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## Avinash Kumar



*Avinash Kumar has completed his Ph.D. in International Investment Law from the Dept. of Law & Governance, Central University of South Bihar. His research work is on "International Investment Agreement and State's right to regulate Foreign Investment." He qualified UGC-NET and has been selected for the prestigious ICSSR Doctoral Fellowship. He is an alumnus of the Faculty of Law, University of Delhi. Formerly he has been elected as Students Union President of Law Centre-1, University of Delhi. Moreover, he completed his LL.M. from the University of Delhi (2014-16), dissertation on "Cross-border Merger & Acquisition"; LL.B. from the University of Delhi (2011-14), and B.A. (Hons.) from Maharaja Agrasen College, University of Delhi. He has also obtained P.G. Diploma in IPR from the Indian Society of International Law, New Delhi. He has qualified UGC – NET examination and has been awarded ICSSR – Doctoral Fellowship. He has published six-plus articles and presented 9 plus papers in national and international seminars/conferences. He participated in several workshops on research methodology and teaching and learning.*

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# **“RENEWABLE ENERGY POLICY AND ITS LEGAL FRAMEWORK”**

AUTHORED BY - MR. HARSHIT MOHAN

Assistant Professor

School of Law and Legal Affairs,  
Noida International University, Gautam Budh Nagar.

CO-AUTHOR - MS. KOUSHIKI MISHRA

Law student, LL.B. 1<sup>st</sup> year,

School of Law and Legal Affairs,  
Noida International University, Gautam Budh Nagar.

- The research paper is about the need of using renewable energy and how government is working on it for the past decades.
- What are the changes we can see, challenges and opportunities in the area.
- It also covers the financial aid, incentives, subsidies which are given by government.
- It talks about the international collaboration and its importance.
- It finally covers about the the comparative analysis of India’s development plan with the development plan of other nations.

## **1. Abstract**

All over the world climate change has become the burning topic on international as well as domestic level due to global warming and uneven climate patterns and their consequences which are been faced by people all over the world wide. According to International Renewable Energy Agency (IRENA) we are all not on the track for a healthy environment and our only option is to put renewable energy at the centre of the solution which are most scientific based pathway. India is contributing to the agenda in however way they can. India’s legal framework for renewable resources is changing over the past decade with everyday changing needs, advancement of technology and commitments made on international platforms whereas the recent policies of India include solar and wind energy mission, tariff policy and policies by individual states for regulating promotion of renewable resources and how these policies are

contributing in the cause as whole union and region wise. Government has taken big steps and given financial incentives and subsidies for the development and promotion for renewable resources by giving 100% of tax waiver of profits for solar power generating companies for ten assessment years from the initial assessment years and permitting FDI up to 100% under the automatic route and Rs.24000 crore outlay provided by government of India; more incentives and exceptions were given to promote the renewable resources. India faced challenges while promoting and failures of policies applied by them during these decades. Intellectual property protection and purchase power agreement played role in incentivizing private sector investment and involvement of technological advancements were huge part of it. Comparing polices and approach of other countries who are developed in technology and other related concept.

Keywords: Renewable resource, development, technological advancement, investment.

## **2. INTRODUCTION**

Renewable energy is Key to addressing the climate crisis. Energy from renewable natural resources is energy that is produced more quickly than it is used. Renewable energy sources are in large amount available to human being. Whereas, Fossils fuels, coal, gas are non-renewable resources which require hundreds of millions of years to shape. In addition to cost, generating renewable energy is beneficial because of lower emissions required than burning fossil fuels, and also results in three times more jobs.<sup>1</sup>Global warming and climate change is the most upcoming and burning topic due to the consequences faced by world because of the actions of human beings which is represented by scientists through a strong census that says that between 90% and 100% humans are the reason of the global warming with most of the study finding 97% to be more accurate (fig.2&fig.1) respectively.

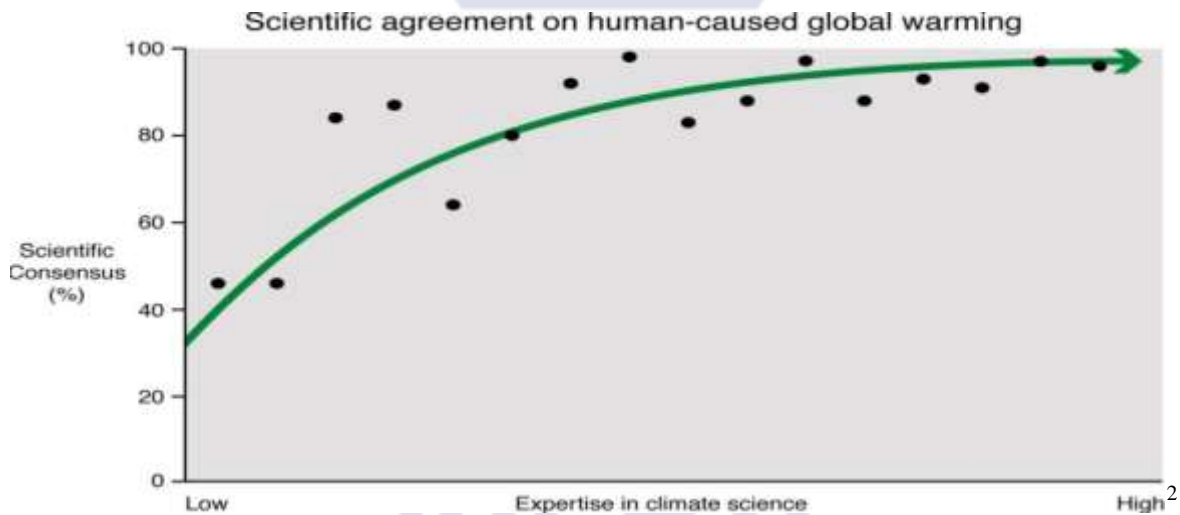
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<sup>1</sup> [https://www.un.org/en/climatechange/what-is-renewable-energy?gclid=CjwKCAiAk9itBhASEiwA1my\\_6-f0TKSQB-iUhr9uh4C7dOsCWd56vwtr3pfgIgik8EHGreT04\\_MUnBoCWRMQAvD\\_BwE](https://www.un.org/en/climatechange/what-is-renewable-energy?gclid=CjwKCAiAk9itBhASEiwA1my_6-f0TKSQB-iUhr9uh4C7dOsCWd56vwtr3pfgIgik8EHGreT04_MUnBoCWRMQAvD_BwE)

