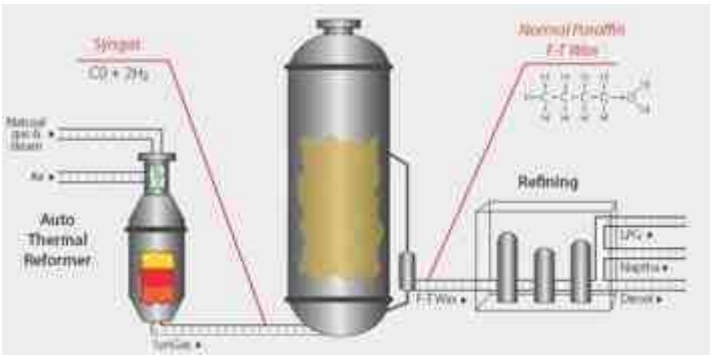
UNDERGROUND COAL GASIFICATION

Biggest Threat Ever to Britain's Remaining Coal Reserves

David Douglass

The Tories have long danced on the grave of the coal communities and the memories of the once powerful NUM, but at the back of their minds they have retained the fear that this corpse might not stay down and might one day rise again. Fears were grounded in the fact that something like 1000 years of untapped coal reserves in vast coalfields still remain. That the existing mining workforce and army of unemployed miners are still just young enough to fuel and redevelopment of the coal fields. That our sons and grandsons might follow on in our traditions in the conscious memory of our collective history. Now they have the stake with which to drive through the corpse of the coal industry to make sure it never rises from the dead. It is called UCG.

"Research projects on underground coal gasification, coal bed methane and enhanced coal bed methane are underway. Each of these projects is intimately linked with our carbon capture and storage research, so ensuring the impact on the environment is minimised.



Underground Coal Gasification

Long after its gas and oil reserves have been exhausted, the UK will still have large onshore and offshore coal reserves, though most of these are beyond the reach of conventional mining techniques.[1]

- UCG can be directly coupled to carbon capture and storage to unlock these vast energy reserves without increasing greenhouse gas emissions.
- Directionally drilled boreholes can be installed in a target coal seam.
- Seams of coal are gasified and syngas produced from the burn zone is collected by the production wells.

[1] Mining technology is an ever evolving science and few coal reserves would be beyond reach indefinitely

Use of Syngas:

- Syngas can directly feed a gas turbine power plant
- The syngas can be reacted with steam and a catalyst to produce CO2, which can be stored and H2 for power generation.
- Syngas could be converted to diesel using the Fischer-Tropsch process.

- UCG derived syngas could replace petroleum derived syngas in a wide variety of processes in the chemical industry "[2]

Down a first borehole measuring six inches across they would send oxidants- air/oxygen or steam triggering the coal to partially oxidate. Because this is partial combustion, a gas called syngas would be produced which maintains much of its original energy (the gasses energy not the partially combusted coal, an important difference as we shall see later). Due to the pressures differences trapped gasses are released from the seam and the area around the seam.
All of these gases, hydrogen, carbon monoxide, methane and carbon dioxide would then be extracted through a second borehole back to the surface and shore.

We have no problem with the science or technology of the process or its environmental impact (other than the duel standards applied to coal powered C02 emissions and those of Methane and C02 from this process). Our only concern is that this is being wheeled out to replace and displace and block the development of Britain's vast remaining coal reserves. In fact nothing is extracted from this process which cannot equally be extracted on the surface once the coal is conventionally mined.

Underground Coal Gasification. Basically it is the neutron bomb of coal mining. They drive holes into the underground seams, pump in water, steam, air and oxygen and force gas to the surface (see above proposal paper). They destroy the coal seam as a mining prospect and leave hundreds of miles of thick seams raped and abandoned. The calorific utility of the fuel by this method is tiny; it represents something in the order of 4% of the real value of the reserve which would then be left wrecked and unusable. The process doesn't need miners, doesn't offer jobs and will make sure we never ever come back to haunt them. The Coal Authority had already granted 18 licences to carry out this plunder and destruction.
Where this really simply a plan to exploit coal reserves traditional mining methods cannot reach we wouldn't be too concerned, but this is not the case, all of the licenses which have been granted are in offshore seams where our best hopes of a revival of the industry lie.

