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Research Article

Role of Biomass (Bio-Diesel, Bio-Ethanol, Biomass Pyro-Lysis), Solar Energy and Green Energy Related Project

Bhavya Tripathi*

Department of Chemical Engineering, Banasthali Vidyapith University, Rajasthan, India

ABSTRACT

The present work outlines the energy crisis produced by burning of excess amount of fossil fuels. The scientists and environmentalists come to realize the importance of renewable amount of energy to eradicate the pollution by developing new technologies and discussing its pros and cons, in addition to it developing sustainable ways to tackle the problem of global warming and green-house effect.

There is a need to understand the development of developing the bio-fuel project by undergoing the cumulative aspects of various environmental, man-made, resource etc. We cannot only rely on the unique aspect of producing bio-fuel products. There are certain numbers of ways to inculcate the agendas related to its development. An attempt was made to produce bio-oil from wheatgrass. In conclusion, the bio-oil was obtained by means of biomass pyrolysis method indicates that it is a good source of bio oil and can be used as a resource of diesel and various petroleum products after grinding, separation, distillation and extraction.

Keywords: Energy; Fossil fuels; Bio-fuel; Petroleum products; Bio-fuel products; CO_2

INTRODUCTION

Biomass

Biomass is the most eminent fuel for producing heat, electricity and light for its ecofriendly environment fuel, replacing on the grounds of economic entity and nature being renewable. Scientists have discovered it on the economic grounds it to be very beneficial for the energy crisis in future. If the consumption fossil fuels is increased day by day. Then one day we will be left with 0% energy fuels, if we are unable harness biofuels for the existence of mankind.

Pyrolysis

It is the process of decomposition of biomass into bio-char and bio-oil, the former can be use Bio-energy is defined as a renewable source of energy which is manufactured from biomass. Organic materials such as trees, plants and waste materials, it is rapid because of rapid growth of fuel prices, fast fossil fuels depletion, environmental degradation by fossil fuels and an alteration of climate change.

Countries like Malaysia and Indonesia are producing world's highest production of palm oil and from this they are producing biodiesel, while in India we have used 5% ethanol in diesel, neem-oil, jatropha, karanja etc.,. In china the major source of ethanol production is corn, it produces around 80%. In Brazil, the production of ethanol, bio-fuels are from physic nut, sunflower, soybean, castor bean, sesame, canola etc. to purify water as a water–filter. Latter can be used as an energy fuel for the replacement of petrol, diesel etc.

Bio-diesel

Bio-diesel is an alternative fuel made from biological sources such as vegetable oils both edible and non-edible, animal fats etc.,. Bio-diesel is a fuel comprised of mono alkyl esters of long chain fatty acids from vegetable oils or animal fats. With the increasing use of diesel, to more attractive bio-fuel products to increase the production of bio-fuels, there are also some alternatives mainly biogas, producer gas, ethanol, methanol and vegetable oils.

Solar energy

The planet (arrangement of solar panels) which converts solar energy to the light energy from the sun into electrical energy (charge emission) is called a solar power plant process. In solar plant there are many solar panels are connected and in panels there are many cells which make panels. In which special metal is used which is the form of lines and these lines are also connected to very thin lines and all these lines are connected to a metal line frame which is mainly quadrilateral in shape. So there is large area to trap light i.e.,

Correspondence to: Bhavya Tripathi, Department of Chemical Engineering, Banasthali Vidyapith University, Rajasthan, India, E-mail: p20200011@pilani.bits-pilani.ac.in

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now there is a suitable area for light to fall on it electrons start's to emit from thin lines to metal frame and current goes into a diode box which is behind the panel and then into supply wires.

Solar power is an immense source of directly useable energy and ultimately creates resources: biomass, wind, hydro-power and wave energy.

Sunlight provides the energy source that powers the earth's climate and ecosystem. Harnessing this energy for hot water and electric power could provide a renewable, low carbon energy source, and presents an attractive way of mitigating climate change. In developing countries, solar technologies are already in use to enhance the standard of living. They are a natural choice where solar influx is high and grid services are unavailable or limited. In developed countries, solar energy can seem less attractive than conventional sources due to its intermittent nature, but with the right technology it can have considerable benefits in terms of reduced carbon emissions and improved energy security. In developed countries, most forms of solar energy are currently more expensive than conventional alternatives. At this pre-competitive stage, incentives are needed to encourage their uptake.

Due to decreasing amount of fossil fuels, the urge to create new, eco-friendly energy is on top priority, that's why we are focusing on solar energy which is eco-friendly and pollution-free. As our earth receives 1366 W approximately, so we need to harness this energy with the combination of PV cells or photo-voltaic to obtain electricity. An increased need of energy needs to be fulfilled by the renewable sources of energy like solar energy and also provide us the parameter of its efficiency from thermoelectric cooling technique.

Solar power is transforming into a boon by its effortless criteria and eco-friendly nature. It has the nature and potential to supply a rapidly growing amount of electricity that is environment friendly and economically attractive nationwide. Its rooftop setting up of solar panels is on high demand to produce electricity.

The idea of generating the strength of solar power generation or increase the overall generation of electricity is distributed generation system. Since the magnitude of electric power generation demand is greater than the electric power production because of the decrease in the supply of natural resources, coal, petrol, diesel etc. In case of hydroelectric power generation, there is not always the fulfillment of production of electricity, as there is low flow of rivers. So there will less or no production of electricity in that particular area, in order to compensate the loss of production of electricity we have an idea to cover the reservoir or dam with the series of solar panels with PV cells. By doing this system the water will not get evaporated, and there will be no loss of energy for the production of electricity as there will be an increment in the output of power and electricity generation.

