) a target of 8% of total consumption of electricity is set to be from solar energy by March 2022. NTP also provides that in order to keep the tariff low, the States shall endeavour to procure power from renewable

³⁷ Lok Sabha, Problems Faced By Renewable Energy Sector Unstarred Question No 4221, Ministry of New & Renewable Energy (Jan 1, 2020 11:02AM) <http://164.100.24.220/loksabhaquestions/annex/171/AU4221.pdf>

³⁸ Lok Sabha, Development Of Renewable Energy Sources Unstarred Question No 872, Ministry of New & Renewable Energy (Jan 1, 2020 10:03 PM) <http://164.100.24.220/loksabhaquestions/annex/173/AU872.pdf>

³⁹ Lok Sabha, Exploration Of New And Renewable Energy Sources Unstarred Question No 4107, Ministry of New & Renewable Energy (Jan 1, 2020 8:00PM) <http://164.100.24.220/loksabhaquestions/annex/172/AU4107.pdf>

⁴⁰ The Electricity Act 2003, Section 3

energy sources through competitive bidding. The policy clearly states that state can only attain a maximum of 35% of installed capacity based on the tariff as determined by the state electricity commission.⁴¹

The data analysed above highlights the comprehensive framework laid down by the government of India for fulfilment of their renewable energy commitments. The government has moves very strategically in order to incorporate renewable energy share in India. A bird's eye view of the data analysed above reveals that the government of India has come a long way forward from setting of goals to putting them in action. Firstly it ensured enough funding and incentive availability for laying down the infrastructure. Further encouragement was done through Renewable Purchase Obligations and PAT (Perform Achieve and Trade) scheme. Thereafter, physical infrastructure was built by establishing renewable energy parks in collaboration with various public sector undertakings as well as state support. DISCOMs were also given a task of establishing rooftop solar programme.

The Legal framework for promoting competition in the sector has also been laid down via the competitive bidding process. *Secondly*, the state has also established ease of doing business for renewable energy projects by the waiver of Inter State Transmission System (ISTS) charges & also by exempting of renewable energy projects from Environment Impact Assessment. The notification of Ministry of Environment, Forest & Climate Change (MoEF) dated 30th June 2011 completely exempts Solar Thermal Power Projects from EIA. Further, Ministry Notification dated 7th July 2017 exempts projects of Solar Photo Voltaic (PV) Power Projects, Solar Thermal Power Plants and Development of Solar Parks from the purview of EIA. Even small hydro projects upto 25MW and wind power projects are exempted under the EIA regime⁴². These exemptions have been made by the ministry with a sole purpose of facilitating the establishment of renewable energy projects. It complements the government's policy of ease of doing business. *Thirdly*, A Monitoring Mechanism and Dispute Resolution Mechanism has also been set up to incorporate a follow up process to the policy implementation. Sufficient state and rural

⁴¹ National Tariff Policy 2016 (Dec 20 2020, 05:30PM) <https://aureuslaw.com/national-tariff-policy-2016/#:~:text=Subject%20to%20conditions%2C%20power%20generation,when%20the%20grid%20reaches%20th ere>

⁴² EIA Guidelines for Wind Power, Centre for Science and Environment, (Jan 01 2021, 04:54PM) https://shaktifoundation.in/wp-content/uploads/2017/10/EIA-Guidelines-Wind-Power_1.pdf

participation was also ensured by the government. The policy was not restricted to just cities. The states through State Nodal Agencies were entrusted with the task of ensuring ground root implementation. Despite occurrence of challenges and delays, the government was successful enough in laying down the legal and regulatory framework for renewable energy sector in India. Sufficient Capacity building has been done by the government in accordance with the targets set. The government has moved from one level to the other and has laid down a comprehensive regime at ground root level. The policy measures taken by the government have taken a concrete form as can be seen from the statistics discussed above. India has made renewable energy as its top priority. All the economic sectors have been included in the quest towards renewable energy. Agriculture activities are made part of the solar power programme, the major energy intensive industries such as Textile, Aluminium, Iron and Steel, Cement and Chemical industry are also made part of RPO obligations. The telecom sector was also involved in promotion of renewable energy by way of energy efficient equipment and Network Planning, deployment of energy efficient technologies and adoption of Renewable Energy Technology (RET)⁴³. All the major economic sectors are being integrated into the renewable energy policy. This way the installed capacity of renewable automatically increases. It means that there without any compromise on production of economic sectors the country is progressing towards reduction in carbon footprints. This is what we call sustainable development. India's renewable energy is practically incorporating the norms of sustainable development. This is the direct result of using greener and cleaners forms of energy.