### Studies into scientific agreement on human-caused global warming



(Figure1) source: skepticscience.com

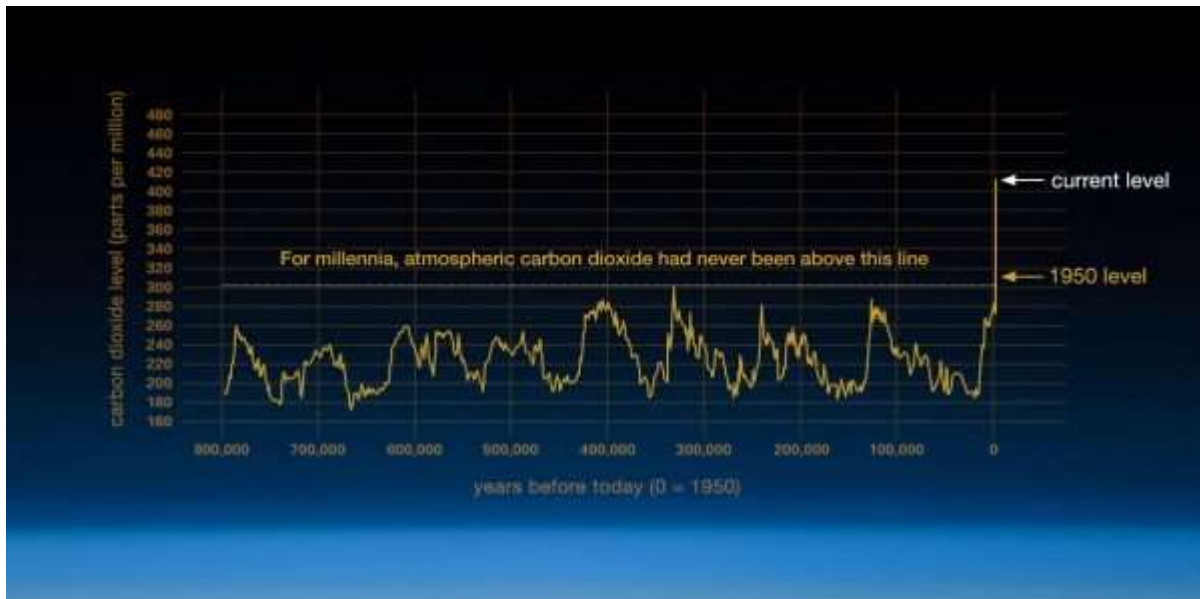


(Figure2) source: skepticscience.com

The study has shown that the concentration of carbon dioxide in the atmosphere has risen from hovering approx. 280 parts per million (ppm) in pre-industrial time, to 413 ppm as of early 2020. This concentration of carbon dioxide is unprecedented in recorded history. Scientists have reported that we have to return to a safe concentration of 350ppm by 2100 with the aim to stabilize global warming. (figure3)<sup>3</sup>

<sup>2</sup> <https://skepticscience.com/global-warming-scientific-consensus-intermediate.htm>

<sup>3</sup> [https://climate.nasa.gov/climate\\_resources/24/graphic-the-relentless-rise-of-carbon-dioxide/](https://climate.nasa.gov/climate_resources/24/graphic-the-relentless-rise-of-carbon-dioxide/)



(Figure3) source: climate.nasa.gov

The International Energy Agency (IRENA) being leading international intergovernmental organization for energy transformation that is in the service of providing state of the art data and analyses on technology, policy, innovation, investment and finance.<sup>4</sup>IRENA manages the worldwide adoption and use of all forms of sustainable sources for renewable energy, which includes geothermal, hydropower, bioenergy, geothermal, ocean, hydropower, wind and solar energy in order to promote sustainable development, energy security and energy access for economic, social resilience, prosperity and a future that is climate-proof. IRENA’s membership comprises 168 countries and the EU.

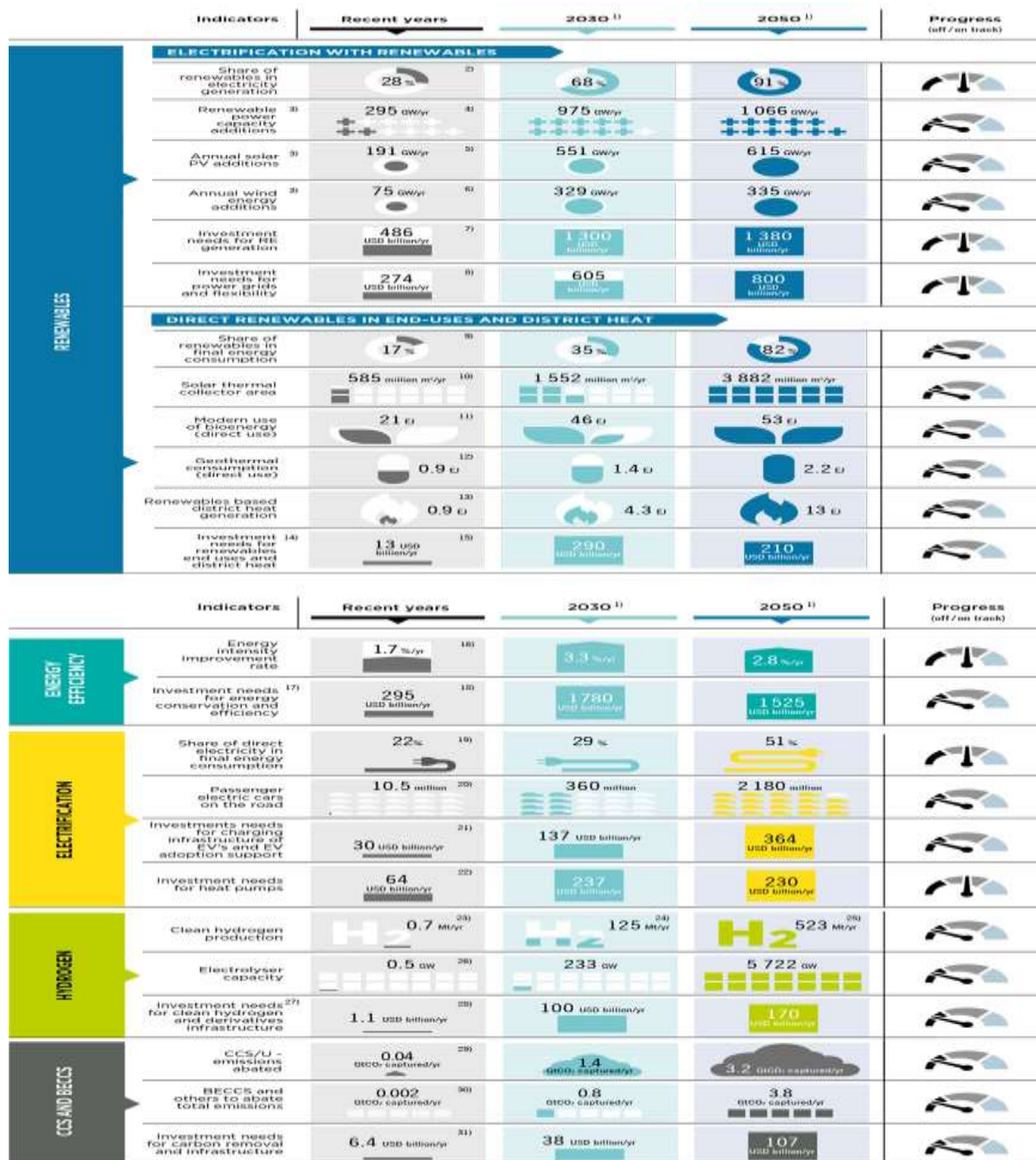
IRENA has also said that *“energy transition is not at all on track for a healthy environment and the aftermath of the COVID-19 pandemic and the ripple effects of the Ukraine crisis have further compounded the challenges facing the transition making every step more important and needed because of any change in the fraction of a degree in global temperature will change significant and out of control consequences on the environment effecting natural systems, human societies and economies and our only option is to put renewable energy at the centre of the solution which is most scientific based pathway.”*<sup>5</sup>

Their proposed methods for reducing global warming include lowering carbon dioxide (CO<sub>2</sub>)

<sup>4</sup><https://www.irena.org/About#:~:text=IRENA%20drives%20the%20widespread%20adoption,and%20a%20climate%20proof%20future>

<sup>5</sup> <https://www.irena.org/Digital-Report/World-Energy-Transitions-Outlook-2023>

emissions by about 37 gigatonnes (Gt) from 2022 levels, reaching net-zero emissions in the energy sector by 2050, and deploying about 1000 GW of renewable energy each year in order to maintain the 1.5C trajectory.



