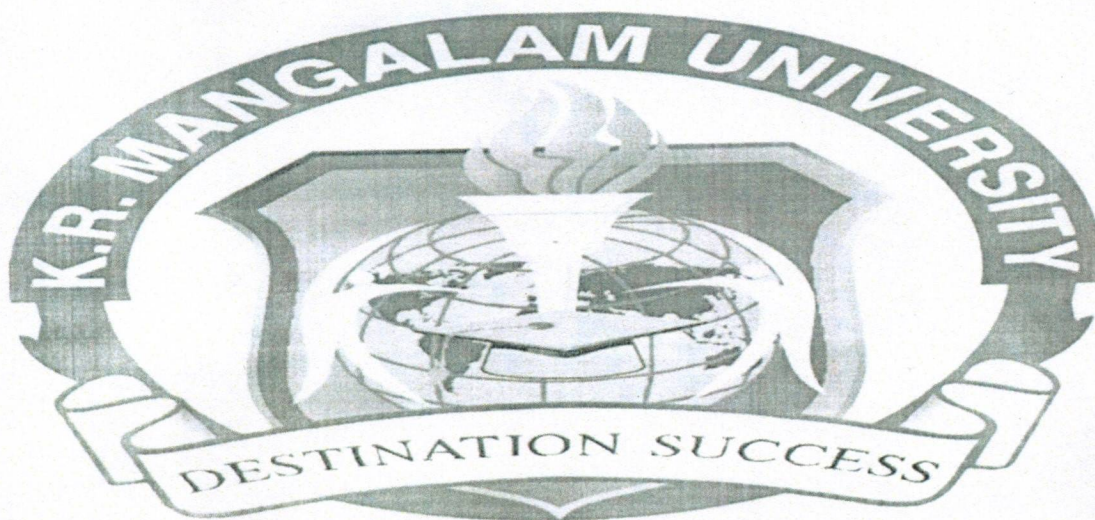


Will Shift to Renewable Energy Increase welfare in India



A Dissertation Submitted for fulfilment of :-

BA(Hons)Economics

By

NANCY GAHLOT

(1708190006)

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SCHOOL OF HUMANITIES

KR MANGALAM UNIVERSITY


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CERTIFICATE OF COMPLETION

This is to certify that NANCY GAHLOT, Enrollment Number 1708190006 has successfully completed the Dissertation in BA(HONS)ECONOMICS titled, **Will Shift to Renewable Energy Increase welfare in India** under the guidance of Ms. Komal Yadav.

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Abstract:

The main objective is to enhance economic development, higher energy security, higher access to energy, and mitigate international global climate change is to talk about renewable energy in India. Renewable energy used for production of heat, power, transport fuels, and bio merchandise. It's used on a property basis; it's a carbon-neutral carrier and would possibly build an oversize contribution to reducing gas emissions. Currently, it combined heat and power, co-firing, and combustion plants offer reliable, efficient, and clean power and warmth. The agricultural house have to be compelled to be electrified properly, therefore biomass power generation is that the simplest as a result of its renewable provider of energy and conjointly the things the for running the plant plentiful in nature. The work has been done on utilizing the agriculture residue to satisfy the necessities of power demand and employment generation in India. Victimization the renewable energy will solve a pair of major problems with geographical area, initial the dearth of power and second to push and notice a stronger technique for agriculture production. Biomass based mostly Combined Heat, and Power production holds an superb potential to satisfy India's growing energy demand, but there's could be a serious drawback that it's not used in all over the India. It's solely doable by use of renewable energy and by making sure access to cheap, reliable, sustainable, and trendy energy for individuals to realize higher, Sustainable development. Robust government support and conjointly the additional advantageous economic situation have pushed India to be one in all the simplest leaders inside the world's most appealing renewable energy markets. Renewable energy area unit being supported by most of the governments for making sizable quantity of benefits likewise as improved domestic energy security, reduced gas (GHG) emissions once place next with totally different fossil-fuel, and economic development and employment generation, considerably in India. India contains an enormous supplier of renewable energy resources, and it's one in each of the most important programs inside the nations for bring into effective action of renewable energy merchandise and systems. Indeed, India is that the only country inside the world to possess a unique ministry for renewable energy development, the Ministry of Non-Conventional Energy Sources. There's an outline of Renewable energy supply that but India's renewable energy has various achievements, prospects, projections, production of electricity, still as major challenges and employment opportunities. India is moving from non renewable energy to sustainable development by promoting renewable energy.

