SavitribaiPhule Pune University

Proposed structure of T. Y. B. Sc. (Physics) revised syllabus

To be implemented from 2014-2015

Sem III	Sem IV
PH-331: Mathematical Methods in Physics II	PH-341 Classical Electrodynamics
PH 332: Solid State Physics	PH-342: Quantum Mechanics
PH-333: Classical Mechanics	PH-343: Thermodynamics and Statistical Physics
PH-334: Atomic and Molecular Physics	PH-344: Nuclear Physics
PH-335: Computational Physics	PH-345: Electronics/Advanced Electronics
PH-336 Elective I : (Select any One)	PH-346 Elective II : (Select any One)
A: Astronomy and Astrophysics	G: Medical Electronics
B: Elements of Materials Science	H: Physics of Nanomaterials
C: Motion Picture Physics	I: Microcontrollers
D: Biophysics	J: Electro Acoustics and Entertainment Electronics
E: Renewable Energy Sources	K: Lasers
F: Applied Optics	L: Radiation Physics
PH-347: Laboratory Course I PH-348: Laboratory Course II PII-349: Laboratory Course III (Project)	

should be equivalent to twenty experiments.

T. Y. B. Sc. Physics

PH348: Laboratory Course II

GROUP I

ELECTRONICS (ESSENTIAL) (ANY TWO)

(For the students not offering advance electronics in theory courses)

1. Characteristics of JFET
2. Design and built astablemultivibrator using IC 555/IC 741
3. IC 723 as regulated power supply
4. Integrator and differentiator using IC 741

ADVANCED ELECTRONICS (ANY TWO)

(For the students offering advance electronics in theory courses)

1. Instrumental amplifier using three op-amps
2. Temperature controller using PT 100 / thermocouple /thermistor temperature sensors
3. Object counter (two digit)
4. Study of LVDT
5. Schimdt trigger

ACOUSTICS and Lasers (ANY TWO)

1. Frequency response of loudspeaker (twitter, woofer, mid-range)
2. Study of interference by Quinck's method
3. Use of Ultrasonic interferometer to measure velocity of sound in liquids
4. Transmission loss using expansion chamber muffler.
5. Study of diffraction using a reflection grating (metal ruler)
6. Study of the characteristics of a laser beam.
7. Determination of the diameter of a thin wire using a laser beam.

NOTE: Four practicals will be from **optional course I and II** (two each).

GROUP II

COMPUTER INTERFACED PHYSICS EXPERIMENTS/INSTRUMENTATION (ANYTWO)

1. Charging and discharging of capacitor and RC time constant
2. Measurement of g using simple pendulum
3. Velocity of sound
4. Radiation detection
5. IV Characteristics of diode
6. Temperature controller using AD590
7. Study of IC 7490 as mod 2, mod 5, mod 7 and mod 10 counter

C-PROGRAMMING (ANY FOUR)

1. Factorial of a number by simple and recursive method.
2. To find out the first 100 prime numbers
3. Matrix multiplication
4. Graphics (line, circle, arc, ellipse, bar, draw poly)
5. Position time data using kinematic equations
6. Finding pressure using Vander Waals' equation of state

COMPUTATIONAL PHYSICS (NUMERICAL BASED) (ANY TWO)

1. Roots of an algebraic equation (Bisection)
2. Roots of polynomial (Newton Raphson)
4. Trapezoidal and Simpson's 1/3 rule

Additional Activities (Any Two)

a. Demonstrations- Any 4 demonstrations equivalent to 2 experiments

b. Study tour with report equivalent to 2 experiments

c. Mini project equivalent to 2 experiments

d. Computer aided demonstrations (Using computer simulations or animations) (Any 2 demonstrations equivalent to 2 experiments)

e. Use of plagiarism software to find plagiarism in research work.

Students have to perform at least two additional activities in addition to sixteen experiments mentioned above. Total laboratory work with additional activities should be equivalent to twenty experiments.

PRINCIPAL
K.K.H[illegible]'s, S.M.G.L. Comm.
& [illegible].J. Science College,
Chandwad Dist. Nashik.

LODHA COM. JAIN SCIENCE COLLEGE
CHANDWAD (NASHIK)

Justification of Renewable & non- Renewable energy sources and It's present scenario

A project report Submitted by

AHIRE VRUSHALI BHALCHANDRA

Seat No: 37246

Under guidance of

Ms. Sampada Thakare

Department of physics

In the partial fulfillment for the award of the degree of Bachelor of science In PHYSICS

SNJB's KKHA Arts , SMGL Commerce & SPHJ Science College , Neminagar Chandwad - 423101 Dist. Nashik

Savitribai Phule Pune University, pune

Academic year : 2020-2021

Seat No: 37246

Certificate

Certified that this project report "JUSTIFICATION OF RENEWABLE OR NON RENEWABLE ENERGY SOURCES &.ITS PRESENT SENARIO" is the bonafied work of "AHIRE VRUSHALI BHALCHANDRA" of T.Y.B.sc(PHYSICS) during the academic year 2020-2021 who carried out project work under my supervision .

Ms. Sampada Thakare

(Project Guide)

Smt.Dr.Sarika D. Shinde

(Head of Department)

HEAD
Department of Physics
KKHA Arts, SMGL Commerce &
SPHJ Science College, Chandwad
Dist- Nashik 423 101 Maharashtra

ACKNOWLEDGEMENT

I Wish to thank the principle DR.G. H. Jain of my college for permitting me to use all the facilities available in the institution for my project work .I would also like to thank the head of department DR.Sarika D.Shinde ,The teaching faculty the and all the non- teaching staff of my college for their support in completing the work successfully .