Being a developing country with a huge burden of fuel import, the need of solar energy research and development in India cannot be over-emphasized. The geographical location of India is also quite favorable for solar energy implementation. However, a densely-populated country like India, with a fragmented electricity market, poses endless challenges to the scientists and entrepreneurs. The nature of Indian electricity market is quite unique, and cannot be compared directly with other countries. Unlike USA or Japan, India has numerous villages and islands unconnected from the main grid, spatial and seasonal variation in agricultural demand, and cottage to large-scale industrial sectors. Our country, therefore, requires solar energy development at different scales such as, small (~W) to large (~MW), grid-connected to islanded, supplemented with some energy-storage to no-storage capabilities. Also important is the hybridization of solar energy with other renewable sources. Considering this socio-economic scenario, the present state of solar energy technology in India stands far from being adequate.

But several initiatives are being planned. On 30th June 2008 the Prime minister of India, Dr. Man Mohan Singh, announced the National Plan for Climate Change. This includes a National Solar Mission to "significantly increase the share of solar energy in the total energy resources while recognizing the need to expand the scope of other renewable and non-fossil options such as nuclear energy, wind energy, and biomass". The Departments of Science and Technology (DST) and the Ministry for New and Renewable Energy (MNRE) have taken initiatives to promote formation of networks of premier research institutes to work on solar power generation related projects. The primary objective of the solar energy research enclave will be two-fold:

a) Establishment of a solar power station that can supply 1 MW 3 power.

b) Outline the research areas that will be explored for sustainable solar energy generation, storage and distribution.

The solar power station will be built in modular fashion such that different technologies can be utilized or tested for generating power. The modules will be designed not only as a demonstrator of existing technologies but also to explore cutting edge research technologies that have potential for economic viability. The over view of the solar power station will be presented in Section 3 The various research projects that will be explored under the present initiative.

Bio-ethanol

The production of ethanol using diverse conversion technologies and various renewable nonfood feedstock marks the beginning of sustainable energy future. Production of ethanol sustainable non-food feedstock in first generation bio-refineries has been recently deployed at commercial scale. Biological conversion processes including hydrolysis-fermentation and syngas fermentation have been developed for the production of Ethanol. Various process configurations are possible in the hydrolysis-fermentation route. Syngas fermentation is an indirect conversion process for production of alcohols and chemicals from CO, CO_2 and H_2. Advancement in metabolic engineering, strain and process development of syngas fermentation resulted in production of new products from syngas and enhanced product selectivity, productivity and yields. Further research efforts should be focused on utilization of different types of non-food feedstock, process integration, metabolic engineering, and discovering new highly productive microorganisms. Ultimately, the reduction in bio-fuels production cost improves their feasibility to become a viable alternative to fossil fuels. Bio-ethanol presents energetic, economic, and environmental challenges, in all the steps of its production (pre-treatment, hydrolysis, fermentation, and distillation). These challenges include lack of cost efficient technology, low yields, costly pre-treatments, cellulose enzymes, and lack of microorganisms capable of fermentation both C5 and C6 sugars.

METHODOLOGY

Biomass

Agricultural industry residues and wastes constitute a significant

proportion of worldwide agricultural productivity. Although the quantity of wastes produced by agricultural sector is significantly low compared to wastes generated by other industries, the pollution potential of agricultural wastes is high on a long-term basis. Agricultural waste is unwanted or unusable materials produced wholly from agricultural operations directly related to the growing of crops or raising of animals for the primary purpose of making a profit or for a livelihood (Figure 1).

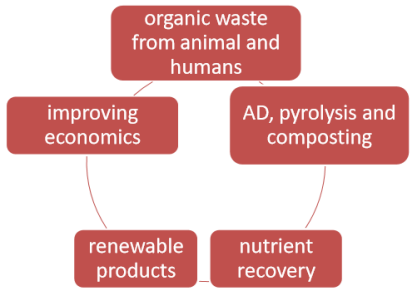

Figure 1: Recycling of biomass production and application.

Some examples of examples of biomass include:

- Grape vines
- Fruit bearing trees
- Vegetables
- Date palm fronds
- Tallow
- Starchy crops
- Algal crops
- Ligno-cellulosic crops

Biomass gasification can be combined with SOFCs has promise for electricity and heat generation, as well as environmental and socio-economic benefits. Drivers for adopting this technology, particularly in remote rural areas, are both environmental and financial, since connection to the grid can be expensive in such areas and biogas can be produced on site with no significant extra costs.

Biomass pyrolysis

Pyrolysis principles: The process of pyrolysis of organic matter is very complex and consists of both simultaneous and successive reactions when organic material is heated in a non-reactive atmosphere. In this process, thermal decomposition of organic components in biomass starts at 350°C-550°C and goes up to 700°C-800°C in absence of nitrogen. The long chains of carbon, hydrogen and oxygen compounds in biomass break down into smaller molecules in the form of gases, condensable vapors (tars and oils) and solid charcoal under pyrolysis conditions.

