

CRUSADE

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RENEWABLE ENERGY

ENERGY FROM A SOURCE THAT IS NOT DEPLETED WHEN USED, SUCH AS WIND OR SOLAR POWER.

SUSTAINABLE ENVIRONMENT

ENVIRONMENTAL SUSTAINABILITY IS THE RATES OF RENEWABLE RESOURCE HARVEST, POLLUTION CREATION, AND NON-RENEWABLE RESOURCE DEPLETION THAT CAN BE CONTINUED INDEFINITELY.

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SUSTAINABLE LIVING

WAY OF LIFE FOR THE FUTURE

FRESH

WHERE DID IT GO WRONG? It was only 200 years ago, we started putting our mother nature on the road to death in the name of industrial revolution, the resources that were freely available on the earth was put into use by our fellow humans precariously. We started consuming the resources that are precious and limited in excess and it was a downslide from there onwards. From agriculture to the personal transport, we rely only on the natural resources such as fossil fuels and water for the effective functioning of everything around us.

of the world's resources." After a decade, even today we still rely only on the fossil fuels for our automobiles with the exception of hybrid vehicles here and there.

DEFORESTATION: In the field of agriculture, due to the modern agricultural practices we have been poisoning our lands by using tons of fertilizers and pesticides. The lands are becoming infertile and we will no longer be able to use it anymore. If it continues, we will be reaping only the poison that we have fed to the earth. Our forests are being deforested today for the household furniture, beautiful wood works of our offices, Schools, Colleges, etc. Humans have involved in deforestation in order to make industries, hotels and homes. Trees are being cut down for paper, that we use unnecessarily. Deforestation is the major contributor for the global warming and often cited as the major cause of enhanced greenhouse effect.

WATER POLLUTION: All the living creatures primarily need water every day to live on this planet. Only 1% water is consumable and others are salty and 1 more percentage of consumable water is stuck in Icecaps. Water also regulates the temperature of the planet and cycles essential nutrients through the land, air, and all living things. The flow of water through the atmosphere, biosphere, lithosphere, and hydrosphere is called the hydrologic or water cycle.



Apart from the regular consumption of water for drinking, we use large quantity of water for the industrial production, chemicals processing, agriculture and make the water non-recyclable or if it is recycled simply H₂O without any minerals. Since we are the so called sixth sensed humans, being so selfish only on our survival, took Mother Nature for granted in many ways. I am certain that we do it in almost all the possible ways. We know very well that today, climate change, global warming, rising sea levels, depletion of ozone layer and resource depletion are real and their impact on human and animal lives can be devastating.

SO HOW DO WE GO BACK? The answer is "Sustainable living". So, what's this term Sustainable Living? According to Wikipedia' "Sustainable living is a lifestyle that attempts to reduce an individual's or society's use of the earth's natural resources and personal resources". To put it in Simple words, it is the practice of reducing our demand on the natural resources by making sure that we replace what we use to the best of our abilities.

HOW DO WE BECOME SUSTAINABLE? This is very simple if we follow the 3R's - Reduce, Reuse , Recycle. It's basically about reducing the usage of natural resources in the day to day lives, reusing the natural resources in an optimized way, recycling the used energy and natural products wherever possible. Every product we purchase today, has a direct link with the carbon footprint either in the manufacturing or in the transportation, storage, packaging, etc. From our end, we can choose to reduce or use the alternatives which has less impact on the environment.

TRANSPORTATION AND AUTOMOBILES: The modern transportation and automobile industry is moving towards using the electrical means of energy in the name of hybrid vehicles and electric cars. One such example for an electric car is "Tesla" which has been commercialized on a larger scale. One of my friends named Siva kumar, who is also my classmate, talks on and on about Tesla and what they are doing positively for the environment by using renewable solar energy to produce electricity, store, transfer the same to the power packs to obtain the same personal transportation by means of cars, where we use fossil fuels to gear our cars.



Even the hybrid cars produce pollutants but the electric cars and bikes completely eliminate the carbon footprint and pollutants in a large scale. Solar powered vehicles and development of the same using more renewable energy resources will alone keep the world a better place to live.

AGRICULTURE: Since the dawn of civilizations, agriculture is one field that completely depends on the environment and thus impacts the environment. So, in the agricultural field, we simply have to go back to our old methods and have to completely forget the use of fertilisers, pesticides which contribute much more to the decline of safer environment than the productivity of food produce and vegetables. India is facing the food crisis due to the systematic destruction of the farmlands by using chemical needs of productivity. To make it worse, the government is focusing on the false solutions such as Genetically modified crops which still need so called fertilisers.

In order to progress towards the sustainability we need to rethink the way in which we produce our own food. There are many recent developments in agriculture in all the countries since everywhere water and land is becoming a real concern. One answer to all these crisis is sustainable farming. The idea of sustainable agriculture is simply,

- Building and maintaining healthy soil
- Managing water wisely
- Minimising air, water, and climate pollution
- Promoting biodiversity

following are few ideas which we could promote further to cater the needs of sustainable agricultural practices. Through this ideas and putting the same to use, we could eliminate the usage of harmful substances in the food production.

- Crop Rotation techniques.
- Soil Enrichment
- Permaculture
- Hydroponics, Aquaponics
- Urban Agriculture

PRACTICING MINIMALISM: Minimalism is the process of using the things that are sufficient enough for individual to have a better life and harmony. When we practice minimalism we will not only use resources efficiently, but we are saving the resources for the future generations to come.



Minimalism doesn't mean living without anything, it means that you are making sure that everything you own and use is put to its maximum purpose. This means waste materials as well. With a minimalist lifestyle, you will recycle more, and be more mindful of the items you support being produced so that sustainability is emphasised.