(Figure 4) source: irena.org

According to IRENA's 1.5C scenario, by 2050, the proportion of renewable energy in the world's energy mix would rise from 16% in 2020 to 77%. By that same year, electricity would take the lead as the primary energy carrier, making up over 50% of all final energy consumption. By that same year, 94% of hydrogen would come from renewable sources. To

accelerate global progress, policymakers must strike a balance between reactive measures and proactive energy transition strategies that will support a more resilient, inclusive, and climate-safe system.<sup>6</sup> Every nation is making every effort to create policies for energy governance, a highly difficult topic for which there is no ideal model. Around the world, both direct and indirect measures have been implemented.

A few legislative framework initiatives and policies can be taken into consideration that were like taking a step in the right direction, such as the enactment and passage of specific laws on renewable resources that contain series for the introduction of tariff support for electricity generation from renewable resources. At the national level, decisions are always made about what is needed and what measures are taken by the policy makers. Furthermore, subsidies and incentives were offered, which have been shown to be effective and beneficial. Treaties on international investment and legally enforceable agreements guaranteed energy access to everyone who made cross-border political pledges. The SDGs, which were adopted by the UN, are important for attaining clean, affordable energy for all legislative systems.

All things considered the preference and reliance on renewable resources in the twenty-first century is an unavoidable global, regional, and home necessity.

### **3. RENEWABLE RESOURCES IN INDIA AND THEIR APPROACH**

#### **3.1) What is India's present legal framework for renewable energy, and how has it progressed over the last decade?**

With the most populated country in the world India demand for the energy usage has been increased and the best options for the economy and environment have been taken into consideration. From the start when India started gaining its independence it heavily relied on coal to meet its demands for energy but coal and fossils were not an efficient way to move further with development and India was committed to move to more long term and sustainable resources for their purposes. The starting was done with hydro-power making it India's energy platform. Over the years many policies, initiatives, investments have promoted the hydro-power development leading India to 5<sup>th</sup> position in the world in respect of hydropower usage. "*Bhabha Atomic Research centre (BARC)*" was established in 1950s for India's long term independence in energy. Wind energy was started in 1960s when the National Aeronautical

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<sup>6</sup> <https://www.irena.org/Digital-Report/World-Energy-Transitions-Outlook-2023#:~:text=According%20to%20IRENA's%20Planned%20Energy,a%201.5%C2%B0C%20pathway>

Laboratory (NAL). After many years of extensive scientific research and technology advancement has brought us to the stage where India is the only nation with domestic development, demonstration and deployment of nuclear reactors for electricity generation, 4<sup>th</sup> largest wind power capacity in the world, large scale usage in solar energy spearheading International solar alliance (ISA) which is a determined, an action-orientated, with a combined platform for increasing deployment of solar energy technologies which aims towards using solar energy to reduce fossil fuel dependency and creating a healthy planet, 800 biomass power and bagasse, non-bagasse co-generation projects has inducted in the country, power surplus country with a total installation of capacity of over 4 lakh MW.

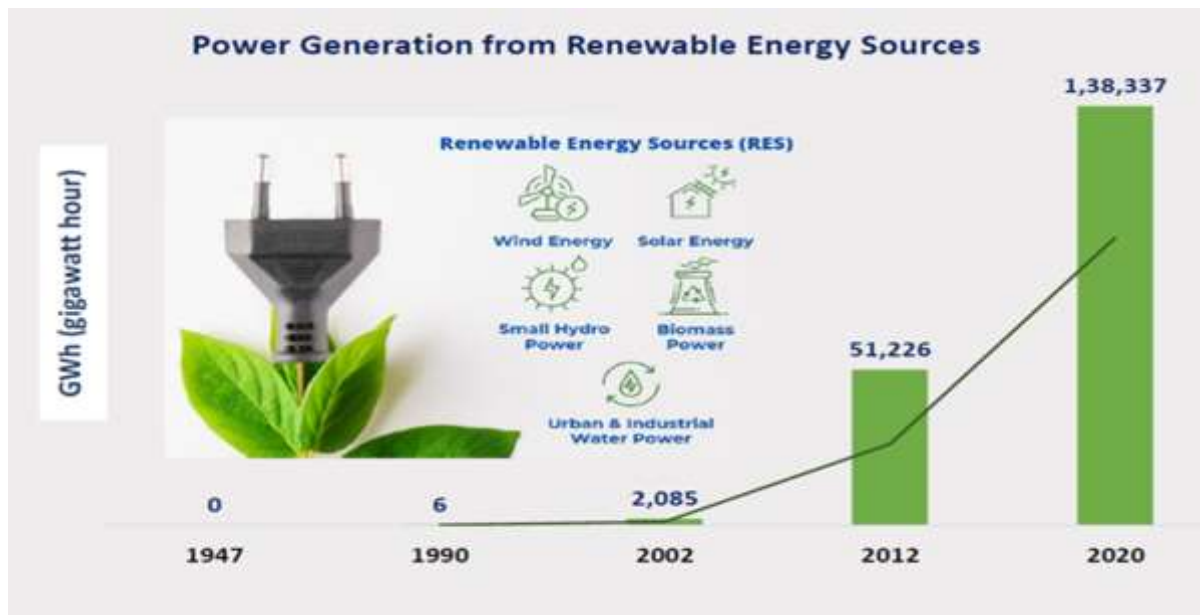
Keeping sustainable development goals in the front of mind, India's power generation mix is quickly changing towards a larger amount of renewable energy.

In present scenario, India is the world's 3<sup>rd</sup> largest producer of RE because of its installed capacity of 40% till 2021 by achieving one of its Paris 2030 Nationally Determined Contributions (NDC) commitment 9 yrs. in advance. The country surpassed 100GW installed capacity landmark on august 2021. India stands 4<sup>th</sup> position in the world in terms of overall installed renewable energy capacity. By December 2021 RE capacity stood at 104.88 GW and till February 2023 it stands more than 174.53 GW. (Given and explained in table 1 and figure 4)<sup>7</sup>

| <i><u>"Installed capacity of renewable sources of energy in India"</u></i> |                 |                    |                    |                 |                 |
|--|-----------------|--------------------|--------------------|-----------------|-----------------|
| <i>Solar</i>   | <i>Wind</i>     | <i>Small hydro</i> | <i>Large hydro</i> | <i>Biopower</i> | <i>Nuclear</i>  |
| <i>48.55 GW</i>  | <i>40.03 GW</i> | <i>4.83 GW</i>     | <i>46.51 GW</i>    | <i>10.62 GW</i> | <i>6.78 GW"</i> |

*(Table1) source: pib.gov.in*

<sup>7</sup> <https://pib.gov.in/FeaturesDeatils.aspx?NoteId=151141&ModuleId%20=%202>



(Figure5) source: pib.gov.in

The key policies and regulations for making renewable resources a successful plan by Indian government includes:

- National Action Plan on Climate Change (NAPCC):** NAPCC was launched on 30<sup>th</sup> June 2008 by government of India to outline a national scheme for aiming towards the country which can adapt change in climate and enhances the ecological sustainability of India's development path stressing that maintaining a high growth rate is crucial to increase living standards and mitigating the negative effects of climate change. Eight national missions addressing climate change are included in this action plan: the solar mission, the mission for improved energy efficiency, the missions for sustainable habitat, water mission, the Himalayan eco-system mission, green-India mission, the missions for sustainable agriculture and the mission of strategic knowledge on climate change.
- National Solar Mission (NSM):** National solar mission also known as The Jawaharlal Nehru national solar mission launched In January 2010 was an initiative of the government of India and state government for solar power energy. This mission has three phases; phase 1 (2010-2013), phase 2 (2013-17), phase 3 (2017-2022) aiming for the solar technology penetration in the country on both centralized as well as decentralized level. It has created policy for its deployment across the country. Each phase has different goals introduced by policies to achieve it. Phase 1 has the target for grid-connected PV 1000 MW, off-grid solar PV applications 200 MW. Phase 2 has the

cumulative target for grid-connected solar PV 4000-10000 MW, off grid solar PV applications 1000MW, scheme for at least 25 solar parks and ultra-mega solar power projects to target 40 GW solar PV 13th plan. Phase 3 cumulative targets for grid-connected solar PV 100000 MW, off-grid solar PV applications 2000 MW. Every policy is for evaluation of progress and targets based on emerging cost and technology.

- **Renewable Purchase Obligation (RPO):** The state agency for renewable energy research and technology for RPO's and renewable energy certificates in Kerala which maintains electricity distribution licensees which should be purchased or produce a minimum specified quantity requirement from RE sources. RPO is a regulatory mechanism for the purpose of promoting the growth of RE sources and contribute towards environment sustainability. The total of 3% RPO in 2010 was notified by Kerala where 2.75% is to be met from non-solar sources and 0.25% from solar energy. Then further RPO was increased by 10% of 3% every year. RPO must fulfil their renewable energy obligations by purchasing renewable energy certificates or purchasing themselves typically applicable to power distribution companies, open-access or other entities.
- **Tariff policy:** The government has announced plans and policy for "green tariff policy" for increasing the consumption of renewable resources. Under this power distribution companies will supply more power which is generated by renewable resources at a tariff that is lesser than of conventional energy. It's for the increase in energy beyond the RPO compulsion.
- **The Electricity Act, 2003:** the electricity act principally governs the electricity sector of India and provides the structure for the generation, transmission, distribution, trading and use of electricity. It deals about national policy and plan and needs to be published in newspaper once in 5 years.<sup>8</sup>
- **The National Portal of rooftop solar:** The Indian government launched this for the encouragement in adoption of solar energy. Online platforms were created for individuals and companies who are interested in using solar power. On those online platforms eligibility for the solar subsidies can also be checked.
- **Recent plans:** There are recent plans on which government is focusing for the betterment.

Under the environment (protection) act, the "**PM Programme for Restoration,**

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<sup>8</sup><https://www.iisd.org/topics/energy>

**Awareness, Nourishment and Improvement of Mother Earth"** green credit programme encourages behavioural change to support alternative fertilisers and the balanced application of chemical fertilisers.

In order to support one crore farmers in adopting natural farming during the following 3 years, 10,000 *"Bhartiya Prakritik Kheti Bio-Input Resource Centres"*<sup>9</sup> will be established. This would provide a nationwide distributed network for the production of pesticides and micro-fertilizers.

**"mangrove initiative for tangible income and shoreline habitats"** MISHTI, if possible, through collaboration between MGNREGS, CAMPA fund, and other sources, for mangrove plantations along the coast and on salt pan areas.

**Amrit Dharohar** is a plan to promote the best possible use of wetlands and improve chances for ecotourism, carbon storage, biodiversity, and generating money for nearby communities.

Through PPP mode and viability gap funding, coastal shipping will be pushed as the more affordable and energy-efficient mode of transportation for both passengers and freight. providing sufficient funding for the Central Government to scrap its outdated cars and to assist the states in replacing their outdated ambulances and cars.

**Ultra Mega Renewable Energy Parks** are being established to give land and transmission to renewable energy developers on a plug-and-play basis.

**Launch of Programmes:** Phase II of the 12000 MW CPSU Scheme, Phase II of the Solar Rooftop Programme.

***"PM-KUSUM (Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan)"*** the construction of new substation capacity and transmission line layouts as part of the Green Energy Corridor Scheme to evacuate renewable energy.

Transmission Plan for Including ***"500 GW of Renewable Energy by 2030"***. The setting

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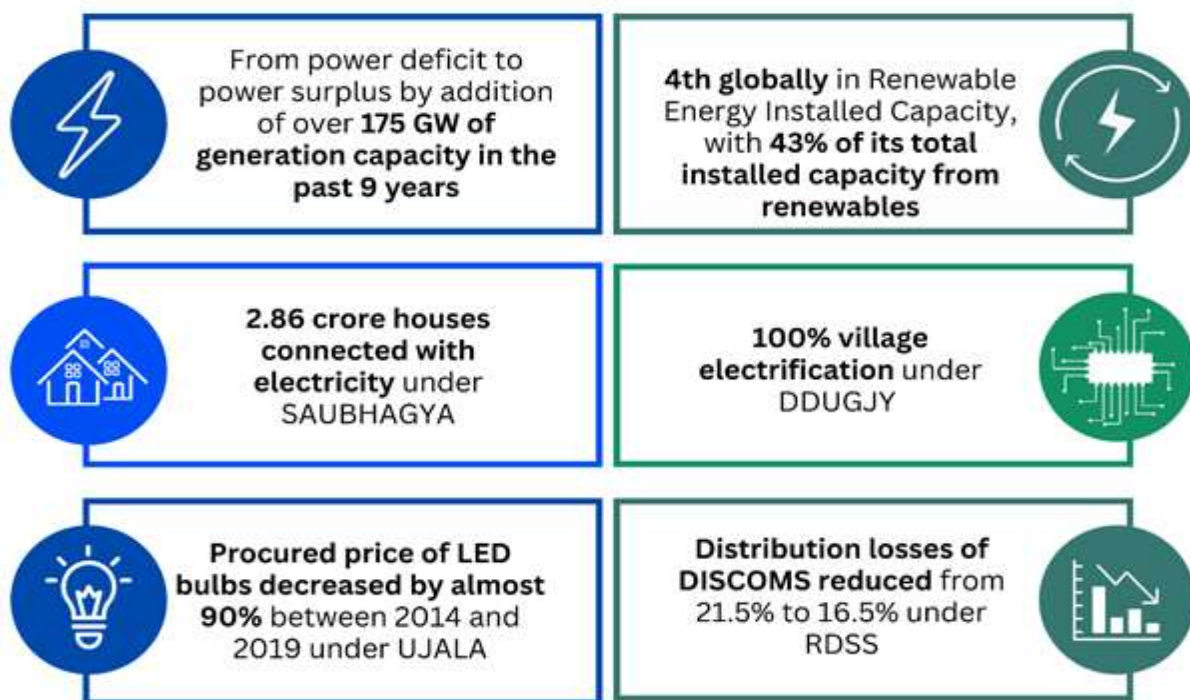
<sup>9</sup> <https://naturalfarming.niti.gov.in/bharatiya-prakritik-krishti-paddhati-bpkp/>

up of a project development cell aimed at drawing in investments and standardising the bidding process for tariff-based competitive bidding on grid-connected solar PV and wind projects.

