

# Going to Extremes:

The project to develop unconventional gas extraction in Britain

**Paul Mobbs**

Mobbs' Environmental Investigations

<http://www.fraw.org.uk/mei>



# The Telegraph

People need to be educated about fracking, says IGas chief  
Andrew Austin

The head of IGas Energy, Andrew Austin, tells Emily Gosden about the future for fracking, his view of recent protests and why his favourite film is Local Hero.



# TheNational

UK shale oil and gas renaissance at risk from new 'eco-warriors'

Angela Jameson, Foreign Correspondent, writes from London  
September 12, 2013

A few months ago, British politicians

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## NEWS UK

### Energy Minister Michael Fallon urges support for new shale gas wells

Energy Minister Michael Fallon says it would be "irresponsible" not to support firms trying to access shale gas, while predicting dozens of test wells will be drilled over the new few years.

Mr Fallon also warned MPs against opposing shale exploration in their constituencies.

ft.com > markets >

## Surging shale output shakes up US gas

By Gregory Meyer in New York

The US natural gas market will be shaken by surging shale production inventories, leading research group.

The northeast, traditionally the most expensive region in a dramatic revamp, has a long-term market outlook.

**US natural gas by hub**  
\$ per m Btu

Domestic - South	Henry
4.5	

The shale trader's view

## ENERGYLIVE NEWS

### Make Blackpool Europe's shale gas centre says Cameron

Posted on 02 October 2013 by Vicky Ellis

## theguardian

Environment > Shale gas and fracking

### Ukip: anti-fracking 'eco-freaks' will kill economic opportunity

Party's energy spokesman says fracking protesters would kill 'greatest new economic opportunity for UK in our lifetimes'

Damian Carrington and agencies  
theguardian.com, Friday 20 September 2013 06.00 BST

Jump to comments (300)

## BUSINESSDAY

### UK shale gas reserves may be 'bigger than first thought'

June 4, 2013 | Filed under: Energy | Author: Editor

One of the energy firms hoping to exploit the UK's resources of shale gas says it may be sitting on significantly more gas than previously thought, according to a BBC news report yesterday.

UK firm IGas says there may be up to 170 trillion cubic feet (4,810 cubic km) of gas in the areas it is licensed



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### 'Fracking tax' could lead to lower energy bills

The Conservative party may use funds raised by issuing fracking licences to cover cost of green policies and reduce consumer energy bills



## news.com.au

### Australia on the verge of a gas boom

KIM CHRISTIAN  
AAP  
September 27, 2013  
8:51 PM

AUSTRALIA is in the midst of a gas boom.

Domestic gas supplies and exports are expected to grow rapidly by the end of the

## THE TIMES

### Natural Resources

#### Shale gas industry 'may create more than 100,000 jobs'

## ENERGY TRIBUNE

### Shale Oil Boom Fuels Argentina's Dreams

by: energytribune  
Posted date: October 03, 2013 in

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# The Shale Gas Boom: Energy's 'Big Lie' Of The Century?

Oct 8 2013, 17:49 | Includes: DBO, FCG, FRAK, GASL, GASX, GAZ, IEO, NAGS, OIL, PXE, UNG, USO, XOP

Disclosure: I have no positions in any stocks mentioned, and no plans to initiate

## Bloomberg: fracking unlikely to bring down UK energy bills

Last updated on 3 October 2013, 5:27 pm  
Submission to UK Parliament suggests shale gas could cost 50% to 100% more in UK than USA



theguardian  
Dangerous levels of radioactivity found at fracking waste site in Pennsylvania  
Co-author of study says UK must impose better environmental regulation than US if it pursues shale gas extraction

Felicity Carus  
theguardian.com, Wednesday 2 October 2013 14:20 BST  
Jump to comments (58)

## THE WALL STREET JOURNAL. BUSINESS

### Exxon: 'Losing Our Shirts' on Natural Gas

Email Print Save Comment

By JERRY A. DICOLO and TOM FOWLER  
Updated June 27, 2012 5:55 p.m. ET  
NEW YORK—Even energy titan Exxon Mobil is losing its shirt on natural-gas prices.

On Wednesday Exxon Chief Executive Rex Tillerson said that it wasn't being hurt by natural gas prices, among those hurting from the price

# Chesapeake Energy writes off 4.6 trillion cubic feet of shale gas reserves

August 8, 2012



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## The Coming Shale Write-Downs

The World of Energy

## Bloomberg VIEW Our Company Professional Anywhere



### African Myth of Cheap Oil and Gas

7, 2013 4:08 PM GMT+0100

### Oil & Gas

September 30, 2013 12:09 pm  
Shell looks to sell US shale portfolio after \$2bn writedown  
By Guy Chazan

Royal Dutch Shell is to sell its position in the Eagle Ford shale in Texas, two months after announcing a big writedown on the value of its US shale assets.

Shell took impairments of \$2.1bn in the second quarter, mostly related to its tight oil

## BHP Billiton writes down shale gas assets by \$2.8bn, chief Marius Kloppers forgoes bonus

BHP Billiton has written down the value of its US shale gas assets by \$2.84bn, prompting the head of the world's biggest miner Marius Kloppers to forgo his annual bonus.



