



Unconventional Fossil Fuels: Underground Coal Gasification – unsafe, unnecessary, unwanted

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While fracking continues to dominate the headlines, the extractive industries are pushing forward with yet another extreme and unproven fossil fuel extraction process known as underground coal gasification. Heralded by the industry as yet another way to provide 'cleaner' energy and provide energy security it is in reality a false solution that would continue to lock us into carbon based energy sources.

Not only does climate science demand that we leave these fossil fuels in the ground, the evidence from trials around the world points to inherent and unacceptably high environmental and health risks associated with underground coal gasification.

What is underground coal gasification?

Underground coal gasification (UCG) is a process that at its most basic level converts coal into fuel. The technique is used to access coal seams that are too uneconomical to exploit using conventional methods. This is usually because the coal seams are too thin, deep or too low quality. Pairs of wells are used to access the seams, one to partially ignite the coal using oxygen or steam, and the second to extract the resulting gases. At the surface the gases are separated into carbon dioxide, water, and syngas. Syngas is the combination of hydrogen, methane, carbon monoxide and very often carbon dioxide. It can be used to generate electricity, as transport fuel or industrial feedstock.

Underground coal gasification is not a new idea; unsuccessful attempts to get UCG off the ground were made as early as 1912 here in the UK. By the 1950-1960's up to 14 industrial-scale UCG power plants were operating in various locations throughout the Soviet Union. Following the discovery of natural gas, enthusiasm for the technique diminished; more recently the decline in conventional sources of fossil fuels combined with advances in drilling technology has seen renewed interest in UCG and an increase in the number of projects around the world. Recent trials of UCG have been dogged by pollution incidents and explosions that seriously call into question its safety.

Unsafe

Environmental and public health impacts

The gasification cavity created by UCG contains gas and liquid pollutants including mercury, arsenic and selenium, coal tars and ethyl benzene, among others, which are well known to present serious public health and environmental risks. Recent underground coal gasification trial projects have resulted in serious incidents of groundwater contamination and air pollution as well as explosions and other accidents.

UCG company Linc Energy has been taken to court by the Queensland municipal government for 'irreversible damage' to the environment from toxic gases produced during the gasification process. There is currently a 300km² exclusion zone where farmers are not allowed to dig more than two metres below the

ground in case harmful gases escape. In a separate case, Australian-based Cougar Energy was forced to shut down a UCG project in Brisbane in 2011 due to environmental concerns over benzene contamination.

Scotland's coal seams are heavily faulted and have been mined for decades, adding complexity to the gasification process and increasing the potential for ground water contamination, leaks and subsidence. There is currently no evidence from anywhere around the world that shows the successful decommissioning of a UCG project without causing environmental damage and health risks.

Climate change

The industry claims underground coal gasification is cleaner, cheaper and safer compared to traditional extraction methods. However UCG still burns coal, in a process that is thought to produce more greenhouse gas emissions than almost any other fossil fuel. Not only is the UCG process inefficient – with around 40% of energy from burning the coal lost in the process – but syngas has a relatively low energy content, around half that of natural gas. At a conservative estimate UCG would allow companies to access an estimated 600 billion tonnes of coal that would otherwise be left untouched.

UCG is anything but a clean source of energy, and the science is clear: in order to avoid the worst impacts of climate change the vast majority of remaining fossil fuels must remain in the ground. In the context of Scotland's commitment to reducing greenhouse gas emissions under our world-leading Climate Act, it is utterly irresponsible to open up a new frontier of fossil fuels.

Carbon Capture and Storage (CCS)

Proponents of UCG claim that it is ideally suited for combining with carbon capture and storage (CCS) technology thereby mitigating its climate impacts. CCS aims to reduce the climate impact of fossil fuels by capturing CO₂ from power station smokestacks – and in this case the UCG process – and disposing of it underground. However, CCS involves a suite of technologies that haven't been tested on a commercial scale: any part of the process – the capturing, the transporting or storing – could prove commercially unviable. In any case CCS does nothing to address the social and environmental impacts of fossil fuel extraction.

Despite a Government offer to fund CCS trials in the UK for the last ten years the technology still hasn't got off the ground here. Leaving aside the various problems with CCS itself, the combination of UCG and CCS is likely to be an even greater challenge. There are huge questions around the integrity of partially combusted coal seams as a storage site for CO₂ and the potential consequences of leakage. CCS and other unproven technological fixes are a serious distraction from tackling the climate crisis with the readily available solutions that energy efficiency and renewables provide.

