

Mercury declines in East Coast bluefish

Janet Pelley

Since the US Environmental Protection Agency mandated cuts to mercury (Hg) emissions in the 1970s, air deposition of the toxic metal has plunged by over 40% along the US eastern seaboard. Despite this decrease, scientists have speculated it could take centuries for Hg concentrations in marine fish to decline, since the ocean is so vast and slow to change. However, a new study shows that Hg concentrations in the body tissues of bluefish (*Pomatomus saltatrix*) have kept pace with falling Hg inputs to the mid-Atlantic coast (*Environ Sci Technol* 2015; doi:10.1021/acs.est.5b01953).

Released through the burning of coal and waste, inorganic Hg is converted into neurotoxic methylmercury – which bioaccumulates in aquatic food chains – by aquatic bacteria. About 10% of US women of

childbearing age have methylmercury levels high enough to damage fetuses. The greatest source of Hg exposure is from eating contaminated marine fish.

“It’s widely recognized that declining mercury deposition drives decreasing mercury concentrations in freshwater fish, so we wondered if the same thing was happening in marine fish”, says Richard T Barber, a biological oceanographer at the Duke University Marine Laboratory (Beaufort, NC) and a coauthor of the paper. He and his team relied on a 1972 study that measured Hg levels in bluefish in North Carolina. In 2011, the scientists collected bluefish at the same place and month as the earlier investigation. They used measurements of Hg in mid-Atlantic bluefish from eight other studies conducted from 1973 to 2007 and calculated that average Hg concentration in fish filets declined by 43% over the 40-year period. This mirrors the change in estimated annual mer-

cury inputs to the offshore study area from Massachusetts to North Carolina, which decreased by 37% over the same period. “These results show that mercury bioaccumulation in marine fish is tightly coupled to mercury inputs to ocean water”, Barber explains, adding that the findings run counter to earlier assumptions that the ocean responds slowly to Hg inputs. Although concentrations in bluefish have dropped to 0.33 µg of Hg per gram of fish tissue, pregnant women must still limit the amount they consume.

“The study shows that if you clamp down on mercury emissions, you’ll see positive results in a fairly short period of time”, says Susan Fisher, an environmental toxicologist at Ohio State University (Columbus, OH). However, she cautions that the declines in the US may not be permanent since global Hg emissions are climbing due to expansion of coal-fired power plants in Asia. ■

Energy-positive housing for the masses

Sophia V Schweitzer

The Welsh School of Architecture at Cardiff University in the UK is accelerating the future of energy-efficient housing with its new Solcer House design. Open since July, the three-bedroom home is both affordable and capable of exporting more energy to the electricity grid than it uses on an annual basis – a rare combination. The home, measuring 1000 square feet, was built in 16 weeks at a cost of £125 000 (\$195 000). Energy-positive homes exist already, but they are rare and expensive, making them difficult to replicate. “The house we built is the first of this kind in the UK that is low cost”, says the project’s lead architect, Ester Coma Bassas (Cardiff, UK). “We’ve developed a design that can be built for the masses, allowing optimization for cost and energy-efficiency.”

The building’s balance of components involves high levels of thermal



The energy-positive Solcer House, in Wales, UK.

insulation to reduce energy demand; fully integrated, glazed photovoltaic panels and solar air collectors to provide power and thermal energy; and dual thermal/battery storage systems. In collaboration with the Welsh government, the architects relied on local manufacturers, materials, and installers when possible, further reducing the building’s carbon footprint while providing local jobs. “The individual items we used are nothing special”, explains Coma

Bassas. “They are ‘off the shelf’, already existing on the market. But it’s how we designed the house – as an integrated efficient system with all items, power and thermal, working together – that gives the concept its potential.”

Relying on the nation’s electricity grid for supplementary energy imports and surplus exports, the house generates £175 (\$272) in exports for every £100 (\$155) spent on electricity. Energy-positivity works best when there are ways to absorb surplus power, such as through the electric grid or electric cars, although that’s not yet the case in many locales. The Solcer House provides proof of concept for energy-efficient building. “Its design is based on new priorities”, enthuses Eric Corey Freed (International Living Future Institute, Portland, OR). “The idea that you can have a low-cost net-positive house is exactly what we need. The rules that we took for granted on how we build our buildings are changing.” ■