Pyrolysis classification:There are two types of pyrolysis process: (1) fast pyrolysis (2) slow pyrolysis .In slow pyrolysis, the vapor residence time is too high and the temperature range is too low, whereas in fast pyrolysis, the vapor residence time is small and the temperature range is high enough.

Components of biomass: The components of biomass are cellulose, hemicelluloses and the lignin. The feedstock of biomass contains wood, willow, straw, sweet grass, reed canary grass etc.

Pyrolysis reactors:

- Fixed bed reactor
- Vortex reactor
- Rotating disc reactor
- Vacuum pyrolysis reactor
- Rotating cone reactor

Pyros reactor:

- Auger reactor
- Plasma reactor
- Microwave reactor
- Solar reactor

Pyrolysis process description:

- Feed preparation
- Biomass heating
- Char separation

Pyrolysis products: The quality of bio-oil depends on the raw material and technology used for pyrolysis. The chemical composition of bio-oil, cellulose, hemicelluloses, and lignin are the sources of chemical and physiochemical characteristics of bio-oil. During the pyrolysis the cellulose degrades to form levoglucan, oligosaccharides and other glucose compounds. Hemicellulose forms acetic acid, glycoaldehyde, furfural and anhydroxylopyranose and lignin is converted into aromatic compounds including phenolics and hydrocarbon. From studies we get that the cellulose and hemicelluloses creates maximum yield of bio-oil, lignin leads to bio-char formation (Figure 2).

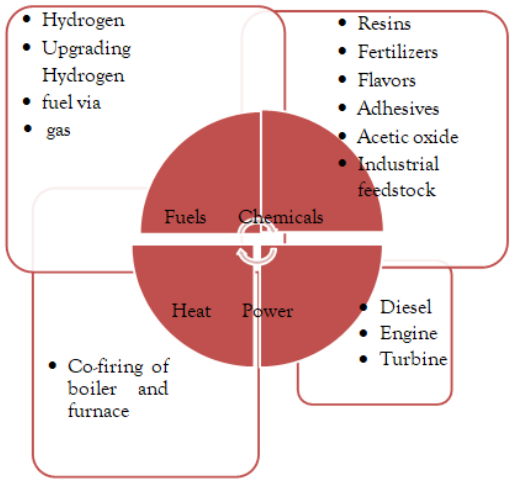

Figure 2: Pyrolysis products manufacturing and applications.

The raw material for the production of bio-oil is black spruce hails from Quebec, Canada is taken here. Here we have used some reactors like auger reactors, bubbling, circulating and spouted reactors, latter 3 reactors comes under the list of fluidized bed rectors, the advantage of using fluidized bed reactor is that it provides conduction heat, convection, and radiation, above all it also facilitates the working under high temperatures requiring

less residence time. In case of auger reactions, it works on less temperatures and preheat-treatment steps applied to biomass, but we prefer fluidized bed reactor because it works on fast pyrolysis at high temperatures. The operational technique we use is fractional condensation; in this we condense the volatile vapors of bio-oil through the dew point differences of condensable components. We obtain a fraction of bio-oil with lower water content and higher quantity of organic compounds can be recovered between 70°C-120°C. The remaining fractions obtained by using low temperature controlled condensers, contains high water content and high-oxygenated compounds.

Bio-diesel

Methods to produce to bio-diesel:

- Production of bio-diesel by trans-esterification
- Production of bio-diesel from edible oil
- Production of bio-diesel from non-edible oil
- Production of bio-diesel from waste cooking oil

The conclusion of literature review:

- Bio-diesel is an important alternative transportation fuel and it possesses properties like renewability, bio-degradability, non-toxicity and environmental friendly benefits.
- Bio-diesel can be produced from different feedstock containing fatty acids such as animal fats, edible oils, non-edible oils, and waste cooking oils and by products of the refining vegetables oils.
- Trans-esterification is a commonly employed method for its production. The purpose of this method is to reduce the viscosity of oil or fat using acid or base to catalyst in the presence of methanol or ethanol.
- Trans-esterification with alkali catalyst (KOH and NAOH) is more economical than acid catalyst and enzyme catalyst.
- The bio-diesel production is strongly affected by parameters such as molar ratio of alcohol, reaction temperature, reaction time and catalyst concentration.

This is the vegetable oil that has had a glycerol removed, a process that involves adding methanol and lye. This makes the mixture less viscous and gives it additional energy density. This makes the fuel easier to use in vehicles year-round, even in winter. Straight Vegetable Oil (SVO) also is a drop-in fuel, but cold weather can cause the fuel to gel. It's important to note that bio-diesel replaces diesel fuel, not gasoline. Most diesel-fueled vehicles in the U.S are heavy-duty and commercial trucks.

Solar energy

The solar energy is produced by the sunlight is a non-vanishing renewable source which is free from eco-friendly. Even hour enough sunlight energy reaches the earth to meet the world's energy demand for a whole year. In today's generation we needed electricity every hour. This solar energy is generated by as per applications like industrial, commercial, and residential. In this article, we have reviewed about the solar energy from sunlight and discussed about their future trends and aspects. The article also tries to discuss working, solar panel types: emphasize the various applications and methods to promote the benefits of solar energy.

Most of the people are aware about non-renewable energy resources. Solar energy has become increase more popular due to their economic benefits. By on battery backup, solar energy can even provide electricity 24 by 7, even on cloudy days and at night. This is also used with inter-grid system with continuously power supply. It has more benefits compared to other forms of energy like fossil fuels and petroleum deposits. It is an alternative which is promise and consistent to meet the high energy demand. Research on solar cell and solar energy is promise has a future worldwide.