I am grateful to my Guide Sampda thakre for his encouragement , guidance and supervision of my project work during the year . My classmates have been of great help to me during the project work. My ideas were shaped and refined progressively through my discussions with them from time to time. I cannot miss to thank them all. I hereby appreciate their contribution and thank them too.

THANK YOU

AHIRE VRUSHALI BHALCHANDRA

T.Y.BSc (PHYSICS)

INDEX

Justification of Renewable or Non-Renewable energy Sources & its present scenario.

1. INTRODUCTION

1.1 INTRODUCTION TO ENERGY SOURCES:

Energy is absolutely needed part of our living the standard of living of people across countries is determined by many factors one of which is the energy consumption .Acess to various energy resources is the cause behind the growing imbalance from country to country. The sources are not proportional distributed among countries leading thereby some Nations can make use of resources in the best efficiently. leading to better services to its people and his improve the standard of living.

Start with the introduction of energy and its different sources and the need felt to switch to renewable energy resources . Coal, nuclear energy , natural gas, petroleum, diesel and hydroelectric are some of the traditional sources of energy use worldwide for the generation of electricity. The priority on fossil fuels are the source of energy has shifted to unconventional sources of energy which are clean and renewable. then need to look for alternative source of energy was felt long back by nations extreme climate changes started to pose a potential threat to the existence of life in future on Earth global population is expected to increase from 6 billion to 11 billion in century and the life explain expectancy has increased two times in the last two centuries and the energy requirement has increased 35 times in the same period energy security sustainability and environmental concerns are the major factors behind shifting to renewable sources of energy

Across the world are exploring this segment and the trying to achieve maximum possible uses of the solar sources in the energy mix thereby contributing life to greenhouse gas emission totally today India perhaps the only ministry of non- conventional energy sources in the world the ministry manages one of the world largest renewable energy programs covering the whole spectrum of memorable energy technologies for a variety of grade of grade application the country has the largest solar energy program the second-largest biogas and improve the cook stoves program and feet largest wind power program .With constraints faced in resource availability and in delivery mechanism traditional means of energy supplier falling short renewable energy can make sustainable contribution in the regard .

Since traditional people have been using conventional sources of energy for various purposes which ultimately lead to need their need energy needs and requirements need to do they realise that the use of such resources not only was the stock available for future generation but also for the serious environmental Thread to the world in general the cheap availability of these resources keep their demand a all time high . if this trend continues in future we might to have the face seriously energy shortage because once gone this resource cannot be really an otherwise you will take millions of your to form a given the energy shortage because once gone these resources cannot be renewed and otherwise would take millions of the fuel cost in future .

Renewable resources, on the other hand, replenish themselves. The five major renewable energy resources are: Solar, Wind, Water also called hydro, Biomass or organic material from plants and animals .the advantage of unlimited supply over the long haul, they are limited in their availability at any given moment.

Most renewable energy sources are also clean in there used faster than they replenish (they may be finite or not). Biomass and biofuels are an interesting case. If they are used faster than their natural growth rate, or in an unsustainable way, they can also become nonrenewable.

Solar energy:

The sun is the world primary source of energy and solar power can harness the sun's rays as high temperature , clean energy source for heat or electricity. The conversion of solar radiation for heating and cooling purposes. solar technologies are broadly characterized . Solar energy in the form of heat is collected through devices such as solar cookers , solar cells & solar heaters . Solar energy is radiant light and heat from the Sun that is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaics, solar thermal energy, solar architecture, molten salt power plants and artificial photosynthesis.

It is an essential source of renewable energy, and its technologies are broadly characterized as either passive solar or active solar depending on how they capture and distribute solar energy or convert it into solar power. Active solar techniques include the use of photovoltaic systems, concentrated solar power, and solar water heating to harness the energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light-dispersing properties, and designing spaces that naturally circulate air.

Wind energy :

Wind power or wind energy is the use of wind to provide mechanical power through wind turbines to turn electric generators for electrical power. Wind power is a popular sustainable, renewable energy source that has a much smaller impact on the environment compared to burning fossil fuels. Wind farms consist of many individual wind turbines, which are connected to the electric power transmission network. Onshore wind is an inexpensive source of electric power, competitive with, or in many places cheaper than, coal or gas plants. Onshore wind farms have a greater visual impact on the landscape than other power stations, as they need to be spread over more land and need to be built in rural areas, which can lead to "industrialization of the countryside" and habitat loss. Offshore wind is steadier and stronger than on land and offshore farms have less visual impact, but construction and maintenance costs are significantly higher. Small onshore wind farms can feed some energy into the grid or provide power to isolated off-grid locations.

Wind power is an intermittent energy source, which cannot be dispatched on demand. Locally, it gives variable power, which is consistent from year to year but varies greatly over shorter time scales. Therefore, it must be used with other power sources to give a reliable supply. Power-management techniques such as having dispatchable power sources (often gas-fired power plant or hydroelectric power), excess capacity, geographically distributed turbines, exporting and importing power to neighboring areas, grid storage, reducing demand when

wind production is low, and curtailing occasional excess wind power, are used to overcome these problems. As the proportion of wind power in a region increases, more conventional power sources are needed to back it up, and the grid may need to be upgraded. Weather forecasting permits the electric-power network to be readied for the predictable variations in production that occur.

