

A photograph of a papaya tree with large, deeply lobed green leaves and several green papaya fruits hanging from the branches. The tree is supported by a wooden trellis system. The background shows a clear blue sky and some distant trees.

WELCOME

**RENEWABLE ENERGY POWER
PROJECT(REPP)
CAPACITY – 1.2MW
BASED ON DAIRY SOLID WASTE
AT
PARIYAT VILLAGE,
JABALPUR DISTRICT,
MADHYA PRADESH,
INDIA**

BY

RDM CARE (INDIA) PVT. LTD.

Introduction :-

The project owner M/s RDM Care (India) Pvt. Ltd. is in the herbal cosmetics business since 1985 and established their brand as **AYUR HERBALS** across the country and abroad with wide range of successful beauty cosmetic products.

- RDM Care(India) Private Limited, part of the **AYUR GROUP**, New Delhi is in the process of implementing a 1.2 MW capacity which can extend to 2 MW renewable energy power project using dairy solid waste at Pariyat Village in the state of Madhya Pradesh. The objective of this project is not only to generate the biogas based renewable energy but also to achieve an environmentally friendly way of managing dairy solid waste.
- The purpose of the project activity is to treat the solid waste generated from dairy farms of the villages consisting cattle in excess of 15000 numbers.
- It also aims to clean the River Pariyat and it's a social act to make our environment more clean and green.
- It aims to convert solid waste into organic manure, develop and market organic manure, electricity generation, biogas recovery and a solution to pollution and greenhouse gas (GHG) emissions.

BRIEF OVERVIEW

- **India is traditionally an agriculture base country. 165 million families are depending on agriculture for their livelihood. About 65% population reside in the villages. Agriculture and animal husbandry both are the sources of income to the farmers.**
- **In India cattle population is estimated to be 185.18 million (Live stock census 2003) of which 160.50 million are indigenous and 24.68 million are cross bred cows. The total cow dung produced is 1815.80 million kg. per day. Proper management of cow dung and urine would save precious foreign exchange incurred towards import of chemical fertilizer and petroleum.**
- **According to national council of applied economic research (N.C.A.E.R.) cattle dung in India has a fuel value equivalent to 35 million ton of coal or 68 million ton of wood. An estimated one third of the dung amounting to some 300 million tones is used as fuel in rural houses, another 340 million tones goes back to soil as fertilizer. F.Y.M. (Farm Yard Manure) is still the most predominant source of organic farming in country**



TECHNOLOGY TO BE EMPLOYED

The project activity is the first large-sized biogas based electricity generation project in the country.

The key equipments comprising the higher-rate CSTR anaerobic digesters, biogas turbine generators and the waste heat recovery boilers are imported from Germany and Netherlands

WHAT IS BIOGAS?

- **Biogas typically refers to a gas produced by the biological breakdown of organic matter in the absence of oxygen.**
- **Biogas originates from biogenic material and is a type of biofuel. Biogas is produced by anaerobic digestion or fermentation of biodegradable materials such as biomass, manure, sewage, municipal waste, green waste, plant material and energy crops.**
- **This type of biogas comprises primarily methane and carbon dioxide. Other types of gas generated by use of biomass is wood gas, which is created by gasification of wood or other biomass. This type of gas consist primarily of nitrogen, hydrogen, and carbon monoxide, with trace amounts of methane.**
- **The gases methane, hydrogen and carbon monoxide can be combusted or oxidized with oxygen. Air contains 21% oxygen. This energy release allows biogas to be used as a fuel.**

