A PROJECT REPORT ON

"GREEN CITY"

(POWERED BY COMBINATION OF SOLAR & HYDRO POWER)

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CERTIFICATE

This is to certify that the project entitled, “GREEN CITY ” has been carried out by Dipanjan Paul (Reg No. D192008846) along with his team members Bubai Routh (Reg No. - D192008841), Jyotishman Bank (Reg No. - D192008848), Biswajit Shit (Reg No. - D192008840), Dipanjan Paul (Reg No. - D192008846), Chandan Khanra (Reg No. - D192008842 Kallol Pramanik) at Ghatal Government Polytechnic under my supervision and guidance in the fulfillment of requirements of 5th semester, Diploma (Mechanical Engineering) of West Bengal State Council of Technical & Vocational Education and Skill Development, Karigari Bhavan, WB.

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INTRODUCTION

Green energy is important for the environment as it replaces the negative effects of fossil fuels with more environmentally-friendly alternatives. Derived from natural resources, green energy is also often renewable and clean, meaning that they emit no or few greenhouse gases and are often readily available.

Even when the full life cycle of a green energy source is taken into consideration, they release far less greenhouse gases than fossil fuels, as well as few or low levels of air pollutants. This is not just good for the planet but is also better for the health of people and animals that have to breathe the air.

Green energy can also lead to stable energy prices as these sources are often produced locally and are not as affected by geopolitical crisis, price spikes or supply chain disruptions. The economic benefits also include job creation in building the facilities that often serve the communities where the workers are employed. Renewable energy saw the creation of 11 million jobs worldwide in 2018, with this number set to grow as we strive to meet targets such as net zero.

Due to the local nature of energy production through sources like solar and wind power, the energy infrastructure is more flexible and less dependent on centralised sources that can lead to disruption as well as being less resilient to weather related climate change.

Green energy also represents a low cost solution for the energy needs of many parts of the world. This will only improve as costs continue to fall, further increasing the accessibility of green energy, especially in the developing world.

HISTORY

Indian government wants to develop a ‘green city’ in every state of the country, powered by renewable energy. The ‘green city’ will mainstream environment-friendly power through solar rooftop systems on all its houses, solar parks on the city’s outskirts, waste to energy plants and electric mobility enabled public transport systems.

India’s Ministry of New and Renewable Energy (MNRE) on December 3 unveiled a concept note stating that Prime Minister Narendra Modi desires one city in each state to be developed as a green city that will meet all its energy requirements from renewable sources of energy.

The ministry notes that the idea is in line with international trends in green energy. “Various countries have announced periods during which they will use only green energy. Many buildings and enterprises are declaring and moving towards net-zero emissions. The city will continue to be connected with the grid, and the renewable energy injected into the grid shall be equivalent to or more than the total consumption of electricity in the city,” said the concept note.

The idea is to have either the state’s capital city or a renowned tourist area for this programme.

Of the 100 GW of solar power that the Indian government aims to have by 2022, 40 GW is targeted through solar rooftop by 2022. However, the solar rooftop sector’s growth has been very poor with just over six GW installed capacity.

Under this proposal, the government’s objective is to install rooftop solar on most if not all rooftops in the green city.

Ahmedabad is the one of most fastest growing city of India, and it has already been honoured internationally by 'Green City of India”. The first planned hill city LAVASA, which is also one of the best going green city in India and Chandigarh is considered as “Ever green city of India”

COMPONENTS OF GREEN CITY

1. SOLAR PANEL: It the heart of the solar power plant. Solar panels consists a number of solar cells. We have got around 35 solar cells in one panel. The energy produced by each solar cell is very small, but combining the energy of 35 of them we have got enough energy to charge a 12 volt battery. It is also called Photovoltaic Panel.

2. SOLAR CELL: Solar cell is the energy generating unit, made up of p-type and n-type silicon semiconductor. It's the heart of solar power plant. Light shines on a solar cell, some of the photons are absorbed by the material, and this causes electrons to be knocked loose from their atoms. These free electrons flow through the cell to produce electricity. It is also known as Photovoltaic Cell.

3. BATTERY: The role of solar battery in the photovoltaic solar system is very significant. It stores the excess energy your solar panel system generates. The batteries used in a solar energy system function as energy "accumulators" and are responsible for storing the energy obtained by the solar panels. The batteries have the function of providing electrical energy when there are service interruptions or blackouts due to emergency situations.

4. INVERTER: Solar panels produce direct current which is required to be converted into alternating current to be supplied to homes or power grid.

5. HYDRAULIC TURBINE: The hydraulic turbine's principle is based on Newton's second law of motion. It is a device that converts the energy in a stream of fluid into mechanical energy by passing the extreme through a system of fixed and moving blades and causing the wheel to rotate.

6. RESERVOIR: A reservoir is an artificial lake where water is stored.

7. PUMP: A pump is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action, typically converted from electrical energy into hydraulic energy.

8. CITY: A city is a large human settlement.

9. IRRIGATION SYSTEM: Irrigation system provide water. The supply of water to land or crops to help growth typically by means of channels.

10. VEHICLE CHARGING SYSTEM: It helps to charge the vehicles.

WORKING OF GREEN CITY

A green city improves the environment, ensures rich biodiversity, reduces air pollution, ensures water storage, dampens noise and help cooling down in warm periods. Green is also essential for a climate-proof and sustainable environment.

In this project, we create a solar plant that produce electricity by absorbing sunlight. Then the electricity stored in a system called storage system. Then the inverter converts the DC power to AC power, while at the same time regulating the voltage, current and frequency of the signal. After that a gride connected to inverter that controls the flow of electricity. Generated electricity is converted to low voltage with the help of step down transformer.

Now the electricity is distributed to the city. In this city, the electricity is utilized in various purposes, such as-

1. Household
2. Medical purpose
3. In school & college
4. Water supply to farming
5. Market & street light
6. In police station
7. Vehicle charging station
8. Park

For backup purpose at night and other times when the solar panels are unable to generate as much electricity as is required then we will use a hydraulic turbine. It will produce electricity for the green city.

Green City

IMPACTS OF ENVIORNMENT

Green energy provides real benefits for the environment since the power comes from natural resources such as sunlight, wind and water. Constantly replenished, these energy sources are the direct opposite of the unsustainable, carbon emitting fossil fuels that have powered us for over a century.

Creating energy with a zero carbon footprint is a great stride to a more environmentally friendly future. If we can use it to meet our power, industrial and transportation needs, we will be able to greatly reduce our impact on the environment.

CONCLUSION

Green energy looks set to be part of the future of the world, offering a cleaner alternative to many of today's energy sources. Readily replenished, these energy sources are not just good for the environment, but are also leading to job creation and look set to become economically viable as developments continue.

The fact is that fossil fuels need to become a thing of the past as they do not provide a sustainable solution to our energy needs. By developing a variety of green energy solutions we can create a totally sustainable future for our energy provision, without damaging the world we all live on.

TWI has been working on different green energy projects for decades and has built up expertise in these areas, finding solutions for our Industrial Members ranging from electrification for the automotive industry to the latest developments in renewable energy.

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