ENERGY CONSERVATION: Given the scarce nature of natural resources it will be a boon for the future, if we save the resources such as electrical energy. For example using electrical power only when required, turning of lights, fans, ac's not when not in use is going to save a lot of power. For a change, if we use CFL bulbs in place of traditional bulbs, we will be doing a great help to the conservation of energy. If we start to become self sensitive towards such ideas we are leaving our future generation a great prospect.

DITCHING PLASTIC: Plastic is causing major impact to the living organisms and to the mother nature.

It takes hell lot of time for a molecule of plastic to break than a organic substance. So when plastic usage is high, we are actually putting out more wastes in terms of earth pollution. By choosing products which are produced using organic products we are helping the nature to become sustainable. Plastics also gets eaten by the livestock when its littered around and its very dangerous for them, as it leads to the death of the animals. Its our responsibility to cater the needs of the animals and protect them for a better biological food chain.

CONCLUSION: In conclusion, Sustainable development is not only focusing on industrialised agriculture or energy conservation actions. It's the practice of not only becoming aware of the unhealthy habits that we possess in the use of natural resources



but also about following the simple Reduce, Recycle, Reuse habits and making them into considerable actions which will yield good results to the environment and the earth. As per united nations the sustainable development is not about the development of ideas but craving ways as the picture depicts here. Sustainable development is the process of finding alternatives which are efficient and cost worthy meanwhile they are purely based on renewable resources.



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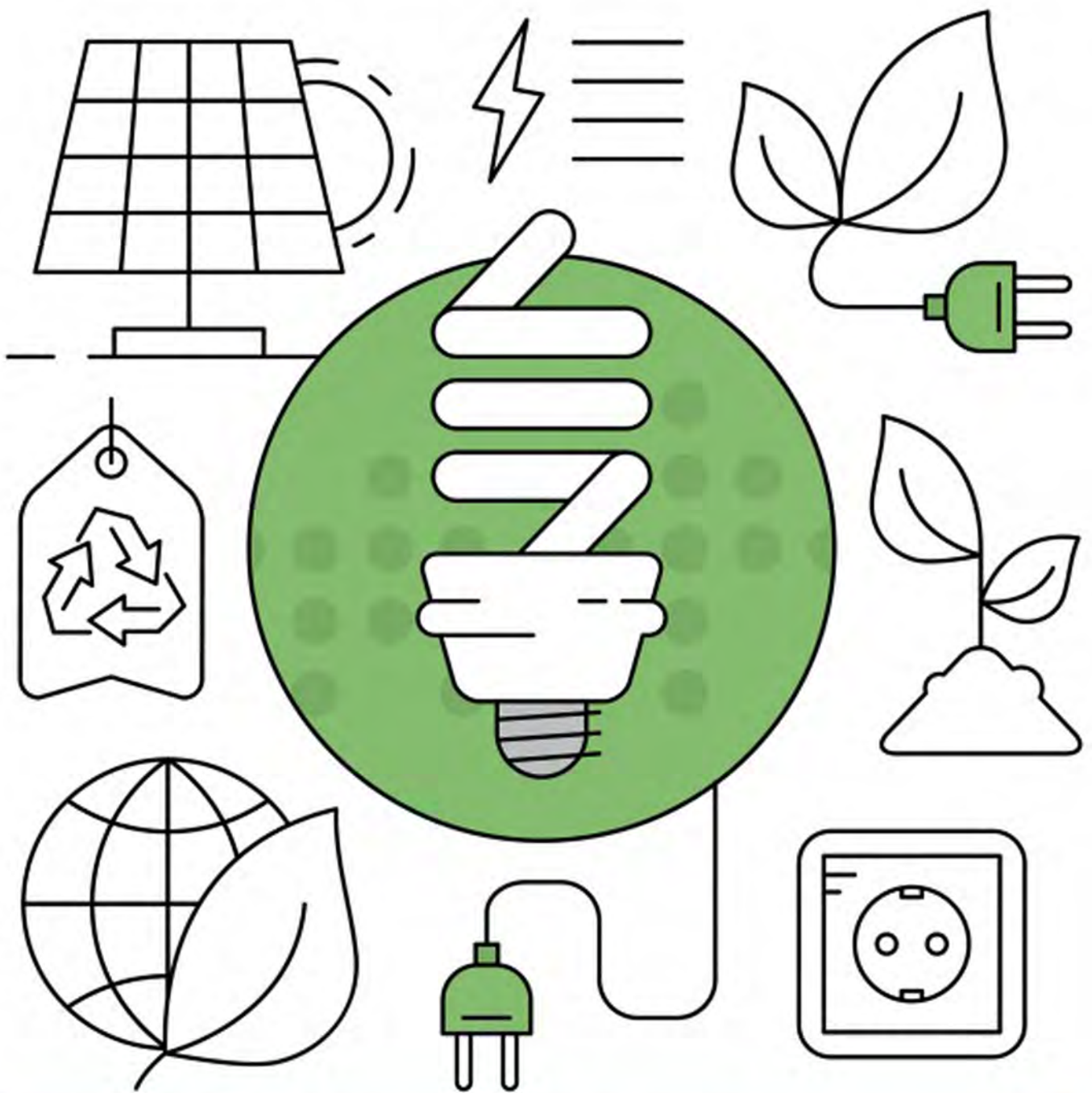


SUSTAINABLE DEVELOPMENT GOALS

COURTESY

PART OF THE CONTENTS WERE REFERRED FROM VARIOUS ONLINE RESOURCES FROM ORGANISATIONS FOCUSED IN THE AREA OF SUSTAINABLE DEVELOPMENT AND ENERGY CONSERVATION.





SMART AND MICRO GRIDS

SMART AND MICRO GRIDS



In this modern world, which is driven by technology, almost everything has become smart. They include phone (Smart phone), watch (smart watch), lock (smart lock) and even homes (smart home). Electrical peoples trying out their smartness in the grid.

WHAT IS ELECTRICAL GRID? Most of the website and researchers say that "It is an interconnecting network which supplies electricity from the producers to the consumers. Here it carries the high voltage transmission lines that transfer the power to demand centres and to the individual customers as per their need".

