Algae Biofuel

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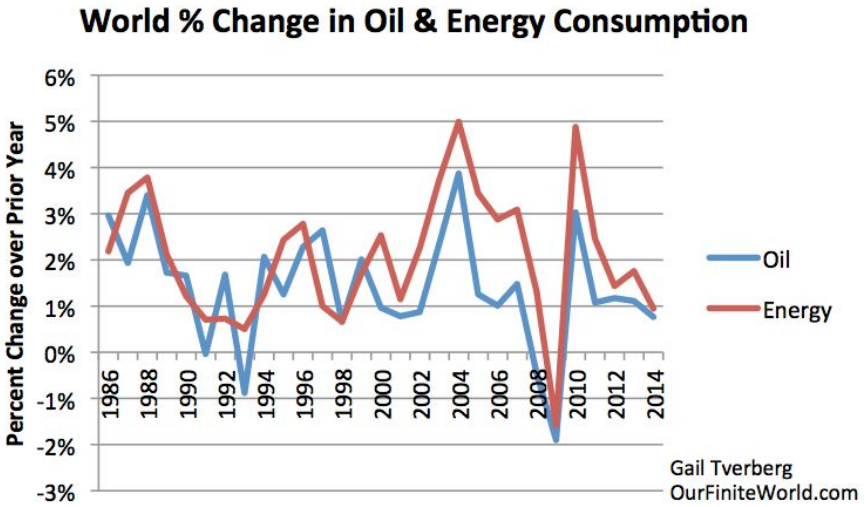
Video

World Problem

For this project we were tasked to pick a world issue, and our group unanimously decided to focus on the energy crisis. We then divided this issue down, and through many layers of brainstorming, we found our biotech solution, Algae Biofuel.

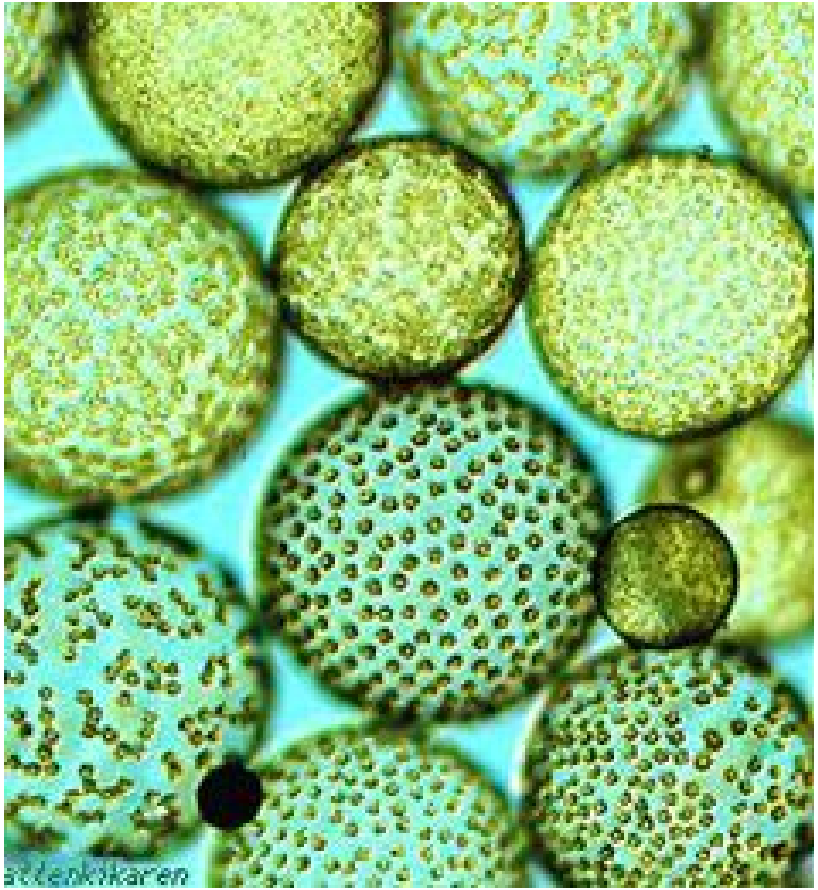
In Today’s World

Fossil fuels in modern day have still maintained dominance over the energy business. Global Warming in large effect is due to maintaining the fossil fuel industry. The ozone layer in the atmosphere is greatly depleting with little hope of saving it. Today, we are willing to ask you to consider a new method that's just as efficient, and saves the environment. Algae biofuel will be the energy of the future.