Hydroelectric energy:

The dam is build on large river having has a large drop in elevation. **r**iver The dam stores lots of water behind it in the reservoir. Near the bottom of the dam wall there is the water intake. Gravity causes it to fall through the penstock inside the dam. At the end of the penstock there is a turbine propellor, which is turned by the moving water. The shaft from the turbine goes up into the generator, which produces the power. Power lines are connected to the generator that carry electricity to your home and mine. The water continues past the propellor through the tailrace into the river past the dam. By the way, it is not a good idea to be playing in the water right below a dam when water is released. **A hydraulic turbine converts the energy of flowing water into mechanical energy. A hydroelectric generator converts this mechanical energy into electricity.**

Biomass & biofuels :

Biomass is organic matter – anything that is alive or was a short time ago - that can be used as an energy source. Examples of biomass include wood, crops, seaweed and animal waste. Biomass gets its energy from the Sun and is a renewable energy source.

Wood and wood residues is the largest biomass energy source today. Wood can be used as a fuel directly or processed into pellet fuel or other forms of fuels. Other plants can also be used as fuel, for instance corn, switchgrass, miscanthus and bamboo. The main waste energy feedstocks are wood waste, agricultural waste, municipal solid waste, manufacturing waste, and landfill gas. Sewage sludge is another source of biomass. There is ongoing research involving algae or algae-derived biomass. Other biomass feedstocks are enzymes Biomass is also used to produce fibers and industrial chemicals. Based on the source of biomass, biofuels are classified broadly into three major categories First-generation biofuels are derived from food sources, such as sugarcane and corn starch. Sugars present in this biomass are fermented to produce bioethanol, an alcohol fuel which serve as an additive to gasoline, or in a fuel cell to produce electricity. Second-generation biofuels utilize non-food-based biomass sources such as perennial energy crops (low input crops), and agricultural/municipal waste. Proponents argue that there is huge potential for second generation biofuels. Third-generation biofuels refer to those derived from micro or bacteria from various sources, grown in cell cultures

1.2 Non- renewable energy sources or renewable energy sources

Non-renewable energy resources are available in limited supplies, usually because they take a long time to replenish. The advantage of these non-renewable resources is that power plants that use them are able to produce more power on demand. The non-renewable energy resources are : Coal ,Nuclear, Oil, Natural gas, etc. non-renewable. generally create waste by products, some of which can be harmful pollutants.

Coal:

Coal is a combustible black or brownish-black sedimentary rock with a high amount of carbon and hydrocarbons. Coal is classified as a nonrenewable energy source because it takes millions of years to form. Coal contains the energy stored by plants that lived hundreds of millions of years ago in swampy forests. Coal is classified into four main types anthracite, bituminous, subbituminous, and lignite. The ranking depends on the types and amounts of carbon the coal contains and on the amount of heat energy the coal can produce. The rank of a coal deposit is determined by the amount of pressure and heat that acted on the plants over time.

Layers of dirt and rock covered the plants over millions of years. The resulting pressure and heat turned the plants into the substance we call coal. India has third rank in the production of coal in the world. Being the abundant fossil Geothermal energy which is derived from the high temperature geothermal fluids. Can be utilized for power generation and thermal applications .like greenhouse cultivation,

space heating and cooking however for further utilization of geothermal energy adequate infrastructure needs to be created and training to be undertaken fuels in india .The development of core infrastructure sectors like power, steel, and cement are dependent on coal. Anthracite contains 86% to 97% carbon, and it has the highest heating value. It is much harder to find than the other types of coal and is used in the metal industry.

Geothermal energy: Geothermal energy is the thermal energy generated and stored in the Earth. Thermal energy is the energy that determines the temperature of matter. The geothermal energy of the Earth's crust originates from the original formation of the planet and from radioactive decay of material . Earth's internal heat is thermal energy generated from radioactive decay and continual heat loss from Earth's formation. Temperatures at the core–mantle boundary may reach over 4000 °C (7200 °F). The high temperature and pressure in Earth's interior cause some rock to melt and solid mantle to behave plastically, resulting in parts of the mantle convecting upward since it is lighter than the surrounding rock. Rock and water is heated in the crust. The Earth's geothermal resources are theoretically more than adequate to supply humanity's energy needs, but only a very small fraction may be profitably exploited. Drilling and exploration for deep resources is very expensive.

Nuclear energy :

Certain elements undergo radioactive decay. Harnessing this nuclear energy and transforming it into electricity is one way to generate substantial power. Nuclear power is controversial because the material used can be dangerous and resultant waste products are toxic. Accidents that take place at nuclear power plants, such as Chernobyl, are devastating to local populations and environments. Still, many nations have adopted nuclear power as a significant energy alternative.

As opposed to nuclear fission, where particles decay into smaller particles, scientists are continuing to study feasible ways of harnessing nuclear fusion for power production. Uranium is found in small quantities, and miners often gather the uranium deposits for refining and purification. The mineral generates power through a process known as nuclear fusion, which creates enough pressure to run turbines and generate nuclear power.

Crude Oil:

Oil is a hydrocarbon formed over thousands of years from the decomposition of dead plants and organisms. Intense heat and pressure on this material triggers a reaction, which leads to the creation of oil.