YOU MIGHT THINK HOW THE SMARTNESS CAN BE INTRODUCED? One of the important disadvantage of a traditional grid is that, while transmitting energy, power loss will occur and maximum power cannot be transferred, so we electrical engineers had to try something new. The research and development ended with SMART GRIDS.

WHAT IS SMART GRID? In the developing nations, we mainly focus on the renewable energy, efficiency, and more over now, we are in the state of modernizing the industries. The stakeholders are eagerly waiting for the launch of new products. One of the products that came into the forefront is SMART GRID a perfect power system. The system is a smart microgrid that meets the needs of the twenty-first century consumers and provides reliable and secure electricity.

HOW DOES A GRID BECOME SMART GRID? To explain a Micro-Grid in short, it is a digitalised technology which builds a bridge between the utilities service provider and the consumers by sensing along the transmission lines and that's what makes it smart. This smart grid requires internet connected computers, automation, and new technologies and equipment, which in turn tells about the changing electricity demands.



HOW DOES SMART GRID WORK? Smart grids give an opportunity to the service providers to bring in more efficient, reliable and readily available energy services to this modern era consumers. The main benefits of the smart grids are as follows,

- More efficient transmission of electricity
- Quicker restoration of electricity after power disturbances
- Reduced operations and management costs for utilities, and ultimately lower power costs for consumers
- Reduced peak demand, which will also help lower electricity rates
- Increased integration of large-scale renewable energy systems
- Better integration of customer-owner power generation systems
- Improved security

CONTROL TO CUSTOMERS: The smart grid will provide information on how we utilise the energy and not how we utilize technologies. It is just an informer who informs about the energy usage. It is like managing the electricity in a way similar to banks that provide mobile banking. If it is enabled, we can check our electricity billing using our mobile phone.

One such mechanism is SMART METERS which tells us about the electricity usage and its cost. Smart Grid has the potential to help you save money by helping you manage your electricity usage and choose the best time to purchase electricity. You can save even more by generating your own power.

INSTALLING THE SMART GRIDS: Today, it is not difficult to install smart grids. The Smart Grid will consist of millions of pieces and parts such as controls, computers, power lines, and new technologies and the equipment. It will take some time for all the technologies to be perfected, equipment installed, and systems tested before it comes fully on line. And it won't happen all at once because Smart Grid is evolving, piece by piece and it would be complete over the next decade. Once mature, the Smart Grid is likely to bring the same kind of transformation that the Internet has already brought in the way we live, work, play and learn. Moreover, there will not be any trouble in getting high speed internet in this modern digital 4G world.

MICRO GRIDS: The next innovation of smartness is Micro Grid. Microgrid is a localized grouping of electricity sources and loads that normally operates when connected and synchronized with the traditional centralized electrical grid (macrogrid), but can disconnect itself and function autonomously.

DIFFERENCE BETWEEN A SMART AND MICRO GRID: In short, we can say smart grid uses both electrical and IT level parameters whereas micro grid is one interconnected device which carries loads and distributes energy source in boundary areas.

NEED FOR A MICRO GRID: A micro grid can not only be used as a backup in case of emergencies, but can also be used to cut costs, or connect to a local resource that is too small or unreliable for traditional grid use. A micro-grid allows communities to be more energy independent and, in some cases, more environmentally friendly.

FUTURE SCOPE: Nuclear has got scope in micro grids with the next generation small scale reactors by using thorium as fuel and molten salt as a heat sink to provide safe, and clean energy with no nuclear waste.



Integrating smartness both in distribution and consumption ensure that these micro-grids would manage the ebb and flow of demand and production far more efficiently than today's power generation infrastructure. During a power failure at a regional level, the microgrid could safely continue to function, generate and distribute power to its customers.

HOW DOES IT FUNCTION: The grid connects homes, businesses and other buildings to central power sources, which allows us to use appliances, heating/cooling systems and electronics. But this interconnection means that when part of the grid needs to be repaired, everyone is affected. Micro-grid generally operates while connected to the grid, but it can also break off and operate on its own using local energy generation in times of crisis like storms or power outages, or for any other reasons. Micro grids are powered by Distributed generators, solar panels and Batteries. Depending on the necessities, the fuel that is used and their requirements, a micro grid may run indefinitely.

ADVANTAGES:

- Provides power quality, reliability and security for end users and operators of the grid.
- Enhances the integration of distributed and renewable energy sources
- Cost competitive and efficient.
- Enables smart grid technology integration.

CHALLENGES IN MICRO GRID:

- **Bidirectional power flows:** the network at low voltage levels can cause reverse power flows that may lead to complications in protection coordination, undesirable power flow patterns, fault current distribution, and voltage control.
- **Stability issues:** transition activities between the grid-connected and stand-alone modes of operation in a microgrid can create transient stability.
- **Uncertainty:** Load profile and weather forecast are two attributes that make this coordination more challenging in isolated microgrids.
- **Modelling:** Many characteristics in traditional scheme such as primarily inductive transmission lines, constant-power loads do not necessarily hold valid for microgrids, and consequently the models need to be revised.



REALITY IN TODAY'S WORLD:

The smart and micro grids are two of the most innovative inventions that has taken place in distribution side, which helps both the customers and distributors. The world is moving in the pattern of making something new which makes everyone to think differently. These innovations in the energy industry will definitely make this world green and smart.

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WIND ENERGY

WIND ENERGY



Around 80% of the world's total population is reliant on fossil fuels for energy. While burning fossil fuels, carbon-di-oxide is released and that traps the heat energy. However, most of the people on this planet are also aware of the greenhouse effect which leads to global warming. It's not only about the greenhouse effect, non-renewable sources will also go extinct one day and governments have to spend huge sum of money to transport fuels from one place to another.