What is at risk in Scotland?

There are currently six UCG licenses around the Firths of Forth and Solway in Scotland held by Cluff Natural Resources and Five Quarter Energy Ltd.

Cluff's plans to develop Scotland's first commercial UCG project around the Kincardine area of the Firth of Forth have been put on hold following strong public opposition and the introduction of a moratorium. The proposal - to drill into a coal seam deep under the seabed from land and use the gasification cavity for CCS - has never been tried before. Cluff recently extended a contract with Halliburton (the engineering company famous for securing fracking companies exemption from clean drinking water laws in the USA) and have a 'watching brief' on Scotland while the moratorium remains in place.

Five Quarter Energy Ltd held one UCG license in the Forth of Solway and two in the Firth of Forth. When the UK Government put a stop to CCS funding in December 2015, Five Quarter Director Prof Paul Younger stated that the case for unconventional fossil fuels had been 'fatally undermined', and quit his role in the company. Five Quarter ceased trading in March 2016, blaming market conditions and uncertainty around UK Government energy strategy.

Unnecessary

Scotland has an abundance of renewable energy resources: 25% of Europe's offshore wind; 25% tidal; and 10% wave potential. Not only is the Scottish Government on track to meet its 100% renewable electricity consumption by 2020 target, but independent research demonstrates that Scotland could meet all our

electricity needs from renewable sources and phase out fossil fuel generation by 2030 and have excess to export.

The renewables industry in Scotland is a valuable to the economy, providing over 21,000 jobs in 2013, and many thousands more in the pipeline. The International Energy Agency and other leading commentators such as Deutsche Bank warn that a dash for unconventional gas could prove a serious distraction from badly needed investment in clean renewable energy and energy efficiency, and see us locked into expensive, carbon-intensive infrastructure for years to come.

Unwanted

People around the world and here in Scotland faced with the unconventional gas industry are increasingly aware of its dangers and are opposing its advance. Communities around the Forth and Solway areas are actively resisting underground coal gasification, working together with communities across Scotland fighting shale gas fracking and coal-bed methane drilling. Before the moratorium on UCG was introduced, Cluff shelved its plans for the Firth of Forth due to huge public opposition.

Bans and moratoriums on other forms of unconventional fossil fuels are in place in: Scotland; Wales; Northern Ireland; Ireland; Denmark; Germany; Bulgaria; Czech Republic; the Netherlands; the Spanish regions of Cantabria, La Rioja, Navarra and Catalonia; Canadian states of Quebec, Newfoundland, New Brunswick and Nova Scotia; Vermont, New York, New Jersey in the USA; New South Wales and Victoria in Australia; as well as a huge number of local and regional bans around the world.

Our campaign

Four years of campaigning against unconventional fossil fuels alongside grassroots groups and communities paid off when the Scottish Government announced a moratorium on shale gas and coalbed methane in January 2015, and a further moratorium on underground coal gasification in October 2015.

Now our job is to turn the moratoriums into bans. We are convinced that a full and thorough assessment of the public health, climate and environmental impacts of this industry will lead to the Scottish Government banning unconventional gas extraction outright and permanently. But the industry will be gearing up with the opposite aim in mind. It's very important that the public momentum behind this campaign doesn't stall at this crucial stage, but keeps the pressure up to ensure the most robust assessments and consultation are carried out.

What you can do

- Stay in touch! Sign up for regular email updates about our fracking and unconventional gas campaign
- Write / email / visit your MSPs, MPs, local councillors and community councillors and ask them to work for a ban now
- Ahead of the Holyrood 2016 elections contact your candidates and quiz them at hustings and on the doorstep
- Get together with your neighbours and community to declare yourselves a UFF free zone! The Lock the Gate movement in Australia has had huge wins this way
- Visit our website for more information and regular campaign actions

More info: www.foe-scotland.org.uk/fracking

Contact: info@foe-scotland.org.uk



Friends of the Earth Scotland's work on unconventional fossil fuels is part of our campaign for a Fossil Free Scotland: A just transition to a 100% renewable, nuclear-free, zero-fossil-fuel Scotland

find out more at: www.fossilfree.scot