Food: not just a wrapping for sushi, algae are used in sweets, chocolate milk and that welsh delicacy laverbread.

Health and beauty: Colouring for cosmetics, stabilisers for toothpastes and food supplements all come from algae.

Gels: Agar has uses from setting agents for jams, jellies and ice-creams, to growing microbes or separating DNA in the lab.

Fertilisers and chemicals: from seaweed extracts to specialist compounds.

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Meet the Algae

Food and Fuel for a Growing World

Past aquatic micro-organisms gave us oil and gas, so how can we stop trading on past sunlight to use algae in today's world? Algae provide food, vitamins, cosmetics and colourants, as well as a range of biofuel sources and substitutes for plastics and gels. These algal products show how useful these organisms can be for mankind.

ALGAE AS BIO-BATTERIES

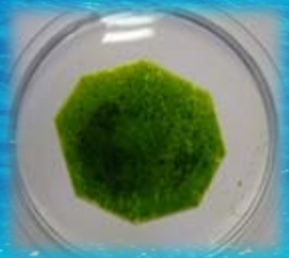
Biological **P**hoto**v**oltaic Cells (BPV)

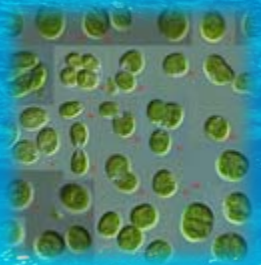
BPV Cells offer an exciting opportunity to use algae to harvest sunlight and generate electricity.

Algae-powered BPV cells work like a conventional battery.

Sunlight can be captured by algae and used as a source of renewable energy.

Advantages compared to conventional solar panels, these are cheap, green, long lasting, environmentally friendly, and easy to manufacture!





BIOFUELS: HARVESTING SUNLIGHT TO REPLACE FOSSIL FUELS

Bioreactors or **open ponds** are needed to grow algae commercially.

Biomass produced from fast growing algal offers many ways to generate energy – such as digestion for biogas or simply burning for combined heat and power.

Oils are produced by many algae as storage reserves, and these can be extracted and refined to make biodiesel.

Hydrogen is produced when green algae are starved of resources like sulphur, and have plenty of starch reserves.

EVEN ALGAE NEED THEIR VITAMINS!

All life needs vitamins - some were needed by the first life on earth. Vitamins provide cofactors that many enzymes need to work.

Humans need vitamins for a healthy life - we can get this from eating lots of fresh fruit and vegetables.

Mineral supplements

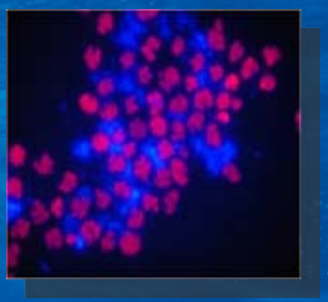
One vitamin not made by plants is vitamin B_{12} (cobalamin), which many algae contain in high levels, but they need an external supply like humans!.

Bacteria to the rescue

Algae rely on bacteria in their growth media to provide vitamin B_{12}.

With a little help from my friends…

This association or "symbiosis" was found in our laboratories, and shows how we rely on both algae and bacteria for vitamins.



Algae (red) & bacteria (blue) living together