Engineering a greener future with biology

Bondi is a Sydney-based solar bioengineering company focused on producing traditionally plant-derived Natural Products, at low cost from light and carbon dioxide and without the over-reliance on energy-crops or arable land.

Our target-agnostic platform applies photosynthetic cyanobacteria to design robust, reliable and sustainable solutions for target compounds in a broad range of markets to be produced using solar biomanufacturing.

The Bondi platform can also facilitate the recycling of industrial and agricultural waste, such as phosphates, nitrates, CO_2 and other pollutants, into Natural Products, resulting in a bioremediation win-win.

The Power of Bioengineering and Biomanufacture

Since the Agricultural and Industrial Revolutions in the 18th century, the global population has grown from about 700 million to almost 8 billion. This has placed increasing pressure on traditional production methods to operate faster and produce more in order to satisfy an ever-growing demand. So far, the energy and resources to allow this acceleration has largely been achieved through the consumption of irreplaceable resources, such as petrochemicals and ancient forests.

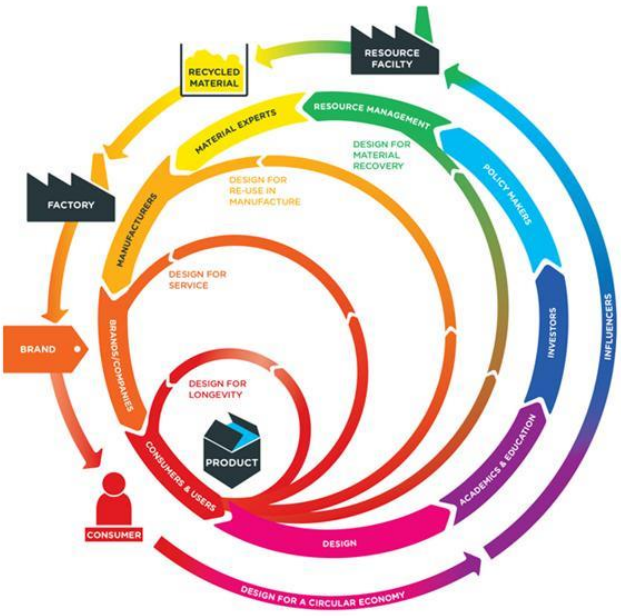
Biomanufacturing offer an alternative method to produce almost all these resources, in a far more reliable, efficient and sustainable manner, while also developing a new generation of naturally produced products that are designed for precise consumer requirements.

Bioengineering and the Recycling Economy

All over the world the consequences of human activity and global warming are being identified, from our oceans and waterways, to our forests and urban areas, the effects are being witnessed. The recycling of all materials currently used in production processes must be considered when designing new products. This must happen for industrial competitiveness and for global security. Many governments around the world are looking at conservation legislation ideas to tackle these global problems.

Thankfully we live in an era of extraordinary scientific and technological advances.

At Bondi, we believe that recycling industrial and agricultural waste is a win-win bioengineering possibility. We are working on new bioengineering and biomanufacturing processes, that will be able to use household and industrial waste streams, such as carbon dioxide and fermentation wastes emitted by factories to power the manufacture of renewable materials. With the help of new bioengineering methods, the use of industrial waste streams will become increasingly efficient, helping us to make a transition to the circular economy.



Solar Biomanufacturing

Compared to traditional plant-based agriculture or petrochemical production, advanced solar biomanufacturing, made possible by bioengineering cyanobacteria, offers huge potential for the clean and sustainable production of a vast range of Natural Products.

Cyanobacteria only requires the renewable resources of CO_2 and potentially wastewater. This reduces the dependence on arable land for feedstock and production, and offers the potential of engineering cyanobacteria to provide huge commercial and environmental benefits for Natural Product biomanufacturing.