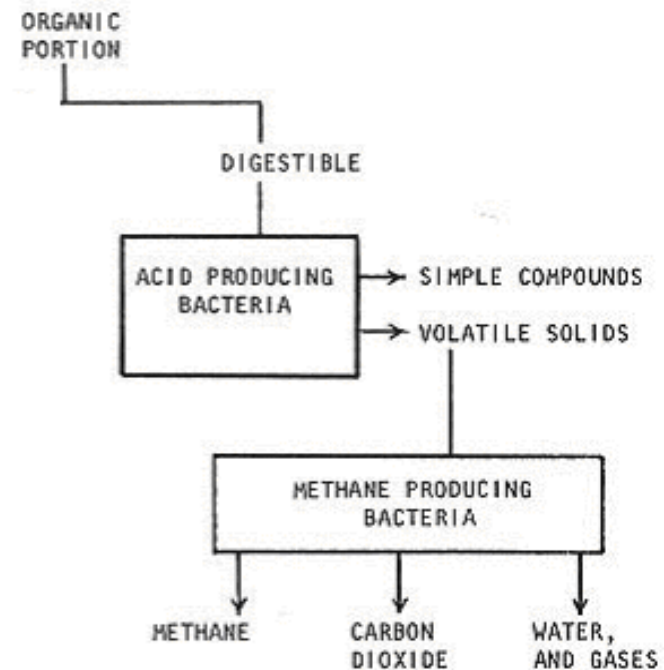


What is a Biodigester?

- A device that mimics the natural decay process of organic matter
- Biogas is produced from anaerobic decay (decay that occurs without oxygen)

Anaerobic Digestion in a Biodigester

- Digester is fed a mixture of water and waste called a **slurry**
- Daily, fresh slurry is added, displacing previous days load that bacteria have started to digest
- First, digestible organic matter is broken down by **acid-producing** bacteria
- By-products are then broken down by **methane-producing** bacteria



WHERE DOES BIOGAS COME FROM?

- **Vegetation** –

When vegetation decomposes, it gives off methane gas

- **Farm and ranch animals** -

cattle, chickens, pigs produce manure. When manure decomposes, it also gives off methane gas

- **Sewage** –

The treatment of human waste in anaerobic digesters produces methane

- **Landfills** -

Garbage produces methane as it decomposes

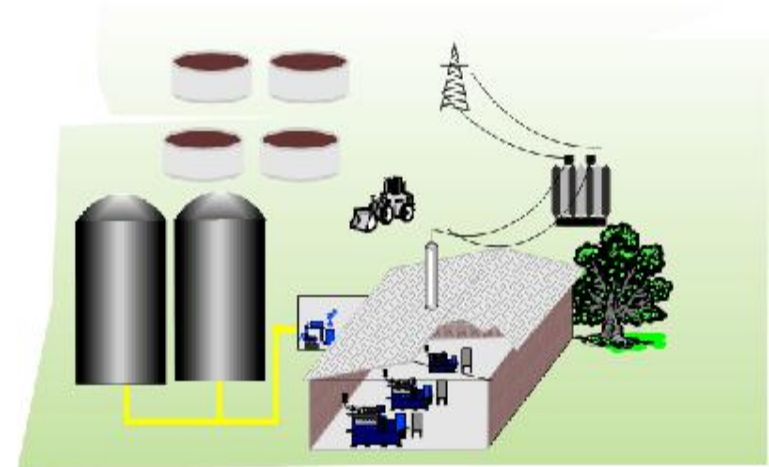


How Much Biogas Can I Get From My Waste?

- Amount of biogas depends on the waste itself and design of the digester.
- Some digesters can yield 20 liters of biogas per kilogram of waste up to 800 liters per kilogram.
- **Factors:** waste quality, digester design, temperature, system operation, presence of oxygen.

USE OF BIOGAS

- Biogas can be used as a low-cost fuel in any country for any heating purpose, such as cooking.
- It can also be used in modern waste management facilities where it can be used to run any type of heat engine, to generate either mechanical or electrical power.
- Biogas can be compressed, much like natural gas, and used to power motor vehicles and in the UK for example is estimated to have the potential to replace around 17% of vehicle fuel.
- Biogas is a renewable fuel, so it qualifies for renewable energy subsidies in some parts of the world.