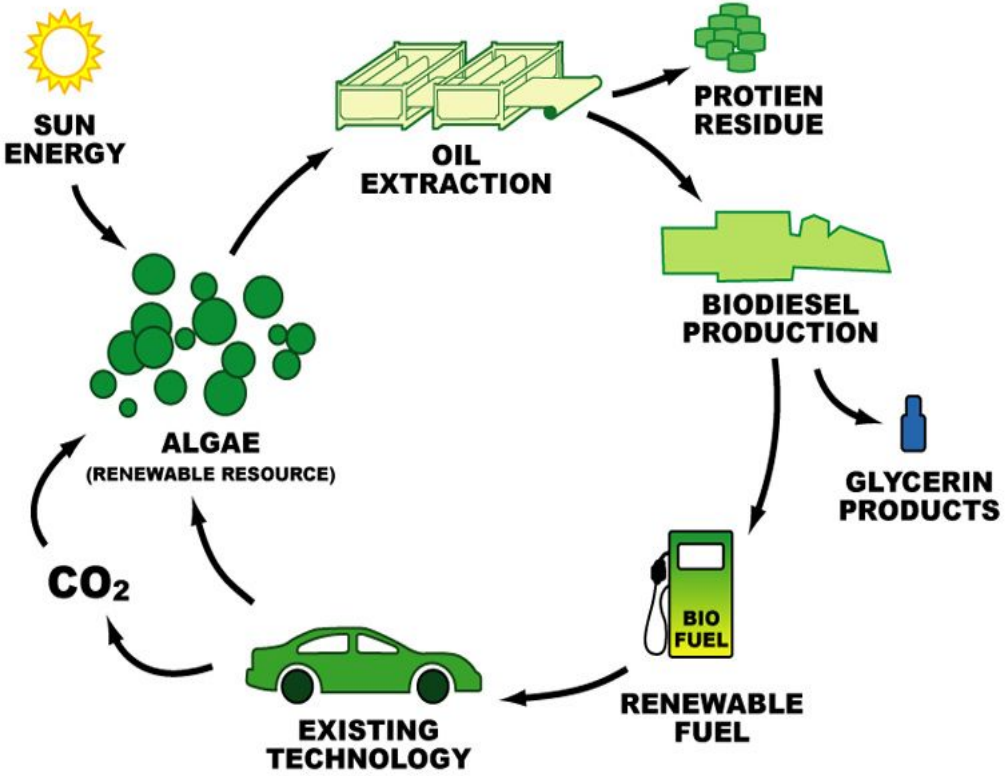


What Algae Biofuel is

Algae biofuel is an alternative to fossil fuels that uses algae as a source of oil that is then turned into fuel. Algae is very rich in natural oils, making it a prime candidate to be used in fuel. It can also grow easily in a number of places, allowing for plenty of it to be grown and turned into fuel. Algae biofuel is the future or the fuel industry, and could change the fate of the world drastically.



