# From ocean to engine

# Creating a renewable fuel from seaweed may be a popular idea but making the product commercially viable remains a huge challenge, UNB professor says

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They have been used for centuries for food and fertilizer, but now there is growing global interest in the potential of seaweeds for a much wider range of uses, including as a possible source of biofuel.

Scientists at a lab in California say they have developed a technology that turns seaweed into renewable fuel, a process biologists have been trying to perfect for decades.

The research team from the Bio Architecture Lab has engineered a microbe to extract the sugars in seaweeds and convert them into renewable fuels and chemicals.

Some industry experts have heralded the genetically modified microbe used in the process as a real breakthrough, but here in New Brunswick, biologist and seaweed guru Thierry Chopin is taking a more cautious approach toward the potential benefits of marine algae.

Chopin, a biology professor at the University of New Brunswick in Saint John, said making seaweed fuel commercially viable remains a huge challenge.

"We have to be cautious with what we promise," Chopin said in an interview.

"There were big seaweed projects in the 1970s. Every time there is an oil crisis, the algae come back into the picture. During the '70s oil crisis, we heard 'Oh algae will save the world.' Now we're hearing the same thing. For me, I take a much more cautious approach. I'm not interested in big, big projects. I say let's do projects on a scale we can handle."

Chopin said he understands the potential of seaweeds as a possible source of fuel in an energy-hungry world.

With most of the world covered in water, seaweeds are plentiful and accessible in many countries. Chopin said there are more than 10,000 seaweed species worldwide, including at least 100 in the Bay of Fundy.

He said scientists know the chemistry and properties of only a few of the species.

"I don't want to shut the door on biofuel," Chopin said.

"But for me it's not happening right away and you have to think of the scale of these operations ... it's likely many years down the road."

Chopin points out that no one is sure what the future holds for automobiles, pointing out that carbon-based oils and biofuels could ultimately lose out to hydrogen-based engines.

Chopin said there are more immediate and realistic uses of seaweed and that is what he is focusing on in his UNB laboratory.

In a recently released paper and YouTube video (www.youtube.com») Chopin highlights the huge potential of seaweeds, which he says are often unappreciated in the Western world, despite being the largest group of organisms cultivated at sea.

"The problem we have is that 99.8 per cent of the seaweed production is in Asia," he said. "That leaves 0.2 per cent for the rest of the world. That's where the problem is because we don't know what to do with seaweed. In the Western world, when you say 'aquaculture,' people mostly think about fish and maybe after that, shellfish. Seaweeds are really not on the radar."

Chopin wants to put seaweeds on the radar, and not in some commercially questionable way.

He is looking at four concrete applications for seaweeds that hold promise to immediately help the aquaculture industry and become money-making enterprises.

The applications are: seaweeds as sea vegetables in restaurants and grocery stores; the use of seaweeds in cosmetics; as ingredients in salmon feed for aquaculture operations to reduce the use of fish meal; and as a source of energy for smaller scale operations, such as fish plants.

Chopin said an agreement is in the works with a European cosmetics company interested in incorporating seaweed extracts into its products.

"Seaweeds have their own sunscreen compounds for protecting themselves against UV radiation," he said.

"The cosmetics industry is interested in extracting these molecules and using them in their products for skin and hair protection from UV radiation and for their rejuvenating properties."

In terms of energy, Chopin said the plan is to mix fish discards and seaweeds to make a kind of compost that could be used to generate power and heat for fish plants.

"We are going into energy applications, but not with big, promising-the-moon types of projects," he said.

"We are not promising that within five years all airline companies will run on algal biofuels. We are working on something that could make fish plants more competitive by cutting down on their power and heating costs. These are tangible results we could see soon at the local or regional level, rather than somewhere in 15 or 20 years."