The sun is the major source of inexhaustible for planet earth, to generate electricity, purify water ponds etc. Approximately around 4 million joules of energy is required to harvest and some contributions are made by countries like California, India, etc. Are giving their full effort to replace the fossil fuel crisis in transportation sector Policies, investments, and supports (including funding) from various governmental and nongovernmental organizations for solar technologies have helped build up a solid foundation for the exploitation of this renewable sources of system. In addition to, greater subsidiaries should be provided for residential generators over utility-scale generators. In this article, we will discuss about the perspectives of solar energy, related to their potential, present capacity, limitations and policies.

Potential of solar energy technologies and comparisons: Solar energy exhibits the highest global potential since geothermal has a few locations to be planted .some sunniest countries like Africa, western china, California, Australia are labeled very good for solar energy implantation as they have favorable weather conditions like high altitudes, low fugitive dust, high transparency, and low humidity. On global front we observe that, the earth reflects 30% of solar radiation and only 70% is captured and harvested. Recently Morocco is going to launch one of the largest solar energy projects of 200 MW. Now there are two types of solar technologies:

- Passive solar technologies
- Active solar technologies

Technical review: First generation PV panels are made from silicon wafers at relatively high cost. They represent the industry standard, delivering efficiencies between 12%-20% and are particularly durable. Second generation PV devices are made by depositing thin film of semiconductor directly onto glass, metal foil or plastic, reducing the cost of materials but resulting in a loss in efficiency (usually to 10% less) when manufactured over large areas. All plastic, flexible solar cells have the possibility of very low manufacturing cost, but the efficiency (4%) and lifetime (typically one year of operation) need to be improved. Third generation, PV devices, currently under development, aim to improve the efficiency of solar conversion towards the thermodynamic efficiency limit of 86.8%. Currently, the highest efficiencies achieved are around 40%, with very high costs. Nevertheless, these technologies are used in terrestrial concentrator solar power plants and used to power modern communication satellites. On the domestic scale, the quantity of electricity that PV panels can provide depends upon their efficiency, size and local level of solar illumination. PV panels suitable for use of roofs are now manufactured in sufficient quantity that the electricity generation is favorable in almost reaches grid parity (Figures 3-5).

Figure 3: Passive solar technologies.

Figure 4: Active solar technologies.

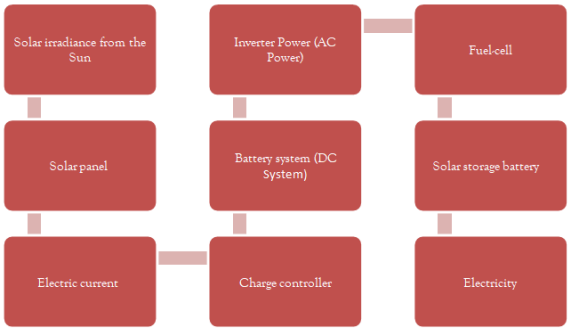

Figure 5: Solar energy production cycle.

Bio-ethanol

In this paper, we have taken the strain of yeast K. Marxiamus separated from bagasse hydrolyses. It has grown under both aerobic and anaerobic conditions at 48 and produced ethanol efficiently by fermentation. It can also utilize the cellobiose, xylose, arabinose, and lactose without them into ethanol by fermentation. At 42, the strain of above yeast produced ethanol, but at 30, we used eucalyptus-cedar hydro-lysates poorly produced ethanol. On other we have taken another yeast strain called *S.cerevisiae* produced more yield of ethanol than the former strain of yeast same conditions.

In this paper we have discussed about producing bio-ethanol from lingo-cellulosic biomass, first step is pre-treatment, the process consists of ultra-filtration, nano-filtration, in addition to it enhancing of pre-treatment involving fungi (*T.reesi* and *Basidiomycetes*), *Candida*, Pichai and Dekkra from sugarcane molasses, with low pH and high temperature. This process requires genetically modified fermentative and cellulolytic microorganisms under the stress conditions of the ethanol yield and productivity for the production bio-ethanol processes. Simultaneous saccharification and combined fermentation of enzymate hydrolyzate and also CBP is considered appropriate for cost reducing and effective. Here is genetic engineering is playing a vital role for the production of bio-ethanol and also their recombination's of DNAs play a good role in this process of their fungi.

The cellulosic bio-ethanol production process involves specific processing steps, especially in the pre-treatment and hydrolysis. Fermentation of C5 and C6 sugars needs adapted microorganisms, still to be further investigated.

New combined processes reduce both the number of operation steps and the production of chemical inhibitors. Recent advances in genetically engineered *S.cerevisiae* and *Z.mobilis* are promising for higher alcohol tolerance and conversion efficiency. Second generation bio-ethanol could surpass the traditional first generation processes, provided present processing bottlenecks are removed and the best combination of advanced system is used. With the urge of the fossil fuels, on the depletion zone, the demand of petroleum products have been on a low mode because of its drastic depletion. So we have invented a lingo-cellulosic biomass which consists of the cellulosic, hemicellulose and lignin is processed along with the distillation, pretreatment, enzymatic hydrolysis, fermentation and dehydration.