Conventional oil is a term used to describe oil that can be produced (extracted from the ground) using traditional drilling methods. It is liquid at atmospheric temperature and pressure conditions, and therefore flows without additional stimulation. This is opposed to unconventional oil which requires advanced production methods due to its geologic formations and is heavy and does not flow on its own. The crude oil is then pumped out to the surface, taken through a refinery, and then used to create different products. It used to produce gasoline and diesel to power motor vehicles and manufacture plastics, heating oil, propane, and jet fuel, as well as artificial food flavors.

With oil reserves being used up more quickly than new oil fields are discovered, scientists predict that the current oil reserves may not last beyond the middle of the 21st century.

Natural gas Natural gas is a non- renewable hydrocarbon used as a source of energy for heating, cooking, and electricity generation. It is also used as a fuel and as a chemical feedstock in the manufacture of plastics and other commercially important organic chemicals. Industries such as power generation , fertilizers and petrochemical production are shifting towards natural gas.

Gas is incompletely utilized at present & huge quantities are burnt off in the oil production process because of the non-availability of ready market the reason may be the high transportation cost of gas . Methane is odorless, and it is mixed with a special additive to give it an odor for easy detection in case there is gas leakage. Once natural gas is extracted, it is sent to processing plants to remove propane and butane, which are used as liquefied petroleum gas (LPG). Natural gas is used for heating homes, as well as for cooking in gas ovens, stoves, and grills.

2. EVALUATION

2.1 Scope in Present Circumstances:

The scope for improvement in India's energy system is vast. Renewable energy currently makes up a negligible share (0.36%) of total primary commercial energy supply while 96.9% of such supplies come from fossil fuels and 2.76% from hydro and nuclear resources. The non-commercial combustible biomass and wastes which contributes to the extent of the total energy supplies are excluded in this balance. This column outlines the state of renewable energy in India and what can be done about it.

The most important application for new alternative energy resources, such as wind, solar, micro-hydel, biomass and waste, is in the area of electric power

generation. Wind energy, solar thermal as well as solar photovoltaic electric energy (that which comes from solar radiation)have substantial potential in India . Wind power can be generated from the energy potential of on-shore wind flow on a cost-competitive basis, but only at a low-load factor of about 20%. Solar thermal energy, on the other hand, is an economically feasible option mainly for water heating. The solar photovoltaic power is still a high-cost option. However, the development of solar thermal power involving the use of high temperature collectors with mirrors and lenses, and steam turbine is underway and could add substantial potential power generation in the future.

Development in the use of these renewable energy sources has, until now at least, been poor. The lack of entrepreneurship in the deployment of such capital and technology, lack of institutional support at the grass-root level, poor focus on training and management for using and maintaining such new technologies and the lack of awareness of the rural community – on top of the high cost – have been key barriers.

2.2 Conservation of energy:

Energy conservation is achieved when growth of energy consumption is reduced, measured in physical terms. Energy Conservation can, therefore, be the result of several processes or developments, such as productivity increase or technological progress. On the other hand Energy efficiency is achieved when energy intensity in a specific product, process or area of production or consumption is reduced without affecting output, consumption or comfort levels. Promotion of energy efficiency will contribute to energy conservation and is therefore an integral part of energy conservation promotional policies. Energy efficiency is often viewed as a resource option like coal, oil or natural gas. It

provides additional economic value by preserving the resource base and reducing pollution. For example, replacing traditional light bulbs with Compact Fluorescent Lamps (CFLs) means you will use only 1/4th of the energy to light a room. Pollution levels also reduce by the same amount

Nature sets some basic limits on how efficiently energy can be used, but in most cases our products and manufacturing processes are still a long way from operating at this theoretical limit. Very simply, energy efficiency means using less energy to perform the same function. Although, energy efficiency has been in practice ever since the first oil crisis in 1973, it has today assumed even more importance because of being the most cost-effective and reliable means of mitigating the global climatic change. Recognition of that potential has led to high expectations for the control of future CO2 emissions through even more energy efficiency improvements than have occurred in the past. The industrial sector accounts for some 41 percent of global primary energy demand and approximately the same share of CO2 emissions.

2.3 Energy and Environment:

The usage of energy resources in industry leads to environmental damages by polluting the atmosphere. Cement plants and power plants spew out particulate matter. Typical inputs, outputs, and emissions for a typical industrial process.

Air Pollution: A variety of air pollutants have known or suspected harmful effects on human health and the environment. These air pollutants are basically the products of combustion from fossil fuel use. Air pollutants from these sources may not only create problems near to these sources but also can cause problems far away. Air pollutants can travel long distances, chemically react in the atmosphere to produce secondary pollutants such as acid rain or ozone.

Evolutionary Trends in Pollution Problems In both developed and rapidly industrialising countries, the major historic air pollution problem has typically been high levels of smoke and SO2 arising from the combustion of sulphur-containing fossil fuels such as coal for domestic and industrial purposes. Smog resulting from the combined effects of black smoke, sulphate acid aerosol and fog have been seen in European cities until few decades ago and still occur in many cities in developing world. In developed countries, this problem has significantly reduced over recent decades as a result of changing fuel-use patterns; the increasing use of cleaner fuels such as natural gas, and the implementation of effective smoke and emission control policies. In both developed and developing countries, the major threat to clean air is now posed by traffic emissions. Petrol- and diesel-engined motor vehicles emit a wide variety of pollutants, principally carbon monoxide (CO), oxides of nitrogen (NOx), volatile organic

A major source of fine primary particles are combustion processes, in particular diesel combustion, where transport of hot exhaust vapour into a cooler exhaust pipe can lead to spontaneous nucleation of "carbon" particles