In order to make things better, there are several renewable energy projects that are undertaken worldwide to harness this energy as it is clean, replenished, sustainable and widely available. Some argue that we might face problems while disposing the elements but while comparing the disadvantages of non-renewable energy, this is far better.

ADVANTAGES OF SWITCHING TO RENEWABLE SOURCES:

1. Cheaper fuel bills. Sun, wind and water are freely and readily available for the world.
2. Cost to be spent for the maintenance of renewable elements are very less.

3. The impact of burning less fossil fuel is that the emissions of greenhouse gases would be reduced to a great extent.

4. Avoiding the fluctuating gas and oil prices.

RENEWABLE ENERGY IN INDIA:

Renewable energy is taken care of by ministry of New and Renewable Energy (MNRE) In India. India became the first country to commission a department for renewable energy in 1980's. As India is a peninsular country, it has a wide scope to install a bulk amount of wind mills in the offshore areas. Wind power contributes about 61% in case of renewable energy sources in India.

WIND ENERGY IN INDIA:

The installation of wind power in India began in early 90s, and has significantly improved in the past decade. Although the country is new to wind energy industry when compared to Denmark and USA, it has managed to become the 4th largest wind power installed nations in the world. As of 28th February 2017, the installed capacity of wind power in India was 29151.29 MW.

WIND ENERGY IN TAMIL NADU: I am proud to say that I am from a state which has one of the largest onshore wind farms in the world. Yes, it's near Kanyakumari the southern tip of India. More sites have been identified for windmills around this area and the wind energy generation capacity is around 1500 MW, which is about 20% of India's energy from renewable sources.

ON-SHORE AND OFF-SHORE WIND FARMS: Offshore wind farm (offshore wind energy) are the wind farms constructed offshore, that is in the shallow parts of the sea which is usually nearby to the seashore to harvest wind energy to generate electricity. The speed of the wind is greater than in the inlands, so, offshore wind power's contribution in terms of generated and distributed electricity is higher.

Onshore wind farms are the one which we usually see on the road side. The wind power is much lesser when compared to offshore wind farms, however the cost of installation of on-shore wind farms are pretty low compared to the offshore wind farms.

CONSTRUCTION OF TRADITIONAL WIND MILL: Structurally wind mill consists of hub, nozzle, wing and tower.



The tower is either a steel lattice tower similar to electrical towers or a steel tubular tower with an inside ladder.

Hub: Hub panel joins three blades. This panel controls the rotation of the blades. It also deviates the blades at particular angles according to the wind's direction. It also controls the power supplied from the battery to the blade. When the windmill is not in a working condition, the power is supplied to the blades through a battery.

Nozzle: The power generated by the generator is controlled and the power is transmitted to the bottom panel. The finished panels are placed in an enclosure box. In the enclosure box, there are many components such as exhaust fans, heaters, transformers which perform on their own. The heater and the exhaust fans are activated according to the temperature sensed by the sensors which in turn are activated by the PLC's as per the program. At the bottom of the wind mill a control panel is placed.

CONTROL PANEL:

Initially the basic components are assembled on the mounting board. The wiring is done as per the General Arrangement. This panel controls the machine as it decides whether to run as a motor or generator (while starting the mill, the machine runs as a motor). When the mill is started, it runs as a motor which is controlled by the PLC. When the rated speed (certain speed where the machine starts generating electricity) is attained, PLC makes the machine to change from motor to generator. On the whole, the total wind mill is controlled by the bottom panel.

The efficiency of a wind turbine will keep changing depending on the speed of the wind. The lowest velocity at which the turbine develops its full power is known as rated wind velocity. If the wind velocity is below certain level, no useful power output can be produced from wind turbine. There are limits on both the minimum (2–5 m/s) and maximum (25–30 m/s) wind velocity for the efficient operation of the wind turbines. The wind mills used nowadays, are fully automated and thus reducing the cost of maintenance.



INNOVATIONS IN WIND ENERGY EXTRACTION:

Altaeros Airborne Wind Turbine:

The Altaeros uses a helium-filled, inflatable shell to enable it to ascend to high altitudes, which gives it access to stronger and more consistent winds than onshore wind turbines, and the generated power is sent to the ground via tethers. The company assure that this product can reduce 65% of the cost needed for the installation of ordinary wind mills and we can also reduce the installation time from months to days. Apart from power generation, they can also be used for telecommunication, Environmental monitoring, Wide area networks for M2M or IOT applications, Soil moisture monitoring and other agro business uses. The Altaeros is fitted with sensors that identify pressure variations in the shell which are indicative of punctures in the fabric. If a severe puncture is detected, the BAT will automatically dock and the operator will be alerted.

