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Efforts of Government of India for Energy Management Challenges and for Energy Security

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Abstract. Nowadays environmental problems are a major topic in all sectors, personal, public and government. Excessive consumption of energy and overexploitation effects on the environment due to excessive consumption of energy, we have to consume energy efficiently and start using environmentally friendly energy resources. Improved energy efficiencies and efficient management of energy will help in reducing environmental damage and financial savings. So in this paper first of all whyenergy is necessary and what are its advantages and disadvantages. After that,why it is necessary to conserve energy is explained. It also told how artificial intelligence is being used in energy security. As such AI technology and big data are able to determine and push advanced analytics to improve predictive maintenance, power, business optimization and operations. Initiative global energy leaders such as General Electric (GE) Power is the way we have beentold about helping make digital power plant. Then the last future scope is told. Overall, why to save energy and how to protect it has been told in the paper, which has become a very important topic in today's era.

Keywords: *Energy security, OSOWOG, Sustainable Development Goal,Renewable energy, Human Development Index, CNG*

Introduction

Man has always been using some sources of energy for various purposes such as cooking, heating, ploughing the field, transport, lighting [1]. In the beginning they used to burn wood and later on they have started using kerosene, coal or electricity in later days. Humans used animal power (horse, ox, camel, yak, etc.) to drive transport and small mechanical devices such as the Persian wheel for irrigation or "crushers" to extract oil from oil seeds. During the past century, thermal plants (using coal) or hydroelectric plants have produced electricity using the water stream. The country's non-conventional energy program is one of the largest such programs in the world [2]. These include various technologies, biogas, improved stoves, biomass gasifiers, fast growing tree species, combustion and co-generation of organic matter, drainage by windmills, power generation by wind turbines, solar thermal and photo voltaic systems, Work is being done on alternative energy sources for power generation from civil domestic and industrial waste and waste, hydrogen energy, marine energy, fuel cells, electric vehicles (buses) and transportation [3]. Our usual sources of energy will indeed be depleted in the next few two millennia. What nature has spent millions of years to make, we finish it in a few minutes. The situation is exacerbated by contamination, socioeconomic pressure, and political turmoil. As a result, the discovery and usage of alternative energy sources, as well as high determination, are critical today. We can divide energy sources in this way on the basis of their availability [4]. Conventional energy sources These are easily avail- able and have been used for a long time. Non-conventional energy sources These are sources in addition to the commonly used energy sources.