THE COMPOSITION OF BIOGAS

Methane

55-65%

**Hydrogen
sulphide**

Trace

Carbon-di-oxide

55-45%

Nitrogen

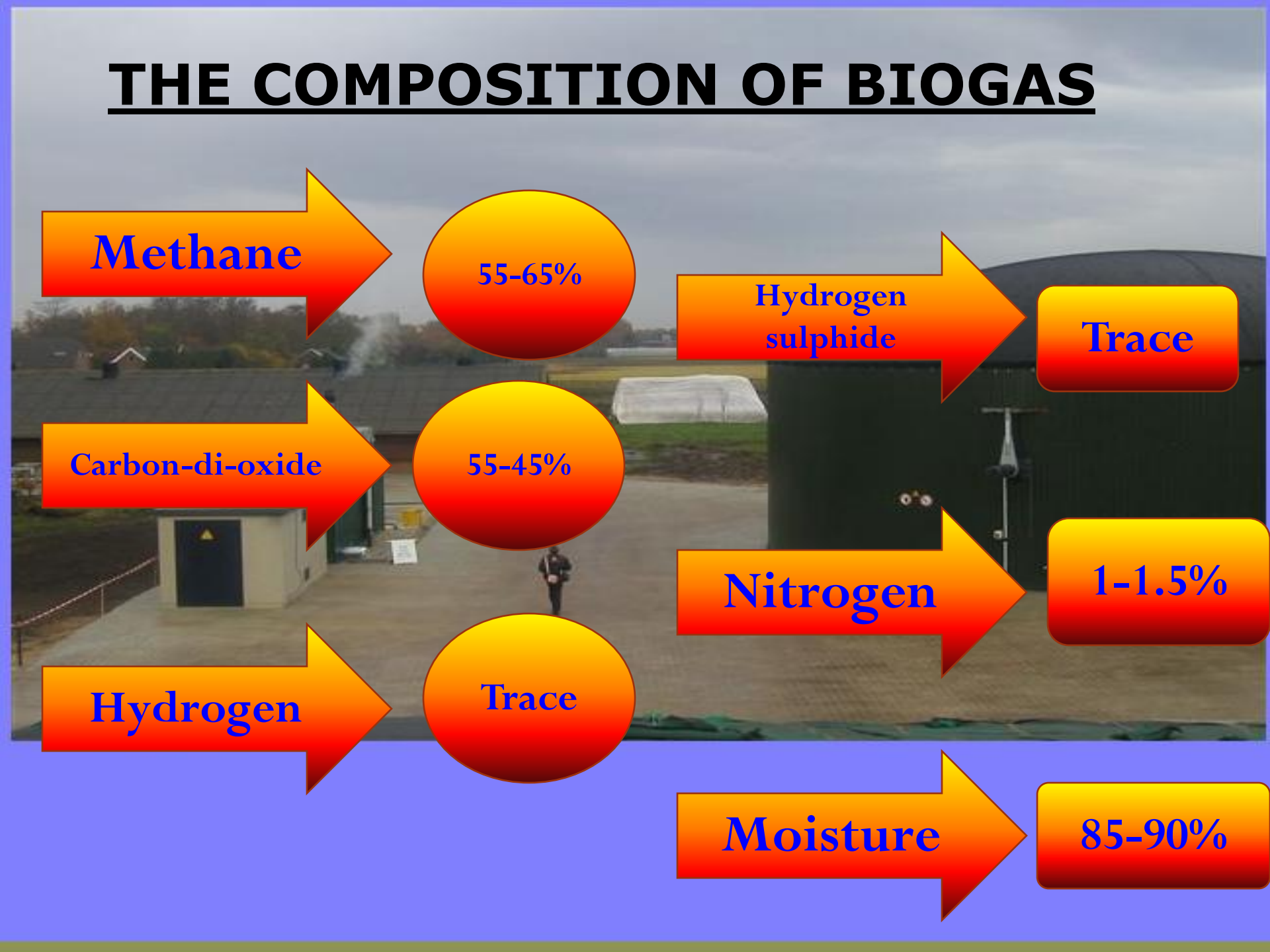
1-1.5%

Hydrogen

Trace


Moisture

85-90%



Effect of green revolution :-


❖No doubt due to the introduction of green revolution in the last fifty years. Grain production has increased and the country became self sufficient in respect of food grains, but due to unlimited use of chemical fertilizer variety of problem such as –



1- Degradation of soil fertility.
2- Low yield of production.
3- Contamination of food, drinking water and air.
4- Number of new incurable disease in man, animals and plants.
5-Economic viability of the farmer is ruined.