Greenhouse Effect

Life on earth is made possible by energy from the sun, which arrives mainly in the form of visible light. About 30 percent of the sunlight is scattered back into space by outer atmosphere and the balance 70 percent reaches the earth's surface, which reflects it in form of infrared radiation .The escape of slow moving infrared radiation is delayed by the green house gases. A thicker blanket of greenhouse gases traps more infrared radiation and increase the earth's temperature Greenhouse gases makeup only 1 percent of the atmosphere, but they act as a blanket around the earth, or like a glass roof of a greenhouse and keep the earth 30 degrees warmer than it would be otherwise - without greenhouse gases, earth would be too cold to live. Human activities that are responsible for making the

greenhouse layer thicker are emissions of carbon dioxide from the combustion of coal, oil and natural gas; by additional methane and nitrous oxide from farming activities and changes in land use; and by several man made gases that have along life in the atmosphere. The increase in greenhouse gases is happening at an alarming rate. If greenhouse gases emission continue to grow at current rates, it is almost certain that the atmospheric levels of carbon dioxide will increase twice or thrice from pre-industrial levels during the 21st century. Even a small increase in earth's temperature will be accompanied by changes in climate such as cloud cover, precipitation, wind patterns and duration of seasons. In an already highly crowded and stressed earth, millions of people depend on weather patterns, such as monsoon rains, to continue as they have in the past. Even minimum changes will be disruptive and difficult .Carbon dioxide is responsible for 60 percent of the "enhanced greenhouse effect". Humans are burning coal, oil and natural gas at a rate that is much faster than the rate at which these fossil fuels were created. This is releasing the carbon stored in the fuels into the atmosphere and upsetting the carbon cycle (a precise balanced system by which carbon is exchanged between the Greenhouse Effect

4. FUTURE EFFICIENCY OF SOURCES:

The human race, in its never ending struggle to improve its standard of living, has invariably depended on colossal amounts of electric power to fuel our evolution. A present day estimate by National Geographic determined that we use 320 billion kilowatt-hours of energy every day. Today, most of this enormous requirement is addressed by burning fossil fuels. So far, fossil fuels have catered to our energy needs very efficiently, but they are also non-renewable and rapidly depleting. These fuel sources have also contributed greatly to greenhouse

gas emissions and pollution. The time has come to find suitable and better replacements for fossil fuels. Scientists are constantly researching newer and greener sources of energy that have limited impact on the environment and reduce their contribution to global warming, which is believed to be caused by the release of carbon dioxide while burning fossil fuels.

Atomic energy, solar energy, and energy from wind and bio fuels are just a few of the promising alternatives for a cleaner and greener future. Other relatively new sources of energy such as fuel cells, geothermal energy, and ocean energy are also being explored. In the following sections, we'll take a look at current sources of energy as well as discuss possible future energy sources. Pursuing an energy trajectory alternate to the historical fossil fuel dominant trajectory is widely regarded as the preferred policy option to rapidly reduce the emission gap without compromising with the imperatives of reducing development deficit. Renewable technologies not only provide a low carbon enhancement of energy security, but also have other crucial benefits like improving access to energy services, increasing the standard of living and levels of employment of the local population, reducing pollution, improving health, ensuring sustainable development of the remote regions in a country and so on. Moreover, renewables are amenable to adoption at various scales ranging from a few kilowatts to hundreds of megawatts, and can therefore be adopted in modular standardized designs across a variety of end-use applications and in a decentralized mode. Renewables can also provide greater resilience to volatility in market prices of energy than conventional energy fuels. In addition to promoting renewable energy, improving energy efficiency across various sectors offers an excellent opportunity for linking sustainable . Development with climate mitigation. Improvements in energy efficiency in fact can bring with it a wide range of positive social impacts

such as reduced air pollution and the consequent health benefits. Various studies indicate that several thousand premature deaths related to air pollution could be avoided annually by 2030 through energy efficiency measures in the transport, buildings and industrial sectors.

India's need for examining alternative energy paths India ranks at a low 136 among 186 countries in terms of its human development index, indicating that India's development needs are still huge. Much of the infrastructure growth across sectors, whether it is in built-up infrastructure, power generation and transmission capacity, mobility provision, education or health related infrastructure, still needs to happen. With a large and increasing population, and the Government's plans to maintain GDP growth at around 8% - so as to improve per capita incomes and bring about inclusive growth - an increase in the country's energy requirements is imminent. Various studies have indicated that India's primary energy requirements could increase at least 4-5 folds over the next 2 decades in order to fulfill the country's development aspirations .India thus faces a huge challenge in meeting its growing energy demands in a sustainable manner. It is important for the country to examine the scope for deviations from its current energy path and explore various alternatives. While India's current energy mix remains largely dominated by coal and oil based energy forms, continuing this trend would increase its import dependencies enormously while creating a high carbon path dependency. On the other hand, India is blessed with a large renewable energy. resource base and should explore the realisation of the opportunity to enhance and accelerate the deployment of renewables and pursue a more sustainable and energy secure development path. Accordingly, we seek to explore the choices, constraints and barriers for India in moving towards a 100% renewable energy scenario, with the intent

of not only examining whether a 100% renewable energy scenario is indeed theoretically possible, but also assessing what such a transformational scenario would imply in terms the requisite technology, policy, behaviour, institutional and infrastructural changes that would be required.