In order to guarantee that distribution licence holders pay RE generators on time, the government has issued directives stating that power will be distributed against **letters of credit (LC) or advance payment**.

**Green Term Ahead Market Launch** to enable sale of renewable energy power through exchanges. (changes shown in figure 6)

## Transforming the Power Sector in India



(Figure 6)<sup>10</sup>

### 3.2) What are the financial incentives and subsidies given by the government which impacting the development, adoption and promotion of renewable energy technologies?

The Indian government has taken various major steps for the expansion and advertisements of clean energy which in respond will accelerate economy transition to one powered by green energy. The kinds of incentives that can accelerate renewable

<sup>10</sup> <https://pib.gov.in/FeaturesDeatils.aspx?NoteId=151483&ModuleId=2>

energy deployment can be categorized into four types which are research and development, fiscal and tax, market development, grid connection and tariff incentives. R&D incentives are designed to reduce the financial strain on businesses investing in research and development can also be weighted tax deductions. Fiscal and tax incentives are provided so that people can make certain decisions which it will make more preferable. Market development policies is provided by government when they want people to enter in certain market and develop it. Opportunities are provided so many people come in certain market and use it for its development. Grid connection and tariff incentives are those where government provide subsidy on the basis of power, voltage of the source of energy.

in budget 2023 the union aimed at promoting clean and sustainable energy by giving the following policies and incentives:

- The ministry of power has formulated a scheme on viability gap funding for development of battery energy storage systems with capacity of 4000 MWH.
- Import of capital goods and machinery required for manufacture of lithium-ion cells for batteries used in electric vehicles are exempted from custom duties.
- The funding of Rs.19700 crore for the **“green hydrogen mission”** to smooth the path for transition to low carbon intensity, lessen reliance on fossil fuel imports. By 2030, an annual production of 5 MMT is the target.
- An amount of Rs. 35,000 crore has been set aside for capital investments that are prioritised in the direction of energy security, net zero goals, and energy transition.
- A total of Rs. 20,700 crore, including Rs. 8,300 crore in central funding, will be invested to upgrade the interstate grid and evacuation transmission system. 13 GW of renewable energy from Ladakh integrated.<sup>11</sup>
- 500 new **“waste-to-wealth”** plants were established under new developing organic bio-agro resources **“dhan scheme”** with total of Rs.10000 crore.
- Permitting of foreign direct investment up to 100% under automatic route for renewable energy projects was provided.
- Waiver of Interstate Transmission System fees for sale of solar and wind power projects between states expected to authorize by 30<sup>th</sup> June 2025.

<sup>11</sup><https://www.pib.gov.in/Pressreleaseshare.aspx?PRID=1907698#:~:text=Notification%20of%20Promoting%20Renewable%20Energy%20through%20Green%20Energy%20Open%20Access%20Rules%202022.&text=Notification%20of%20%E2%80%9CThe%20electricity%20>

- The installation of solar panels across residential, commercial and industrial sectors has been provides various tax benefits for the promotion of Renewable resources.<sup>12</sup>
- Extending direct and indirect incentives by providing safeguards on sales tax, inclusions of anti-dumping duties, exemptions to customs duties.
- A total of “*ten year*” income tax exemption on all projects earnings to developers in addition for the promise of recovery of 40% of cost in the initial (1<sup>st</sup>) year through accelerated depreciation.
- Under section 80-IA of the income tax act,1961 solar power generating companies are granted a tax waiver on 100% of profits for ten assessment years from the initial assessment year in addition to cover sales tax, excise tax and customs duty.
- Up to 100% financial support to government and non-profit research organizations and up to 50-70% to industry, start-ups, private institutes, entrepreneurs and manufacturing units were provides.
- Subsidies introduced for the promotion of solar energy which is based on system’s capacity. The amount of subsidy you receive depends on the capacity of your solar power system. For systems with a capacity of up to 3 KW were provided a subsidy of Rs.14588 per KW, if the system capacity falls between 3KW and 10 KW the amount received is Rs.14588 per KW for the first 3 KW and thereafter, Rs.7294 per KW and the system above 10 KW a fixed subsidy of Rs.94822 per KW is provided.<sup>13</sup>
- Planning for the reduction in total projected carbon emission by 1 Bn tonnes by 2030, carbon intensity of the nation’s economy lower than 45% by the termination of the decade, and achieve net-zero carbon emission by 2070.
- Solar city per state-approved and approved setting up 57 solar parks of 39.28 GW across the nation. The government is also giving a push to floating PV projects.
- **Aatma-Nirbhar-bharat** is to PLI scheme in solar PV manufacturing with financial outlays of INR 24000 Cr introduced.<sup>14</sup>

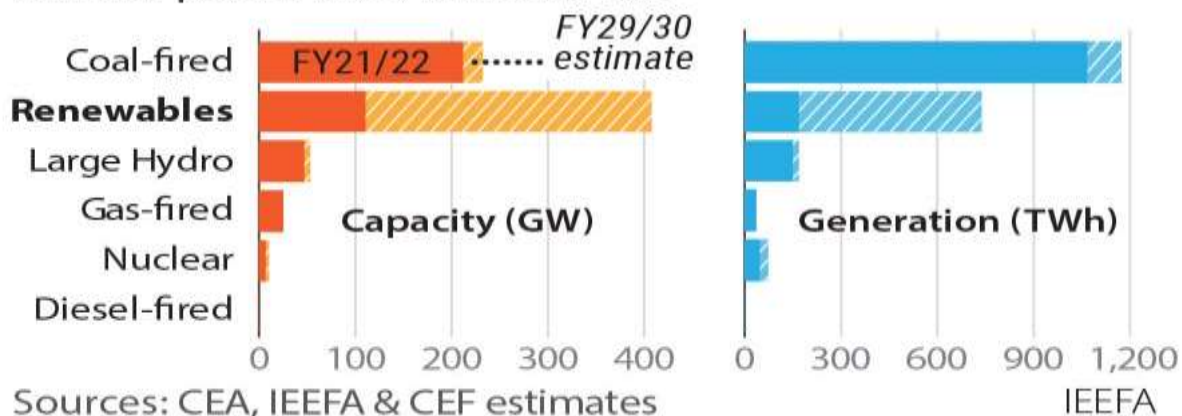
<sup>12</sup> <https://www.investindia.gov.in/sector/renewable-energy>

<sup>13</sup> <https://www.investindia.gov.in/team-india-blogs/understanding-renewable-energy-expansion-india>

<sup>14</sup> <https://pib.gov.in/Pressreleaseshare.aspx?PRID=1795250>

## Projected Shifts in Indian Power Generation Mix

Renewable installations are set to grow rapidly while thermal power loses market share



(Figure 7)<sup>15</sup>

### 3.3) What are the key “challenges and opportunities” by India’s legislative framework for grid integration in renewable energy sources?

