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USES OF NON-CONVENTIONAL ENERGY SOURCES IN DEVELOPMENT OF RURAL AREA: A CASE STUDY OF GURAVAWADI VILLAGE.

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ABSTRACT

In the initial phase of planned rural development the concentration was on sector of agriculture industry, communication, education and health. The ministry of rural development places importance now on health, education, drinking water; housing and road so that the quality of life in rural areas Improves and fruit of economic reform are shared by section of society.

The basic objective of all rural development endeavors program has been welfare of the millions. In order to achieve this, planned attempts have been made to eliminate poverty, ignorance and inequality of opportunities.

As we discuss about the development of village without disturbing the environment, we can develop "Guravwadi village" by using non-conventional energy sources like bio-gas plant, rain water harvesting system and solar power energy plant and wind turbine. By such a way we can make the Guravwadi village independent, clean, eco-friendly and free from chemical and dust etc.

This project is totally economical for Guravwadi village in all aspects, like solving the problem of electricity in the development of Guravwadi village. By the setup of biogas plant expenditure on cooking has been decreased which also helped in cleanliness of Guravwadi village. By using the technique of rain water harvesting & percolation tank the ground water table of Guravwadi village will increase which help in solving all waters related to water scarcity.

KEYWORDS: Bio-gas , Rainwater harvesting ,solar energy , Wind energy

INTRODUCTION

In our project we are introducing the techniques of using the non-conventional energy sources in development of rural areas, generally the sources of non-conventional energy are:

1) Bio gas
2) Rainwater harvesting
3) Solar energy
4) Wind energy

This sources are normally available anywhere the use of this things should be economical, easy,

PRESENT SENARIO IN INDIA

In India, people likes to live in metro cities because where they are having modern facilities and features those they are not availabe in rural areas and that the reason's behind migration of peoples from rural areas to urban areas it creats sudden problems which have to face by the Government of India.

OUR AIM

Our aim is through this project we are introducing the use of non-conventional source of energy and first of all developed the rural areas which can adversely affects on growth of nation.

THE GURAVWADI VILLAGE

For this project we are selecting the guravwadi village.
Following are the overall information related to this village:

1) Name of village: Guravwadi village, taluka akkalkot, dist.solapur.
2) Population of village: 1127
3) Male:-691 and Female: 436
4) No. of house in village: 354
5) Sources of drinking water: well, hand pump
6) Facility of electricity: MSEB
7) Sewage of water: sewage water is carried out of the village with the help of concrete pips
8) No. of families having toilet: 197
9) Source of water available for agriculture purpose: well, bore well etc.
10) Major crops: jawar, tur,sugarcane,sunflower,onine.etc.
11) No. of school in village: 2
12) Profession of the people: agriculture, cattle breeding.

BIO-GAS

Biomass is renewable energy resource derived from the carbonaceous waste of varies human and natural activities. It is derived from numerous sources, including the by-products from the wood industry, agriculture crops, and raw material from the forest household wastes etc.

Biogas is a clean and efficient fuel, generated from cow-dung, human waste or any kind of biological materials derived through anaerobic fermentation process. The biogas consists of 60% methane with

rest mainly carbon-dioxide. Biogas is safe fuel for cooking and lighting. By-product is useable as high-grade manure.

Necessity of biogas plant in Guravwadi village:

International market rate of fuel are increasing day by day. Hence Indian government has reduces L.P.G. cylinder subsidy and numbers of cylinder is supplied to each family. The extra cylinder cost is much higher that is necessary bio gas

The number of animal available in Guravwadi village is approximately 1200 nos. The trees are cut down on a large scale for firewood so the number of trees is reduced. Dung is used for production of gas. The cost of biogas plant is also less.

Basic information of bio-gas plant:-

How much Animal produce excrement:

1 meat or buffalo produce 8 kg.s of fresh excrement per day.

1 milk cow produces 15 kg of fresh excrement per day.

What bio gas can do:-

1 m^3 biogas can cook 3 meals for family of 5-6

1 m^3 of biogas can give as much light a 60-100 watt bulb for 6 hours.

1 m^3 of biogas can replace 0.7 kg of petrol.

1 m^3 of biogas can generate 1.25 kilo watt hours of electricity.

Table. A) Estimate for materials and rate single family of Guravwadi village of one biogas plant.