Abstract:

The main objective is to enhance economic development, higher energy security, higher access to energy, and mitigate international global climate change is to talk about renewable energy in India. Renewable energy used for production of heat, power, transport fuels, and bio merchandise. It's used on a property basis; it's a carbon-neutral carrier and would possibly build an oversize contribution to reducing gas emissions. Currently, it combined heat and power, co-firing, and combustion plants offer reliable, efficient, and clean power and warmth. The agricultural house have to be compelled to be electrified properly, therefore biomass power generation is that the simplest as a result of its renewable provider of energy and conjointly the things the for running the plant plentiful in nature. The work has been done on utilizing the agriculture residue to satisfy the necessities of power demand and employment generation in India. Victimization the renewable energy will solve a pair of major problems with geographical area, initial the dearth of power and second to push and notice a stronger technique for agriculture production. Biomass based mostly Combined Heat, and Power production holds an superb potential to satisfy India's growing energy demand, but there's could be a serious drawback that it's not used in all over the India. It's solely doable by use of renewable energy and by making sure access to cheap, reliable, sustainable, and trendy energy for individuals to realize higher, Sustainable development. Robust government support and conjointly the additional advantageous economic situation have pushed India to be one in all the simplest leaders inside the world's most appealing renewable energy markets. Renewable energy area unit being supported by most of the governments for making sizable quantity of benefits likewise as improved domestic energy security, reduced gas (GHG) emissions once place next with totally different fossil-fuel, and economic development and employment generation, considerably in India. India contains an enormous supplier of renewable energy resources, and it's one in each of the most important programs inside the nations for bring into effective action of renewable energy merchandise and systems. Indeed, India is that the only country inside the world to possess a unique ministry for renewable energy development, the Ministry of Non-Conventional Energy Sources. There's an outline of Renewable energy supply that but India's renewable energy has various achievements, prospects, projections, production of electricity, still as major challenges and employment opportunities. India is moving from non renewable energy to sustainable development by promoting renewable energy.

generation by 2020. Though renewable energy business is presently capital intensive, it's increasing use can for sure decrease its value. Although renewable energy industry is currently capital intensive, it's increasing use will surely decrease its cost. Per dollar investment in renewable energy can guarantee sustainable development for long term, whereas per dollar investment in ancient energy can push mankind at the verge of extinction. India has lots of renewable energy potential to create the gap between demands and provide (K Natarajan, 2015). So, India should place continuous and regular effort in harnessing varied sorts of RES with newer technologies for a cleaner, greener and safer place for our future generation. Renewable energy in India presents vital achievements, prospects, projections, generation of electricity, yet as challenges and investment and employment opportunities. India has created vital progress in utilizing its abundant renewable energy (RE) resources. The country has emerged joined of the leaders of the world energy transition, with a additive renewable energy put in capability of seventy four gig watts (GW) at the end of 2018, and has ambitions to fulfill a target of one hundred seventy five GW by the year 2022. Further, as recently declared by India's Ministry of New and Renewable Energy (MNRE), the govt. seeks to obtain some five hundred GW of further RE capability by the year 2028, ensuing to a forty percent share of put in capability of non-fossil fuel sources within the power sector by 2030. Even so these targets, the employment effects of the ensuing changes within the power sector still got to be properly understood. Over 3.5 million individuals will be employed within the Indian power sector by 2050. More than 3.2 million people are often employed within the renewable energy sector by 2050. The renewable energy sector might employ 5 times additional individuals by 2050 than the complete Indian fossil-fuel sector employs now a day's.

Research Methodology

- The data are going to be collected exploitation secondary sources.
- Secondary sources of knowledge are getting to be
 - NITI AAYOG
 - IRENA
 - MNRE
 - Energy statistics
- This section explains the REmap methodology and provides data concerning the background knowledge used for the analysis of India. REmap is an analytical approach for assessing the gap between presently national renewable energy plans, extra renewable technology choices probably obtainable in future, and also the Sustainable Energy for All (SE4All) objective of enhancing the share of India's renewable energy in future.

Introduction:

The use of fossil fuel with serious concern globally and in India, it's important for India to begin mistreatment renewable energy sources. India is that the seventh largest country within the world extended across **328 million hectares** and explicit related to renewable sources of energy. Among the renewable energy sources, biomass plays a significant role particularly in rural areas, because it constitutes with the key energy supply to majority of households in India. Biomass energy is that the utilization of available organic matter and may be utilized for numerous applications.

