

# Bugs will give us free power while cleaning our sewage

New Scientist

You might think a constant supply of fresh air would be essential for a sewage treatment plant, but some bacteria cannot stand the stuff. These bugs could be the key to cleaning waste water so efficiently that the process could generate power rather than consume it.

In conventional sewage plants, micro-organisms digest solid waste in "activated sludge". They convert the organic matter into methane but leave liquid waste containing ammonium and phosphates, which must be removed before the water can be poured into rivers.

Existing treatment plants use a lot of energy to get rid of the ammonium. The process uses bacteria that convert ammonium into nitrate, and the bugs that do this need oxygen, which must be constantly supplied to the treatment tanks by electric pumps. The nitrate is then converted into nitrogen gas by still more bugs, known as denitrifying bacteria. These require methanol, which must also be added to the mix.

This process consumes an average of 44 watt-hours per day for each person who adds waste to the sewage system. This can add up to megawatts in a big city.

## Cut out the middle bug

But now [Gijs Kuenen](#) [1] at Delft University of Technology in the Netherlands and colleagues are developing a technique that cuts out the energy-consuming processes. The key is a recently discovered type of bacteria that can munch ammonia without oxygen. So-called anammox bacteria short-cut the nitrogen cycle by converting ammonium directly into nitrogen gas.

As a by-product, anammox bacteria produce methane, which Kuenen proposes to harvest and use as fuel. The team calculates that, far from consuming energy, the process could generate 24 watt-hours per person per day. "This is about trying to make waste water treatment plants completely sustainable, in the sense that they could even produce energy, which is not the case in present treatment facilities," says Kuenen.

This month the team will begin building a pilot plant to demonstrate the technology at the Dokhaven waste water treatment plant in Rotterdam, the Netherlands, working with from Radboud University Nijmegen and water purification firm Paques, based in the Dutch town of Balk.

[Michael Wagner](#) [2], a microbiologist at the University of Vienna in Austria, points

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out that anammox bacteria were discovered only 20 years ago and hold great promise for a new generation of sustainable waste water treatment plants. "The anammox story shows how fundamental discoveries by microbiologists can revolutionise waste water treatment," he says.

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