Sr.No.	Particulars	No.	Rate	Total amount
1	Brick (2nd class brick)	1200	5/-	6000
2	Sand	1.5 brass	3500/-	5250
3	Cement	17	320 / bag	5440
4	P.V.C pipe ½"	100 ft	13 ft	1300
5	P.V.C coupler ½"	6	10/-	60
6	P.V.C bend ½"	1	14/-	14
7	P.V.C elbow ½"	6	10/-	60
8	P.V.C value ½"	2	300	600
9	P.V.C pipe ½"	10 ft	20 /ft	200
10	Hose nipple ½"	1	30/-	30
11	Gas shegdi	1	2500/-	2500
12	Gas pipe	1	250/-	250
			Total cost	Rs. 21704/-

Table. B) Labors cost.

Sr. No.	Particular	Size/No	Rate Rs/-	Total amount Rs/-
1	Excavation of earthwork L=1.5m B=1.5m D=1.2m	1.5x1.5x1 .2	800/m^3	2160/-
2	Brickwork with plastering	4m^3	750/m^3	3000/-
3	Plumbing work	100ft	9/ft	900/-
			Total cost	Rs. 6060/-

Total cost of one bio-gas plant

Material cost from A : Rs. 21704/-

Labor cost from B : Rs.6060/-

Total cost of plan : Rs.27764/- for one family

Total number of farmer = 354 in Guravwadi village.

(Total biogas project cost for family of guravwadi village)x no. of houses.

= 27764 X 354 = 98, 28, 456/-

Benefit

Single family in Guravwadi village monthly expenditure on cooking and heating= Rs.1260/-

Yearly total expenditure = Rs. 15120/-

When did use bio gas save expenditure

On cooking and heating = Rs. 27764/- Government subsidy for single family in Guravwadi village = 60% of total cost of Construction. Subsidy = 27764 X 60/100

Subsidy = Rs.16658/-

Benefits of Bio gas:-

Cooking on biogas is quicker and easier than cooking with firewood.

Biogas system produce excellent safe fertilizers for use on the farm.

Biogas systems kill the bacteria in livestock manure. A farm with the biogas system is cleaner and safer place.

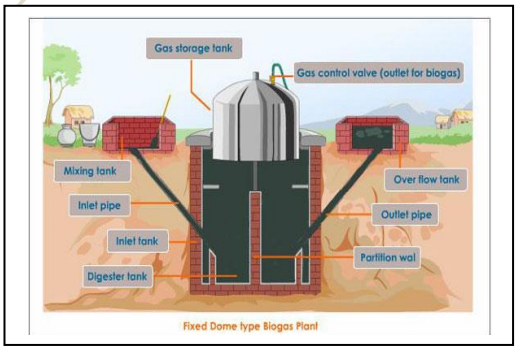

Fig. Working Of Biogas Plant

RAIN WATER HARVESTING

It is the process of collecting and storing water from future productive use.

Components of rain water harvesting.

Any rain water system has three components.

Catchment

Conveyance

Storage

How to harvest Rain water?

Collect water from the rooftop.

Draw it down from pipes.

Store in a sump or tank for large use.

Charge the ground water through a soak pit.

Lead the water into a well to increase ground water content.

Percolation tank.

Site selection criteria:

The hydrogeology of the area should be such that the litho-units occurring in the area of submergence of the tank should have high permeability.
The soils in the catchment area of the tank should be sandy to avoid silting up of the tank bed.
The availability of the non-committed surplus monsoon runoff should be sufficient to ensure filling of the tank every year.
The purpose of percolation tanks is to ensure recharge of percolation tank is to ensure recharge of maximum possible surface water runoff to the aquifer in as short a periods possible with much evaporation losses.
Guravwadi Village Information
Population - 1127
Total House - 354
Water requirement for 1 house - 600 lit/day
Water requirement for 354 houses - 7, 75, 26,000 lit/day
Rainfall data - Max.743.4 mm/yearly And Min. 270.3 mm/yearly
Max. Temperature - 43°C
Avg. Temperature - 30°C
Min. Temperature - 17°C
Rain Water Harvesting

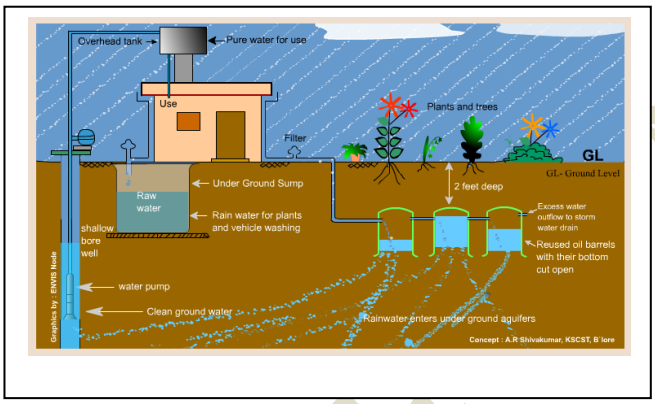

Fig. Rain water Harvesting

SOLAR ENERGY

Solar energy is the most readily available and free source of energy since prehistoric times. It is estimated that solar energy equivalent to over 15,000 times the world's annual commercial energy consumption reaches the earth every year.