Shifting the transport sector from petroleum and gasoline towards more sustainable, renewable and environmentally friendly energy sources such as second generation bioethanol is one of the greatest challenges in engineering. The production of lignocellulosic bio-ethanol requires improvements related to the pre-treatment, enzymatic hydrolysis and fermentation stages, in order to increase the cost-effectiveness of ethanol production, and to make the transition from the laboratory to the industrial/commercial scale. One of the most important goals is to increase the efficiency of the fermentation process to the point where all the sugars (pentose and hexoses) released during the pretreatment and hydrolysis steps are fermented to ethanol. Technical barriers to second generation biofuels production include the variable composition of biomass, generation of inhibitors during pre saccharification treatment, end-product inhibition, osmotic, progress is being made and these technical barriers can be expected to be overcome in the near future, optimizing the bio-chemical.

Bio-ethanol presents energetic, economic, and environmental challenges, in all the steps of its production (pre-treatment, hydrolysis, fermentation, and distillation). These challenges include lack of cost-efficient technology, low yields, costly pre-treatments, cellulose enzymes, and lack of microorganisms capable of fermentation both C5 and C6 sugars. Further research needs to be done in all the stages of the process to increase the efficiency of the production and decrease the costs.

In the distillation process, the biggest challenge refers to the large fraction of biomass waste that is produced and left unused at the end of process. The best solution for utilization of these waste-products is still under investigation.

Utilization of waste-products through further AD has been as a possible path to reduce costs of bio-ethanol production by adding economic value to the production chain, increasing the efficiency of the process, and as an environmental solution to a large quantity of process residue with high BOD that is generated during bio-ethanol production (Figures 6 and 7)

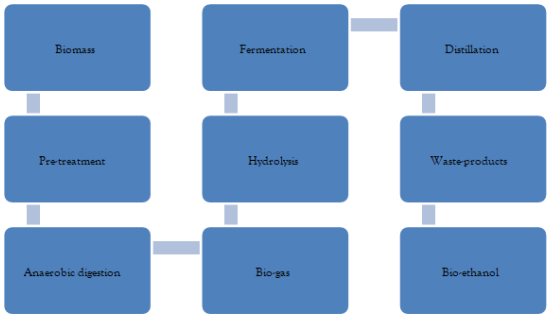

Figure 6: Bio-ethanol production cycle.

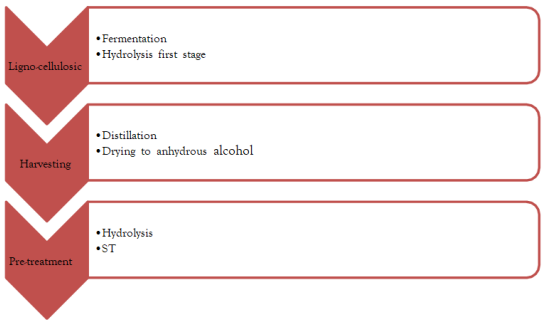

Figure 7: Production of bio-ethanol from lingo-cellulosic plants.

Green technology

As the world continues to transition toward carbon emissions–free energy technologies, there remains a need to also reduce the carbon emissions of the chemical production industry. Today many of the world's chemicals are produced from fossil fuel-derived feedstock. Electrochemical conversion of carbon dioxide (CO_2) into chemical feedstock offers a way to turn waste emissions into valuable products, closing the carbon loop. When coupled to renewable sources of electricity, these products can be made with a net negative carbon emissions footprint, helping to sequester CO_2 into usable goods. Research and development into electro-catalytic materials for CO_2 reduction has intensified in recent years, with advances in selectivity, efficiency, and reaction rate progressing toward practical implementation. A variety of chemical products can be made from CO_2, such as alcohols, oxygenates, synthesis gas (syngas), and olefins-staples in the global chemical industry.

Because these products are produced at substantial scale, a switch to renewably powered production could result in a substantial carbon emissions reduction impact. The advancement of electrochemical technology to convert electrons generated from renewable power into stable chemical form also represents one avenue to long-term (e.g., seasonal) storage of energy.

The subject of Renewable Energy (RE) concerns experts as well as the general public increasingly. Studies on Renewable Energy Sources (RES) has increased in the last years in absolute and relative terms [1].RES can perform an important role by addressing the issues of fossil fuel depletion and global warming [2]. Fossil fuels, nuclear resources, and renewable resources are the three main sources of energy. RES such as solar, wind, biomass, geothermal, and hydro-power are utilized to reproduce energy and are therefore extensively useful to combat energy crises [3-5]. A recent study of communities in Western Greece focused on the public attitude and the willingness to pay for electricity from renewable electricity sources. Renewable energy resources are considered clean energy resources and are critically important due to their environmental-friendly nature. With the increase in awareness of a clean environment, it is believed that traditional dependence on fossil fuels has led to carbon dioxide.

The use of renewable energy resources, such as solar, wind, and biomass will not diminish their availability. Sunlight being a constant source of energy issued to meet the ever increasing energy need. This review discusses the world's energy needs, renewable energy technologies for domestic use, and highlights public opinion on renewable energy.

