

# Alternative Uses for Algae Produced For Photosynthetic CO<sub>2</sub> Mitigation

*by*  
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# **CO<sub>2</sub> production – a major cause of global warming**

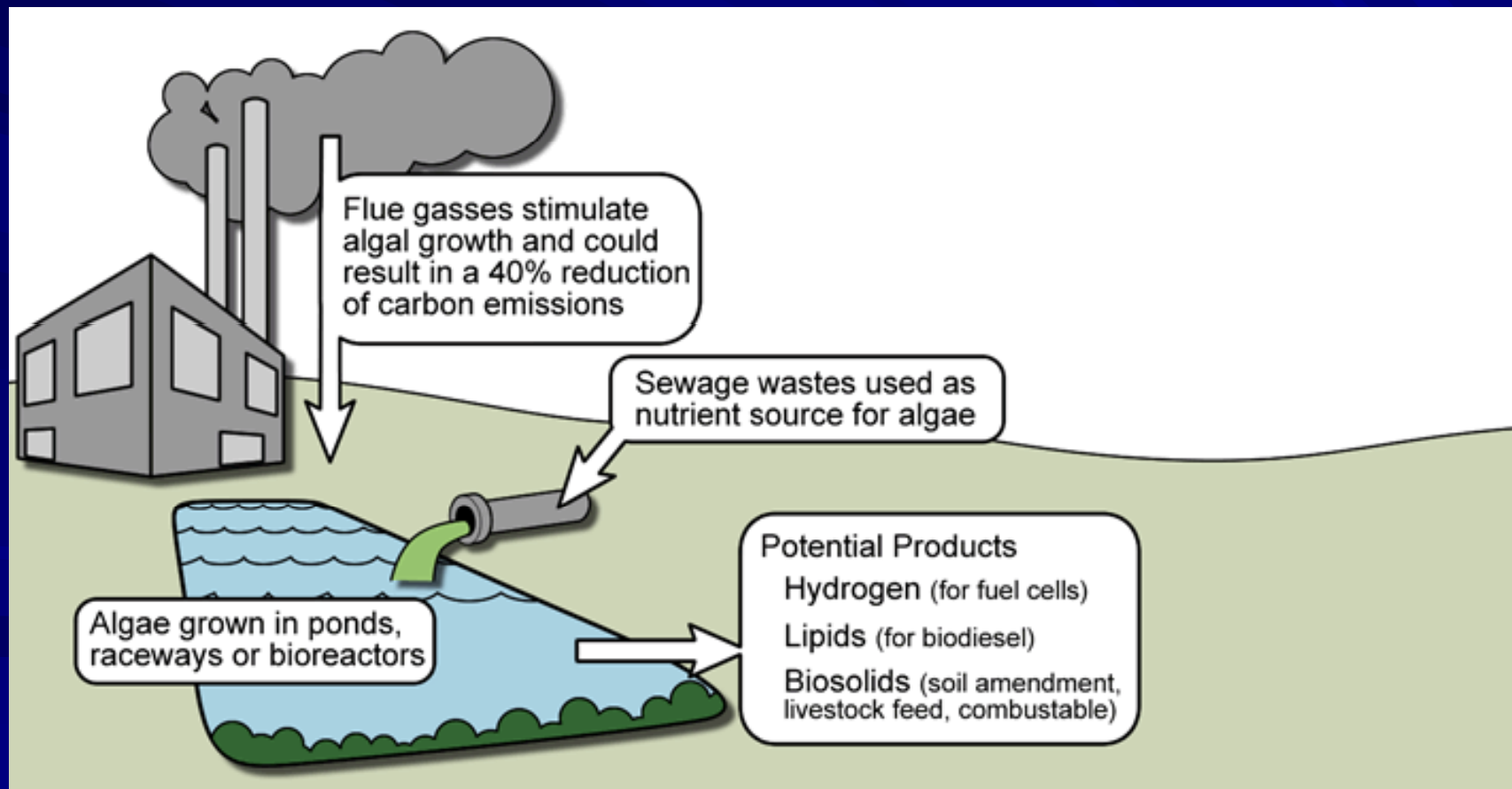
**Burning coal to generate electricity releases large amounts of CO<sub>2</sub>, a gas that contributes to global warming. Algae can capture CO<sub>2</sub> and other gases and convert them into algal biomass. This algal biomass is presently being dried and used as fuel to produce electricity. Other uses of this biomass are potentially very profitable and can make the whole process economically viable.**

