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Mini-turbines to harness energy from pressure in UK's gas pipelines

Scheme in east London expected to produce 20MW by 2010 with national rollout promising electricity equivalent to output of conventional coal or nuclear power station

David Adam, environment correspondent
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The enormous pressure inside the gas pipeline grid that supplies UK homes is set to be harnessed to generate clean electricity.

Work to place small turbines inside the gas network will start later this year at Beckton in east London. This first scheme will produce 20MW by 2010 from the natural gas that rushes through the pipes. Repeated across the country, the technology could generate up to 1GW – equivalent to the output of a conventional coal or nuclear power station.

Andrew Mercer of company 2OC, which has developed the "geo-pressure" technology, said: "We're very lucky that somebody else has built this pipeline infrastructure. We can borrow it to produce renewable energy."

When natural gas is drilled from underground reservoirs it is at far too high a pressure to be used safely in homes. "It would just blow up your gas cooker," Mercer said. Instead, the pressure must be released at hundreds of sites across the supply network known as letdown stations.

Currently, the energy contained in this released pressure is wasted. The new technology aims to capture it to generate electricity.

2OC has teamed up with the National Grid, which owns most of the gas pipeline network in the UK, to build mini-power stations at eight letdown stations over the next few years. They will install devices called turbo expanders that generate electricity as the gas pressure is reduced. The turbines used are compact – 20cm in diameter – but can generate 1MW of electricity each.

The idea is not completely new. US companies experimented with turbo expanders in the 1980s and Mercer said a handful of similar efforts have already been set up in Europe. "But this isn't a cheap way to generate electricity. The reason it hasn't really taken off is that it's expensive."

Blue-NG, the joint venture developing the UK projects, aims to reduce costs by combining the turboexpander with a combined heat and power (CHP) engine, which generates both electricity and heat. Mercer says this boosts the efficiency of the CHP unit to over 70%. The CHP engine would run on vegetable oil squeezed from local rapeseed, though 2OC is experimenting with other fuels, such as synthetic oil made from wood.

Electricity may not be the only useful product of the turboexpander technology. Reducing the gas pressure also brings about a sudden drop in temperature, typically from 10C to -30C. Mercer calls this "free cold" and says it could be used as a cheap and green way to replace refrigeration units and air conditioning. He says 2OC is in talks

with two companies that are interested in siting computer data centres, which require massive cooling, near UK letdown stations.

The technology could also cool the London Underground network he claimed, though Transport for London has balked at the likely cost.

Another use could be to provide cooling for giant concentrated solar power plants, which are gaining credibility as a future large-scale energy source. One plan is to site such plants in desert regions of north Africa, and to transport the electricity generated to Europe. Mercer says a lack of available cooling water could cripple such schemes. Siting solar plants near letdown stations, which are common in gas-rich North African countries and the Middle East, would halve the costs and double the electricity generated, he said.