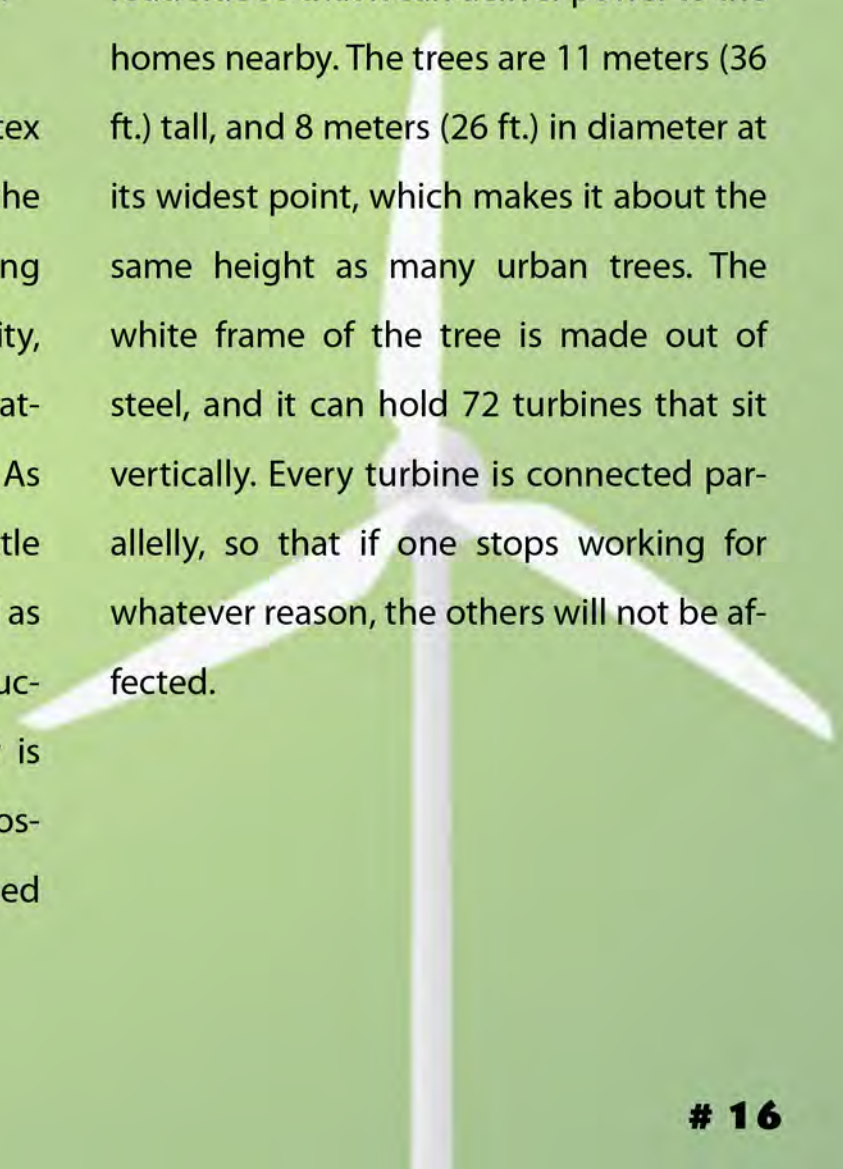


BLADELESS WIND POWER: These bladeless wind turbines may be the future of wind power. Traditional wind turbines have two major drawbacks when compared to this technology. Firstly, it requires sophisticated engineering for the development of blades. Secondly, it causes problems to the environment as the efficient working of traditional wind turbines require adequate land. So, the threat of destructing the forest and agricultural lands will be formidable.

Now, a Spanish company called Vortex Bladeless is looking to improve on the design. They brought an idea of generating energy using the phenomenon, vorticity, an aerodynamic effect which creates a pattern of wind whirls or spinning vortices. As the wind blows across these turbines, little wind whirls are produced behind it, and as these get big enough they cause the structures to oscillate. These kinetic energy is then used to power an alternator so the oscillation of the towers could be increased furthermore.

TREE SHAPED WIND TURBINES: One of the biggest criticisms against wind turbines is that they aren't usually nice to look at, but a French company called New Wind is installing tree-shaped wind turbines in De La Concorde in Paris, France.

They look just like the natural trees. Each tree has a current power output of 3.1 kilowatts. These trees can be placed on the road side so that it can deliver power to the homes nearby. The trees are 11 meters (36 ft.) tall, and 8 meters (26 ft.) in diameter at its widest point, which makes it about the same height as many urban trees. The white frame of the tree is made out of steel, and it can hold 72 turbines that sit vertically. Every turbine is connected parallelly, so that if one stops working for whatever reason, the others will not be affected.





Apart from these innovations there are many more technologies available to capture wind power. As Engineers, we have certain responsibilities and ethics to be followed for the betterment of future world. In the long run, you are doing the right thing for the environment. You are creating a cleaner and brighter future for your children.



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BIOMASS ENERGY



BIOMASS ENERGY



Biomass materials are used as a fuel and energy source from the beginning of time to meet the myriad human needs for a comfortable living. Main source of biomass energy are tree, crops, and animal waste. Until the mid-19th century, biomass dominated the global energy supply with a seventy-percentage share (Grubler and Nakicenovic 1988). Among the biomass energy sources, use of wood for energy in the total energy generation declined steadily with the invention of coal and gas during the twentieth century. Despite its declining share in energy, global consumption of wood energy continued to grow. Now, biomass contributes about 14% of the total energy supply worldwide. India, being a tropical country, has tremendous potential for energy generation through biomass and its residues. Biomass energy is normally produced from firewood, agricultural residues such as bagasse, crop stalks, animal dung and wastes generated from agro based industries. In India biomass energy is being utilized mainly for domestic, commercial and industrial application. To become a world leader in utilization of biomass.

India has the potential to generate 16,000 MW (Excluding co-generation) from biomass energy but installed only 630 MW. India stands fourth in generating power through biomass and it has a huge potential to increase its biomass energy to become a world leader in utilization of biomass.

APPLICATIONS:

Various applications that are widely in use are the following;

- Power generation
- Biomass gasification for thermal heating and power generation.
- Biogas generation for cooking and distributed power generation.

1) BIOMASS-BASED POWER GENERATION:

Biomass based power plants can generate grid quality power. A wide variety of fuels like firewood, rice husk, coconut fronds, coconut shell, and crop stalks etc. can be used.

One MW grid connected biomass based power plant operating for 5000 hrs in a year would require about 6000kg of dry wood.

(Approximately 1.3 kg of dry wood per KW).

The investment required for a typical One MW biomass based power plant varies from Rs.3.5 to 4.0 crores.

CASE STUDY: A 4.5 MW biomass based power plant was installed in Karnataka. Bangalore consumes about 150 Tons of biomass energy per day to generate about one lakh units of electricity. The material used for generating energy comprises of cane trash, coconut fronds, rice husk, saw mill wastes and firewood. The ash collected from the boiler is processed and used as organic manure for agriculture.

