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Will microbes give us clean coal?

Jim Thomas 22/05/2009

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Hungry microbial organisms that eat coal and excrete clean-burning methane gas – fool's gold or philosopher's stone? Take a guess...

Attention climate activists – here comes the next 'clean coal' scam: hungry, methane-belching microbes are being unleashed to clean up the image of the world's dirtiest industry.

In April, genome mogul J Craig Venter wowed a room full of investors in San Diego, California, with a black-and-white image of coal covered in some kind of moss. Only it wasn't moss. According to Venter, those fuzzy edges harboured microbial organisms that eat coal and turn it into methane gas. Coal, of course, is one of the world's dirtiest climate-changing fuels, and still embarrassingly plentiful. Methane, found in natural gas, has the reputation of being relatively 'cleanburning'. Turning the ugly duckling of coal into the white swan of methane is an energy alchemist's wet dream. 'We and BP think we can scale this up substantially,' boasted Venter in San Diego. 'We're not too far away from making an announcement to scale this up.'

Yes, that's global energy giant BP, which holds an undisclosed stake in Venter's private company, Synthetic Genomics Inc. Neither BP nor Venter is shy when it comes to grand visions and inflated claims. If you believe his publicist (who also happens to be his wife), Venter has so far singlehandedly decoded the human genome, revolutionised the field of genomics, (almost) built the world's first artificial life form, more than doubled the number of species known to humankind and intends to put the petroleum industry out of business within a decade. Expect fawning headlines when Venter and BP announce they have also achieved the holy grail of 'clean coal' with their mossy-looking microbes.

They won't be the only ones building the hype. There are now a handful of startups also on the scent of magical methane-making microbes. While oil and gas companies have been tapping existing methane deposits in coal seams for some time now (known as coal-bed methane) it has only recently become apparent that some of these natural methane pockets result from the activity of a class of bugs known as methanogens, which naturally metabolise hydrocarbons such as coal, oil and shale. The theory goes that if you can isolate and breed the very best methanogens and then inject them into coal seams and abandoned mines, you should get a stream of profitable gas back in return. It's a sort of probiotic therapy– using 'good bacteria' to inoculate coal against bad PR.

And it's not just coal that will get the methane takeover. Calgary-based Profero Energy is about to start pumping methanogens and a few key nutrients into Canada's infamous Athabasca oil sands, hoping also to transform heavy, polluting bitumen into an abundant source of 'clean' natural gas. Whether in the tar sands or coal country, the ultimate target for deploying this new approach is likely to be in reviving old workings to eke out extra revenue, rather than replacing existing and planned coal and oil extraction.

Doing so will bring new environmental disruption associated with methane recovery, such as contamination of groundwater and the risk of methane escape through natural fissures (raw methane is a much more serious greenhouse gas than CO_2). While the current generation of microbes under consideration are naturally sourced, at least one company, Luca Technologies of Colorado, is also looking at genetically engineering its microbes to further convert coal into hydrogen. Nor is microbial mining likely to bring much in the way of local economic benefits. It used to be that coal miners were communities of real people with jobs and pay cheques; in this new model they are colonies of archaebacteria that ask no salary or overtime.

The realities of mining-by-microbe are likely a long way off, but the experimental nature of the technique won't be so evident when the headlines come around. Just as policymakers already treat unrealised carbon capture and storage schemes as if they were an existing technology in order to justify building coal-fired power stations, so the coal industry will tout its unproven methane microbes as proof that the dirty black stuff is now, once again, definitively clean and green. Now that's magic.

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