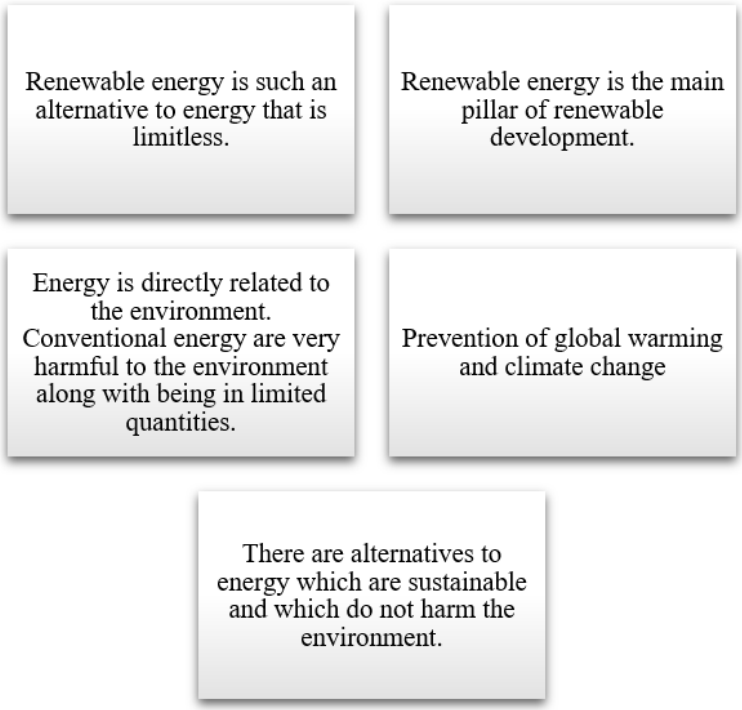

Fig. 1. Benefits of renewable energy resources

The rapidly diminishing fossil fuels and the increasing demand for energy have created a need for us to look at alternative sources which are called renewable or non-conventional sources [5]. We can also call these renewable energy sources. We can define renewable energy sources as "energy sources that can be used without being exhausted". The majority of these resources are non-polluting, and a few of them can be used anywhere. Non-conventional, sustainable, or alternate power sources are terms used to describe these renewable resources. Sunlight, water supply, wind, gas, and geothermal power are all producers of this type of electricity. Renewable solar energy can be obtained energy from the sun or through from flowing water, wind, and biomass [6]. Each alternate renewable energy, like fossil fuel sources technology, has its own set of benefits and drawbacks. In figure 1, we'll go over some of these in greater depth. Renewable energy sources are safe, self-sustaining and reliable, while being freely available in large quantities throughout the year. Also, their equitable distribution is also possible. India has abundant organic matter, solar energy, wind energy, biogas and small hydro power generating sources [7]. The nature of the 21st century is going to be determined without fossil energy whereas in the 20th century it was determined by him. All over the world, the development and research on non-carbon energy sources has now become an industrial and commercial reality outside the confines of the laboratory. India needs a well-planned road map to achieve clean energy goals, for which NITI Aayog is preparing 'Energy Vision 2035'. India needs to focus on diversified energy sources, there is no doubt that solar and wind energy has more potential but hydrogen can also prove to be revolutionary in India's energy transition period [8]. By the year 2050, fossil fuels are expected to be completely replaced by renewable energy. In the near future, India needs to work on areas like investment in infrastructure, capacity building and better integration [9]. The rest of the paper lies as follows. The second section gives a brief introduction to India's Energy Supply - Big Challenges, New Opportunities, third section will study about the policies of government, fourth section gives importance of energy security and the fifth section gives a brief introduction to future scope. Then to the final conclusion of the paper.

India's Energy Supply - Big Challenges, New Opportunities

Energy is the engine of development of any country. Per capita energy consumption in a country is also an indicator of its standard of living. Not only this, economic development also has a strong relationship with energy use. Therefore, for a fast growing economy like India, self-reliance in an important sector like energy is very important. In view of these aspects, while addressing a gathering in New Delhi recently, the Prime Minister of India urged the oil producing countries to reduce the cost of energy so that the global economy can be helped [10]. The first meeting of the International Solar Alliance held some time ago also set a target of 40 percent electricity generation from non-fossil fuel based resources by 2030. There is no doubt that the resources are being consumed rapidly for the maintenance and amenities of the rapidly growing population [11]. But this is giving rise to serious problems like environmental pollution and climate change. In such a situation, the question is how to strike a balance between the increasing population and the energy supply? The question is also what should be the future strategy of India keeping in mind the environment and the future generation. Also, how much dependence does India have on which sources at present and how can it be changed? Through this article, we will discuss some of these issues. Chanakya Niti says that 'not a solution to a problem, find a solution'. Therefore, renewable energy sources such as solar and wind energy potential can be seen as the best solution to meet our energy needs, protect the environment and reduce dependence on polluting coal [12].

It is worth noting that in the last 150-200 years, man has relied on the resources buried under the earth's surface to meet his energy needs. But now the time has come to make maximum use of available resources like solar and wind energy for a secure future. This will require a strong policy framework in which India can play an important role. For this, India wants to take the members of the United Nations on the platform of the International Solar Alliance, so that the attention of all countries can be focused on renewable energy sources to meet the energy needs [13]. As per the Paris Agreement on Climate Change, keeping in mind our nationally determined contributions and our responsibility towards a cleaner planet, India has committed to using clean energy sources for 40% of its installed electrical producing capacity by 2030. It is also expected that by 2022, 175 GW of renewable energy capacity will be installed [4]. Solar power accounts for 100 GW, wind power for 60 GW, bio-electricity for 10 GW, and modest hydro power for 5 GW. With this ambitious goal achieved, India will join the ranks of the world's largest clean energy producers. It will even overtake many developed countries. At present, thermal power accounts for 63.84 percent, nuclear power 1.95 percent, hydro power 13.09 percent and renewable energy 21.12 percent in the country's total installed capacity in 2018. At the same time, India ranks fifth in the world in terms of total installed renewable energy capacity and solar energy and fourth in wind energy. To achieve all these set goals, the government is taking many commendable steps, which also becomes important to discuss [5].