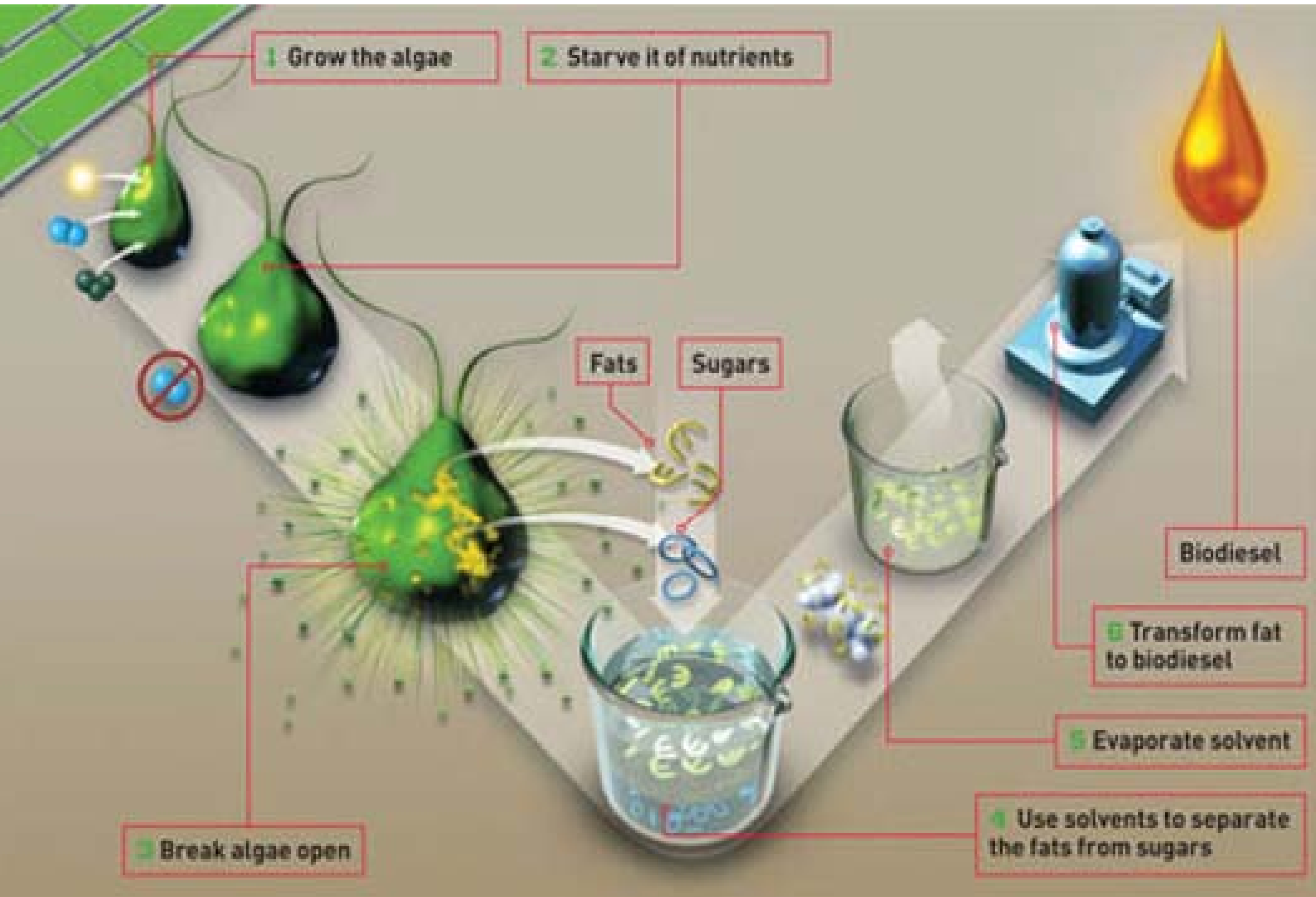
# **Algae – a very diverse group**

**Microalgae: Very small algae or microalgae are single-cell, photosynthetic organisms that grow very rapidly and have a high energy content. They are termed microalgae to distinguish them from seaweeds or macroalgae. They form the base of the food chain in freshwater and marine ecosystems.**



