Green Schools Network

Gobartimes

ACTIVITY SHEET

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Why talk about BIOMASS?

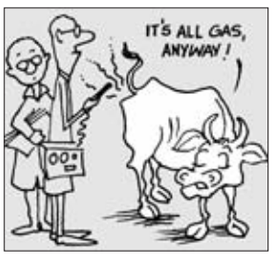
Biomass is the oldest form of energy – humans have used wood for cooking and heating for thousands of years. In fact, wood was the largest energy provider in the world till mid 1800's. In India 80 percent of the population resides in villages and they still depend heavily on biomass resources like wood and cow dung for their livelihood. The innovative ways in which villagers use cow dung is a lesson in itself. The uses range from cooking, heating, killing pests, plastering houses to fertilising farmland. And this is just a tip of the iceberg!

Name.....

School Name .....

Class..... **Date** .....

Gobar Gyan



Biomass is any organic matter that can be used as an energy source. Everything from wood, vegetable matter, cow dung, to waste material is a biomass resource which when burnt releases energy. Fossil fuels too have their origin in ancient biomass but are not considered biomass because they contain carbon that has been "out" of the carbon cycle for a very long time. Their combustion therefore disturbs the level of CO_2 in the atmosphere.

The source of this renewable biomass is the inexhaustible solar energy which is captured by plants through photosynthesis. This chemical energy of plants, when consumed, is passed on to animals and humans alike.

Activity–1

Available biomass resources

Make a list of biomass resources. Think of all sources from which you get biomass like plants, animals, industrial waste, sewage, landfills etc.

Example	Source

Gobar Gyan:

Biomass can be a life saviour for developing nations. It is locally accessible, has low carbon emission levels over longer time-frames, is highly flexible and can be converted into heat, electricity, gas or liquid at varying commercial scales. This implies that it can meet diverse energy needs ranging from heating, cooking, illumination, refrigeration etc.

Hi! I am Pandit Gobar Ganesh. You will find me in Gobar Times—a magazine that tells you how your everyday life is linked to the world around you. Hooked, huh? If you want to know more about me and GobarTimes visit us at:

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Creating and using biomass effectively is a labour-intensive process which has a hidden potential to boost rural employment and reduce poverty. Currently, India's energy consumption pattern is 56.5 percent from commercial sources like coal and oil and the remaining 43.5 percent from non-commercial sources like wood, charcoal, agricultural residues, vegetable wastes, cow dung, urban and industrial wastes, forest etc. A report by the International Institute for Environment and Development points out that reliance on biomass fuels is set to treble from 10 to 30 percent of global energy consumption by 2050.

Activity–2

How we use Biomass

Take different biomass resources and complete their cycle of use. Some examples have been provided for your understanding. Make five groups of five students each. Compare group results, discuss them in class and finally put up a chart on the notice board.

Type of waste/organic residue *(crop residue, farm waste, industrial waste, forest waste, municipal solid waste, animal waste etc.)*	**Technology used for converting waste** (*Combustion, Pyrolysis, gasification, alcoholic fermentation, liquefaction etc)*	**Result of conversion** (*Energy- thermal, steam, electricity. Solid fuels -charcoal, combustibles Synthetic fuels - methanol, methane, hydrogen gas etc.)*	**Uses** (*cooking, lighting, heating, water pumping, electricity generation, industrial and transport fuels etc.)*
Fire wood	Destructive distillation	Charcoal	Cooking fuel, smelting iron, art, medicine etc.
Cattle dung	Fermentation	Methane	Electricity generation, vehicular fuel in the form of CNG etc.

That was one hell of a cross-connected activity to do! Phew! Did you also get the feeling that it is an abundant renewable resource which you can capitalise on to create sustainable economies?

Gobar Gyan:

Let me tell you the story of 'Saran Renewable Energy' plant in rural Bihar. One day a young entrepreneur Vivek Gupta decided to bring electricity to his village in Saran, where he grew up without it. A bio-mass gasification plant with a capacity of 120 kilowatt came up in Garkha to generate electricity. As a resource Gupta chose a leafy plant called *dhencha (a local woody plant)*, which thrives on waterlogged soil. So a lot of low-lying farmland that remains

waterlogged throughout the year and is unsuitable for growing crops, is instead used to grow *dhencha*. The farmers earn additional income by growing *dhencha* in fallow land and selling it to the plant. The plant also uses biomass resources like rice and wheat husk, plant stalks, juliflora, waste wood etc. but 85 percent of the fuel used is now *dhencha* since it has gained a lot of community support.

Since its inception, the plant has helped light up more than 200 homes, dozens of small business units, a school, and a medical centre in Garkha, one of the most under-developed villages in Saran. The plant provides 8-10 hours of regular electricity at Rs 8-10/unit, which is 40 percent cheaper than diesel generation sets. Saran also releases little carbon footprint and helps save over 200 tonnes of carbon dioxide a year, which makes the project eligible to earn carbon credits. The demand for electricity in nearby villages is growing as is Vivek's business.

So you see how trash from your backyard, a dose of common sense, and a brilliant idea is all you may need to make your village self-sufficient.

Activity–3

Case Study

Google, discuss, talk with elders and find out more success stories, where different biomass resources have been effectively utilised to sustain livelihoods. Groups created for the last activity will now take up one case-study each. Share your findings with your class and with us at panditji@cseindia.org We would love to hear about more entrepreneurial ventures!

Gobar Gyan:

All biomass resources when burnt release carbon into the air. However, during the process of creation, they had captured an equivalent amount of carbon from the air through the process of photosynthesis. Hence, sustainable cultivation and harvesting of biomass does not increase CO_2 emissions. On the other hand, burning of fossil fuels disturbs the CO_2 content in the atmosphere as it brings out additional CO_2 which was suppressed over millions of years. However, we need to use and convert biomass wisely. The efficiency involved largely determines how clean the process is.

Activity–4

Comparison – Biomass vs. Fossil Fuels

List here the advantages and disadvantages of the renewable and non-renewable sources of energy. Think through the societal, environmental and geological aspects.

Biomass		**Fossil Fuels**	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**

If you found the activity sheet interesting, E-mail us at eeu@cseindia.org or write to:
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