Policies

Energy is required for rapid industrialization, contemporary modes of transportation, and many types of equipment. Fossil fuels, which are likewise restricted and non-renewable, are the major source of energy body. As a result, it is critical that we avoid wasting energy and endeavor to save it. Reduced energy expenditure can be achieved by using fluorescent light bulbs, energy-efficient equipment, and low-emitting glass. If the sources of energy are exhausted, then we will fail in our duty [2] [4]. It is our responsibility towards our next generation. Conservation of energy should be the duty of every human being in daily life. Energy conservation requires serious efforts at individual, community and government levels. Energy obtained from renewable energy resources is called renewable energy. Renewable energy resources are a never-ending resource that can be recovered. In fact, the earth keeps on replenishing them naturally. It includes solar energy, geothermal energy, wind energy, tidal energy, hydro energy, biomass energy etc.

They are available in unlimited quantities on the earth and are environment friendly due to being free from pollution. In fact, conventional fossil energy sources cause excessive water, air and soil pollution, which is the cause of global warming. Renewable energy resources are cheaper and more affordable than conventional energy resources. Renewable energy sources are the energy resources of the future which will ensure the sustainable development of any nation. This is in line with Sustainable Development Goal (SDG)-7 'Clean and Affordable Energy'. Since India is located on the Tropic of Cancer, solar light is available throughout the year in most parts of India, from which a large amount of solar energy can be produced. Similarly, the availability of wind energy, hydro energy, geothermal energy, tidal energy etc. is also available in India. SDG-7 aims to ensure access to affordable, reliable, sustainable and affordable energy for all. Pradhan Mantri Ujjwala Yojana and Pradhan Mantri Sahaj Bijli Har Ghar Yojna were launched to ensure availability of LPG connections and electricity in rural areas. Priority is being given to increase the number of electric vehicles, increase the proportion of biofuel and use of compressed biogas. The National Wind Solar Hybrid Policy was announced in the year 2018 [6]. Hydrocarbon Exploration and Licensing Policy (HELP) was announced for exploration and exploitation of non-conventional hydrocarbons like shale gas, coal bed methane. National Solar Energy Mission is operating many schemes like Prayas, Kusum, Solar Park, So- lar Roof Top Scheme, Solar Defense. NITI Aayog has launched 'India Energy Security Scenery-2047'. International Solar Alliance was established. India has set a target of achieving 40 percent cumulative electric capacity by 2030 from energy resources based on non-fossil fuels. India has a high dependence on conventional energy sources, which are costly as well as a factor of carbon emissions. The increase in import dependence leads to an increase in the current account deficit. There is a lack of skilled manpower and infrastructure for the development of energy resources. Uncertainty in international oil markets, monopoly on oil markets, trade war, currency wise, mutual tension of oil exporting countries etc. Still a large population depends on carbon emitting fuels for cooking. Important steps taken by the government are followings.

Gobardhan scheme

Mahatma Gandhi had said that many experiments can be done in the village. The hallmark of this is the Gobardhan scheme launched by the government. Everyone knows that India is the region with the largest livestock population. In such a situation, the scheme focuses on converting animal dung and solid waste into useful compost, biogas and bio-CNG. Apart from increasing the income of the farmers, the benefit of this scheme will also be available in keeping the villages clean and generating energy.

Electricity generation using biomass resources

The Ministry of New and Renewable Energy is running several programs to promote power generation from biomass in the country. Its objective is to utilize the biomass resources avail- able in the country such as sugarcane bagasse, rice husk, straw, cotton stalks etc. for power generation.

Boost to methanol

NITI Aayog is also considering a plan to convert coal, petroleum and natural gas to methanol. This can be expected to reduce the consumption of domestic LPG. In this sequence, cooking stoves based on methanol gas were manufactured as part of a pilot project by Assam Petro- chemicals Limited in Namrup, Dibrugarh district of eastern Assam. This project has started with cooking fuel, which is a new initiative for the empowerment of women. According to NITI Aayog, 'Methanol is a clean alternative fuel' by which crude oil imports can be reduced by up to 10 percent by 2030.

National Wind-Solar Hybrid Policy

At the same time, the National Wind-Solar Hybrid Policy was released in May 2018. The main objective of this policy is to provide a framework for promoting large grid-connected wind-solar photo-voltaic hybrid systems. Through this, it will help in producing more energy by making efficient and optimum use of land from wind and solar resources. In this sequence, solar parks are being set up in the country. It is worth noting that recently the world's largest solar park 'Shakti Sthal' has been built in Pavagadh, Karnataka. In addition, 47 solar parks with a total capacity of 26,694 MW have been approved in 21 states of the country.