2) BIOMASS GASIFICATION: Biomass gasification can be used for both thermal and electrical applications. Generally, firewood, agricultural residues such as rice husk, cashew shell etc. are being used in biomass gasifiers. In India, there is a wide range of gasifiers available with capacities varying from 20 kw to 500 kw for electrical applications. Largest biomass thermal gasifier used in India for industrial application has One MW capacity. This has substituted conventional fuel (furnace oil). Thermal gasifiers are applied in industries like steel re-rolling, engineering industries, tiles manufacturing, brick kilns, chemical Industries etc. Typical One MW biomass gasifier requires about Rs 2.5 to 3.0 Crores investment and they have a simple payback period of 3-4 years depending on the type of fuel and capacity utilization.

A 200-kw biomass gasifier system has been installed for power generation in a Potassium Chlorate manufacturing company.

An average of 3800 units of energy is generated per day out of the total power generated through all the other sources. 12% of the energy is consumed by auxiliaries. The gas produced contains particulate matter and is being filtered and cooled with scrubbers and micro filters. The electricity thus generated, is used for electrolysis to produce potassium. The cost of the power generation works out to Rs 3.0 per unit but the present grid electricity is sold for Rs 4.50 to the HT industries. Total investment for this project was Rs.61.0 lakhs. The estimated saving from this project is about Rs.17.0 lakhs per annum which was paid back within two years, after considering the subsidy component.





3) BIOGAS GENERATION: Biogas produced from organic materials such as animal dung, canteen wastes, industrial wastes & selective plants could be used in biogas plants. The gas essential comprises of methane and CO_2 in the ratio of 55:45. It is methane, which has the fuel value. It is estimated that about 100 metric tones of cattle dung would be required to generate 300 kw of power.

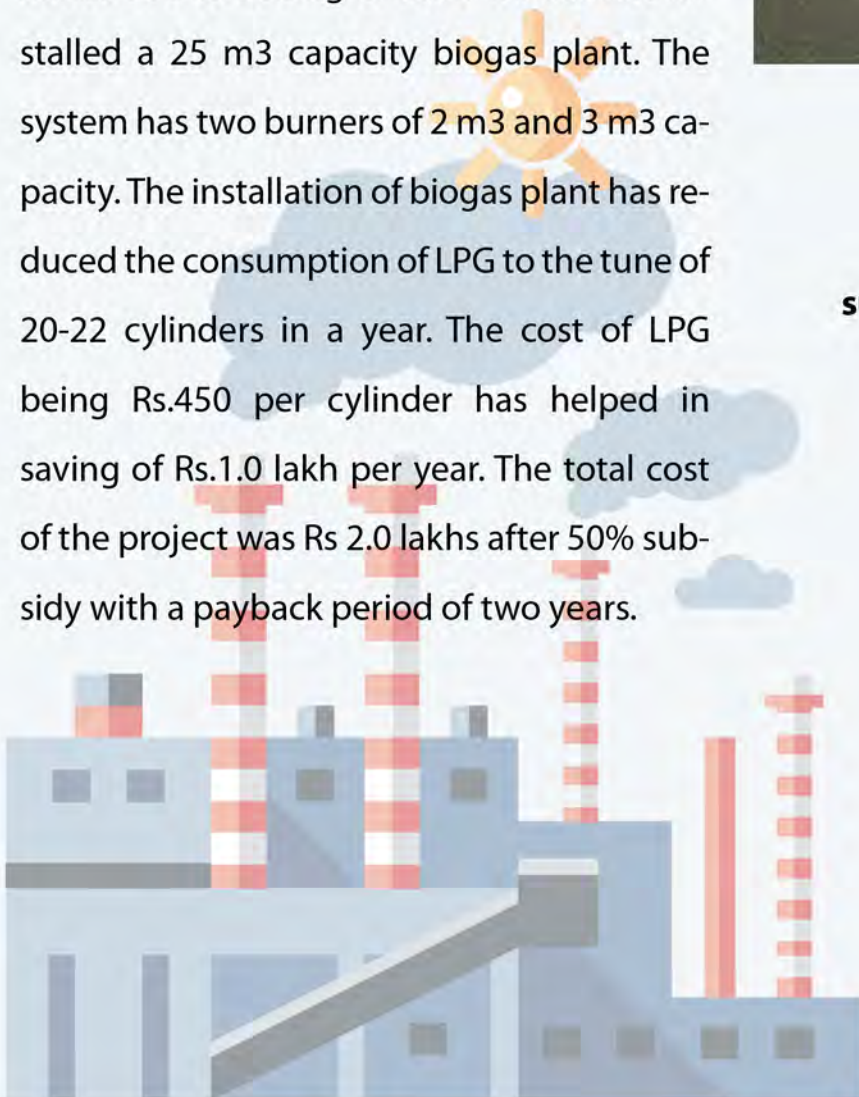


CASE STUDY: An industry which generates about 200 to 250 kg of solid wastes has installed a 25 m³ capacity biogas plant. The system has two burners of 2 m³ and 3 m³ capacity. The installation of biogas plant has reduced the consumption of LPG to the tune of 20-22 cylinders in a year. The cost of LPG being Rs.450 per cylinder has helped in saving of Rs.1.0 lakh per year. The total cost of the project was Rs 2.0 lakhs after 50% subsidy with a payback period of two years.

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GREEN VEHICLES



GREEN VEHICLES



The gradual increase in global population, demand for basic needs and movement of goods and people from one place to another, has resulted in high usage of modern transportation. The modes of transportation has grown exponentially from the traditional bullock and horse carts to different modes of transportation, such as bike, car, vane, lorry, buses, aeroplane, spacecraft etc. To operate these transportation modes, large amount of fossil fuels such as petrol, diesel, white petrol etc. is required.

Fuel and electricity needs have grown considerably with continuous developments and invention in transportation. Due to the rapid developments in transportation, the basics needs of the people are fulfilled quickly, the growth of economy of different countries has increased gradually and more time is saved in travelling, so we could say that modern transportation has lots of advantages to the human beings. This doesn't mean it hasn't got any disadvantages. The environment is the most affected phenomenon on this planet because of the increase in the use of fossil fuels.