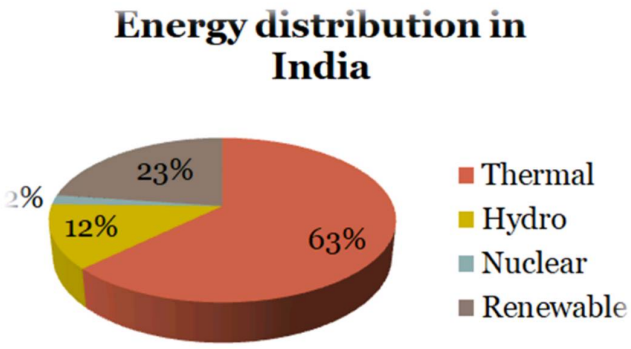
Further, it is assumed that renewable resources will Replace conventional sources of energy almost completely by 2051. Nuclear and fossil fuels are phased out gradually by 2051. The most efficient fossil based technologies such as advanced gas-based power generation (e.g. H-frame combined-cycle gas turbine) with 60% efficiency are assumed to be commercially available by 2016/17. Bio-fuels are also assumed to be available as replacement of petroleum fuels in the transport sector. While all of the potential area delineated for Jatropha plantation is taken up, second generation bio-fuels like cellulosic ethanol and advanced biodiesel (FT-Biodiesel) bio-fuels are also assumed to be produced from crop residue and fuel wood for energy purposes from the year 2026. Additionally third generation (algae) biofuels also need to play a major beyond 2031.

4. Present energy scenario :

India is one of the countries with large production of energy from renewable sources. As of 27 November 2020, 38% of India's installed electricity generation capacity is from renewable sources .In the Paris Agreement India has committed to an Intended Nationally Determined Contributions target of achieving 40% of its total electricity generation from non-fossil fuel sources by 2030. The country is aiming for even more ambitious target of 57% of the total electricity capacity from renewable sources by 2027 in Central Electricity Authority's strategy plan .According to 2027 plan, India aims to have 275 GW from renewable energy,

72 GW of hydroelectricity, 15 GW of nuclear energy and nearly 100 GW from "other zero emission" sources . Government of India has also set a target for installation of Rooftop Solar Projects(RTP) of 40 GW by 2022 including installation on rooftop of houses. As of September 2020, at various stages of implementation and projects are under various stages of bidding.

India was the first country in the world to set up a ministry of non-conventional energy resources (Ministry of New and Renewable Energy (MNRE)), in the early 1980s, and its



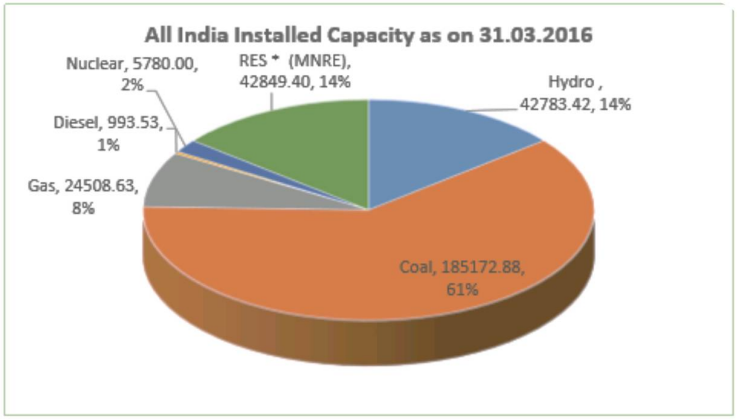
public sector undertakings the Solar Energy Corporation of India is responsible for the development of solar energy industry in India. Hydroelectricity is administered separately by the Ministry of Power and not included in MNRE targets. India has a strong manufacturing base in wind power with 20 manufactures of 53 different wind turbine models of international quality up to 3 MW in size with exports to Europe, the United States and other countries. Wind or Solar PV paired with four-hour battery storage systems is already cost-competitive, without subsidy, as a source of dispatchable generation compared with new coal and new gas plants in India.

India is running one of the largest and most ambitious renewable capacity expansion programs in the world. In 2019 , India announced that it will be more than doubling its renewable energy target of renewable energy by the same year. Newer renewable electricity sources are projected to grow massively by nearer term 2022 targets, including a more than doubling of India's large wind power capacity and an almost 15 fold increase in solar power from April 2016 levels. These targets would place India among the world leaders in renewable energy use and place India at the centre of its "Sunshine Countries" International Solar Alliance project promoting the growth and development of solar power internationally to over 120 countries. Energy plays a vital role in the economic development of all countries. India ranks second position in terms of population that accounts to 17% of world's overall population. The increase in standard of living and population in India makes India to rank third place in consumption of energy in the globe. As fossil fuels are depleting and creating more pollution causing global warming, and also since energy demand is increasing day by day, energy production from renewable energy resources becomes the best solution in present condition as renewable energy resources are not exhaustible, clean, and green energy.