Ban on sale and registration of motor vehicles with BS-IV standard engine

If we talk about the environment, climate change is affecting the geological, biological and ecological systems, due to which pollution is continuously increasing. In such a situation, the Supreme Court has asked to ban the sale and registration of motor vehicles with BS-IV standard engine from April 1, 2020. In its place, BS-VI standards will be implemented from 2020. In this sequence, the Delhi government was planning to move towards electric buses to curb pollution, but after the Supreme Court order to find new clean fuel, the Delhi government has planned to run hydrogen based CNG buses on the roads. HCNG can be used as fuel for internal combustion engines. It is considered a clean and powerful source of fuel. This is being considered as a commendable step towards the future 'hydrogen economy'. The most important point here is that running HCNG based buses would require minimal modification in the engine structure.

Bio-CNG production from agro-waste

Apart from all this, in order to promote clean energy, the government has started a scheme to produce bio-CNG from agro-waste by constructing 5,000 plants in the next five years. These plants will not only help in tackling the problem of burning agricultural waste but will also bring monetary benefits to the farmers.

One Sun One World One Grid (OSOWOG) project

Recently the Union Ministry of New and Renewable Energy (MNRE) has invited proposals from consultancy firms to implement the 'One Sun One World One Grid' project to prepare the roadmap for a sustainable global Electricity Grid in an inclusive manner. India intends to play a leadership role in the field of global energy security by undertaking such cross-border energy projects in collaboration with South East Asian countries, Middle East and African countries [6]. Prime Minister Narendra Modi created the notion of "One Sun, One World, One Grid" in October 2018 at the 2nd Global Re-Invest Conference of the Indo - pacific Rim Organization and the 1st Conference of the International Solar Alliance to assure the provision of energy around the world (ISA). During the inauguration ceremony, delivered a speech. OSOWOG is an Indian initiative to create a global ecology for renewable energy resource interconnection. The OSOWOG blueprint will be produced through the World Bank's Technical Assistance Program. The OSOWOG project should be completed in three phases. The Middle East, South Asia, and Southeast Asia (MESASEA) will be linked in the first stage. In the second stage, Africa will be linked, and in the third stage, the entire operation will be globalized. One Sun One World One Grid Project (OSOWOG) is an ambitious solar power project in India that aims to create a global collaboration to share the benefits of infrastructure and solar energy using common resources. It can also be called India's attempt to counter China's One Belt One Road initiative challenging India's sovereignty. The need for this can be understood on the basis of the points in Figure 2.

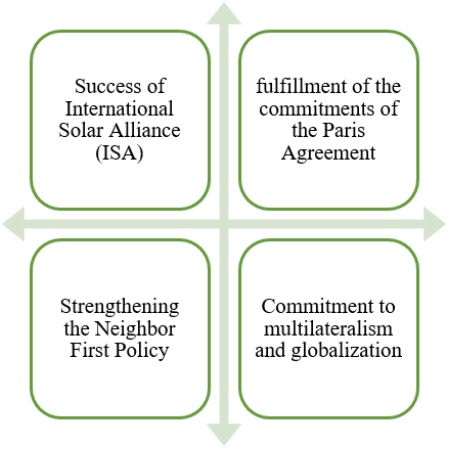

Fig. 2. Importance of 'One Sun One World One Grid' project

Importance of energy security

The Human Development Index (HDI), a comprehensive index of individual standard of living, has a considerable association with a nation's electricity consumption. Low for every capita emissions places economies lower on the Human Development Index. That is, Human Development Index and Energy Consumption are complementary to each other. No country can perform better in the Human Development Index without reducing its energy consumption [2]. Presently India's per capita energy production rate is much lower than developed countries, which needs to be increased. India is striving for this. Recently, the Indian Prime Minister has set a target to increase the renewable energy generation capacity in the UN to 450Gw by the year 2022. India has committed to increase its share in the generation of renewable non-conventional fuels/energy. Energy security is defined as the 3A, availability, accessibility and affordability. In fact, energy security is the uninterrupted availability of energy at affordable prices. That is, energy security is the availability of energy to all without any hindrance at affordable and affordable rates. Long-term energy security and short-term energy security are the two dimensions of energy security. Long-term energy security refers to the long-term investment in energy supply in order to meet economic and environmental needs. The ability of an energy system to respond swiftly to any sudden changes in the energy supply and demand balance is referred to as short-term energy security.

