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Biofuels as renewable energy sources

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Soaring oil prices and global efforts to stave off the worst effects of climate change have made the search for clean, renewable fuels a new priority. Biofuels have been around longer than cars, but cheap petrol and diesel have long left them on the side-lines. The idea behind biofuels is to replace traditional fuels with renewable fuels made from plant or other sources. Today's transportation relies primarily on fossil fuels. Advances in biology show that our road trips, flights, and boat transportations account for approximately a quarter of the world's greenhouse gas emissions.

As fossil fuels start to run out, different solutions for fuels are required. There are two types of biofuels: biogas, and ethanol-based fuels. There are two ways to make ethanol, one of them is the hydration of ethene, however it is not a renewable source as it is made from crude oil so does not solve our problem. The second way is the fermentation of natural products. Ethanol is made when yeast breaks down glucose in anaerobic respiration, without oxygen. The ethanol is separated from the yeast and the remaining glucose by distillation. These ethanol-based fuels are quite effective. In places like Brazil, they commonly use ethanol mixed with petrol as it is a good fuel which is carbon neutral. This means that there is no net release of carbon into the atmosphere as there is a balance between the amount of carbon emitted and the amount of carbon absorbed. They also do not release any harmful gases when burned.

The other type of biofuel is biogas. Biogas is approximately 70% methane and 30% carbon dioxide and lots of different microorganisms are used to ferment plant and animal waste in anaerobic respiration. It can be made in a generator which is kept at a constant temperature so that the microorganisms are always respiring. The biogas cannot be stored as a liquid so it must be used immediately. However, this means that you can use it as a small biogas to generate gas for a family and the products which you are inputting are human, animal and food waste. The by-products released are not necessarily dangerous and can be used to fertilise crops. When the bacteria decompose, they produce methane as a waste product which is a flammable gas and can be used for fuel. Methane is a greenhouse gas but by using it as a fuel you are not releasing it into the atmosphere straight away.

There are different kinds of generators you can use to make biogas. Firstly, you can use a batch generator, which makes biogas into small batches. They are manually loaded and cheaper than continuous generators, but are less convenient as they continually need loading, emptying, and cleaning. Continuous generators make biogas all the time as waste is continually inputted, so this means it is more suited for large scale biogas projects. Generators should be kept well insulated to prevent heat loss because their optimum temperature for work is 35 degrees. Exothermic reactions occur which means they let off heat and they need to be kept away from houses because when you are using cow manure the smell is not the nicest.

Fossil fuels like oil, coal and natural gas are the remains of organisms from millions of years ago. They are mainly composed of carbon with varying amounts of hydrogen. There are some advantages to fossil fuels. Coal is formed from ferns, plants and trees which has hardened due to pressure and heat and it is relatively inexpensive. Oil is formed from small organisms like zoo plankton and algae where pressure has caused the more complex organic matter to decompose. It has a high specific energy and density. Natural gas is formed from the same process of oil only it was exposed to more heat and pressure causing it to further decompose into a gaseous form. It is also a relatively clean fuel and does not contribute to acid deposition. However, when these materials are burned the elements mentioned above are released into the atmosphere slowly causing the global temperature to rise. This is how greenhouse gases come to surround the earth. Greenhouse gases isolate the heat not allowing it to escape the earth’s atmosphere. By allowing the heat to rise, we are causing drastic allow consequences for our climate that we will not be able to reverse in the future such as glaciers melting which is leading to the rise of our ocean’s levels.

After analysing the advantages and disadvantages of biofuels, they are shown to be an efficient renewable energy source that can be extremely beneficial to our society if harnessed and used well. As opposed to non-renewable fossil fuels, biofuels do not produce any toxic gases. Ethanol is carbon neutral, its raw material is cheap, it is quite easily available, and the by-products can be used as fertiliser in biogas. Therefore, the next challenge for humanity to overcome would be to be able to utilise the modern-day biofuels to control the increasing issues associated with non-renewable fuels.