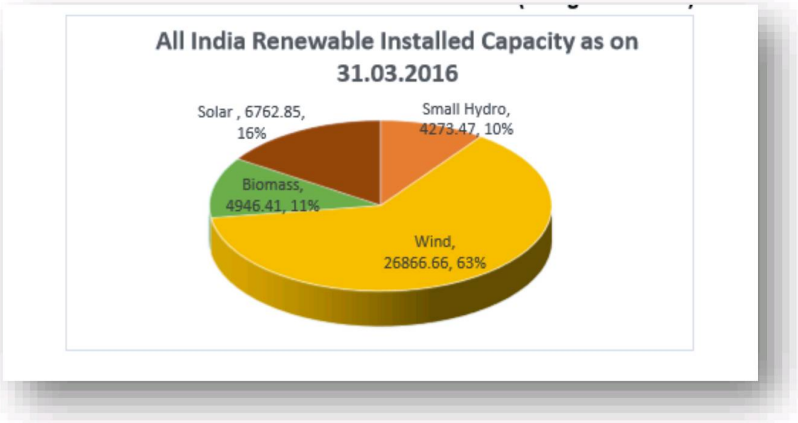
The government target of installing 20 GW of solar power by 2022 but it was achieved four years ahead of schedule in January 2018, through both solar parks as well as roof-top solar panels. India then set a new target of achieving 100 GW of solar power, 60GW of wind power, 10GW of bio mass and 5GW of small hydro power by 2022. Three of the top Five largest solar parks worldwide are in India including the second-largest solar park in the world at Kurnool, Andhra Pradesh, with a capacity of 1000 MW. The world's largest solar power plant, Bhadla Solar Park is in Rajasthan with a capacity of 2255 MW.

The 2022 electrical power targets include achieving 227GW (earlier 175 GW) of energy from renewable sources - nearly 113 GW through solar power, 66 GW from wind power, 10 GW from biomass power, 5GW from small hydro and 31GW from floating solar and offshore wind power. The bidding process for the further additional 115 GW or thereabouts to meet these targets of installed capacity from January 2018 levels will be completed by the end of 2019–2020. The government has announced that no new coal-based capacity addition is required beyond the 50 GW under different stages of construction likely to come online between 2017 and 2022. With the expansion of renewable power generation capacity, the outstanding payment dues from the power purchasers are also increasing due to their weak purchasing capacity.

Unlike most countries, until 2019 India did not count large hydro power towards renewable energy targets as hydropower was under the older Ministry of Power instead of Ministry of New and Renewable Energy. This system was changed in 2019 and the power from large hydropower plants is since also accounted for. This was done to help the sale of the power from the large Hydropower plants, as this reclassification has made such plants able to sell their power under the Renewable Energy Purchase Obligation. Under the Renewable Energy Purchase Obligation, the various states have to source a certain



percentage of their power from Renewable Energy Sources under two categories Solar and Non-Solar. The power from the large Hydropower plants now classifies under the Non-Solar Renewable Energy Category. In 2018, India has set target to produce 15 million tons of biogas/bio-CNG by installing 5,000 large scale commercial type biogas plants which can produce daily 12.5 tons of bio-CNG by each plant. The rejected organic solids from biogas plants can be used after existing coal fired plants to reduce coal consumption. The number of small family type biogas plants reached 3.98 million.



Ethanol market penetration reached its highest figure of a 3.3% blend rate in India in 2016. It is produced from sugarcane molasses and partly from grains and can be blended with gasoline. Sugarcane or sugarcane juice may not be used for the production of ethanol in India. Government is also encouraging 2G ethanol commercial production using biomass as feed stock

The market for biodiesel remains at an early stage in India with the country achieving a minimal blend rate with diesel of 0.001% in 2016. Initially development was focussed on the jatropha plant as the most suitable inedible oilseed for biodiesel production. Development of biodiesel from jatropha has met a number of agronomic and economic restraints and attention is now moving towards other feedstock technologies which utilize used cooking oils, other unusable oil fractions, animal fat and inedible oils.[65] Biodiesel and also

Biopropane are produced from non-edible vegetable oils, used cooking oil, waste animal fats, etc.

. Coal: Grade wise basic price of coal at the pithead excluding statutory levies for run-of-mine (ROM)coal are fixed by Coal India Ltd from time to time. The pithead price of coal in India compares favourably with price of imported coal. In spite of this, industries still import coal due its higher calorific value and low ash content.

OilAs part of the energy sector reforms, the government has attempted to bring prices for many of the petroleum products in line with international prices. The most important achievement has been the linking of diesel prices to international prices and a reduction in subsidy. However, LPG and kerosene, consumed mainly by domestic sectors, continue to be heavily subsidised. Subsidies and cross-subsidies have resuled in serious distortions in prices, as they do not reflect economic costs in many cases.

Natural Gas :The government has been the sole authority for fixing the price of natural gas in the country. It has also been taking decisions on the allocation of gas to various competing consumers.

5. APPLICATION :

4.1 Applications of non – renewable energy sources & renewable energy sources:

These natural resources are a major source of power for a vast amount of industries – however, there are numerous downsides to non-renewable energy, including their negative environmental impact and the fact they are in limited supply**.** It is a primary energy power on the earth . Non-renewable energy

sources can be used for all kinds of things. Over 70% of the energy used in industrial processes comes from non-renewable sources, while fossil fuels are also used for many household purposes.

In addition, the life cycle in the economy of some non-renewable resources, particularly metals, can be extended by recycling. This process involves collecting and processing disused industrial and household products to recover reusable materials, such as metals and plastics. However, there are thermodynamic and economic limits to recycling, which means the process cannot be 100% efficient. Furthermore, the demand for non-renewable resources is increasing rapidly because of population growth, spreading industrialization, and improving standards of living along with the associated per-capita consumption. This has resulted in an accelerating demand for non-renewables that must be satisfied by mining additional quantities from the environment. It is critical for any economy to have ready access to relatively inexpensive and accessible sources of energy for commercial, industrial, and household purposes. The use of large amounts of energy is especially characteristic of developed countries, such as Canada. As has been examined previously, relatively wealthy, developed countries use much more energy (on a per-capita basis) than do poorer, less-developed countries.