In January of 2014 the local press announced to banner headlines "£1bn key to unlock coal gas bonanza" [3] The £1 billion which the government withdrew from the Clean Coal

[2] Next Generation Coal Conference, 12-13 July, 2012, Newcastle upon Tyne.
[3] The Northern Echo, January 31st 2014. Front Page, Comment & pages 4/5

CCS programme for Don Valley is now being handed over to Underground Coal Gasification on the North East coast. The CCS which was so vital to the survival of the remaining three deep mines and was with-held from that scheme is now wheeled out as the life saving "green energy" applied to UCG. You wouldn't have to be a grand conspiracy theorist to see the hand of bitter political interference and bias here. As Chris Kitchen the General Secretary of the NUM said in response to the news: - "This government knows it has an energy crisis coming but for what I believe is a continuation of the Thatcher vendetta refuses to admit that coal is the answer….Cameron would rather allow fracking which no one wants except the energy firms that will make a fortune from it then walk away from the devastation that fracking and UGC will cause."[4] The Northern coastal coalfield is an immense area of coal reserves, untapped and virgin from Lincolnshire and North Yorkshire and barely touched from the Durham Northumberland coalfields to the Firth of Forth. Hopes for the redevelopment of eight new coal mines along the north east coast had centred on plans for new drift mines from south of the Wear to Berwick. The area of some 23 ***trillion*** tonnes of coal had been mapped out and expert mining engineers had given the seal of approval as to the viability of the redeveloped Northumberland-Durham coalfield. Even if each mine produced a massive 2 million tonnes per year, and employed 1500 men per mine, we were looking with great confidence at 16 millions of tonnes of coal per year, and a minimal workforce of 12,000 for centuries. The announcement that Five Quarter has been awarded a license from the UK Coal Authority to frack the entire reserve is nothing short of devastating. No consideration whatever has been given to the permanent damage done to the seams, and the fact that they will be destroyed as a workable resource. Only 4% of the calorific value of the seams will be exploited leaving the residue, 96% wrecked and unworkable in the ground. Fracking is a low labour intensive process industry which after the initial drilling and infrastructure employment falls to just 500 jobs rather than thousands.

Five Quarter has also obtained licenses for The Firth of Forth, the Solway Firth, and Liverpool Bay in an area of untapped coal probably equally as large on the western coast as the Eastern.[5]

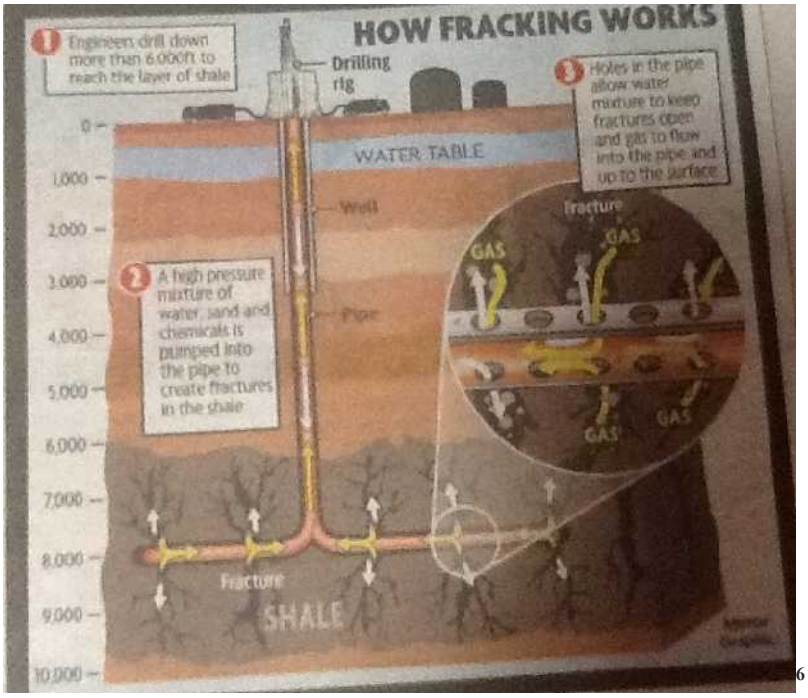
We could be conservatively looking at 50 ***trillion*** tonnes of coal. A potential to redevelop the Cumberland and Lancashire coalfield alongside the Northern and southern Scottish coalfields with secure mining jobs for 30,000 miners, their sons, grandsons great-grandsons etc for centuries. Instead they will rape and pillage the nation's energy treasury, destroy its long life potential and walk away with megabucks leaving the population robbed of its heritage.