India has a large usage of energy which needs to be fulfilled and to maintain the environment precautions need to be taken. Renewable energy is the best way to go through the need and usage with the environment friendly ways. But still there are challenges that are faced while using renewable resources. Challenges can be categorized in major three principles. How to expand reliable energy access and usage while maintaining affordability for consumers and financial stability for the DISCOMs. How to add increasing shares of renewable energy with security and reliability. How to reduce emissions for the achievement of social and environmental objectives. The challenges faced to promote and use renewable energy are as follows:

- **Variability and unpredictability of renewable resources:** Forecasting is that 62% of global electricity will be generated by renewable sources by 2050 which will be an increment from 27% which will increase the challenge for the grid operators in planning and managing power flows properly and avoid imbalances.
- **Cost of production:** The cost associated with building and installing facilities like solar or wind farms is too expensive and the budget given for green energy is not up to that par.

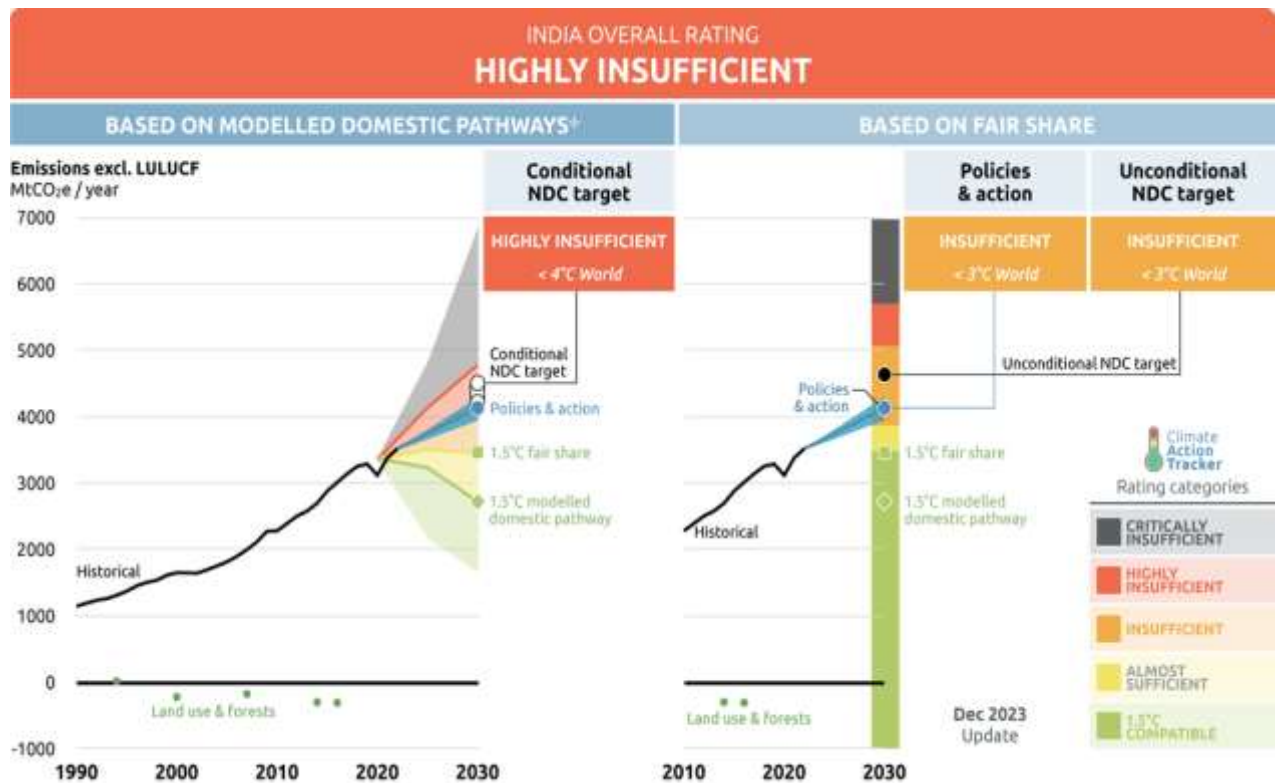
<sup>15</sup> <https://ieefa.org/articles/india-projected-add-35-40gw-renewable-energy-capacity-annually-fy202930>

- **Grid modernization:** The lines and the sources used in distribution of energy need to be changed as they have gotten older and distributing over long distances cause heat damaging the lines further. Changing the lines is costly.
- **Energy transmission:** In the past the power transmission infrastructure was built with large fossil fuels plants and nuclear plants in mind but to make renewable resources more sufficient new transmission infrastructure is required.
- **Barriers to entry:** As the energy transmission have a long history with non-renewable resources making it immense powerful in the market which makes a powerful barrier for renewable resources for better establishment of these a higher budget, policies and investment is required. Starts up face even bigger problems or can say barriers to enter in the market as investors mainly want large amount of production which will be challenging for the starts ups and small scale business.<sup>16</sup>
- **Availability of power:** Like solar power is generated when sunshine is available and turns off at night. Just like that availability of renewable resources is needed as it depends on natural sources which are not in hands of human.
- **Power quality issues:** consistently high power quality is needed to ensure stability and high efficiency of the source. The power is needed for the system to work well with high reliability and lower costs.
- **Lack of knowledge:** as this area is still developing the lack of information and knowledge in the people is the barrier between the use of resources and the sources itself. The government is needed to assist and inform people about it and spread awareness about its benefits.

(Challenges are showing the negative impact on the results as shown in figure 8)

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<sup>16</sup> Renewable Resources and Renewable Energy- a global challenge 2nd edition By: Mauro Graziani, Kai Sundacher, Gerhart Braumegg, Andrea Corti, Emo Chiellini.

(Figure8)<sup>17</sup>

As there are challenges which are faced by India in the renewable energy sector which not only is faced by India but other countries as well. There are opportunities also where the expansion and promotion of renewable energy sector can grow and create a better source for the government and for a healthy environment. The opportunities are as follows:

- **Increase in the use and promotion of hybridization of different renewable sources:** the hybrid system in renewable resource will be very helpful it will reduce the variability in power generations they will be complementary to each other. They will also reduce the cost of transmission lines by sharing it. Germany has enough storage capacity to cover the needs of 6.3 million people to support their grid infrastructure while we do not have any. In this area only there are more chances for the growth.

For example: In 2018, national policy was announced to promote an extensive grid-connected wind-solar PV hybrid system for efficiently utilizing transmission infrastructure and land. However, the capacity of one resource must be at least 25% of the rated power capacity of other resources.<sup>18</sup>

<sup>17</sup> <https://climateactiontracker.org/countries/india/>

<sup>18</sup> <https://www.investindia.gov.in/sector/renewable-energy>

- **Evacuation infrastructure building:** Evacuation infrastructure means the use of transmission and distributing infrastructure for the discharge or transfer of electric power from generating facility to the grid for distribution. It will be important in the areas where solution for storage is not developed. High voltage transmission lines will be able to transport a huge amount of energy over a long distance.
- **Promotion and development of digitalization:** Advanced software solutions can better the level of grid connectors impacting the consumer behaviour. It has huge potential and it will impact the growth significantly. Promotion and development in digitalization will make people work easier and will make it look more attractive.
- **Development of battery storage solutions:** battery storage costs are decreasing significantly making them an important and cost efficient tool for managing fluctuations because of renewable resources in large battery systems in low demand situations.
- **Development in the distribution companies:** a lot of energy produced is wasted because the distribution companies use out dated machinery which results in line faults, leakages, undersized and over-utilized transformers. Maintenance and proper monitoring of the work and machinery used by distribution companies can save a lot of energy transmission. Privatization and better autonomy can also be a better way to support the cause.
- **Better policy and regulation:** the most effective way is to make and provide better policy and proper management in the regulations of those policies which can include targets, carbon emissions reduction and energy efficiency ways. It can be to reduce the fossil fuels subsidy imposing higher tax and penalties in certain way. Innovative hubs and investment incentives will also help in the promotion of the RE.
- **Education and awareness on the topic:** raising awareness and educate the people and stakeholders about the benefits and potential of the renewable energy will bring huge amount of people in the sector. Advertisement and opportunities to them should be given so that it will attract the people. Engaging and empowering the committees, consumers and investors will be huge profit for the sector. It will foster the culture where innovations can take place and solutions will be brought to the table.