A systematic review of the literature was conducted from 2009 to 2018. During this process, more than 300 articles were classified and 42 papers were filtered for critical review. The literature analysis showed that despite serious efforts at all levels to reduce reliance on fossil fuels by promoting renewable energy as its alternative; fossil fuels continue to contribute 73.5% to the worldwide electricity production in 2017. Conversely, renewable sources contributed only 26.5%. Furthermore, this study highlights that the lack of public awareness is a major barrier to the acceptance of renewable energy technologies. The results of this study show that worldwide energy crises can be managed by integrating renewable energy sources in the power generation. Moreover, in order to facilitate the development of renewable energy technologies, this systematic review has highlighted the importance of public opinion and performed are all-time analysis of public tweets. This example of tweet analysis is a relatively not initiative in a review study that will seek to direct the attention of future researchers and policymakers toward public opinion and recommend the implications to both academia and industries.

Electricity consumption will comprise an increasing share of global energy demand during the next two decades. In recent years, the increasing prices of fossil fuels and concerns about the environmental consequences of greenhouse gas emissions have renewed the interest in the development of alternative energy resources. In particular, the Fukushima Daiichi accident was a turning point in the call for alternative energy sources. Renewable energy is now considered a more desirable source of fuel than nuclear power due to the absence of risk and disasters. Considering that the major component of greenhouse gases is carbon dioxide, there is a global concern about reducing carbon emissions. In this regard, different policies could be applied to reducing carbon emissions, such as enhancing renewable energy deployment and encouraging technological innovations. Two main solutions may be implemented to reduce CO_2 emissions and overcome the problem of climate change: replacing fossil fuels with renewable energy sources as much as possible and enhancing energy efficiency. In this paper, we discuss alternative technologies for enhancing renewable energy deployment and energy use efficiency.

Considering that the major component of Green House Gases (GHGs) is carbon dioxide, there is a global concern about reducing carbon emissions. In this regard, different policies could be applied to reduce carbon emissions, such as enhancing renewable energy deployment and encouraging technological innovations. In addition, supporting mechanisms, such as feed-in tariffs, renewable portfolio standards and tax policies, are employed by governments to develop renewable energy generation along with implementing energy use efficiency for saving energy. Many countries have started to install facilities that use renewable energy sources for power generation. The importance of alternative energy sources comes together with climate change challenges associated with the excessive use of fossil fuels. There are three primary motivators that stimulate the growth of renewable energy technologies: energy security, economic impacts and carbon dioxide emission reduction. The term "Alternative Energy" refers to any form of energy other than the conventional sources of energy, including hydropower. In recent years the focus has been on renewable energy sources. IEA (2012 d) refers to two significant global trends that should characterize the deployment of renewable technologies over the medium term. First, as renewable electricity technologies scale up, from a total global supply of 1,454 Giga Watts (GW) in 2011 to 2,167 GW in 2017, they should also spread out geographically. Second, the more recent years of high fossil fuel energy use has

led renewable technologies to become increasingly competitive on a cost basis with their alternatives in a number of countries and circumstances. According to IEA calculations, wind is the most competitive type of renewable energy technology among the other options, if local conditions such as financing, CO_2 emission levels and fossil fuel prices prove favorable.

The world is fast becoming a global village due to the increasing daily requirement of energy by all population across the world while the earth in its form cannot change. The need for energy and its related services to satisfy human social and economic development, welfare and health is increasing. Returning to renewables to help mitigate climate change is an excellent approach which needs to be sustainable in order to meet energy demand of future generations. The study reviewed the opportunities associated with renewable energy sources which include: Energy Security, Energy Access, Social and Economic development, Climate Change Mitigation, and reduction of environmental and health impacts. Despite these opportunities, there are challenges that hinder the sustainability of renewable energy sources towards climate change mitigation. These challenges include Market failures, lack of information, access to raw materials for future renewable resource deployment, and our daily carbon footprint. The study suggested some measures and policy recommendations which when considered would help achieve the goal of renewable energy thus to reduce emissions, mitigate climate change and provide a clean environment as well as clean energy for all and future generations.

Research into alternate sources of energy dated back in the late 90s when the world started receiving shock from oil produces in terms of price hiking [6]. It is evidential in literature that replacing fossil fuel-based energy sources with renewable energy sources, which includes: bioenergy, direct solar energy, geothermal energy, hydropower, wind and ocean energy (tide and wave), would gradually help the world achieve the idea of sustainability. Governments, intergovernmental agencies, interested parties and individuals in the world today look forward to achieving a sustainable future due to the opportunities created in recent decades to replace petroleum-derived materials from fossil fuel-based energy sources with alternatives in renewable energy sources. The recent launch of a set of global SDGs is helping to make sure that climate change for twenty-first century and its impacts are combated, and a sustainable future is ensured and made as a bequest for future generations (Figure 8) [7].

Figure 8: Green technology applications.

Initiatives taken by government of India on renewable source of energy

Government policies of solar energy in India: Due to limited domestic fossil fuels reserve, the India has strong planning to expand the renewable energy sources for power sector:

1. To supply the electricity to all the areas included the rural areas as mandated in section 6 of electricity act. Both the Central and State Government will jointly installed to achieve this objective at the earliest. Rural Electrification will be done for securing electricity access to the entire household in rural sector. Most of this requirement will be fulfilled by use of renewable energy sources.

2. Reliable rural electrification would be done either through conventional or non-conventional methods of electricity whichever is more suitable and economical. Non-conventional sources of energy especially Solar can be utilized even where Grid connectivity exists.

3. Particular attention is to be given to Dalit Bastis, Tribal areas and other weaker sections of the society the other newer resources.

4. Rural Electricity Corporation of India (REC) is the nodal agency at central govt. Level to implement these programs of electrification in rural areas. The REC will install all the goals set up by the National Common Minimum Program ensuring timely implementation.