People who were developing these modern transportation were not so keen to predict the negative effects it would bring to the society, instead they focused only on increasing the quantities, profit margins and their own technology to compete in the competitive market. But now, the whole world has come to realise the adverse effect these new developments would bring on air, water and land.

The society has also started to observe the adverse effects of fossil fuel powered transportation. Air and noise pollution are caused by the transportation and they directly affect the human and other living things while they are in use. The fossil fuels pollute soil and water thereby affecting the agriculture and livelihood. Experts say that if the same scenario continues for another 50-100 years, then no one will be able to prevent the extinction of living things on this planet. The awareness is being spread around the world gradually for the past few years and now the world is on its heels to discover alternative fuels for transportation.

GREEN VEHICLE



Even though, the electric motor-powered transportation was discovered in early 1890's, due to lack of production in electricity and lack of technological development the plan didn't take off.

Few of the major setbacks that restricted the development of electrical motor transportation were, lack of battery handling technologies, power resources, investments etc. The development also posed few challenges to the industries such as the range of the vehicle (i.e. mileage), speed of the vehicle and safety requirements.

Today technological development has made it possible as lots of research and experiments are being carried out in developing the battery life, capacity, safety and size to meet the maximum range and maximum speed. The research didn't stop with the battery, but extended to motors too, to achieve high performance by reducing various losses. The research also spread its wings in reducing the size and weight of the motor to be accommodated in specified range of vehicles.

The development of BLDC (Brushless D.C) motor in particular reduces noise and increases performance. We could say that the rapid development of electrical & electronic technologies has definitely helped the world to develop "Green Vehicles".

However, the drive should be supported by the governments because research and development on Green vehicles need lot of financial support as the research in "Green vehicle" today, lies in the hands of few private companies. It is the right time to move towards Green technologies to protect the environment and ecology of the earth. Although, there is a lot of challenges in developing the Green Vehicles there is also enough scope available for the Green Vehicles, the companies and the budding engineers who are involved in developing them.



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GREEN BUILDINGS

GREEN BUILDING



One of the biggest problems facing the world today is global warming and in the immediate future, this could become a very dangerous problem for the mankind, threatening the mere existence of mankind. If we make small changes in the present way we live, we can avoid huge catastrophes in the future. Scientists, governments and individuals must work together to overcome this threat.

There are several things we can do to reduce global warming. One solution is to stop the production of Carbon di Oxide. We can do this by switching from oil, coal and gas to renewable energy. Another solution is to use less energy and reduce and recycle more products. One small step to avoid global warming lies in the concept of "GREEN BUILDINGS".

According to the standard definition, a green building is creating structures and using processes that are environmentally responsible and resource efficient.

Main objectives of green buildings are,

- Minimal disturbance to landscapes and site condition
- Use of non-toxic and recycled / recyclable material

- Efficient use of water and water recycling
- Use of energy efficient and eco-friendly equipment
- Quality of indoor air for human safety and comfort
- Effective control and building management systems.

INDIAN GREEN BUILDING COUNCIL (IGBC) was formed in the year 2001 by Confederation of Indian Industry (CII). The aim of the council is to bring green building movement in India to facilitate India to become one of the global leaders in GREEN BUILDINGS. IGBC has also developed green building rating programs to cover commercial, residential, factory buildings etc. Each rating system is divided into different levels of certification as follows:

1. "Certified" to recognize best practices
2. "Silver" to recognize outstanding performance
3. "Gold" to recognize national excellence
4. "Platinum" to recognize global leadership.



Suzlon is India's largest and one of the world's biggest producer of wind energy. The Head Quarters building reflected their global and "sustainable" status. One Earth has top buildings in INDIA that are rated "PLATINUM" by IGBC and first in Maharashtra. It's spread over 10 acres of land, with a built-up area of 820000 sq. ft. in Hadaspar, Pune.

METHODS ADOPTED

Energy Efficient Equipment: ENERGY STAR label on equipment states that particular product has been considered as energy efficient by the Environmental Protection Agency (EPA).

Reduce, Reuse and Recycle: Reduce need for buying new products that are not environment friendly. Reuse old material such as wood floors, doors, windows in your home. Recycled materials such as recycled glass, aluminum, recycled tile, reclaimed lumber and recycled plastic can be used to make your home GREEN.

Install Solar Panels: Solar energy is renewable source of energy which is ecofriendly. Solar panels are emerging and they are the current technology that utilizes the natural power, the sun. Solar panels may be expensive at first, but it is a long-term savings.

Programmable Thermostat: Survey says that 50% of our energy consumption goes towards heating and cooling of our home. The simplest way to cut down this cost and reduce electricity bill is to install programmable thermostat.

Efficient Landscaping: Planting trees on southern and western side of your home can keep your home cooler as they will block sunlight from falling directly on your home and during the winter, when trees lose their leaves, they will allow more sunlight to reach your home.

GREEN BUILDING is different from the other buildings because it uses minimum amount of non-renewable energy, produce minimal pollution, increases the comfort and health and safety of the people who live in them. It also minimizes the waste in construction by recovering materials and reusing and recycling them.