<sup>19</sup> [https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS\\_895440/lang--en/index.htm](https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_895440/lang--en/index.htm)

Children's should be educated in schools so that they can learn the relation between renewable energy and a healthy environment.

- **Investing in the innovative ideas and research:** the way to promote the renewable energy is when people are motivated to bring their ideas in front and help in the development. When great minds will be working on what's necessary then it will be easy to reach the cause which is required and it can be possible when investments are increased in the innovative ideas and technologies. It can also involve enhancing existing technologies and ways. Government should bring financial incentives and rewards for the promotion and development of ideas and allocate funds towards research and development.<sup>20</sup>
- **Behaviour and lifestyle:** promotion of renewable energy can be increased by the influence and change of the behaviour and lifestyle of the consumers and producers. This can be done by making it a habit to use energy saving and energy efficient practices and habits which will automatically inspire the next generation. Behaviour and lifestyle changes can reduce overall energy demands and increase direct use of clean energy.
- **Acknowledging the challenges and making effort to mind the solutions:** Away to develop in an area is to acknowledge where the problem is and making effort to find the solutions same goes with energy. we firstly need to identify the area which is causing trouble in development which can be social, environmental, political or technical then finding and implementing the best plans will work in favour.<sup>21</sup>

### 3.4) **How are international collaborations and agreements influencing India's renewable energy policies, and what implications do they have on the legal framework?**

The international relation (IR) ministry has been engaging with MEA (missions of India abroad), embassies of other countries and international organizations that works on many sectors for cooperation in the field of new and renewable energy.

Over the years, ministry has taken several initiatives to promote. They have signed memoranda of understanding (MOUs), implementation agreements (IAs), supplementary agreements (SAs), letter of intent (LOI) etc. for bringing and supporting

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<sup>20</sup> Sustainable energy-without the hot air By: David JC MacKay

<sup>21</sup><https://www.weforum.org/agenda/2019/01/a-five-point-plan-for-maximising-indias-renewable-energy-potential/>

new and updated renewable energy. For the same purpose these bilateral, multilateral, joint working group (JMG) meetings are done through offline and online modes. The delegations were led by the honourable minister and senior officers of the ministry for the purpose of these bilateral, multilateral, JWG meetings, signings of MOUs, etc. further, India has been joining forces under number of trilateral and multilateral cooperation framework like:

**India-Brazil-South Africa (IBSA)** in October 2007. At this summit, the three countries reached agreement to work together in the promotion of nuclear energy, clean energy technologies and other renewable energies and in the endorsement of climate change mitigation.

**Association Of South-East Asian Nations (ASEAN)** tripling renewable energy capacity to 11TW by 2030 and joining initiatives like the Global Cooling Pledge to reduce emissions from refrigeration and air conditioning. 45% reduction in GHG emissions and Singapore's net-zero emissions target by 2050.

**South-Asian Association for Regional Cooperation (SAARC)** The 3<sup>rd</sup> Meeting of the South Asian Association for Regional Cooperation (SAARC) Council of Experts of Energy Regulators (Electricity) (SAARC CEERE) was held on 13-14 November 2018 in Colombo, Sri Lanka with the technical and financial support of the Asian Development Bank. The Council discussed ways to initiate regional power trade through the implementation of the SAARC Framework Agreement. The Council aims to provide an enabling regulatory environment to realize the SAARC Energy Ring.

**Brazil-Russia-India-China-South Africa (BRICS)** where China imported 79.64 million metric tons of crude from Russia in 2021, 15% of China's total crude imports and 35% of Russia's exports. China imported 16.9 billion cubic meters of natural gas from Russia last year, 10% of China's total natural gas import and 8% of Russia's exports, according to the CNPC institute.<sup>22</sup>

In its addition, the ministry involves with numerous foreign and transcontinental funding organizations, including New Development Bank, World Bank, African Development Bank (AFDB) and KfW. The Asian development bank (ADB), Global Environment Facility (GEF), United Nations industrial development organization (UNIDO), United Nations development programme (UNDP) and GIZ providing project-based support for renewable energy advancement in India.<sup>23</sup>

<sup>22</sup> [https://en.ndrc.gov.cn/netcoo/achievements/202206/t20220629\\_1329851.html](https://en.ndrc.gov.cn/netcoo/achievements/202206/t20220629_1329851.html)

<sup>23</sup> <https://mnre.gov.in/international-relations/>

There are certain areas on which basis the collaboration happens and can help India to grow in renewable energy sector. Examples of those are:

- **Technology transfer:** International collaborations often involve technology transfer agreements where one country gains benefits from the advanced level of technology developed by other. It accelerates its progress in the cause.
- **Financial assistance:** Many international agreements involve financial assistance or funding support for the projects of the country which helps in making large scale plans and facilities with fewer barriers.
- **Market access:** International collaborations can facilitate market access for one country products and service in other countries. This will create new export opportunities for companies and help to increase domestic RE industries.
- **Climate commitment:** International agreements such as the **Paris Agreement**<sup>24</sup> on climate change place pressure on the countries to reduce their greenhouse gas emissions and transition towards low-carbon energy sources.
- **Alignment of different countries policy:** Most international agreements often encourage countries to align their renewable energy policy with world-wide best practices and standards leading towards the adoption of more ambitious renewable energy targets, implementing supportive regulatory frameworks, introducing incentives and subsidies to promote RE.

Comparing the policies and approaches of other developed countries with India will bring the insights that will help in understanding the things more precisely and how can we improve our policies for the better result.<sup>25</sup>

- **Framework of policies:**

India: it has implemented various policies and initiatives to promote renewable energy, including the national solar mission and various state-level renewable energy policies.

Developed countries: they have more matured and well versed plans including detailed frameworks, tariffs policies, renewable portfolio standards, tax incentives and carbon pricing mechanisms.

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<sup>24</sup> [https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS\\_895440/lang--en/index.htm](https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_895440/lang--en/index.htm)

<sup>25</sup> <https://www.wri.org/insights/cities-companies-collaboration-clean-energy-transition-us>

- **Technology adoption:**

India: India is been active in adopting renewable energy technologies mainly in solar and wind power. However, they have faced immense challenges in terms of technology access and affordability.

Developed Countries: Developed countries tend to have more advanced technology adoption and innovation ecosystems in the renewable energy sector. They often invest heavily in research and development to drive technological advancements.

- **Grid Integration:**

India: India has faced a significant challenge regarding Grid integration of renewable energy sources due to the regular change in the nature of solar and wind power. Efforts are been continuously made for improving grid infrastructure and develop storage solutions.