These schemes are being rolled through and not a peep from anyone. Our problem as a union is Miliband the leader of the Labour Party and Flint the Shadow Energy Minister are almost as manically anti coal as the Tories are. We must make everyone aware of what is going on here and demand that licenses are never allowed in any area of coal

[4] Letter to author, 31st Jan 2014.
[5] Northern Echo, January 31st 2014, pages 4 & 5.

which can be mined from conventional methods now or in the future and that of course includes all the reserves up to 100 miles off shore.

Fracking



[6]

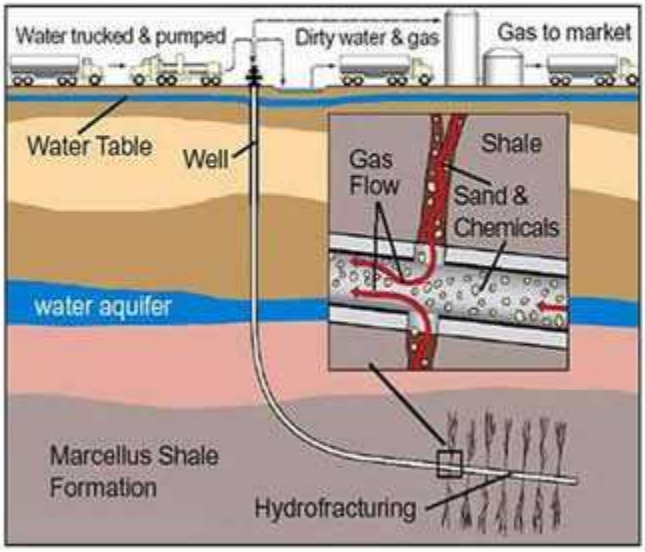
Workers involved with fracking are being exposed to levels of carcinogenic silica up to ten times the US recommended limit.[7]

[6] Illustration from Daily Mirror with a little help from my granddaughter Caitlin downloading it for me.

[7] Hazards, July-September 2013, page 15

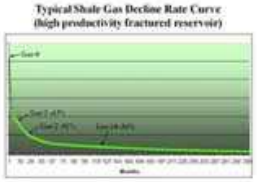
What is fracking?

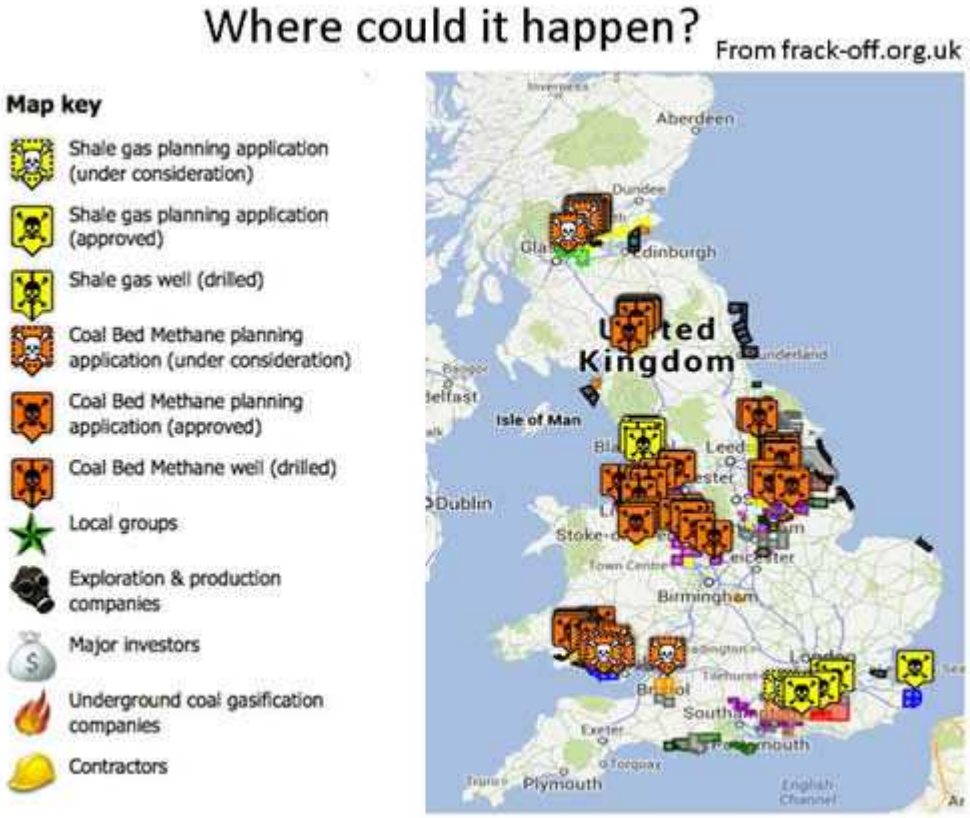
- 'Hydraulic fracturing' Injection of fluid at high pressure to break shale and release gas
- Fluid requires
  - 8 million gallons of water per well (drinking water)
  - Hydrochloric acid
  - Formaldehyde
  - Most remains in ground
- Brought to the surface: radioactive waste!