❖To over come the above problems, we have to look back to our old system of farming where organic manure was used in sufficient quantity for higher production.



❖Organic agriculture-is for fertilizing the soil, which is possible only by exploiting billion of micro-organisms present in the soil. The excessive and indiscriminate uses of chemical have suppressed them. It is high time to create congenial atmosphere for nutrient of such huge microbes by using less chemicals.

❖The agriculture scientists now agree that balanced use of chemical fertilizer should be encouraged.

❖During the last few years, the ministry of agriculture Govt. of India is encouraging balanced use of fertilizer along with Bio-fertilizer and organic manure.

❖Cow dung properly converted into manure can improve the soil, and can meet the nutrient requirement of the plants growth.



TYPES OF BIOGAS PLANTS



Floating drum type



Modified drum type (Deenbandu)



BIOGAS PLANT AT JABALPUR



BIOGAS SLURRY:-

Biogas slurry comes out from the biogas plant, which has three digesters and works in anaerobic condition. The plant is connected with three pipes that allow the dung and other organic waste mixed with water to be fermented in ambient temperature of 30 to 40 degree centigrade. The constant fermentation of the material produces methane, carbon dioxide and nutrient rich slurry. Providing macro-elements like N, P and K and trace elements like iron, copper, boron etc., also improves the soil water retention capacity because of its humus content, apart from this the biogas plant manure buffers pH change in the soil and thus equilibrium of soil is maintained.



Chemical composition of animal dung

	P.H.	ORGANIC CARBON	AVAILABLE NUTRIENT	AVAILABLE PHOSPHORS	AVAILABLE POTASH
COW	8.3	47.2	0.51	0.33	0.48
BUFFALO	8.5	51.8	0.54	0.50	1.07

- The nitrogen and other constituents of the cow dung are not sufficient to meet the requirement of crop production, hence the best method is to use digested sludge, which can increase crop production by 10-20%.
- Biogas technology was developed in this country nearly 100 years back, but due to lack of interest by the Govt. and farmers it was not popular in the field.

Manure value of Bio digested slurry (B.D.S.)

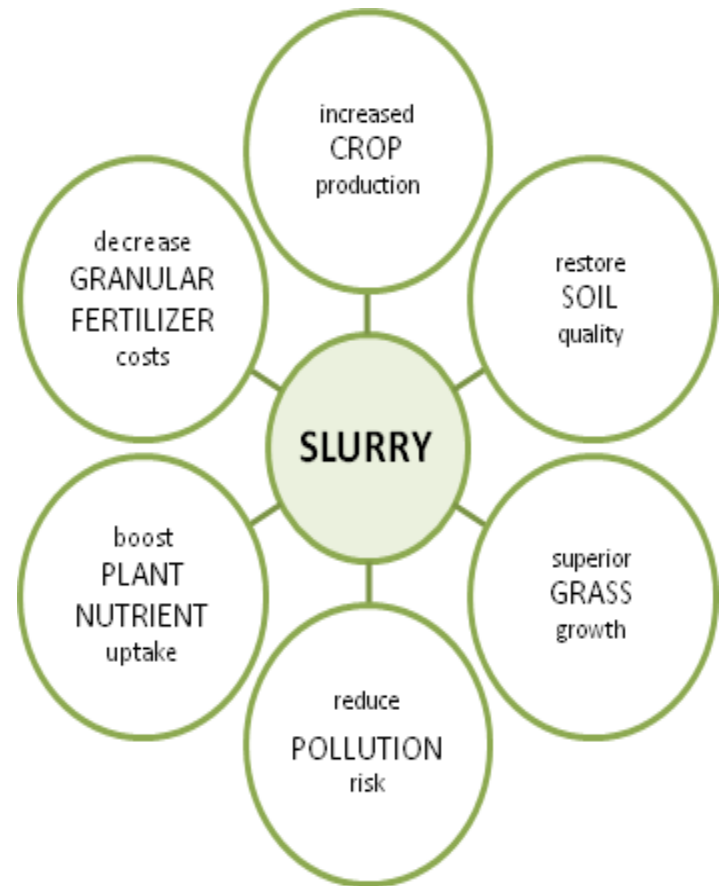
The Bio digested slurry is free from weeds, foul smell and pathogens. It contains highly quantity of micro-organism which are essential for soil and meets the needs of plant nutrients. Comparative quality of F.Y.M. and B.D.S. is shown in the table:-