Solar energy can be utilized through two different routes, as solar thermal route and solar electric (solar photovoltaic) routes. Solar photovoltaic uses sun heat to produce electricity for lighting home and building, running motors, pumps, electric appliances and lighting. Photovoltaic is the technical term for solar electric. Photo means "light" and voltaic means "electric". PV cells are usually made of silicon, an element that naturally releases electrons when exposed to light. These current is guided into a wire that is connected to a battery or DC appliance. Typically, one cell produces about 1.5 Watts of power.
Total cost for single house electricity generation = Rs. 18950/-
Total cost = 354×18,950 = Rs. 67, 08,300/-
Working of solar energy

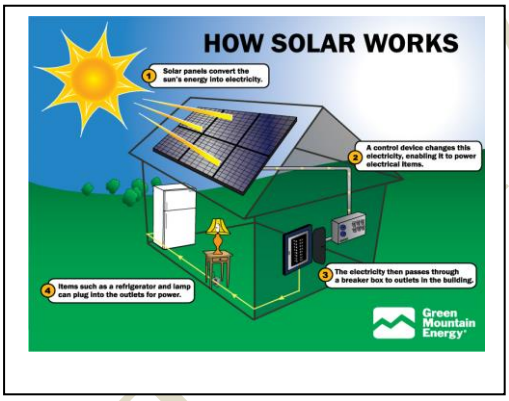

Fig. Solar Energy

WIND ENERGY

Wind energy is basically harnessing of wind power to produce electricity. The kinetic energy of wind is converted to electrical energy. Now wind power is harnessed to generate electricity in a larger scale with better technology.
Wind Electric Generators (WEG)
Wind electric generator converts kinetic energy available in wind to electrical energy by using rotor, gear box and generator.

REQUIRED WATT FOR SINGLE HOME (FOR 8 HOURS)

Appliance	Watts
7 watt CFL (7×2)	14
Ceiling fan	60
Total	74

Wind energy in India
India has been rated as one of the most promising countries for wind power development, with an estimated potential of 20,000 MW. Total installed capacity of wind electric generators in the world as on September 2001 is 23270 MW.

APPLICATIONS

Wind turbines for remote water pumping generate DC current for battery changing.
Wind turbines for remote water pumping generate 3 phase AC current suitable for driving an electrical submersible pump directly.
Wind turbines an electrical submersible pump directly.
Wind turbines suitable for Guravwadi village scale wind power range from 500 Watt to 50 kilowatts.

Population	1127
Total house	354
Basic wind pressure in Guravwadi village	30-35 km/hr
Normal direction of wind	North to south
Temperature	30°C (average)
Per house electricity	100 Watt/ day
Total electricity required	100×354=35400
Capacity of turbine	50 KW/day
Cost of one turbine	Rs.82,50,000/-
Number of turbine	1 No.
Land required	10,000 sq.ft
Cost of land	Rs. 62,500
Total cost of project	Rs. 83,12,500

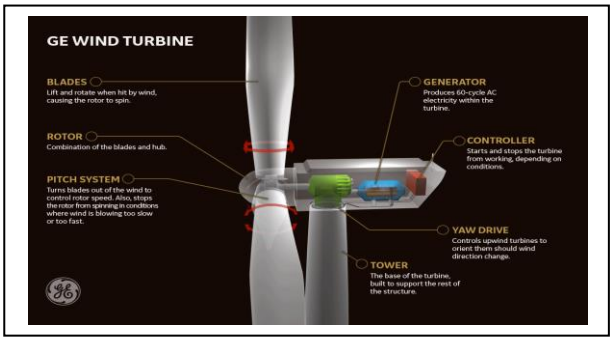

Fig. Components of Wind Turbine

APPLICATIONS OF LARGER SCALE

This project should be done in small village or a rural areas but this also applicable in a large scale cities.

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REFERENCES

1) Sarpanch of Guravwadi village - Mrs. Borgav S.R.
2) Internet - www.Google .com
3) Newspaper - Times of India and Indian express
4) Market Survey - Fairdale solar, Akkalkot
5) Visits - Guravwadi village, Sanjay wind mills, Kolhapur, Ingalgi.