

No planet B

Would you like that in cod skin? A project in Iceland is setting out to use every part of caught fish, including repurposing waste fish skin to make leather and skin grafts, finds **Graham Lawton**



Graham Lawton is a staff writer at *New Scientist* and author of *Mustn't Grumble: The surprising science of everyday ailments*. You can follow him @grahamlawton

Graham's week

What I'm reading

Julia by Sandra Newman, a retelling of George Orwell's Nineteen Eighty-Four from the perspective of Winston Smith's lover.

What I'm watching

The second series of *The Traitors* on the BBC.

What I'm working on

A reporting trip to the remote Pitcairn Islands.

This column appears monthly. Up next week: Annalee Newitz

AFTER taking a breather for a couple of months, I am back onto two of my favourite subjects: fish and the Nordic countries. I used to be jokingly known as *New Scientist's* ambassador to Finland. I have now switched my allegiances to Iceland after two reporting trips there last year.

One was to cover the horrors of the open-pen salmon farming industry. The other was to visit the country's leading innovators in the green economy, including a company with an audacious plan to drill into a magma chamber to tap it for energy.

Less spectacular, but perhaps equally consequential, is a project called 100% Fish, the brainchild of entrepreneur Thor Sigfusson. He is the founder and chairman of the Iceland Ocean Cluster in Reykjavík, which is an incubator for "blue economy" companies attempting to turn a profit from material that is currently discarded as waste.

There is a lot to work with, especially in the fishing industry. Consider cod, which still live in relative abundance in the North Atlantic. Icelandic boats sustainably land some 60 million of them a year, says Sigfusson; about 40 per cent of the catch is used for food. The other 60 per cent – skin, bones, fins, internal organs and heads – is usually thrown away. Or it used to be.

The same is true for wild-caught fish the world over. This adds up to 10 million to 15 million tonnes of fish waste a year, which largely goes to landfill, says Sigfusson. "People say this is waste," he says. "We are saying there is no waste in the fishing industry. Our mission is to utilise all parts of the fish."

Some fishy by-products, such as milt (seminal fluid), roe and cod liver oil, have long been widely used for food and supplements.

But others are newcomers.

We gather round a large table groaning with innovative products made from fish waste. The most striking are the leather goods – purses, slippers and bags made from the skin of the spotted wolffish. It is a stunning product, tough and flexible like ordinary leather but much more eye-catching: silvery smooth with dark brown blotches. The skin of other fish, including cod and salmon, can also be processed to make leather. Weight for weight, it sells for the same price as prime fish fillet.

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Fish skin also supplies the protein collagen, a valuable commodity for food supplements. "It's good for the joints, it's good for the skin," says Sigfusson. The collagen also goes into a health drink called Collab, one of the most popular in Iceland. Calcium from the bones can also be utilised.

There are also fish-waste cosmetics, pharmaceuticals, supplements and snacks, as well as a rather menacing desiccated cod's head. These fish heads are dried using geothermal heat and exported to Nigeria to make soup. There isn't a single scale or drop of oil that can't be used in some way. Even the eyeballs can be drained for useful compounds.

Right now, Iceland turns about 85 per cent of its fish waste into value-added products. A few fishers in remote regions have yet to take the bait, but it is only a matter of time. "We're trying to

reach 100 per cent," says Sigfusson.

The jewel in the crown is a product invented by biotech company Kerecis, based in Ísafjörður, a fishing town in the far north-west. It uses fresh, intact cod skin as a graft to heal stubborn burns, wounds and ulcers. The product replaces standard skin substitutes made from human and pig tissue, which have to be treated with harsh anti-viral compounds to eliminate the risk of passing infections on to the recipient. Cod and humans don't share any viruses, so Kerecis has eliminated that step, saving money and creating a more natural product. In 2014, Kerecis received approval from the US Food and Drug Administration for its technology and, in 2022, made a profit for the first time.

"This is saving lives," says Sigfusson. It is also making serious money. A single cod-skin graft can sell for \$2700. When Kerecis founder Fertram Sigurjonsson approached the Iceland Ocean Cluster a decade ago, he asked for \$1 million in initial investment. In August 2023, the Danish medical products company Coloplast bought Kerecis for \$1.3 billion.

As a result of these innovations, fish is even more valuable than before. The flesh from a 5-kilogram cod fetches up to \$50. Add in the co-products and that rises to \$500. With Kerecis, it tops \$5000 per fish, with no waste whatsoever.

Other fisheries are catching on. The Ocean Cluster project has offshoots in the US, Denmark and Namibia. In the US and Canada, 18 companies have signed up to the 100% Great Lakes Fish pledge, which aims to use every bit of the catch there by 2025. "It makes sense because it's value for the industry and value for the coastal communities," says Sigfusson. There's gold in them there gills. ■