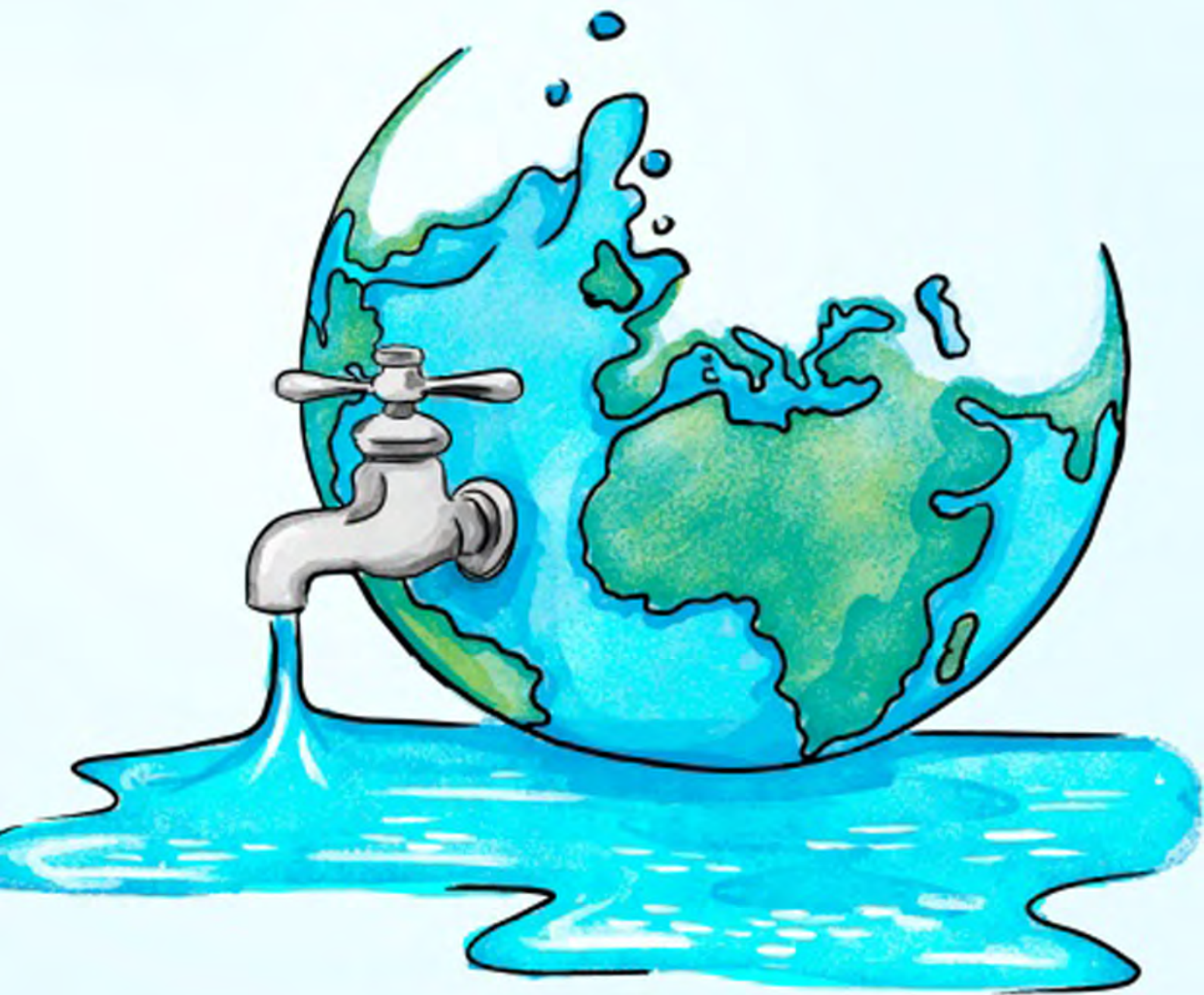
The world should change but the change should start from me. It's time we think of turning towards environment friendly practices and save this planet not just for our future generations but also for the other creatures that live in this earth. Let's not be happy with what we have got but let's also be considerate about other living and non-living things on this planet



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FRIENDS OF THE EARTH



FRIENDS OF THE EARTH



The natural environ, commonly referred as the Environment that includes all living and non-living things on the earth is the surrounding in which we live and it is the source of life. Our whole life depends on the environment and it directs our growth and development. Quality of social life depends on the quality of our natural environment. The needs of human beings such as food, water, shelter and other things depends on the environment in which they live.

Man who is called a social animal, at this time and age, has grown to be the most selfish and inconsiderate of all species and this is evident by the rate with which he has spawned his own annihilation by actively engaging in deforestation. The negligence of geographical conservation which is the genesis of all ecological degeneration might not be the top priority as it should be to a common man given the socio, economic, political climate of the present time. Such ignorance rather than being pitied, should be considered as a strong clarion call for united action against all sorts of ecological devastation.

Action speaks louder than words; an ounce of action is better than tons of ideation or rumination about a brave new world. Social media plays a vital part in educating and disseminating this knowledge to the masses. Here is how my friends and I made our little contribution towards this end. We researched how and why the environment gets polluted? What's the reason behind that? Finally we found out that rapid growth in world population, deteriorating natural resources, dimensioning forests and wetlands, erosion of soil and coral reefs, depleting underground water and vanishing plants had played a major role in environmental pollution. We can't stop this at once but we can control the destruction by following few activities such as planting trees, saving animals, storing the ground water and reducing the plastic usages which is harmful for the animals. So, we as a team, decided to do all these activities. Every organization needs financial support to implement any improvements. We opened a standard account and requested interested people to deposit whatever amount they could. Luckily our team had enough resources and collected enough donations!



Finally, we planned to plant a tree in our localities where we lived to monitor and save the trees. To speak the truth, we put lot of efforts to plant trees and initially we struggled for many reasons. Anyway, life's about learning and this particular activity taught us more lesson from the problems we faced. We gained our identity and many people started supporting us. Some people even started doing it. We thought this small impact will give great life to our earth atleast in the areas where we planted the trees. We are resolute in continuing our services to the next level.

**"AS HUMAN BEINGS AND CREATURES THAT POSSESS A SENSE
MORE THAN OTHER CREATURES, IT IS OUR RESPONSIBILITY TO
SAVE OUR ENVIRONMENT AND ENSURE HAPPY, HEALTHY AND
AMICABLE CO-EXISTENCE ON THIS PLANET EARTH"**



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