Plant Nutrients	Digested Slurry	F.Y.M. %
Nitrogen (N ₂)	1.00 - 1.50	0.5-0.75
Phosphorus (P ₂ O ₅)	0.72 - 0.85	0.5-0.8
Potash (K ₂ O)	0.80 - 1.00	0.5-0.7

Bio digested slurry superior to F.Y.M. and chemical fertilizer:-

Benefits over FYM:-

- 1- Bio digested slurry ready within shortest possible time.
- 2- Contains large amount of organic matter as its loss during composition is less, there is more retention of organic carbon.
- 3- Loss of nitrogen during decomposing is minimal; the amount of available nitrogen is more.
- 4- Due to higher status of humus substance, there is better proliferation of soil microbes.
- 5- No odor or foul smell during decomposition.
- 6- Absence of weed seeds and pathogenic fungi.
- 7- It has higher water holding capacity, which helps the rain fed crops.
- 8- Does not attract insect breeding.
- 9-It is possible to treat the seeds with Bio digested slurry to have better germination rate.
- 10-If night soil and cattle urine is added, availability of nitrogen and phosphorus in Bio digested slurry is strengthened.





Benefit over chemical fertilizer:-

- 1- Improvement in quality of produce in terms of size, taste and keeping quality.**
- 2- Reduction in chemical fertilizers indirectly helps in reduction in unit cost of produce.**
- 3- Improves the physical and chemical properties of soil.**
- 4- There better balance of macro and micro nutrient and deficiency in the soil is reduced.**
- 5- Humus substances contained in it, helps proliferation of soil microbes even in presence of chemical fertilizers.**
- 6- There is more stabilization of yields and crop stand better under stress conditions.**
- 7- Due to better micronutrients pests attack is less prominent.**
- 8- Amelioration with chemical fertilizers reduces volatilization and leaching of nitrogen and enhances mineralization of phosphorus.**
- 9- A proper combination of Bio digested slurry, bio fertilizers and other inoculants such as Rock phosphate, Blue green algae can give sustainable yields at higher levels.**
- 10- It is good medium for cultivation of plants and aquatic plants.**



Dehydration and enrichment of slurry :-

➤ Due to enormous quantity of water (about 90%) contained in it, handling and transport of Bio digested slurry becomes difficult. Moreover, it requires larger space and takes long time for drying in the sun.

➤ Variety of methods could be employed for bringing about proper dehydration of slurry ranging from sun drying to mechanical operation.

➤ The method of drying, sedimentation and absorption of slurry and dry organic refuse and its filtration using sand bed have been found to be useful. The loss of ammonia during direct sun drying could be reduced using low-grade rock phosphate. After 10-12 days of sedimentation the settled sludge is removed with higher solid content from the bottom, having only 10-15% moisture.

➤ The total nitrogen content in organic manure does not exceed 1.5 percent at best. The percentage availability of nitrogen for plants range from 5 to 20 percent with the result that low response is obtained. When applications are made in soil.

➤ A new approach to this problem has been worked out when C/N ratio is less than 10:1 or the nitrogen content is more than 2.5 percent. The low quality manure containing 1 to 1.5 percent nitrogen can be treated with cakes to enrich nitrogen contents up to 3 to 5 percent or more for better result.