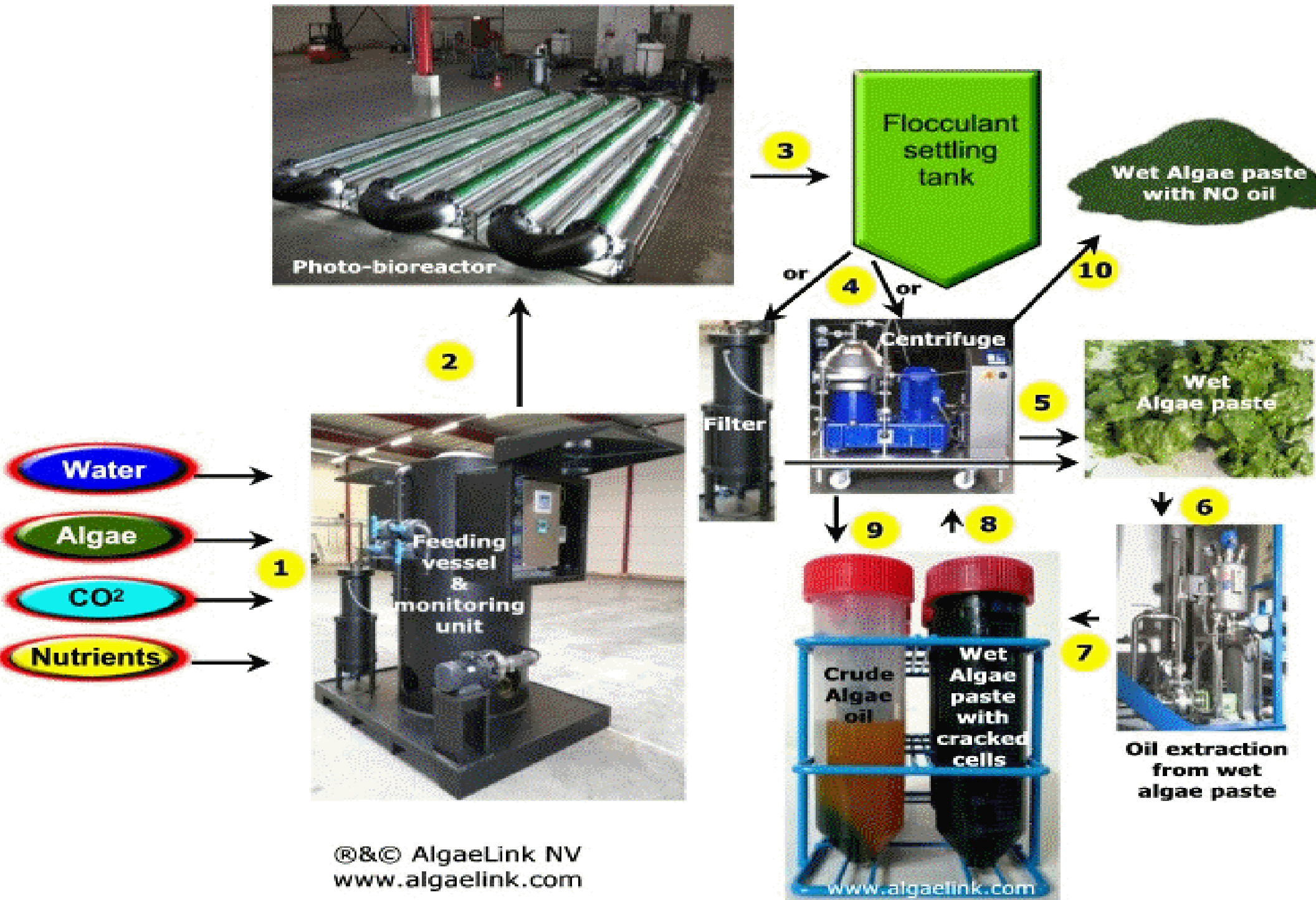
**During photosynthesis algae capture CO<sub>2</sub> and release oxygen into the atmosphere. CO<sub>2</sub> produced during the combustion of fossil fuels can therefore supply raw material for algae production.**





# Greenfuel Bioreactors on Rooftop





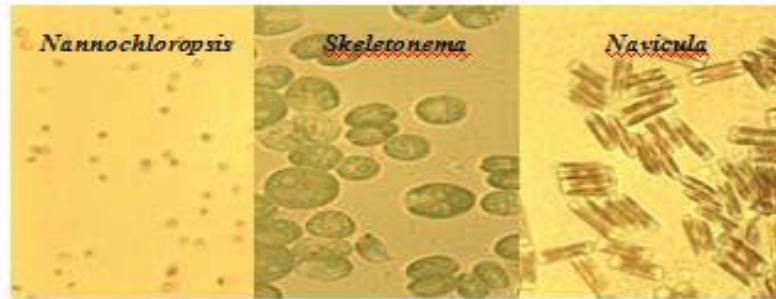
# Valcent Algae Bioreactor – El Paso



# Algal slurry ready for harvest



# Algae as Animal Feed



The most direct use of the biosolid residue left when lipids and carbohydrates are extracted from algae is as animal feed.

# Algae as Animal Feed



**Microalgae has been fed to pigs, poultry, cattle and fish. However the high nucleic acid content of microalgae as compared to conventional protein sources such as fish and soybean meal may limit the amount of algae residue that can be used.**



**Algae eating carp species harvested from fish ponds,  
Mirzapur, Bangladesh**

# Chemicals from Algae

- Carotenoids – xanthophyll, astanzanthin, beta carotene. Pigments used to increase color in fish and poultry flesh
- Phycobiliproteins – pigments used in cosmetics and food coloring
- Marine oils – omega 3 fatty acids
- Drugs – cholesterol lowering compounds, immune system stimulant



**Effect of increasing amounts of dietary carotene on egg yolk color**

# Summary

- **Algal biosolids remaining after oil extraction are a valuable source of plant protein for livestock and fish.**
- **Relatively high concentrations of nucleic acids compared to conventional protein sources reduce the value algal biosolids have as a protein ingredient.**

# Summary II

- **Algal biosolids provide new compounds having nutritional and therapeutic value.**
- **Efforts must be made to isolate, concentrate and market these algal chemicals.**
- **These algal-derived compounds could make CO<sub>2</sub> sequestration of algae profitable even as the price of algal biodiesel goes down.**