5. Responsibility of operation and maintenance and cost recovery could be discharged through appropriate arrangement with Panchayats, Local Authorities, BDO, and NGO etc.

6. This Great task of Rural Electrification requires cooperative efforts of all agencies like Govt. Of India, State Government and community education cell in rural areas.

7. The Electricity act 2003 has provision of restructuring the electricity industry which unbundled the vertically integrated electricity supply in each state. Now generation, transmission and distribution companies have been formed by the Regulatory Commission of state electricity board. Regulatory Commission will also specify the minimum percentage of electricity that each distribution utility must get from renewable energy sources.

New techniques to increase the solar power efficiency: Many of them are explained given below:

1. Solar cells of higher efficiency have been developed having conversion efficiency more than 37% as compared to the previous solar cells having efficiency of 27% made of two materials. Tata power is going to install the solar panels having 35% efficiency. In These cells three photo absorption layers are stacked together. This has been developed by stacking Indium, Gallium and arsenide as the bottom layers. These cells have capability of absorbing the light from various wavelengths available in sunlight and convert into electrical energy. Through optimal process the active area has been increased [8]. This breakthrough in technology has been done by new energy and industrial technology development organization.

2. The conversion efficiency of solar panels/plates is increased by newer devices of cleaning these panels. The device makes use of automated "dry-sweep" to push dust and dirt away from the surface of these devices. In South Arabian these devices, which is very rugged and have low maintenance cost. The device is powered by the lithium ion batteries. These batteries are charged by the array itself and have high efficiency. The device has moving parts. It is very interesting that this act like a robotic arm and automated work with scheduling. The device can jump the obstacle between the panels.

3. Throughout the world research and development is done

to procure more and more energy from various devices and technologies. Under this concept Japan developed a fabric which is known as a solar cell fabric capable of harnessing the energy from sunlight while you are moving by wearing this fabric made cloth. This fabric is made from wafer thin solar cells woven in a stylish way. The electricity generated will be capable to charge the mobile and other portable electronic gadgets. The thread used will be stronger and which increases the life or durability of the fabric cloth. The same idea can be embedded/used in the blind makers and certain type of curtain will also generate power, when sun raise on these. Various companies developing this type of fabric in association with solar cell maker. This will help the men to recharge these small gadgets while in sun.

4. As we are aware of that electrical power demand is increasing and viewing the climatic concerns it is desired that renewable energy sources especially solar may be integrated to the utility grid. By using better flexibility in integration through power electronics [9]. Harmonics can be reduced and the reactive power can be balanced.

5. In these days most of the power industries switchover side by side starting manufacturing of the solar inverters of high capacity. These may be utilized to get emergent power if not continues at remote locations where there is no grid supply.

6. CSP systems technology is used for power generation in the system large, flat, sunlight mirrors known as heliostats receive sun light at the top of the tower. A fluid for heat transfer is used to generation the steam which is used for production of electrical power. In some countries the capacity of these plant as high as up to 200 MW. These power tower are very popular in these days because of solar to electrical conversion efficiency is high.

RESULTS

Biomass

Merits:

- It is widely available as a renewable source of energy.
- It is carbon neutral.
- It is less expensive than fossil fuels.
- It adds revenue in landfills.

Demerits:

- Agricultural wastes will not be available if the basic crop is no longer grown.
- Additional work is needed in areas such as harvesting methods.
- Land use for energy crops maybe in demand for other purposes, such as farming, conservation, housing, resort or agricultural wastes.
- Some biomass conversion projects are from animal wastes and are relatively small and therefore limited.

Biomass pyrolysis

Merits:

- It is a simple, inexpensive technology for processing a wide variety of feedstock.
- It reduces wastes going to landfill and greenhouse gas emissions.
- It reduces the risk of water pollution.

Demerits:

- The product stream is more complex than for many of the alternative treatments.
- The product gases cannot be vented directly in the cabin without further treatment because of the high CO concentrations.

Bio-diesel

Merits:

- It is produced from renewable resources.
- It can be used in existing diesel engines.
- Less greenhouse gas emissions.
- Grown, produced and distributed locally.
- Cleaner bio-fuel refineries.
- Bio-degradable and non-toxic.

Demerits:

- Variation in quality of bio-diesel.
- Not suitable for use in low temperatures.
- Food shortage.
- Increased due to fertilizers.
- Clogging in engines.
- Regional suitability.
- Water shortage.

Solar energy

Merits:

- It is eco-friendly and renewable source product.
- Reduces electricity bills.
- Diverse applications.
- Low maintenance costs.
- Rise in technology development.
- Reducing the global warming effect by generating electricity through solar energy.
- Good ratio of power efficiencies ratio than coal, petroleum products etc.
- A team of MIT (USA) has developed a new solar cell using two different layers of sunlight absorbing material to harvest a broader range of suns' energy, using a heat-resistant device to generate electricity by using a green polymer obtained from bio-waste was applied to the dye-sensitized solar cells.

Demerits:

- High initial costs.
- Lengthy payback period and small revenue.
- Performance limitations of other battery components like (batteries. Inverters) need a side improvement.
- Factors associated loss of skilled workers, demands for installation, maintenance etc. need to be supervised.
- The plausibility of cracks within PV module, water intrusion,

exposure to dust, and algal growth can greatly lower the performance of the system.