Industrialising the whole countryside

- Omitted from media reports- well output declines very rapidly
- So thousands of wells have to be drilled (or 600 'well pads' in the South Downs)
- Each well requires 2,000-4,000 truck movements





While the calorific value of shale gas fracking is only 3% of the actual reserve if it was mined by conventional mining methods, coal gas fracking is only 4% of the conventional mining value, and the reserve once fracked is abandoned; it is by any stretch of imagination a scandalous waste of a valuable earth resource. The effect of Coal Bed methane drilling and extraction upon prospects for conventional mining of those coal reserves is unknown and hasn't been considered before the granting of licenses.

As if Fracking didn't have a bad enough press with mini-earthquakes etc the Tory Minister for fracking (Energy Minister) Michael Fallon scored a home goal by announcing that many of the sites would be in southern rural Tory constituencies. Previously the rich country Tory bumpkins had been great cheerleaders for the new technologies, because they thought like coal mines and oil wells they wouldn't be anywhere near them. Charles Moore Maggie Thatcher's biographer had spoken in glowing terms about fracking which he assumed would be anyway "in impoverished parts of the north"[8]

"It is lucky for those trying to extract it in this country that it is in places like Ellesmere Port and Blackpool where there are not many spoiled rich people to complain about damage to the landscape." Charles Moore. *Spectator.*

Fallon set the cat among the pigeons with his statement: - "The second area being studied is the Weald. Its from Dorset all the way through Hampshire, Sussex, East Sussex, West Sussex and even into my county of Kent. Its right there. The beauty of

[8] The Mail on Sunday, Aug 4th 2013 pg's 6 and 7

that-please don't write this down-is that of course it's underneath the commentariat. All those people writing leaders saying 'why don't they get on with shale?" we are going to see how thick their rectory walls are, whether they like flaring at the end of the drive! That's where the second great belt of shale is"[9] The flares in question are well known to be likely to reach several feet high as leaked gas is burned off. Unlike coal which faces the most vindictive financial and tax penalties, the Fracking firms are be given huge tax exemptions.

The problem for the British frackers is they are likely to get hoisted on their own anti carbon petard. As stated in this document methane is 86 times more damaging than CO2. It being a far worse greenhouse gas. The lobby that brought down the green wrath upon the heads of coal, produced the scarcity and drove British industry onto the rocks of 'green energy' sent them looking for new cheaper sources of power. Shale gas appeared the magic solution and they danced on the grave of coal power and mines. But the trouble with witch hunting is a combination of ever more righteous strictures and a search for a wider field of guilty souls. 'The EU' at time of writing seems likely to burst Britain's shale bubble with fears about climate change and global warming and shale mining methane emissions. The EU's environmental laws which Blair so enthusiastically signed up to not carry a British veto. Britain cannot draft an energy policy suitable to itself if the EU says no. Most EU countries in line with the prevailing liberal climate change dogma's are now anti shale. The spreading industrial crisis across Europe as a result of climate change policies are spiraling energy prices and devastating industrial production.
International competitors one and all have far cheaper energy and far less stringent climate change laws, if any. The truth is in order to achieve the European climate goals industry will have to more or less cease and ready supplies of domestic power and heat is far less ready and on call than at any time for a century. The cash cow that fell from heaven into British energy producer's laps, suddenly looks like a cow jumping over the moon but time will tell. The clamour for a referendum on EU membership, and the knock on demand to be free of EU regulations on climate taxes etc may well change the game, too late we fear to save the British deep coal mined industry, coal generation or develop clean coal technologies, all the of the major political parties are both pro EU and anti coal.

[9] Mail on Sunday, Op.cit