How Algae Biofuel is Made



- Photosynthesis occurs in the algae due to the sun
- Algae grows quickly
- Algae goes to oil extraction plants
- Biodiesel is made through the algae byproducts
- Can be used to fuel and the excess CO_2 from cars can be used again by algae

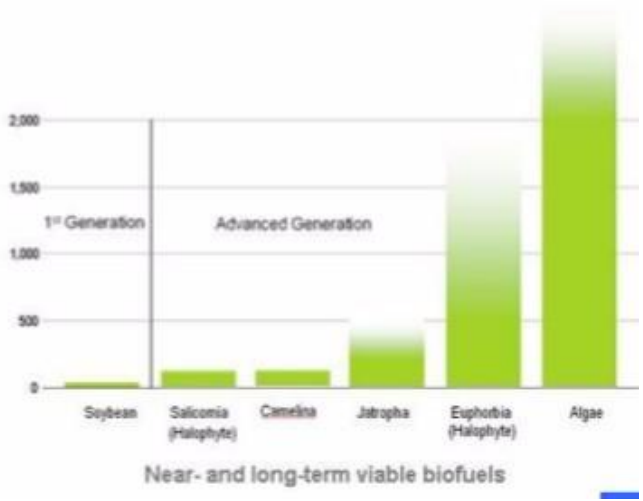
How it Benefits Society (Ease of Growth)

- Can be grown in land not suitable for the growth of regular crops
- Wastewater from farming is very effective in growing algae
- Does not require much attention after planting

Impacts On Food

- Moves biofuel from traditional crops to algae, which puts less strain on the market of these crops
- Algae can be used as solely a fuel source
- Waste Products of algae biofuel production can be used as animal feed

Crop	Oil Yield Gallons/acre
Corn	18
Cotton	35
Soybean	48
Mustard seed	61
Sunflower	102
Rapeseed/Canola	127
Jatropha	202
Oil palm	635
Algae (10 g/m²/day at 15% TAG)	1,200
Algae (50 g/m²/day at 50% TAG)	10,000



Minimization of Waste

- Prevents contaminated water from mixing with the lakes and rivers that provide our drinking water
- Able to remove CO_2 from the atmosphere to use it as energy
- Plant remains can be used for other purposes

Uses CO_2

The process of photosynthesis uses carbon dioxide and water with sunlight to create oxygen and sugar. We are currently producing an excess of CO_2 and the use of algae to make fuels will use plenty of that carbon dioxide. They will also produce more oxygen, which we need to survive. If our carbon production continues, eventually our planet will be much like Venus, and become totally uninhabitable for all life.

Our Earth In the Future

In the near future

In the near future, if our current trend of CO_2 emissions continues to rise, then Earth will venture closer and closer to becoming uninhabitable by all animals on Earth, including humans. We are no closer to finding a new planet to inhabit than ever before, ultimately leaving us with no other option.

Downsides

- Currently, it is quite expensive to grow algae
- Companies making algal biofuels struggle to retain their high productivity at a larger scale
- Predators often contaminate the algae farms
- Building the ponds in which to grow the algae and providing enough light and nutrients for them to grow proved too expensive

Algae Biorefinery

The process of using the other products of algae to offset the downsides of algae biofuel. Many of these by-products are high-value chemicals, which can be sold at a much higher price than biofuels.

- Algae are excellent sources of vitamins, minerals and proteins
- Bioplastics, which can be produced with low carbon emissions, which could help prevent the build up of plastic in the environment
- Biogas which can be sold or used to produce heat for the algae, making the process more efficient

Algae Biorefinery (Cont.)

To make a biorefinery more cost effective and sustainable, waste sources of heat, CO_2 and nutrients that can be found from power plants, factories, and water treatment plants would be used as the nutrients for the algae. This model has been recently adapted by companies such as Sapphire energy. Still, there are problems that can only be solved by further research.

TerraVia Holdings, inc./Solazyme (Our mentor)

What they do:

-They are a large Biotechnology company in the bay area

-They make Algae Biofuel and Algae-based food ingredients

-Spread the message and benefits on algae and the oil and food that comes with it

-They use microalgae to create fuels

-The fuels they make can be used in current car engines, as well as in trains and planes

-Provides the world with answers to fuel scarcity

Our Plan of Action

- Show people environmental advantages of algae biofuels
- Convince them to:
  - Fund
  - Switch from fossil fuels to a renewable fuel source
  - Spread the word about Algae-based fuel
  - Help large companies considering switching to switch

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