Bio-ethanol

Merits:

- It is a renewable source of energy.
- It is cheaper than petrol.
- It burns more cleanly in air than petroleum, producing less carbon (soot) and carbon monoxide.

Demerits:

- It may undergo oxidation reaction to form acetic acid, which corrodes engine parts.
- It has lower heat of combustion.
- Various environmental problems may arise out of disposal of fermented liquors.
- Environment.
- Costs.
- Energy.
- Waste-products.

DISCUSSION

Ongoing concerns about climate change have made renewable sources of energy an important component of the world energy consumption. Renewable sources technology can reduce carbon dioxide emissions by replacing fossil fuels in the power generation and transportation sector. Due to negative and irreversible externalities in conventional energy production, it is necessary to develop and promote renewable energy technologies. Power generation using renewable energy sources should be increased to decrease the unit cost of energy and to make them compatible with a competitive alternative to the conventional energy sources [10]. Two main solutions may be implemented to reduce CO_2 emissions and to overcome the problem of climate change: Replacing fossil fuels with renewable energy sources as much as possible and enhancing energy efficiency regardless of type. In this literature review, we have considered hydro, wind, solar and geothermal sources. Renewable energy production and supply is continuously increasing on global level.

Here we are discussing about the hydro power is the largest renewable energy source for power generation around the world. Hydro power is attractive due to a combined supply of water for agriculture, household, recreation and industrial use. In addition to it, it can store water and energy that can be used for both base and peak load power generations. Also it has very less cost efficiency. It needs to be implemented in perennial river site location for the project to be implemented.

Now we have also considered about geothermal energy which is originated under the earth's crust in the form of vapor heat or steam generation. It is also cost efficient and beneficial to produce energy efficiency.

Energy is a requirement in our daily lives, we make every possible effort to make our both ends need through energy. Primarily there are two types of source of energy: (1) Nonrenewable source (2) renewable source of energy. The former consists of: petroleum products, wood, charcoal, other inorganic chemical compounds, plastics, fossil fuels, etc. The latter consists of: solar energy, wind energy, OTEC, biomass, bio-gas, hydro energy, wave energy etc. According to the renewable energy production biomass, biofuel and biogas energy and wind energy are the most prominent sources of eco-friendly energy production. By further inventions from bio-fuel crops like sugarcane, palm oil, jatropha etc. are discovered by environmental scientists to improve the energy efficiency.

The renewable sources of energy involves following factors:

- Energy security.
- Social and economic development.
- Energy access.
- Climate change mitigation and reduction of environmental and health impacts.

Challenges affecting renewable energy sources:

- All sectors and regions have the potential to contribute by investing in renewable energy technologies and policies to help reduce it.
- Reducing the carbon footprint through the changes in our lifestyle and behavior patterns can contribute a great deal to the mitigation of climate change.
- Research into innovation and technologies that can reduce land use and reduce accidents from renewable energy sources and the risk of resource competition, for example, in bio-energy where food for consumption competing with energy production.
- Enhancing international cooperation and support for developing countries towards the expansion vices as a way of mitigating climate change and its impact.

There are following factors affecting the policies and policy instruments:

- Technological innovation.
- Cost.
- Barriers (market failures, lack of information, future limited access to raw materials and economic).
- Growth affecting the renewable sources supplies (sources and technologies) and sustainability.

From the findings the following suggestions are made:

- Formulation of policies and discussions from all sectors towards the improvement of technologies in the renewable sector to sustain them.
- Efforts that aim at increasing the share of renewable sources of energy and clean fuel technology into global portfolio will help reduce climate change and its impact.
- Increase research in these areas, so that the fear of some renewable posing risks in the future is limited.
- Improve education, awareness-raising and human institutional capacity on climate change mitigation, adaption, impact reduction and early warning. Developed countries should incorporate de-carbonization policies and strategies into the industry, energy, agricultural, forest, health, transport, water resource, building and other sectors that have the potential of increasing the greenhouse gas emissions.

CONCLUSION

The objective of the overview of this consolidate report is to give the importance of RET (Renewable Energy Technologies) and RES (Renewable Energy Sustainability). RES such as solar, wind and biomass are mostly used in the manufacturing of domestic products namely windmills to produce electricity, water pumps and heat and power generation, etc. Among all types of renewable energies, solar energy is available in the majority of the world. This is the reason for solar energy being the most suitable substitute for fossil fuels and most household products leverage solar energy in RET. In order to ensure sustainable development for the future generations, it is indeed important to raise awareness about RES. RE can be utilized in making many products employed in daily use, such as solar cookers, solar cookers and heaters, as well as solar dryers. The application of RES such as solar is worldwide. Biomass assists to absorb dangerous gases such as CO_2 and can also be used for electricity and as a fuel. Wind is another useful RES resource that can be used to produce electricity and power generation. Our findings endorse the fact that the success of RE may be gained by providing greater awareness of RES and RET to the public. This can be achieved by introducing educational programs related to RE through domestic and international platforms.

We have to establish these two prominent factors at domestic level and public opinion about the use of RET through the use of well-established keywords. Overall the analysis is a qualitative interpretation of RES and RETS practices among the public providing aggregate overview of the research and thus allowing us to systematically identifying future research avenues. We hope this symmetric review can assist both academia and industry to promote renewable energy and encourage the analysis of public opinions that are present in twitter or other social network platforms such as LinkedIn.

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