Enrichment of slurry :-

The bio digested slurry can be mixed with oil cakes such as Neem cake, Castor oil cake and any other cake, which will enhance the nutrient value of the manure. At present RDM Care (India) Pvt. Ltd. is adding 5 to 50% neem cake for selling purpose. Neem cake contains 5.22% nitrogen 1.8% phosphorus and 1.48% potassium. This improves the quality of Bio slurry.

VERMICOMPOSTING

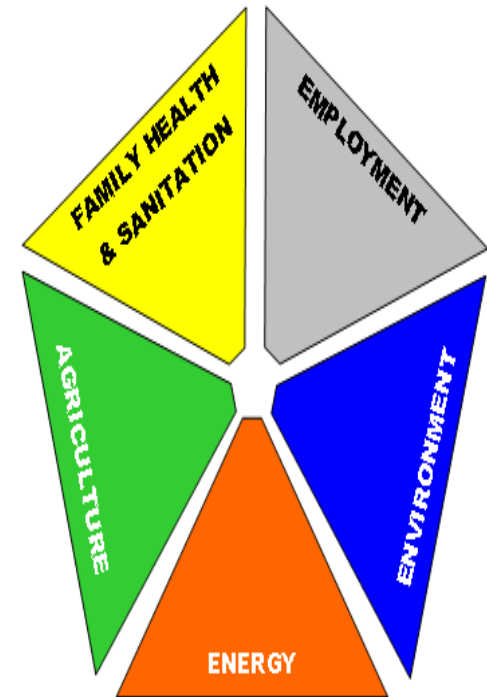


- **Vermicomposting is the process of breaking down or composting organic matter using worms.**
- **Vermicompost is much quicker and easier than traditional composting. This is due to the fact that a worm can eat their weight in organic matter everyday, and they leave behind a richer by product with more nutrients than other composting methods. The worms also do all the work for you, no need to turn over the pile like traditional composting.**
- **Vermicompost bins are odor free and compact and can be placed in the garage, basement, patio, or even your kitchen. This means no more cold or rainy walks to the compost pile.**
- **So do your part and stop sending your organic matter to the landfill. Instead create black gold for your garden, flowerbeds, or lawn. Your vegetables will taste better, your flowers will be brighter, and it is all completely organic, no chemicals.**