PART 2

INDIA & JAPAN PROGRESS ON RENEWABLE ENERGY: COMPARATIVE ENQUIRY

The alliance between India and Japan continues to grow stronger in the light of 'Strategic and Global Partnership' that was entered into by the countries in the year 2006. Since then the nations have been holding annual summits together. The bilateral relations were gradually developed into Special Strategic and Global Partnership in 2014 strategic objectives and

⁴³ Lok Sabha, Use Of Renewable Energy Unstarred Question No 509, Ministry of New & Renewable Energy (Jan 2, 2020 12:32AM) <http://164.100.24.220/loksabhaquestions/annex/173/AU509.pdf>

achieving peace, prosperity and progress to realize a better future for the people of the two countries. On 16th of February 2011, the Comprehensive Economic Partnership Agreement (CEPA)⁴⁴ was signed between the two nations. The preamble of the agreement states and *recognises that the economic development, social development and environmental protection are interdependent and mutually reinforcing components of sustainable development and that the economic partnership can play an important role in promoting sustainable development*; the agreement *inter alia* advocated for enhancement of trade, competition and investment opportunities. Article 129 of the Agreement titled *Fields of Cooperation* include *inter alia* environment and energy. More recently speaking, the 9th⁴⁵ as well as the 10th India-Japan Energy Dialog that were held in 2018 and 2019 respectively revealed a strong inclination of both the nations toward clean energy, energy security, increased share of renewable energy and environment protection.⁴⁶ Keeping in mind these aspects, let us understand how different or similar are the two nations developing their renewable energy basket.

I. Basis of Comparison: Both India and Japan have a good potential for renewable energy, more specifically solar power and wind power. The countries have been working towards harnessing predominantly these two non-conventional sources. The energy demands of India and Japan are highly dependant upon fossil fuels. Japan is largely dependent on oil, coal and LNG (liquefied natural gas). The statistical data states that Japan's dependency on fossil fuels was 81.2%. When the country suffered a shortage of electricity post the nuclear disaster this number rose to 87.4%. Japan In the year 2018, Japan's energy demand from hydrocarbons was 99.7% for oil, 97.5% for LNG (liquefied natural gas) and 99.3% for coal.⁴⁷ As far as the statistics of India goes, in the year 2018 India's proved reserves accounted for 15 per cent of the global total for coal, 0.7 per cent for gas and 0.3 per cent for oil. These reserves are solely more than seven times higher than global carbon dioxide emissions from energy sources in 2018. India was ranked as sixth largest producer of coal, the 22nd largest producer of oil and 28th largest producer of gas in 2018. In

⁴⁴ Ministry of external Affairs, Indo – Japan Relations, GOI

https://www.mea.gov.in/Portal/ForeignRelation/Japan_Relations_-_Jan_2013.pdf

⁴⁵ Ministry of Economy Trade & Industry, Japan, Joint Statement of 9th Japan-India Energy Dialogue (Jan 02, 2021 6:30PM)<https://www.meti.go.jp/press/2018/05/20180507005/20180507005-5.pdf>

⁴⁶ Ministry of Economy Trade & Industry, Japan, Joint Statement of 10th Japan-India Energy Dialogue (Jan 02, 2021 11:00AM) <https://www.meti.go.jp/press/2019/12/20191210003/20191210003-1.pdf>

⁴⁷ Agency for Natural Resources & Energy, METI, Japan 2019 – Understanding the current energy situation in Japan, [https://www.enecho.meti.go.jp/en/category/special/article/energyissue2019_01.html#:~:text=Japan%2C%20in%20particular%2C%20is%20largely,LNG%20\(liquefied%20natural%20gas\).&text=Ratio%20of%20dependence%20on%20imports,%20and%2099.3%25%20for%20coal](https://www.enecho.meti.go.jp/en/category/special/article/energyissue2019_01.html#:~:text=Japan%2C%20in%20particular%2C%20is%20largely,LNG%20(liquefied%20natural%20gas).&text=Ratio%20of%20dependence%20on%20imports,%20and%2099.3%25%20for%20coal)

2017, fossil fuels accounted for 61 per cent of domestic energy production and 75 per cent of total energy supply. India is the world's fourth largest importer of crude oil and gas and the third largest coal importer.⁴⁸ This information is worth mentioning for reason that both India and Japan are moving towards RE sector and are making concrete efforts for achievement of their goals. A comparative enquiry will be justified between the two as both the countries are highly dependent upon conventional source of energy. Moreover, as mentioned earlier, the two nations have entered into an alliance to work towards Efficient Energy. A comparison of their journey will provide useful insight in understanding how different is their move.