- Biomass will be want to turn out heat and power, or utilized in (CHP) plants.
- Biomass may be utilized in combination with fossil fuels (co-firing) for higher potency and scale back the assemble of combustion residues.
- Biomass can even replace fossil oil as a supply for transportation fuel

Biomass in India energy matrix is incredibly necessary for remote village and concrete clusters with suburbanized settlements. Biomass relates project receives associate investment of regarding \$9251 million once a year, resulting in electricity generation of 5000million units. Ministry of latest and Renewable Energy (MNRE) has set the national target is to understand 10GW of put in biomass power 2022 (S Ladanai, 2009). Energy is one amongst the foremost necessary building blocks in human development and a primarily influence the sustainable development of any country. The traditional sources of energy have major scary to our existing and future international safety environmental values, health and society. Thus there's terribly pressing necessitate promoting renewable energy in today's Indian power sector in sustainable and eco friendly method. Renewable energy is energy that is regularly fixed like daylight, wind, rain, tides, waves and energy heat. Renewable energy is one amongst the cleanest/purest choices with minimum carbon emissions or pollution. It's the potential to considerably scale back our dependency on coal and different fossil fuels. By rising renewable energy, India will improve air quality, scale back warming emissions, produce new industries and jobs, and move world towards a cleaner, safer, affordable, and higher energy. India includes a capability of regarding 18GW of energy production from Biomass. Total primary energy employed in India spring from Biomass that is presently regarding thirty two percent. Quite seventy percent of the country population expends upon biomass for its energy demand. Bharat has -5+GW capability biomass power driven plant; eighty three percent are grind connected whereas the remaining seventeen percent are off-grind plants. The off grind plants are divided between cogeneration plants that don't utilize biogases, biomass gasifies for rural applications and biomass gasifies for thermal application in trade. Around seventy cogeneration comes are underneath implementation with surplus capability aggregating to 800mw. Jawaharlal Nehru National Solar Mission (JNNSM) targets total capability of twenty GW grid-connected star powers by 2022 (J Singh, 2008). The year 2016-17 has seen an perfect shift within the method India's economy can perform by that specialization on laying the infrastructure for widespread inclusion of all economic activity on the digital platform.

obtainable copiously and is being not used due because of lack of awareness. Fossil fuels are dominating the energy generation worldwide. Eighty four percent of energy created is by fuel wherever India uses produce its ninety percent energy by use of fossil fuels. As we all know now a day's world depends for the most part on the current that is basic input of our everyday life used for all minor to major works. The countries economy is viewed by its change in energy generation. Electrical energy is at the highest position within the energy hierarchy. It's utilized in diversely in house, industry, agriculture and industrial work. The usage of power has created the work straightforward and cozy. The potency of labor had been inflated abundantly as machines had placed the force and speed to do work has been increased. However the increasing population and thus demand of power is making few issues because the demand isn't being matched. To meet the demand the usage of the non renewable energy sources is being done on massive scale that is ensuring into depletion of resources and production of inexperienced house gases. Therefore to beat this drawback the demand is to skip the traditional sources to renewable sources that are super alternatives and ecofriendly sources. Biomass is one amongst various that is extremely for the most part obtainable in our country. India encompasses a tremendous offer of renewable energy resources. Crop residue and animal waste in rural area are major obtainable sources which might be wanted to generate the ability to satisfy the demand. Exploitation these resources in improve the standards of the electrification in rural areas and can strengthen agriculture sector and can scale back the burden on existing grids. Renewable energy sources will give for indefinite amount and is free from the waste material gases. Therefore, these sources are able to management the worldwide warming and balance the conditions that now a days are being unbalanced. In India the employment of biomass is extremely applicable as we've many of agriculture resources for production of residue. India is that the agriculture primarily based country wherever seventy percent population depends on agriculture sector. The GDP of our nation conjointly depends for the most part on the agro production. However the agriculture sector receives minimum power for irrigation as power is given to business and concrete areas that makes geographical area unelectrified. There are thousands of villages in India that aren't still electrified. Biomass is non typical energy supply in sort of wood, cotton stick, straw, wood, cow dung, etc. these sources are utilized in the varied sectors on generate electrical current, to get steam by directly burning. It's straightforward to get power from these sources however the matter is to gather them and store them. These plants are being terribly helpful to rural areas wherever raw stuff is obtained terribly simply.

Rural electrification

Seventeen p.c. of the world's population – associated degree calculable 1.16 billion folks – currently live while not access to electricity. Associated degree calculable 615 million of those folks board Asia, virtually half of them – 304 million – in India. Renewable-based off-grid systems are usually the foremost economical answer to their wants. By 2012, India's electrification rate had reached seventy five percent and also the urban electrification rate that year was ninety four, with the agricultural areas reaching sixty seven percent. Growth rates for grid electrification in India. (The easy arithmetic of increasing centralised grids is deceptive, however, particularly visible of the geographic realities of mountain ranges with restricted access like in northern India.) Fuel and light-related expenditures account for 7-10% of total unit expenditures in India, considerably beyond in alternative developing countries. Renewable for distributed generation are getting common in