Bloomberg.com | Businessweek.com | Bloomberg TV | Premium

## BloombergBusinessweek Global Economics

### U.S. Shale-Oil Boom May Not Last as Fracking Wells Lack Staying Power

By Asjlynn Loder | October 10, 2013  
SEND TO Kindle

Friday 11 October 2013



## Is fracking a mortal threat to our livestock?

The toxic chemicals in fracking fluid cause reproductive problems, sickness and even death in farm animals, according

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## Potential Greenhouse Gas Emissions Associated with Shale Gas Extraction and Use

Professor David J C MacKay FRS

Dr Timothy J Stone CBE

9th September 2013

The politics of “business as usual”  
is getting desperate...

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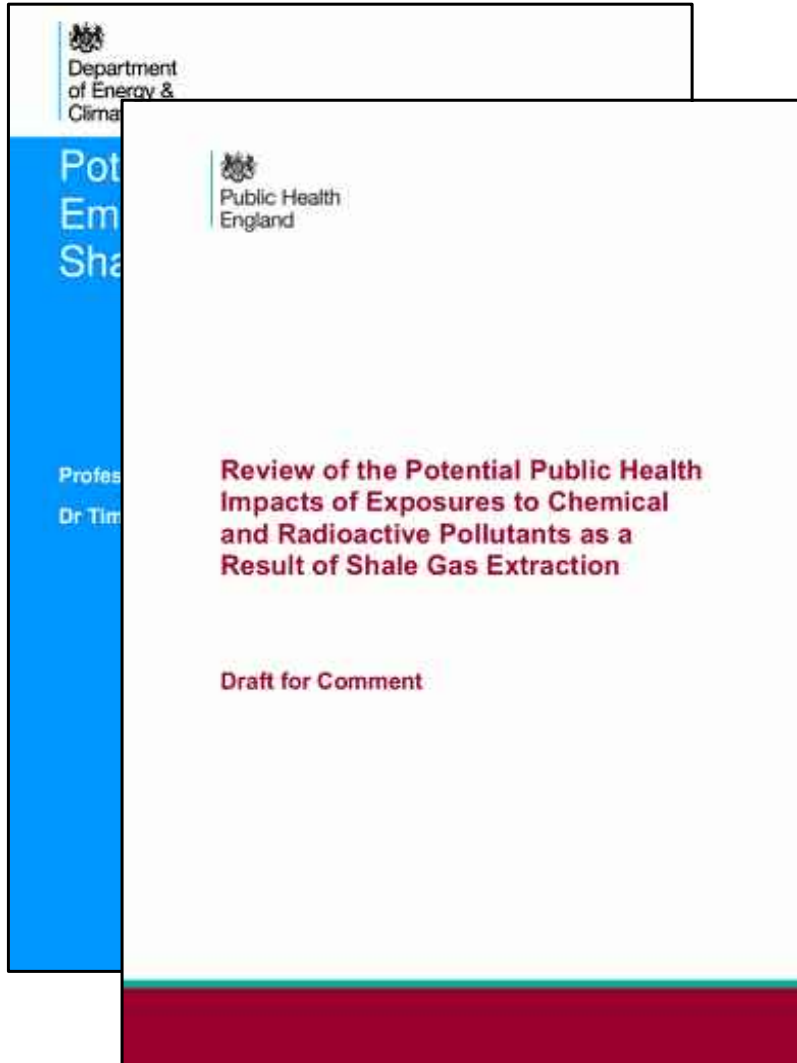
9th September 2013