II. COMPARATIVE ENQUIRY

Goals & Targets Set: In its Intended Nationally Determined Contributions (INDC) Japan set the target of reduction in GHG emission reductions by 26.0% till 2030⁴⁹. Further it has also aimed at 80% cut from the 2013 levels in greenhouse gas emissions by 2050.⁵⁰ The energy basket that the country seeks to achieve for the year 2030 was estimated to be 22-24% renewable energy, 20-22% nuclear power, and 56% thermal power⁵¹. Herein the goal is to give share to permanently eliminate the dependence on hydrocarbons and attain a unique energy mix that consists of clean energy forms only. This target signifies that Japan wants to end their dependence on fossil fuels. India on the other hand is making efforts to increase the share of renewable energy which is indicative of reduced dependence on fossil fuels. The governmental action to increase taxation on fossil fuels is also another step to reduce the share of fossil fuels in the energy mix. The goals of both the nations are on similar lines. However, Japan's focus is more on reduction of Green House Emissions and India on the other hand is completely devoted towards adoption of clean energy.

⁴⁸ Vibhuti Garg, Anna Geddes (2019) *Beyond Fossil Fuels: Fiscal Transition in BRICS*, International Institute for Sustainable Development(IISD) (Jan 11, 2021, 12:23PM) <https://www.iisd.org/system/files/publications/beyond-fossil-fuels-india.pdf>

⁴⁹UNFCCC, *Japan's INDC under Paris Agreement 2016*, (Jan 11, 2021, 4:37PM) https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Japan/1/20150717_Japan's%20INDC.pdf

⁵⁰ Xie, Z. (2020) *Energy Insecurity and Renewable Energy Policy: Comparison between the People's Republic of China and Japan*. ADBI Working Paper 1085. Tokyo: Asian Development Bank Institute. Available: <https://www.adb.org/publications/energy-insecurity-renewable-energy-policy-comparison-prc-japan>

⁵¹ Renewable Energy Institute (2020), *Proposal for 2030 Energy Mix in Japan 1st ed., Japan* (Jan 23, 2021 7:27PM) https://www.renewable-ei.org/pdfdownload/activities/REI_Summary_2030Proposal_EN.pdf

Installed capacity of Renewable Energy: Japan's energy sector is dominated by solar and wind energy. The IRENA energy statistics 2020⁵² state that India's total RE capacity in 2019 was 128233MW whereas for Japan it is 97462MW. India's wind energy was at 37505MG whereas Japan's was at a mere 3786MW. Solar Energy for Japan on the other hand was higher at 61840MW whereas India's was 35060MW. Bioenergy for India was higher at 10228MW whereas Japan was at 3197MW. The statistics definitely show that India has surpassed Japan in increasing the renewable energy capacity. However, it will be unfair to make a comparison in strict terms as India & Japan are quite different in geography and land area Both the countries have shown progress in increasing the renewable energy in the country.

Legal & Regulatory Framework:

- a) **Fifth Strategic energy plan:** Under its 2002 Basic Act on Energy Policy, Japan launched its fifth strategic energy plan in 2018 to make its energy policy more concrete in the light of Paris Agreement 2015. The fifth plan was founded upon forth strategic plan that aimed at reducing nuclear power dependency, reducing fossil resources dependency, and expanding renewable energy. It further emphasised on the realization of the 2030 energy mix goal and the challenge to achieve energy transitions and decarbonisation in 2050 as the new energy choices⁵³. The plan however, also recognised lack of self-sufficiency in the country and reiterated the goal towards curbing Green House Gases. It also recognised the country's strong adherence to its pre-determined norms of saving, maximum usage of renewable energy, incorporation of thermal power generation, and efficient implementation of measures and policies resorted to for attaining their energy mix. The goal of self sufficiency can be streamlined with *Atmanirbhar Bharat* and the goals of increasing domestic production in renewable energy sector. The regulatory framework of India as well as its intended NDCs have focused more in incorporating greener and cleaner energy and power generation energy projects in building Developing climate resilient infrastructure as a response to climate change. Japan on the other hand seems to have decarbonisation and attainment of self sufficiency and priority goals.