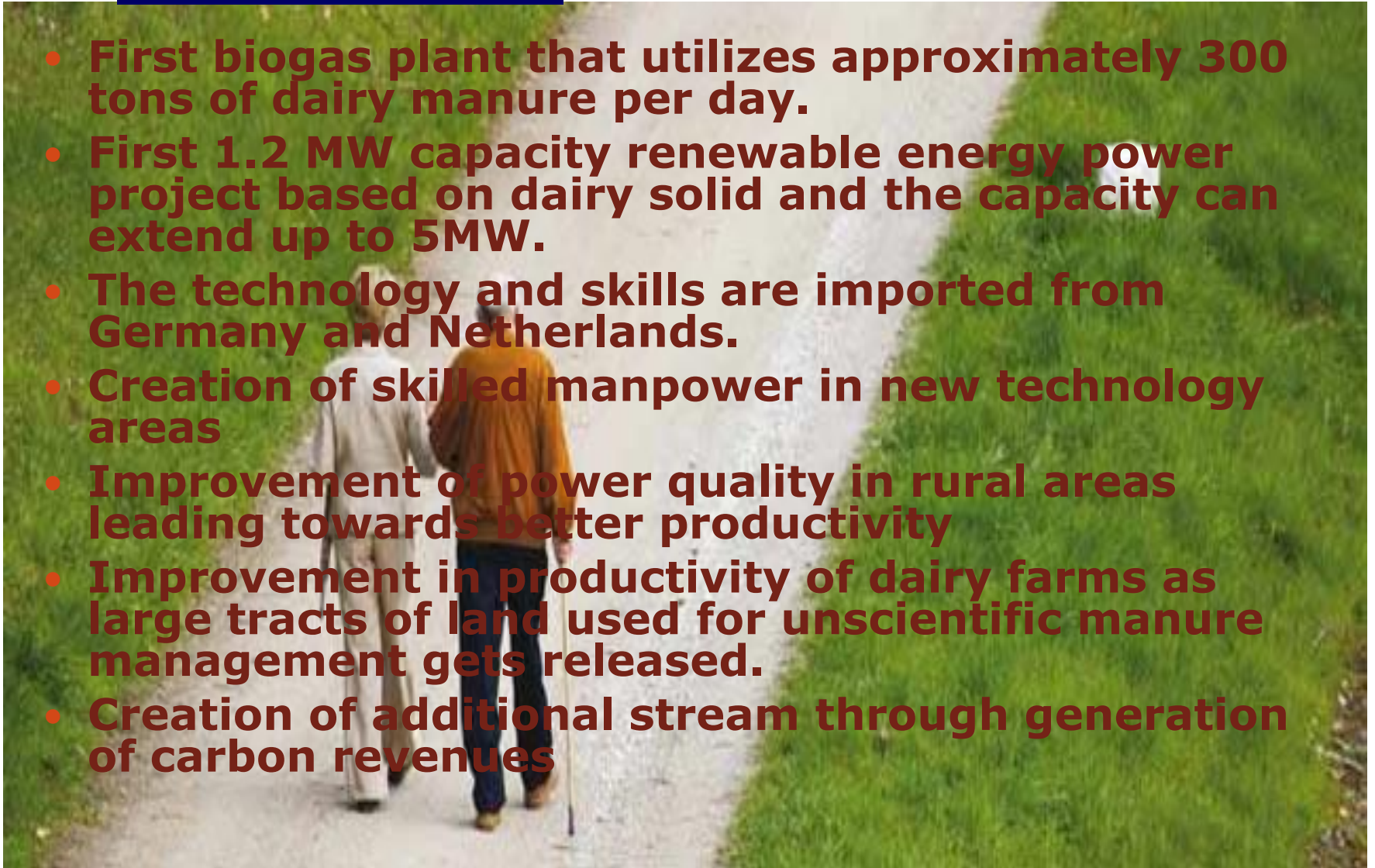
SOCIAL and ENVIRONMENTAL WELLBEING

- **Promotion of large scale biogas plants for treating dairy manures**
- **Increase local employment opportunities**
- **Improvement in rural lifestyles and infrastructure in the areas surrounding the project**
- **Prevents pollution of rivers adjoining the dairy farms**
- **Improves the quality of raw drinking water source for the Jabalpur town**
- **Promotion of the use of dairy manures as renewable source of energy**
- **Conservation of fossil fuels**
- **In the villages, however, kerosene is used for lighting, but it is clear that with increasing population, biogas generation seems to offer solutions in the areas of fuel availability, electricity, fertilizer for cash crops, and would provide other socio-economic benefits**



ECONOMIC and TECHNOLOGICAL WELLBEING

- **First biogas plant that utilizes approximately 300 tons of dairy manure per day.**
- **First 1.2 MW capacity renewable energy power project based on dairy solid and the capacity can extend up to 5MW.**
- **The technology and skills are imported from Germany and Netherlands.**
- **Creation of skilled manpower in new technology areas**
- **Improvement of power quality in rural areas leading towards better productivity**
- **Improvement in productivity of dairy farms as large tracts of land used for unscientific manure management gets released.**
- **Creation of additional stream through generation of carbon revenues**