minimise the impact of blackouts and limitations. India overtime experiences blackouts starting from a number of to eight hours per day, as a results of inadequate transmission and distribution capability, still as energy stealing. Some cities and states have load shedding schedules, giving some populations access to electricity for less than 4-6 hours per day. Kerala, as an example, has limitation regular between 6-10 p.m. each day. thus households are adopting renewable to secure their electricity provide throughout these hours, and producing trade is putting in biomass provides and alternative renewable units to confirm continuous power to their businesses. Transferral electrification to quite than ninetieth of India's rural population would need USD ninety billion -190 billion in total investment between 2010 and 2030, primarily in transmission grids. Mini-grid and off-grid systems supply a crucial different for reducing these investments, and India is already a number one country for off-grid systems. Off-grid systems play associate degree progressively necessary role in rural electrification in India. Mini-grids are seen as stepping stones towards centralised grid extension. The Nehru National Solar Mission (JNNSM) is that the main policy initiative promoting alternative energy, as well as off-grid power development, however there are many alternative programmes for alternative renewable energy technologies. Regarding 860 000 solar home systems, and around 750 mini-grid systems, were put in India by March 2012. The latter embody hundred thirty five biomass rice husk chemical action systems and 599 solar PV mini-grids, every with between ten and four hundred customers and a complete capability of 8.2 MW. Sales of solar lanterns in Asia amounted to as high as 3.2 million systems once a year in 2011, abundant of them in India. Biomass-based power systems are promoted put down alia wherever one or two of firm are putting in them. One company, Husk Power Systems, started in 2007, operated around eighty rice husk-based mini-grids in 2013: their capability ranged from 32-100 kW which they provided electricity to over 200 000 folks across 300 villages and hamlets. Some forty percent of the energy needed by India's 740 000 telecommunication base stations – averaging 3-5 electromagnetic unit (kWe) each are requiring 2-4 GW of capability in total – comes from the grid, the remainder from diesel generators. The govt. mandated that half rural sites be high-powered by renewable by 2015. By 2020, seventy five percent of rural and thirty third of urban stations can get to run on energy (Scientific American, 2013). In 2013, 9 000 telecommunication primarily based stations were operative on renewable electricity, and India put in 1 417 wind water pumps that year (IRENA, 2015a).

Renewable energy for sustainable agriculture

Agriculture is that the sole supplier of human food. Fossil fuels drive farm machines, that mostly contribute to greenhouse emissions and, in return, speed up global climate change. By the promotion of renewable resources like solar, wind, biomass, tidal, geo-thermal, small-scale hydro, bio fuels and wave-generated power will minimise the environmental injury. These renewable resources have an oversized chance for the agriculture business. The farmers ought to be inspired by subsidies to use renewable energy technology. The construct of sustainable agriculture lies on a fragile balance of increasing crop production and promoting economic balance, whereas decreasing the employment of finite natural resources and harmful environmental impacts. Sustainable agriculture additionally accept recharge the soil whereas decreasing the utilization of non-renewable resources, like natural gas, that is employed to show region N into artificial fertilizer, and mineral ores, e.g. phosphate or

fuel utilized in diesel generators for water pumping for irrigation. Hence, for promoting sustainable agriculture there's a desire for promoting use of renewable energy system, e.g. solar electrical phenomenon water pumps and electricity, greenhouse technologies, star dryers for post-harvest process, and solar predicament heaters. In remote agricultural lands, the underground submersible solar electrical phenomenon pump is economically possible associated additionally an environmentally-friendly choice as distinction with a diesel generator set. There's want for renewable energy technology like greenhouses for maintaining the simplest plant close temperature conditions for the expansion of plants and vegetables if there are adverse climate for the germinating of specific plants in cold environmental condition zones. The social science of mistreatment greenhouses for plants and vegetables, and solar electrical phenomenon water pumps for agriculture and therefore the surroundings. Clean development provides industrial countries with associate incentive to speculate in emission reduction come in developing countries to realize a discount in carbon dioxide emissions at the bottom value. The method of fresh development for the utilization of renewable systems for sustainable agricultural development specific to solar electrical phenomenon water pumps in Bharat.