⁵² International Renewable Energy Agency, *Renewable energy Statistics 2020* (Jan 12, 2021 7:27PM) <https://www.irena.org/publications/2020/Jul/Renewable-energy-statistics-2020#:~:text=Renewable%20Energy%20Statistics%202020%20provides,and%20areas%20for%202017%2D2018.>

⁵³ METI, *Strategic Energy Plan 2018, Japan* (Jan 04 2021 9:23PM) https://www.enecho.meti.go.jp/en/category/others/basic_plan/5th/pdf/strategic_energy_plan.pdf

- b) **Feed-in Tariff:** This policy measure was introduced in 2012 with a motive of increasing renewable energy production. Under the policy, the electric power companies are obligated to purchase electricity generated from renewable energy sources, on a fixed period contract at a fixed price. When we look at the statistics, mainly supported through the FIT scheme, the share of renewable energy in the total power generation reached about 14.8% in 2016.⁵⁴ A similar mechanism to this can be found in the Renewable Purchase obligation of energy intensive industries in India.
- c) **Other Incentives:** Under the J-Credit Scheme the Government of Japan provides credits for the amount of greenhouse gas emissions reduced through efforts to introduce energy saving devices. Entities are able to trade approved credits, which can be utilized for various purposes, such as carbon offsets.⁵⁵ Similarly, under green power certification, If an entity introduces a renewable energy power project the subsequent increase in environmental value from the power generation from such a renewable energy project can be certificated into a green power certificate.

The FIT, J credit and Green Power Certificates majorly govern the incentive policy of Japan. The policy framework for India on the other hand was much more comprehensive, detailed and scattered through various diversities. Take for example the rooftop solar implementation has been separately identified for commercial and residential buildings. The implementation of schemes formulated by the centre has been entrusted with State Nodal Agencies. Special priority had been given to rural areas. The reason behind such a pervasive policy implementation for India is its diversity. There are separate schemes for rural areas, incentives for public sector undertakings, different incentives for DISCOMs. The energy capacity installation is not just in grid connected power plants but also for stand alone plants and off grid areas that are useful for remote areas. In this context, India's policy and incentive implementation is more varied than Japan's. The ex-facie reading of Intended NDCS submitted by both the countries indicate that Japan is focus more on reduction of emissions and decarbonisation by way of resorting to cleaner energy forms. India has a clear target of increasing the share of renewable energy in the energy basket which in turn is going to facilitate the reduction in its carbon footprints.

⁵⁴ Hironao Matsubara(2018) *Renewable Energy Policies and the Energy Transition in Japan*, FES Tokyo (Jan 10 2021 02:27PM) <http://library.fes.de/pdf-files/id/14694.pdf>

⁵⁵ METI(2014), *The Third Meeting of the J-Credit Scheme Certification Committee was Held, Japan* (Jan 03, 2021 10:43PM)https://www.meti.go.jp/english/press/2014/0131_01.html#:~:text=The%20J%2DCredit%20Scheme%20is,removed%20through%20appropriate%20forest%20management

Nuclear Prospects for Japan: Japan under its 5th strategic energy plan has made re-establishment of its nuclear energy model as an integral agenda. The country has shown a progress towards development of renewable energy sector whilst recognising how the Fukushima accident resulted in an increase in oil imports. Simultaneously, the country's focus on self reliance and self efficiency keeps its nuclear energy agenda alive. The Japan government formulated the Basic Policy for Accelerating Fukushima's Reconstruction from the Nuclear Disaster. Speaking of development in that area, the country in November 2020 restarted the reactor at its Sendai nuclear. Presently, Japan now has two operating nuclear reactors with a total capacity of 2,070 MW.⁵⁶ These developments indicate the country's intention to revive its nuclear energy sector.

The data analysed above indicate that Japan's focus on reducing its carbon footprint is twofold-reducing of carbon emissions and attaining an energy mix that is free of fossil fuels. In addition to this, the country is focussing on self-sufficiency. In order to attain that self-sufficiency, the country is also inclined towards revival of its nuclear prospects. These three taken together make up Japan's present policy towards renewable energy.