CALON WEN



Food

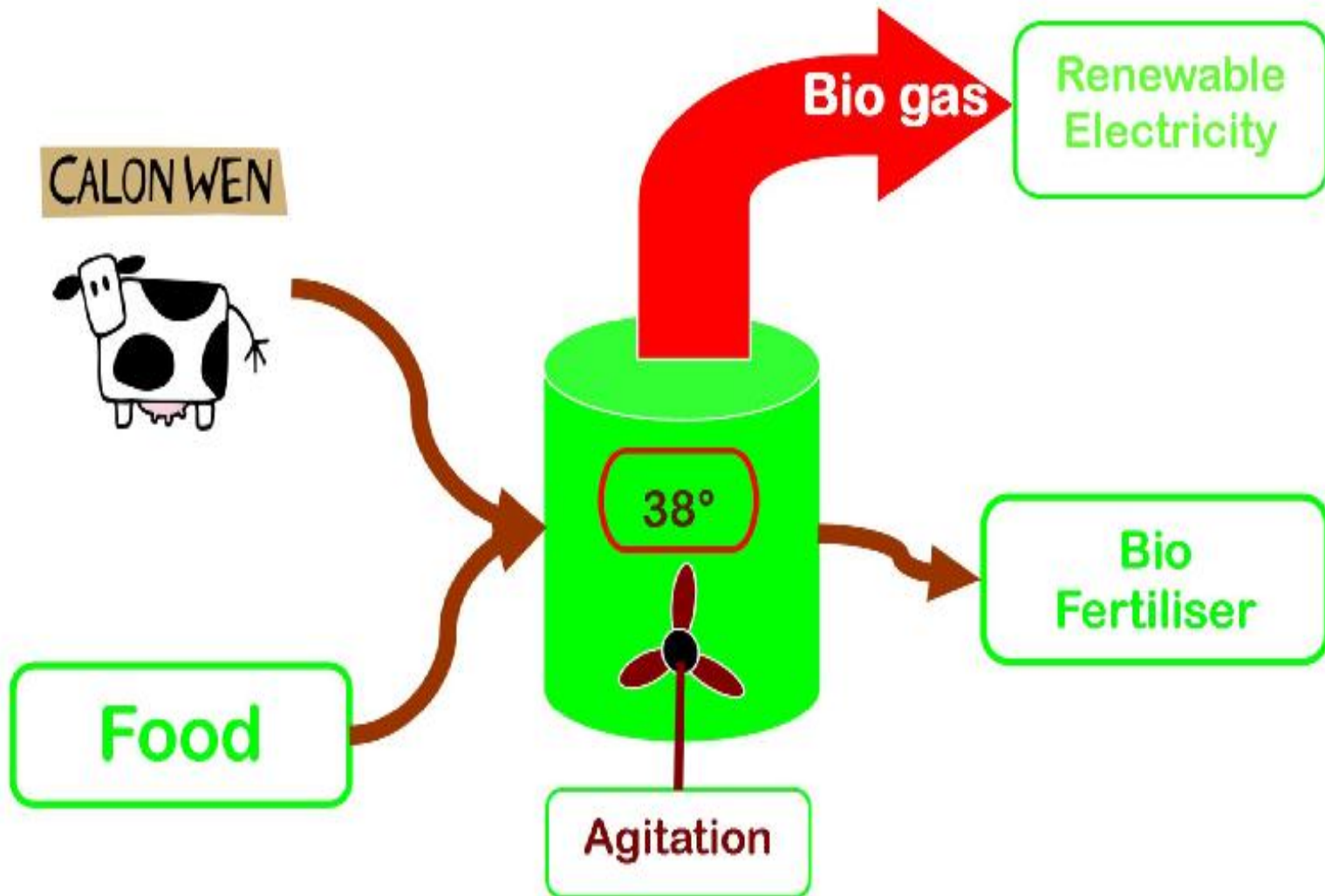
38°

Agitation

Bio gas

Renewable
Electricity

Bio
Fertiliser



GLOBAL and LOCAL **ENVIRONMENTAL BENEFITS**

Global environmental benefits include reduction of carbon emissions into the atmosphere (particularly methane emissions)

Local benefits include :-

- No water pollution**
- Biogas recovery**
- Converting solid waste to manure**
- Employment opportunities**
- Electricity generation**



ADVANTAGES ASSOCIATED WITH BIOGAS POWER PRODUCTION

- Usable fuel from manure and waste water treatment plants
- Useful by-products from the biogas process
- Reduces Greenhouse Gas emissions
- Sustainable Resource as long as we have animals and wastewater treatment plants





**THANK YOU FOR
YOUR
ATTENTION....**

**FOR FURTHER INFORMATION YOU CAN
CONTACT US AT:-
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