Algae building blooms

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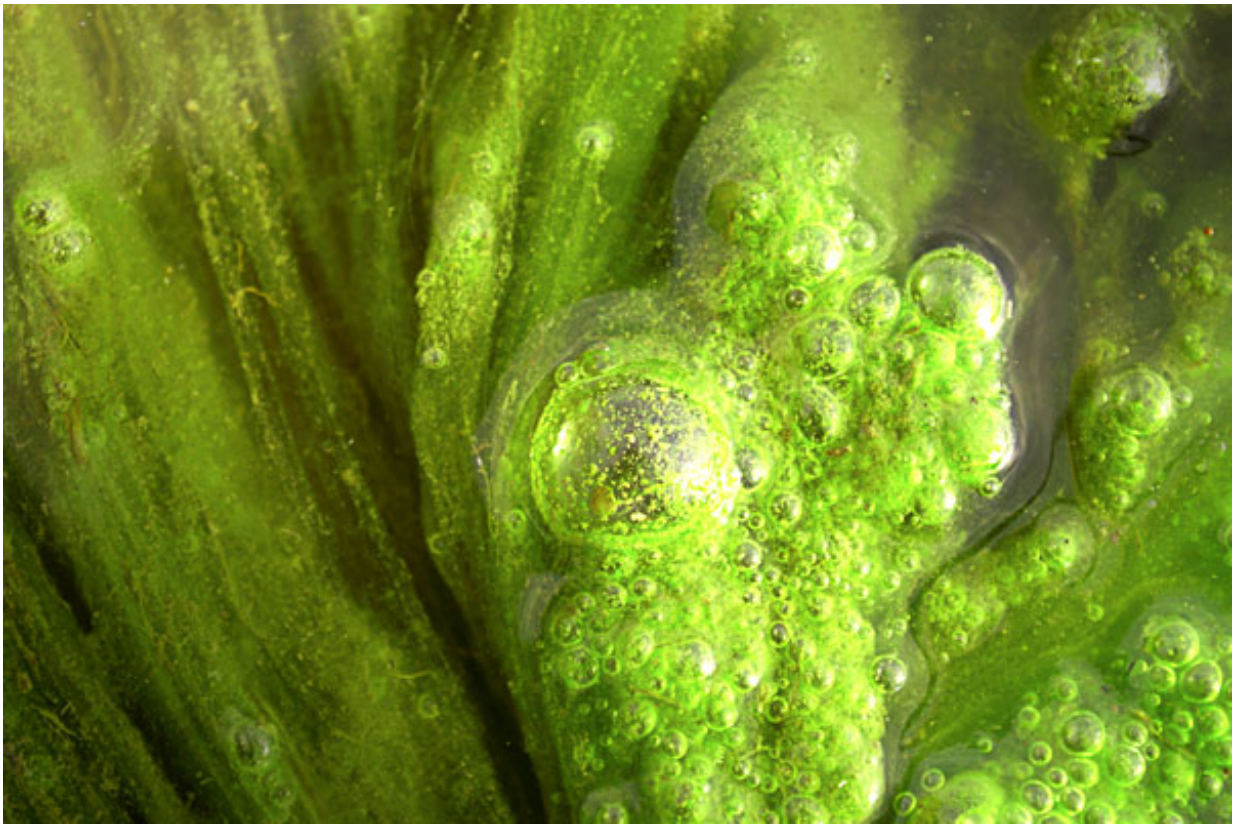

Credit: University of Technology, Sydney

A multi-disciplinary team bringing together science, sustainable building design and architecture may soon develop the first living algae buildings in Australia. Their unique collaboration has seen a comprehensive feasibility study conducted on behalf of the City of Sydney, with plans to create the first flat facade algae panel this year.

It looks like a giant green lava lamp as the bright, syrupy liquid twists and turns from the bubbles rising to the surface. The panel, however, contains microalgae – tiny aquatic plants that capture carbon dioxide from the air and light from the sun to generate energy and oxygen.

While it might appear to be Sydney's latest public art installation, if Sara Wilkinson and Peter Ralph have their way, these flat panels will soon be gracing the outside walls of buildings throughout Australia.

The researchers are working with Research Engagement Manager Dr Brenton Hamdorf and Director of the Australian arm of architectural firm Atelier Ten, Paul Stoller, to make their vision a reality.

"Our goal is to successfully integrate algae into the built environment and use it to heat buildings, fertilise rooftop gardens and filter vehicle exhaust fumes," says Sara Wilkinson, an Associate Professor in UTS's School of the Built Environment.

The concept of a building powered by algae is new to Australia, and one that Wilkinson believes is the next step in sustainable building technology. "There is demonstrated success of living algae bioreactors overseas, but nothing of such scale has been explored in Australia, until now," she says.

Wilkinson has recently undertaken a feasibility study, funded by a City of Sydney environmental research grant, to look at algae building technology. Her team have interviewed over 20 stakeholders in the building industry, including designers, engineers, developers, planners, architects, sustainability managers and certifiers, to ascertain what they see as the drivers and barriers to an algae building.

One year into the feasibility study and the response has been enthusiastic. However, as with all new technologies, Wilkinson's

research has uncovered challenges.

"One of the architects we spoke to said that they've spent most of their professional careers helping design facades that purposely avoid things growing on them or having water flow through them – so you can see how such a concept would raise lots of questions.

"For example, one of the recurring questions we were asked throughout the study was, 'What would happen if a panel was accidentally or intentionally damaged?' So what we've recommended is specifying toughened glazing in certain areas."

Another concern that arose was around excessive heat killing the algae, and what could be done to mitigate that. As a result, the research team spoke to the Australian Window Association, who have advised on tempered and heat-resistant glass.

Such questions and concerns will help inform the next stage of this innovative research – the design of a prototype flat façade panel.

The research team is collaborating with a leading engineering firm to fabricate the Australian-first panels, and they hope to place it in a high visibility location on campus so it can begin to pique public interest.

Ralph, a Professor in the Plant Functional Biology and Climate Change Cluster (C3) is helping to build this prototype. He unabashedly describes his role as ensuring that Wilkinson puts "the right green stuff on the buildings".

Ralph's team from the UTS Centre for Industrialised Algae will be studying algae strain optimisation and selection to recommend the best species for the living building project.

It's just one of the possibly endless applications of algae products, says Ralph. He believes algae can play a large part in solving climate change issues via new, sustainable bioproducts.

"Algae can be used to make almost anything that society needs – plastic, food, pharmaceuticals, paints, carpet and cosmetics, for starters. We think there could be up to 300,000 species of algae out there, and that we are only culturing about 100 of those."

Ralph says the building project is a great medium to encourage people to engage with algae outside of science.

"I want the public to accept the use of algae in everyday life. I want people to see more of this microorganism for what it is – a natural solution to the energy, food, economic and climate challenges facing our world today."

He also believes the project will encourage designers and architects to think about algae in their "quirky" building designs. "I see it as technically interesting and exciting for them, and for us as scientists, it's a chance to promote this natural, sustainable alternative to fossil fuels."

The production and uptake of algae-based materials will also provide greater diversity in our built environment, says Wilkinson. "One of the biggest advantages of this technology is that it is so visually appealing.

"I mean, how could you walk past a building with bubbling green wall panels and not stop to learn more about it? It's eye-catching, it's unique and it's decarbonising the atmosphere, all at the same time."

More information: Algae building feasibility study: www.researchgate.net/publicati … Technology_in_Sydney

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