PART 3

NUCLEAR ENERGY: REDUCED DEPENDANCE ON FOSSIL FUELS

India has made itself as favourable market for renewable energy development. With a hundred percent FDI inflow in the renewable energy sector, it is bound to flourish in the coming year. The growing demand for electricity and the objective of energy security has pushed India towards resorting to cleaner forms of energy. The energy policy review as published by NITI Ayog in collaboration with IEA states that India's electricity generation has increased exponentially in the last decade, with an average annual growth rate of 6%. The Coal power has met over 80% of this growth in electricity generation. Its share of total electricity generation has increased from 65% in 2007 to 74% in 2017. The discussions in the first chapter disclosed some serious efforts to generate electricity from renewable sources. Renewables will attract not just

⁵⁶ Thompson Reuters, TABLE-Japan nuclear reactor operations: Kyushu Electric restarts Sendai No. 1 reactor, (Dec 31, 2020 09:03PM) <https://www.reuters.com/article/japan-nuclear-operations/table-japan-nuclear-reactor-operations-kyushu-electric-restarts-sendai-no-1-reactor-idUSLAN2140FM>

investment, but also increase the availability of power in remote areas. This in turn will lead to a rise in education, healthcare, commerce and thereby overall development of the country.

Looking at the way government has supported the development of renewable energy sector in India, one can possibly draw a conclusion that renewables have a large scope in India. The sensitivity towards the climate change and adoption of greener forms of energy will always be supported both nationally and internationally. The coming years will witness a revival of economy owing to the developments in the energy sector. The pandemic has highlighted the ill state healthcare, education and long distance travel. A switch to greener forms of energy can seriously improve the state of these sectors and will contribute to a gradual reduction in dependence on fossil fuels.

The Way Ahead: The statistics provided by the Department of Atomic Energy of India state that the Government has sanctioned the construction of 12 nuclear power reactors out of which ten are to be indigenous 700 MW Pressurized Heavy Water Reactors (PHWRs) and 2 Light Water Reactors (LWRs) that are to be set cooperation with Russian Federation to enhance nuclear power capacity in the country. The Nuclear Power Corporation of India Limited (NPCIL) and Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI) are involved in nuclear power generation in the country.⁵⁷ The present share of nuclear energy in the installed energy capacity in India is 2.2% and a total of 5780MW is functioning. The country has set the target of 63 GW by 2032⁵⁸ The country has 22 reactors with a capacity of 6780 MW in operation in the country 9 reactors having total capacity of 6700 MW.⁵⁹ In order to utilise Uranium and Thorium reserves Department of Atomic Energy has adopted a special nuclear power programme.⁶⁰

There is no doubt in saying that the transition towards renewable energy sector is going to be a difficult one owing to the high dependency on fossil fuels. The country however, can develop an appropriate energy basket that includes both renewable energy and nuclear energy as a means of

⁵⁷ Lok Sabha, New Atomic Power Plants Unstarred Question No 557, Department Of Atomic Energy (Jan 10, 2020 8:00PM) http://www.dae.gov.in/writereaddata/ls%20usq%20557_1.pdf

⁵⁸ UNFCCC, India's Intended Nationally Determined Contribution, (Jan 10, 2020 12:00PM) <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf>

⁵⁹ Lok Sabha, Investment In Atomic Energy Unstarred Question No 579, Department Of Atomic Energy (Jan 02, 2020 11:34PM) http://www.dae.gov.in/writereaddata/ls%20usq%20579_1.pdf

⁶⁰ Lok Sabha, Thorium Based Nuclear Power Projects Unstarred Question No 680, Department Of Atomic Energy (Jan 02, 2020 12:20PM) <http://www.dae.gov.in/writereaddata/lsusq%20680.pdf>

meeting energy demand in India. The short term goal is to increase the nuclear power capacity to 22480 MW by 2030.⁶¹ These targets highlight the fact that just like Japan, India has saved a room for development of nuclear energy as a source of power in the country. However, there is a high degree of national and international security that needs to be given attention when it comes to using nuclear energy.

India's energy basket is experiencing a drastic change. The investments into renewables is going to significantly increase the country's contribution in the fight against climate change. The FDI inflow into the renewable energy sector will facilitate the recovery of Indian economy from a post COVID world. With rural areas having their own sources of power, there will be an automatic increase in the energy security of the country. Moreover, nuclear Power is very likely to have an increased share in the energy mix which will eventually reduce its dependence on hydrocarbons. The goals of sustainable development will be met in a promising way. After the Paris Agreement of 2015, there is a Global transition towards renewable energy and India has already begin showing its contribution to it.

⁶¹Lok Sabha, Production Of Electricity By Atomic Power Reactors Unstarred Question No 2189, Department Of Atomic Energy (Jan 06, 2020 11:21PM) <http://www.dae.gov.in/writereaddata/lsusq%202189.pdf>