Bondi Bio Pty Ltd | contact@bondi.bio
ABN: 54 628 591 631

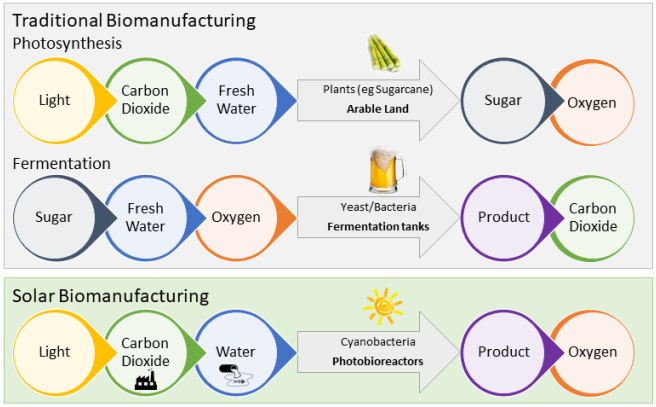
Cyanobacteria: photosynthesising prokaryotes

Cyanobacteria (often referred to as 'blue-green algae') are aquatic bacteria and are some of the oldest living organisms on Earth. They can be found in a diverse range of locations, from pristine freshwater and marine ecosystems, to industrial waste-streams and extreme environments.

Cyanobacteria obtain their energy through oxygenic photosynthesis (meaning they produce energy by capturing carbon and releasing oxygen). They are prolific phototrophs, with some studies suggesting they are responsible for capturing more than 25% of the planet's carbon, and, through its photosynthetic pathway, cyanobacteria are thought to have created the world's oxygenic atmosphere, underpinning the development of life on Earth.

In comparison to petrochemical production and plant-based agriculture, biomanufacturing Natural Products in cyanobacteria offers a more reliable, efficient and sustainable alternative, designed to maximise its target compound production, reduce production times and reduce waste production, in both arable land requirements and water usage.

In comparison to yeast or bacteria biomanufacturing, solar biomanufacturing with cyanobacteria offers potential improvements in efficiency and sustainability, by directly linking light energy capture to the production of Natural Products, reducing arable land and freshwater requirements and reducing organic waste and atmospheric CO_2.



Additional benefits of cyanobacteria

Cyanobacteria offers powerful benefits as a Natural Product platform for a number of additional reasons:

- Their existing metabolic pathways producing key terpene precursors, e.g methylerythritol 4-phosphate (MEP).
- Their genetic tractability allowing relatively straightforward genetic manipulation.
- Their native thylakoid membranes providing the perfect environment to express complex plant proteins, e.g. the cytochrome P450 family of enzymes that represents an attractive Synthetic Biology platform for terpene biosynthesis.

Bondi consider these factors make cyanobacteria and solar biomanufacturing an exciting and powerful platform across a range of markets.

Natural Products

Using traditional methods, Natural Product compounds are often expensive and difficult to extract at high yields and threatened by climate change, unpredictable weather patterns and crop failures.

Solar biomanufacturing offers an exciting and powerful platform for Natural Product production. Terpenes comprise a large family of 70,000+ plant-based Natural Product compounds with potential applications across a huge range of industries including, flavors and fragrances, agricultural feed, pesticides and cosmetics through to pharmaceuticals and bioplastics.

Flavours and Fragrances	Limonene Santalol	Valencene Eucalyptol	Nootkatone
Essential Oils	Feverfew Lavender Rose	Agarwood Cedarwood	Peppermint Sandalwood
Pharmaceuticals	Taxol Retinol	Artemisinin Halomon	Avarol
Cosmetics	Squalene	Camphor	Hyaluronic acid
Pesticides	Pyrethrin	Carvone	

Solar biomanufacturing provides a unique production platform for producing plant-derived Natural Product, without the limitations of traditional plant-¬based cultivation or sugar-based fermentation.

Bioremediation

Our environment is significantly impacted by anthropogenic (human) activities. Waste material, from industry, agriculture, hospitals and urbanization, is accelerating global economic, health, social and environmental degradation. Research using cyanobacteria in bioengineering shows great promise for the remediation of many problematic toxic waste products including CO_2, nitrates, phosphates and heavy metals such as copper and nickel.

Innovate with Bondi

Bondi have developed repeatable platform processes for both Natural Product and bioremediation. We are actively seeking partnerships with governments, industrial and commercial entities to collaborate on the application our solar biomanufacturing solutions.

If you would like to explore Bondi's contract services for targeted Natural Product compounds our our bioremediation solutions, please contact us at **partners@bondi.bio**.