Renewable energy for sustainable development in India

Coal, oil, and fossil fuel have contributed to common fraction of worldwide gas emissions are the sources of electricity production. It's important to uplift the quality of living by presenting cleaner and safer electricity(Zabeltitz, 1994). To fulfil the economic development plans that are being enforced has associate degree increasing demand in India. The availability of skyrocketing quanta of energy is a necessary necessity for the economic process of a rustic. The Ministry of Power (MoP) framed the National Electricity set up [NEP] has developed a 10-year complete action set up with the most objective to present electricity across the country, and has create numerous more commit to check that power is provided to the voters expeditiously and at a acceptable value. Total international carbon(D Pappas, 2017) emissions of India are nearly 6.65%, hierarchical fourth next to China (26.83%), the USA (14.36%), and also the EU (9.66%) in line with the planet Resource Institute Report 2017. Ecological stability within the world may additionally full of global climate change. Meant Nationwide Determined Contributions (INDCs) are submitted to the Paris Agreement and international organization Framework Convention on global Climate Change (UNFCCC). The latter has hoped to attain the goal of limiting the increase in international temperature to well below a pair of °C(Aggarwal, 2017). In line with a World Energy Council prediction, international electricity demand can peak in 2030. India is one of the biggest coal shoppers within the world and imports expensive fuel. The energy demand is provided by coal and oil is almost seventy four percent. The country foreign 171 million heaps of coal in 2013–2014, 215 million tons in 2014–2015, 207 million tons in 2015–2016, 195 million tons in 2016–2017, and 213 million tons in 2017–2018 in line with a report from the middle for observation Indian economy(M Blondeel, 2018). Therefore, there's a vital ought to generate electricity from alternate sources. During this means, to attain sustainable growth and avoid ruinous global climate change the country can have to compel to move to speedy and international transition to renewable energy technology. In securing sustainable energy with lower emissions renewable energy sources play a crucial role(S Kumar, 2016). To hide the electricity demand and cut back emissions renewable energy technology is already accepted. In recent years, a

sustainable path for its energy offer for the country has developed. Awareness of saving energy has been promoted among voters to extend the utilization of solar, wind, biomass, waste, and hydropower energies. It's terribly obvious that clean energy is a smaller amount harmful and equally cheaper. 100 GW from solar power, ten GW from bio-power, sixty GW from wind generation, and five GW from tiny hydropower plants by the year 2022 India is reaching to win one hundred seventy five GW of renewable energy. Investors have absolute to acquire over 270 GW that is eventually on top of the bold goal. Fifty eight GW by foreign firms, 191 GW by personal firms, eighteen GW by personal sectors, and five GW by the Indian Railways the bounded are as follows. In line with recent estimates show that, solar potential are over 750 GW and wind potential are 410 GW in 2047(RB Sholapurkar, 2015). It's necessary that the govt. creates 330,000 new jobs and resource opportunities to achieve the troublesome targets of manufacturing 175 GW of renewable energy by 2022(T Harrison, 2014). To push the event of renewable energy technologies we've to travel with specific ways a combination of push and pull mechanism. Natural resource bases are employed in a price effective and fast manner that ought to be guarantee by advancement in technology, correct restrictive policies(Schmid, 2012), tax cut off, and tries in potency improvement because of analysis and development (R&D) are a number of the pathways to conservation of energy and surroundings. Hence, alongside jobs for the unskilled employees, technicians, and contractors are way to push investment opportunities within the renewable energy sector. It additionally exhibit technological and monetary initiatives(Singh), policy and restrictive framework, also as coaching and academic initiatives(T Blenkinsopp, Energy Policy, 2013)(TC Kandpal H. G., 1999) launched by the govt for the expansion and improvement of renewable energy sources. There are numerous express obstacles that encountered the event of renewable technology, and thus, there's a necessity to highlights and discuss these barriers. For the steady growth of renewable power, it's additionally vital to search out doable solutions to tackle with these barriers, and hence, correct recommendations are recommended(S Rehman, 2017). India to become a worldwide leader in clean and inexperienced energy, it's to present the big potential of renewable and also the key drivers are coherent policy measures associate degree an investor-friendly administration.

Current achievements in renewable energy 2017– 2018

India cares for the earth and has taken a groundbreaking journey in renewable energy through the last four years. An obsessive ministry together with monetary and technical establishments have helped Asian nation within the promotion of renewable energy and diversification of its energy combine. The country is engaged in increasing the utilization of unpolluted energy sources and has already undertaken much large-scale sustainable energy comes to make sure an enormous growth of inexperienced energy.

1. India doubled its renewable power capability within the last four years. The additive renewable power capability in 2013–2014 reached 35,500 MW and rose to 70,000 MW in 2017–2018 grading the additive pt in capability within the wind and solar sector, severally. What is more, its additive put in renewable capability stands in fifth position globally as of the 31st of December 2018.