Developed Countries: Whereas, Developed countries had a substantial progress regarding the grid integration because of advanced grid management systems, demand-side management programs and energy storage technologies.

- **Investment and Financing:**

India: Attracting sufficient investment for renewable energy projects has been a challenged for India, although it is being significant progress in past recent years.

Developed Countries: whereas, developed countries generally have more available and mature financial markets and more and greater access to capital for renewable energy projects. They also often got over leverage public-private partnerships and innovative financing mechanisms to move their investment.

- **Energy Transition Policies:**

India: Energy transition of India shifted from coal-dominated, fuel power generation towards renewable energy to make energy accessible, affordable, and sustainable.

Developed Countries: whereas, developed countries' energy transition policies often prioritize and involves decarbonisation, energy security and climate mitigation with an emphasis on making fossil fuels phased out and accelerating the deployment of renewables.

- **Targets:**

India: India has been very persistent in achieving their targets which is 450 GW of renewable energy till 2030.

Developed countries: whereas, Denmark and Germany have goals of 100% RE till 2050 and UK and Sweden shares same goals but slightly different timelines.

(As summarised in table 2)

| Aspect                     | International Development   | India development  |
|----------------------------|---|--|
| Policy Framework           | Mature and detailed frameworks, including renewable portfolio standards, tax incentives, and carbon pricing mechanisms.   | Implemented various policies and initiatives, including the National Solar Mission and state-level renewable energy policies.            |
| Technology Adoption        | More advanced technology adoption and innovation ecosystems.  | Active in adopting renewable energy technologies, primarily in solar and wind power.   |
| Grid Integration           | Substantial progress in grid integration due to advanced grid management systems and energy storage technologies.         | Faced challenges regarding grid integration due to the variability of solar and wind power. Efforts made to improve grid infrastructure. |
| Investment and Financing   | More available and mature financial markets, greater access to capital for renewable energy projects.                     | Attracting significant investment for renewable energy projects, showing significant progress in recent years.                           |
| Energy Transition Policies | Prioritization of decarbonization, energy security, and climate mitigation, with an emphasis on phasing out fossil fuels. | Transition from coal-dominated power generation towards renewable energy, focusing on accessibility, affordability, and sustainability.  |
| Targets                    | Goals of transitioning to 100% renewable energy, with different timelines among countries.                                | Persistent focus on achieving targets, with a goal of 450 GW of renewable energy by 2030.  |

(Table 2)

In short, India and developed countries have same goals in energy transition towards renewable sources; however there is difference in policy frameworks, grid integration, technology adoption and investment strategies. By analysing the experiences of developed countries, India can get very working insights to learn valuable lessons and know their opportunities for improving its renewable energy policies and approaches.

#### **4) Conclusion:**

With an analysis, it was founded that the conditions of the environment of the world is on wrong track because of various reasons and one of the biggest cause is the actions of human beings. Human beings have caused tremendous negative effect on the environment and the safe thing to do is bringing the concentration of carbon dioxide to 350 ppm till 2100. It was analysed that the only and scientific based pathway will be the use of renewable resources which can be possible by developing, promoting and encouraging the use of resources among people. As Renewable energy holds a lot of potential in turning the table over the climate changes; it can increase energy security and can be better option for sustainable development. It underscores a pivotal nexus in addressing pressing global challenges while making a blue print for the path towards sustainable development. It shows that there is a relationship between renewable energy development and how management and governing of its legal aspects. India's development in respect of renewable energy was not over a year but it took decades to reach where we are and it will took more years to reach where we want to. There have been plenty of policies that they have generated for the development of renewable energy and there are recent plans that are still on the progress.

Whereas the policies that is supporting the plans of government form years there have been recent legal framework which has played a vital role in providing the renewable energy with their policies, incentives, subsidies and regulations. These aspects are instrumental role to the goals. The government has taken many steps to promote the RE so that people and companies adapt it instead of non-renewable resources. There are various areas where RE policies focus and have different impacts and implications regarding it. It will be impossible to achieve the goals if government doesn't provide incentives, subsidies and tax exemptions to people for the promotion, development and use of the sources.

India alone cannot achieve its goals and control the effects of weather if the world is not in support of it. The policies and financial incentives that they frame are one thing but to have the

international support on the way is another. International relations and support is important to achieve their goals. This support is beneficial to everyone and plays another important role. This support is known as International collaborations. International collaboration, agreements and treaties are the key aspect to promote and develop the RE in any country and same goes for India. Technology transfer, assistance in funding, etc. are not only for the development were domestic country can use best areas international country have but they can also be provided by market access in international market and its access. It helps in the development of the domestic country knowledge and access towards the technology. The aspects of these collaborations and treaties are to help each other and reach the same goal for the same world.

The comparative analysis of Renewable Energy policies and approaches between India and developed countries gives the idea that every country has some insights just different targets for different timelines. Whole developed countries showcase mature policy frameworks, advanced technology adoption and robust investment ecosystems, India's journey is more focussed on innovation, dynamism and resilience for social-economic and environmental development. Every country is focussing on the betterment of the environment with better legal framework.

It becomes evident that the change of energy to renewable sources is not only based on technological aspect but also on the moral and ethical aspect. To narrow interest and embrace a collective vision of a sustainable and equitable future, bold and transformative action needs to be taken form policymakers, practitioners, developers should continue to invest in each other and overcame barriers, addressing challenges to reach full potential of renewable sources for a healthy, clean and green environment.

The synthesis of renewable resources and its legal framework holds a new starting for humanity and its sustainable future. By adopting the potential of sources while progressing in the development and legal aspect of the targets, we can forge a pathway toward a greener, more prosperous world for the present and future generations. The time for action is now, and together, we must seize the chances we still have to safe our tomorrow.

## **SUGGESTIONS:**

There are some suggestions which can make the goals and targets easily achievable and help in the development of the transition of energy. It can also help to overcome the challenges we faced regarding the use of the renewable energy and the problems we are yet to focus on.

- ❖ **Encourage Investment:** Increase in the investment will be very beneficial for the development and promotion. The increase in funding because of the investment will encourage the companies and people in research and development to work better and provide better services. It will work as a motivation to everyone related to it. To promote investment in renewable energy projects, offer financial incentives including tax credits, grants, and low-interest loans can be provided by government. They are still doing that but a better plans and incentives with detailed analysis to where it is required will help in the proper funding. Put in place measures that lessen investor financial risk, like guarantees for contracts for the purchase of renewable energy.
- ❖ **Promote Innovation and Research:** Innovation and research in the technological advancement for the renewable energy will help in the development of market and better energy transition. To stimulate innovation and research, allocation of funds for research and development of renewable energy technology and encouraging the commercialization of novel technology in renewable energy by supporting activities in this area.
- ❖ **Make sure Equality and Accessibility:** everyone should have the access of energy and policies. Creating policies that give fair access to the advantages of renewable energy should be the top priority, especially for marginalised communities. Putting policies in place to combat energy poverty and help low-income households obtain renewable energy sources. It will be a huge step that will provide an equal platform for all people.
- ❖ **Encourage Education and Awareness:** Changing everyday life and habits create more impact on the environment. If people are aware and are in habit of preserving the environment then it will get easier to protect it. Funding public education and awareness initiatives to highlight the advantages of renewable energy sources and motivate people to adopt more sustainable energy-related behaviours can help the initiative of protecting the environment.