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Biofuel Generation as an Alternative of Energy

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Fossil fuels are a major global resource that has caused an enormous amount of pollution on Earth and is a leading cause of global warming [1]. The majority of fossil fuels are gathered and processed in a few select regions. With the US, Russia, and Iran being the top producers [2]. With this distribution, fossil fuels are limited to countries that can afford to purchase them and are further limited to the socioeconomic classes that can afford to purchase the products associated with fossil fuels.

To offset some of the inequity in naturally occurring fossil fuel deposits, biofuels could potentially be a very beneficial energy alternative. All countries can create biomass and create biofuel with the proper materials and knowledge. With first generation biofuel, agricultural countries can use common crops, such as corn or wheat, to generate biomass for biofuel production [3]. Additionally, with second generation biofuels, nations can use non-food crops as biomass sources [4].

However, if a country does not have the land to produce crops as a biomass source there is still the opportunity to produce third, fourth, and fifth generation biofuels. With third generation biofuels, non-traditional spaces can be used for algae growth and the algae will be an effective biomass [3]. For example, there is research into the idea of "algae green cities" which are urban areas that have algae built into many of its building surfaces to aid in reduction of waste and pollution, while also serving as excellent biomass growth areas for biofuel [5]. With fifth generation biofuel, the biomass is found from sources such as landfills, wastewater treatment plants, and animal waste [6]. Finally, if a country has limited area or limited allocations of crops for biomass use, genetically modified plants and algae can be used to create a need for less biomass that has the same energy output as non-genetically modified crops [7].

Unfortunately, care must be taken in biofuel production. First generation biofuel production is the cheapest to produce, but uses crops that could otherwise be used for food [8]. The division of crops for use as biomass versus food causes a noticeable cost increase of food, which can be hugely detrimental to communities [9]. With the research going into biofuel production from food waste, algae, animal waste, wastewater, and other non-food crops, it seems unnecessary to put the stress of biofuel production on food sources. While the cost of other biofuel generations is higher [10], additional studies may allow for second through fifth generation biofuels to be reasonably produced in large scale in the future. Both food and fuel availability are important and finding solutions for efficiently producing both is key to a sustainable future.

There are however companies that are aligned with the Paris agreement by already looking into all generations of biofuel production which will reduce climate change impacts. In Colorado, there are many biofuel companies that produce different biofuel generations. Sundrop Fuels is a company that uses second generation biofuel production, with biomass that comes from sustainable timber and agricultural waste, to produce biodiesel [11]. There are also many wastewater treatment plants across the state that collect biogas from their processes to be used for energy, such as in the city of Grand Junction, CO, which uses biogas produced at their wastewater treatment plant to fuel city owned vehicles [12]. If every community were able to use biofuels such as with these examples, there would be a beneficial reduction to climate change.

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