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2. As same higher than, the additive renewable energy capability target for 2022 is given as one hundred seventy five GW. For 2017– 2018, the additive put in capability amounted to seventy GW, the capability beneath implementation is fifteen GW and therefore the tendered capability was twenty five GW. The target, the put in capability, the capability beneath implementation, and therefore the tendered capability are shown in Fig. 4.
3. There's tremendous growth in solar energy. The additive put in solar capability exaggerated by over than eight times within the last four years from a pair of.630 GW (2013– 2014) to twenty two GW (2017–2018). As of the 31st of Dec 2018, the put in capability amounted to 25.2122 GW.
4. The renewable electricity generated in 2017–2018 was 101839 BUs.
5. The country printed competitive bidding pointers for the assembly of renewable power. It conjointly discovered all time low tariff and clear bidding technique and resulted in an exceedingly notable decrease in per cost of renewable energy.
6. In twenty states, there are forty one solar parks with a additive capability of over twenty sx, 144 MW that have already been approved by the MNRE. The Kurnool solar park was created with one thousand MW; and with 2000 MW the most important solar park of Pavagada (Karnataka) is presently beneath installation.
7. The target for solar energy (ground mounted) for 2018–2019 is given as ten GW, and solar energy (Rooftop) as one GW.
8. MNRE doubled the target for solar parks (projects of five hundred MW or more) from twenty to 40 GW.
9. The additive put in capability of alternative energy exaggerated by 1.6 times within the last four years. In 2013–2014, it amounted to twenty one GW, from 2017 to 2018 it amounted to thirty four GW, and as of 31st of Dec 2018, it reached 35.138 GW. This shows that achievements were completed in alternative energy use.
10. An offshore wind policy was declared. 34 companies (most important international and domestic alternative energy players) competed within the "expression of interest" (EoI) floated on the attempt to created India's initial mega offshore power plant with a capability of one GW.
11. 682 MW tiny hydropower comes were put in during the last four years together with 600 watermills (mechanical applications) and 132 comes still beneath development.
12. MNRE is implementing inexperienced energy corridors to expand the transmission system. Ninety four thousand km of green energy corridors are completed or under implementation. The price spent on that was INR 10141 crore (101,410 Million INR = 1425.01 USD). What is more, the whole capability of nineteen thousand MVA substations is now planned to be complete by March 2020.

13. Major government initiatives for renewable energy

14. **Technological initiatives:** The Technology Development and Innovation Policy (TDIP) discharged on the 6th of October 2017 were endeavoured to market analysis, development, and demonstration (RD&D) within the renewable energy sector. RD&D meant to judge resources, progress in technology, exploitation, and also the presentation of renewable energy technologies across the country. It aimed to provide renewable power devices and systems domestically. The analysis of standards and resources, processes, materials, components, products, services, and subsystems was disbursed through RD&D. A development of the

market, potency enhancement, value reductions, and a promotion of exploitation (scalability and bankability) were achieved through RD&D. Likewise, the proportion of renewable energy within the entire electricity combine created it self-sustainable, industrially competitive, and profitable through RD&D. RD&D additionally supported technology development and demonstration in wind, solar, wind-solar hybrid, bio fuel, biogas, hydrogen fuel cells, and geothermal energies. RD&D supported the R&D units of educational institutions, industries, and non-government organizations (NGOs). Sharing expertise, information, also an institutional mechanism for collaboration was realized by use of the technology development program (TDP). The various people involved in this program were policymakers, industrial innovators, associated stakeholders and departments, researchers, and scientists. Renowned R&D centers in India are the National Institute of Solar power (NISE), Gurgaon, the National Institute of Bio-Energy (NIBE), Kapurthala, and the National Institute of Wind Energy (NIWE), Chennai. The TDP strategy encouraged the exploration of innovative approaches and possibilities to obtain long-term targets. For the development of renewable technology that meets the electricity needs of India from the efficiently supported the transformation into technology through a well established monitoring system. The research facility of excellence approved the TDI projects, which were funded to strengthen R&D. Funds, were provided for conducting training and workshops. The MNRE is now preparing a database of R&D accomplishments within the renewable energy sector. The Impacting Research Innovation and Technology (IMPRINT) program seeks to develop engineering and technology (prototype/process development) on a national scale. IMPRINT is steered by the Indian Institute of Technologies (IITs) and Indian Institute of science (IISCs). The expansion covers all areas of engineering and technology including renewable technology. The ministry of human resource development (MHRD) finances up to 50% of the entire cost of the project. The remaining costs of the project are financed by the ministry (MNRE) via the RD&D program for renewable projects. Currently (2018–2019), five projects are under implementation within the area of solar thermal systems, storage for SPV, bio fuel, and hydrogen and fuel cells which are funded by the MNRE (36.9 million INR, 0.518426 Million USD) and IMPRINT. Through lab policies that were published on the 7th of Dec 2017 promoted the event of domestic technology and internal control. Lab policies were implemented to check, standardize, and certify renewable energy products and projects. They supported the development of the reliability and quality of the projects. Furthermore, Indian test labs are strengthened in line with international standards and practices through well-established lab policies. From 2015, the MNRE has provided “The New and Renewable Energy Young Scientist’s Award” to researchers/scientists who demonstrate exceptional accomplishments in renewable R&D. Financial initiatives 100 percent financial assistance is granted by the MNRE to the govt and NGOs and 50% support to the industry. The policy framework was developed to guide the identification of the project, the formulation, monitoring appraisal, approval, and financing. Between 2012 and 2017, a 4467.8 million INR, 62.52 Million USD) support was granted by the MNRE. The MNRE wanted to double the budget for technology development efforts in renewable energy for the current three-year plan period. Table 9 shows that the government is spending more and more for the development of the renewable energy sector. Financial support was provided to R&D projects. Exceptional consideration was given to projects that worked under extreme and