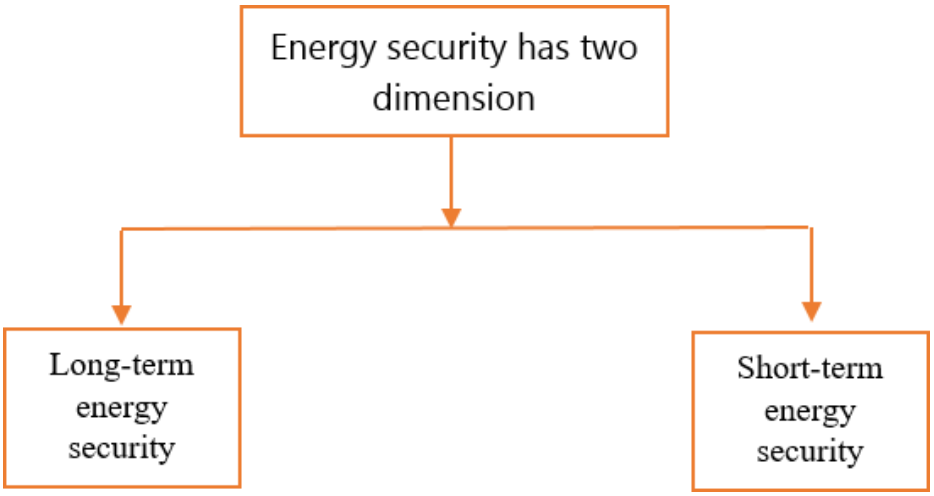

Fig. 3. Energy security dimensions

There is a complementary relationship between the Human Development Index and energy consumption of any country. In fact, energy is the axis of economic and social development of

any country. Economic development of a nation is possible only on the basis of energy resources [1]. Therefore, it is very important to have strong energy security. India needs to become self-reliant in the field of 'energy security' to convert demographic dividend into returns and become a global superpower. Apart from this, energy security is necessary to meet the basic needs. Energy security is also necessary for the strength of the infrastructure. Energy security is important for skill development generation and manufacturing capacity development. SDG-7 aims to ensure access to affordable, reliable, sustainable and affordable energy for all. Pradhan Mantri Ujjwala Yojana and Pradhan Mantri Sahaj Bijli Har Ghar Yojna were launched to ensure availability of LPG connections and electricity in rural areas. Priority is being given to increase the number of electric vehicles, increase the proportion of biofuel and use of compressed biogas. The National Wind Solar Hybrid Policy was an- nounced in the year 2018. Hydrocarbon Exploration and Licensing Policy (HELP) was announced for exploration and exploitation of non-conventional hydrocarbons like shale gas, coal bed methane. National Solar Energy Mission is operating many schemes like Prayas, Kusum, Solar Park, Solar Roof Top Scheme, Solar Defense. NITI Aayog has launched 'India Energy Security Scenery-2047'. International Solar Alliance was established. India has set a target of achieving 40 percent cumulative electric capacity by 2030 from energy resources based on non-fossil fuels.

Future Scope

The world's population is about 7600 million, which may reach 900 million by 2050. Re- sources are being rapidly consumed to meet the needs of this growing population. All non- renewable energy sources are likely to be exhausted in the near future, so the search for renewable energy sources and clean fuels has become an important topic [9]. Talking about India, it is a fast growing economy and 'energy and finance' act as fuel in any economy. In the absence of finance, energy cannot accelerate economic progress. In such a situation, the global investor industry today is looking at the Indian energy sector as an attractive investment destination, to take full advantage of it and make India a new record in the level of renewable energy sources to make the program like Make in India a success. Will be in this, the training given by the Government of India through the 'Surya Mitra App' and the award given in the name of 'Abhinav Soch-Nai Sambhavna' is a commendable step.

Energy storage is also considered very important for India's energy strategy. Therefore, a comprehensive National Energy Storage Mission has been prepared for the betterment of energy storage sector. It has to focus on innovation and policy support in a more effective manner. At the same time, we have to focus on R&D in the energy sector which will ensure quality and reliability in the renewable energy sector. Apart from this, we also have to reduce the consumption of electricity for which 'Green Building Program' can play an important role. The program can improve the air quality and health conditions of the city concerned, apart from improving the energy landscape and ensuring economic savings. If India really succeeds in creating low energy-consuming 'timber' infrastructure, then this infrastructure can prove to be helpful in successfully building inclusive, green, healthy, safe and sound cities in India going forward.

Conclusion

The majority of current societal actions require power. The use of which or intake is commonly used as a measure of a person's living standard. We use power in the form of biomass, coal power, and electrical to making our lives much easier. But this day is on the way to end, so it has become very important to protect it. So for this, the government has made many policies, which they want to tell through this paper. Along with this, how active one should be regarding the safety of energy has also been told in this paper. Big challenges and new opportunities for India's energy supply have also been told. And finally, what work can be done on it in future is also shown in this paper.

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