Ever since people achieved a mastery of fire, they have used fuels for subsistence purposes, that is, to cook food and to keep warm. Initially, locally collected wood and other plant biomass were the fuels used for those purposes. Perhaps only one-million people were alive when fire was first domesticated, and their per-capita energy use was small. Consequently, biomass fuels were a renewable source of energy because the rate at which they were being harvested was much smaller than the rate at which new biomass was being produced by vegetation.

4.2 Advantage & disadvantages

Some Advantages (Good factors) about non- renewable energy sources

- Lots available: Humans have invested a lot of time, effort, and money into obtaining fossil fuels, so we now have a ready supply.
- Easier to find: Fossil fuels can be found all over the world, with many areas already identified as being rich in these resources.
- Very efficient: Fossil fuels can generate a lot of energy, even from just a small amount of fuel.
- Simpler to transport: Fossil fuels can be easily transported, e.g. using underground pipes to move oil and gas.
- Easy set-up: A fossil fuel plant can be set up at any location, as long as there is a large quantity of fuel to generate power.
- **Some disadvantages about non-renewable energy :**

- Environmental pollution: Burning fossil fuels releases carbon dioxide, which is directly linked to global warming – so fossil fuels are very damaging to the health of our planet.
- Huge amounts of fuel reserves: To keep power stations working, you need truckloads of fuel. This can make energy generation very expensive.
- Public health issues: Because of all their nasty air pollution, burning fossil fuels can lead to lung problems and asthma attacks in humans.
- They will run out: Once the earth's supplies of fossil fuels have been used up, they can't be renewed (at least not for several hundred million years), so we won't be able to use them for our rising power needs.

- Oil spills: The huge tankers transporting oil sometimes crash and spill their contents into the sea and nearby coast. This is disastrous for the ocean and land and can be deadly for the animals that live there.
- Rising costs: As just a few countries hold a large number of fossil fuels, fuel prices can rise without warning.
- Health risks to workers: Mining for coal or drilling for oil can be very dangerous, resulting in a large number of diseases, injuries, and deaths every year.

Some disadvantages of renewable energy

Just like with fossil fuels, there are some disadvantages as well. Renewable energy plants are subject to fluctuations in wind, sunlight and other natural resources, meaning some days or in some particular months, a facility might produce more electricity than others. Today, in areas where renewables are common, fossil fuels are often used to make up any shortcoming in renewable energy production.

Due to their reliance on natural occurrences, renewables may fare better in some areas than others. An area with lots of direct sun all day long will be more suitable for a solar plant than somewhere that's often dark and cloudy. Renewable energy project also often require large areas of land, and while renewable energy tends to be cheap, initial construction and development costs can be quite high.

Despite these disadvantages, renewables are proving an important part of the energy of today and of the future, especially in the face of environmental concerns and worry about the availability of fossil fuels.

6. Conclusion:

Humanity today faces great problems in the energy sector. There are growing energy needs of mankind, which is every day more and more increasing. Limited reserves of non-renewable energy sources with its emissions exhaust gases and particulates significantly affect climate change in the world .Currently, as an environmentally friendly solution there are renewable energy sources. Like all new technologies at this stage of development, the exploitation of renewable energy economically is not, yet, fully viable. As a result, many countries, with theirs various measure of incentives are affecting the development and the use of renewable energy sources. energy. Interconnection of economic and socio-cultural development, with the state of the environment

6. REFERENCE :

Featured Application: Renewable Energy: Campbell Update 1st Quarter...

Application of Renewable Energy Resources In All Sectors

Chapter 12 ~ Resources and Sustainable Development – Environmental Science

Nonrenewable Resources | National Geographic Society

Non-Renewable Energy - Knowledge Bank - Solar Schools

Potential applications of renewable energy sources, biomass combustion problems in boiler power systems and combustion related environmental issues - ScienceDirect

CURRICULUM VITAE

PERSONAL INFORMATION :

NAME	:	**Miss. VRUSHALI BHALCHANDRA AHIRE.**
DATE OF BIRTH	:	**02-09-2000**
FATHER's NAME	:	**Mr. BHALCHANDRA RAMKRUSHNA AHIRE.**
NATIONALITY	:	**INDIAN.**
ADDRESS FOR PERMANENT	:	**51, NAYANA HOUSING SOCIETY, NAKANE ROAD DEVPOUR DHULE, (424002) MAHARASHTRA.**
EMAIL ID	:	**vrushaliahire2000@gmail.com**

EDUCATIONAL DETAILS:

S.S.C

N.Z.B. patil highschool , dhule. (Maharashtra.)

(81.60%)

H.S.C (SICENCE)

Kamlabai girls college, dhule. (Maharashtra.)

(Percentage 60.62 %)

B.S.C (PHYSICS)

S.N.J.B'S K.K.H.A Arts , S.M.G.L. Commerce and S.P.H.J. science college chandwad. (neminagar chandwad , dist. Nashik) Maharashtra- 423101.

F.Y.B.S.C (percentage 66.67%)

S.Y.B.S.C (percentage 73.7%)

T.Y.B.S.C (Appear)

Place : DHULE.(MAHARASHTRA.) (VRUSHALI AHIRE.)