hazardous conditions. Furthermore, financial support was applied to organizing awareness programs, demonstrations, training, workshops, surveys, assessment studies, etc. Innovative approaches will be rewarded with cash prizes. The winners are going to be conferred with a support mechanism for reworking their concepts and prototypes into marketable commodities like start-ups for enterprise development. Innovative comes are going to be supported via start-up support mechanisms, which is able to embrace associate investment contract with investors. The MNRE provides funds to proposals for work policies and performance analyses associated with renewable energy. Technology validation and demonstration comes and different innovative comes with reference to renewable received a money help of fifty of the project price. The CFA applied to partnerships with business and personal establishments, as well as engineering facilities. Non- public tutorial establishments, authorized by a government certification body, were additionally eligible to receive a five hundredth support. The involved industries and establishments ought to meet the remaining five hundredth expenditure. The MNRE allocated associate bureau 3762.50 crore (INR 37625 million, 528.634 million USD) for the grid interactive renewable sources associated an INR 1036.50 crore (INR 10365 million, 145.629 million USD) for off-grid/distributed and located renewable power for the year 2018–2019. The MNRE asked the federal reserve bank of India (RBI), making an attempt to create renewable power comes below “priority sector lending” (priority lending ought to be done for renewable energy comes and with none limit) and to eliminate the obstacles within the funding of renewable energy comes. In Gregorian calendar month 2018, the Ministry of Finance proclaimed that it'd impose a twenty fifth safeguard duty on solar panels and modules foreign from China and Malaysia for one year. The quantum of tax could be reduced to twenty for consecutive half of the year, and fifteen for the subsequent half the year.

Challenges faced by renewable energy in Bharat

- Policy and regulative obstacle
- Institutional obstacles
- Financial and monetary obstacles
- Market obstacles
- Technological obstacles
- Awareness, education, and coaching obstacles

Data analysis

"Fossil fuel" refers to a natural fuel supply that was shaped within the geologic past from the remains of living organisms. Fossil fuels like coal, oil, and natural gas occur from the remains of ancient plants and animals that were buried for variant years. The conditions that the remains were underneath over time (such as pressure and temperature) play an area within the fuel they became. As an example, coal is primarily shaped from the remains of land plants that are compressed and heated. Humans access fossil fuels now a day by drilling and mining into the planet to extract them from rocks and earth science formations

Fossil fuels are used for hundreds of years to get power, however there are several disadvantages related to their use:

- Fossil fuels contaminate the surrounding
- Fossil fuels are non-renewable and unsustainable
- Drilling for fossil fuels could be a dangerous method
- Production price is high

Fossil fuels have many drawbacks. Though we've got relied on fossil fuels to power our society for a protracted time, there are many disadvantages to the continuing use of those varieties of obsolete energy sources.

KEY FINDINGS:

- In all eventualities, the hands needed within the Indian power sector can increase significantly and should reach 3.5 million by 2050.
- Renewable energy technologies tend to be additional labour intensive than standard energy technologies. At the identical time, distributed renewable like small-scale hydro, rooftop solar and biomass produce most employment for each MW of pt in capability.
- Rooftop solar employs 24.72 persons, tiny hydro employs 13.84 persons and biomass employs 16.24 persons for constructing and running a one-megawatt plant.
- The renewable energy sectors are going to be the biggest worker within the future Indian power sector.
- Already in 2020, 264,000 supplementary renewable energy jobs may be created by shifting from BAU to the NDC state of affairs. Underneath the REmap state of affairs, quite 3.2 million individuals would use within the renewable energy sector by 2050.
- Biomass and alternative energy are going to be the foremost drivers of employment, with up to 2 million and 1.1 million staff, severally, by 2050.
- Skilling is that the primary future challenge. In line with the NDC PLUS state of affairs, India would need 143,000 adept consultants and just above 410,000 semi- and low-skilled

- technicians within the solar sector. This range would increase to 250,000 adept jobs and quite 850,000 semi- and low-skilled technicians underneath the REmap state of affairs.
- The range of staff within the coal sector has already reduced significantly in past decades because of increasing mechanization. Within the coal-mining sector alone, just about.
 - Use the agriculture residue to line up the twelve MW biomass plant by perceptive the potency of various samples scrutiny with coal.
 - The cow waste has potency of forty six percent wherever as wood has forty five percent and cotton stick has low potency of thirty eight percent. It was absolutely was ascertained that the high hot worth has low potency. The straw is basic residue that is on the market within the fields that even have higher potency then others may be terribly appropriate for the biomass plant. It'll permit the agricultural space to be independent for power and might have safe surroundings.

Recommendation:

- When building the capability, specialize in poor individuals and peoples to empower them with coaching in operational and maintenance.
- Develop and provide coaching programs for people with least education and coaching. UN agency don't match current programs that prohibit them from operation in renewable areas.
- Include ladies within the renewable hands by providing localized coaching.
- Establish connections between coaching institutes and renewable power firms to ensure that (a) trained employees are placed in applicable positions throughout and when the completion of the educational program and (b) coaching programs match the necessities of the renewable sector
- Policy and regulation advancements; The MNRE ought to offer a comprehensive set up or policy for the promotion of the renewable sector in its restrictive framework for renewable energy. The action set up may be ready in consultation with SERCs of the country inside a set timeframe and execution of the policy/action set up. The central and state government ought to embrace a "Must run status" in their policy and follow it strictly to form use of renewable power.
- Transmission needs
- Financing the renewable sector
- Improvement in manufacturing/technology
- Awareness regarding renewable

Conclusion

In the past century, analysis and literature have over that greenhouse emission concentration hyperbolic by twenty eight percent following the commercial revolution. The world wide average temperature has hyperbolic by 0.3°C to 0.6°C , and also the water level rose ten to fifteen cm in the past hundred years. Scientists predict that if greenhouse emissions continue and no effective protection policies for the environment are put into place, the worldwide temperature can extended by 1°C to 3.5°C , and also the water level can increase by fifteen to ninety five cm. Food stuff production would decrease by some twenty eight percent and sixty eight percent for rice and wheat, severally thanks to rise in temperature. This can create several countries unliveable by 2100. During this state of affairs, renewable energy is that the most elegant option to bring for meeting our energy demand, making certain sustainable development and facilitate humanity to continue, a minimum of not creates a finish from energy crisis. Although renewable energy business is currently capital intensive, it's increasing use can sure enough decrease its price. Per dollar investment in renewable energy can guarantee sustainable development for future, whereas per dollar investment in ancient energy can push humanity at the verge of extinction. India has many of renewable energy potential to bridge the gap between demands and provide. So, India should place continuous effort in harnessing varied sort of RES with newer technologies for a cleaner, greener and safer place for our future generation the tiny biomass plant of twelve MW capability being originated within the geographical region(A Kumar, 2010). It absolutely was over that the agriculture residue area unit to an adequate degree to be used as fuel for biomass plant. The potency of all the samples were calculated and compared with coal. The potency of straw was to be highest forty seven percent and coal was having least of solely twenty two percent that is lowest then all the samples of agriculture residue. It'll solve the matter of disposal of residue and power necessities of geographical region. The depilation of fossil fuels also can be elongated. The renewable sector suffers notable obstacles. A number of them are inherent in each renewable technology; others are the end result of a skew restrictive structure and marketplace. The absence of comprehensive policies and regulation frameworks stop the adoption of renewable technologies. The renewable energy market needs specific policies the country ought to take measures to draw in non-public investors. Inadequate technology and also the absence of infrastructure needed to ascertain renewable technologies ought to be overcome by R&D. The govt ought to enable a lot of allow funds to support analysis and innovation activities during this sector. There are insufficiently competent personnel to coach, demonstrate, maintain, and operate renewable energy structures and so; the establishment ought to be proactive in getting ready the force. Foreign instrumentality is expensive compared thereto of domestically manufactured; thus, generation of renewable energy becomes dear and even unaffordable. Hence, to decrease the value of renewable product, the country ought to become involve within the producing of renewable products. Another vital infrastructural obstacle to the event of renewable energy technologies is unreliable property to the grid. Inadequate servicing and maintenance of facilities and low reliableness in technology decreases client trust in some renewable energy technologies and thus stop their choice(A Bergmann, 2006). Adequate skills to repair/service the spare parts/equipment are needed to avoid instrumentality failures that halt the provision of energy. Awareness of renewable energy among communities ought to be fostered, and a big concentrate on their socio-cultural practices ought to be thought. Governments ought to support investments within the growth of renewable energy to hurry up the commercialization of such technologies.

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