The politics of “business as usual”  
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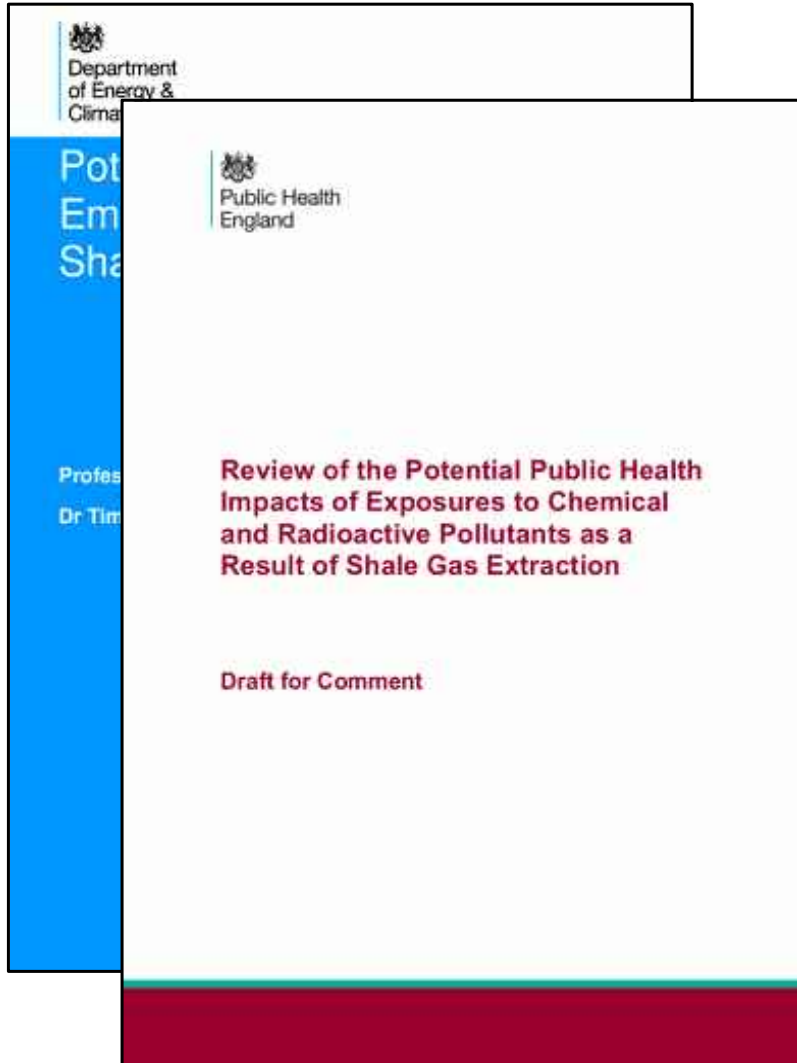
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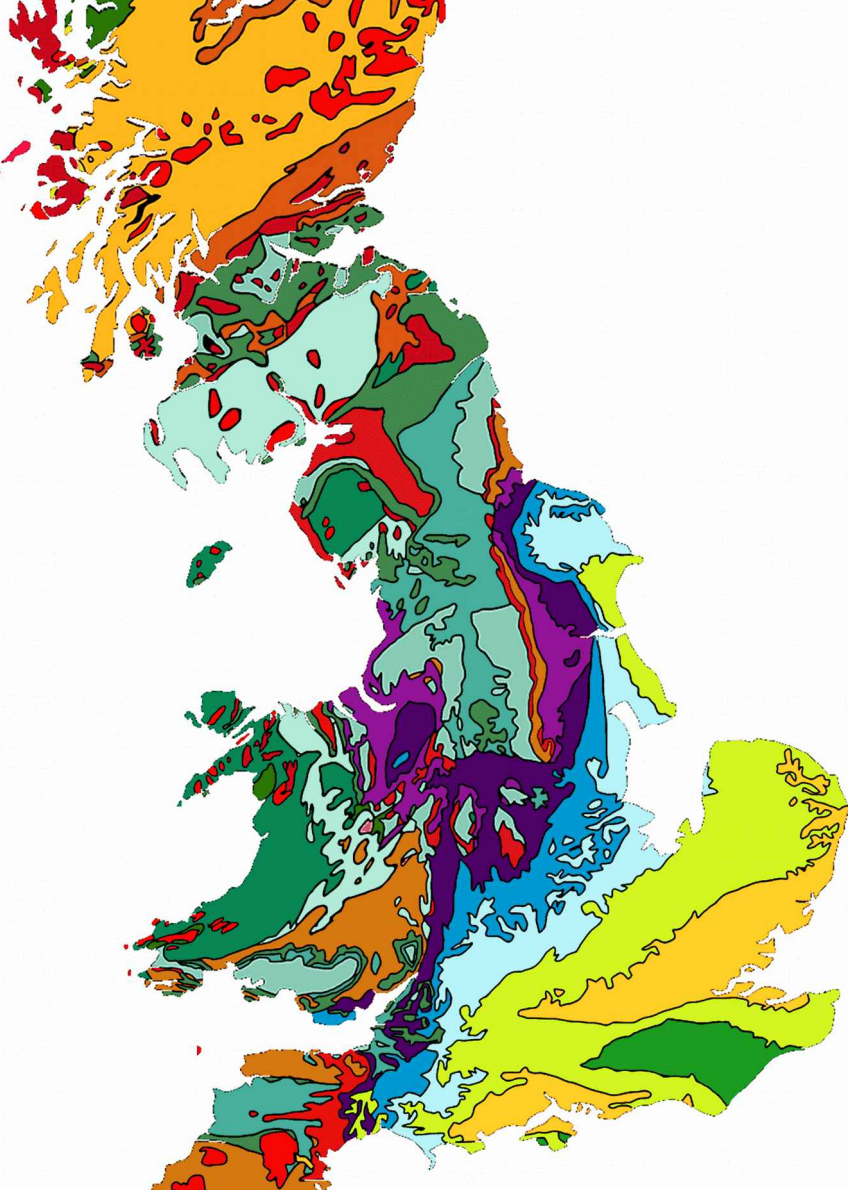
# The politics of “business as usual” is getting desperate...

*“In the absence of information about the quality of the UK’s shale gas we have assumed that shale gas would produce similar emissions to those in the production and processing of conventional gas.”*

*“The currently available evidence indicates that the potential risks to public health from exposure to the emissions associated with shale gas extraction are low if the operations are properly run and regulated.”*







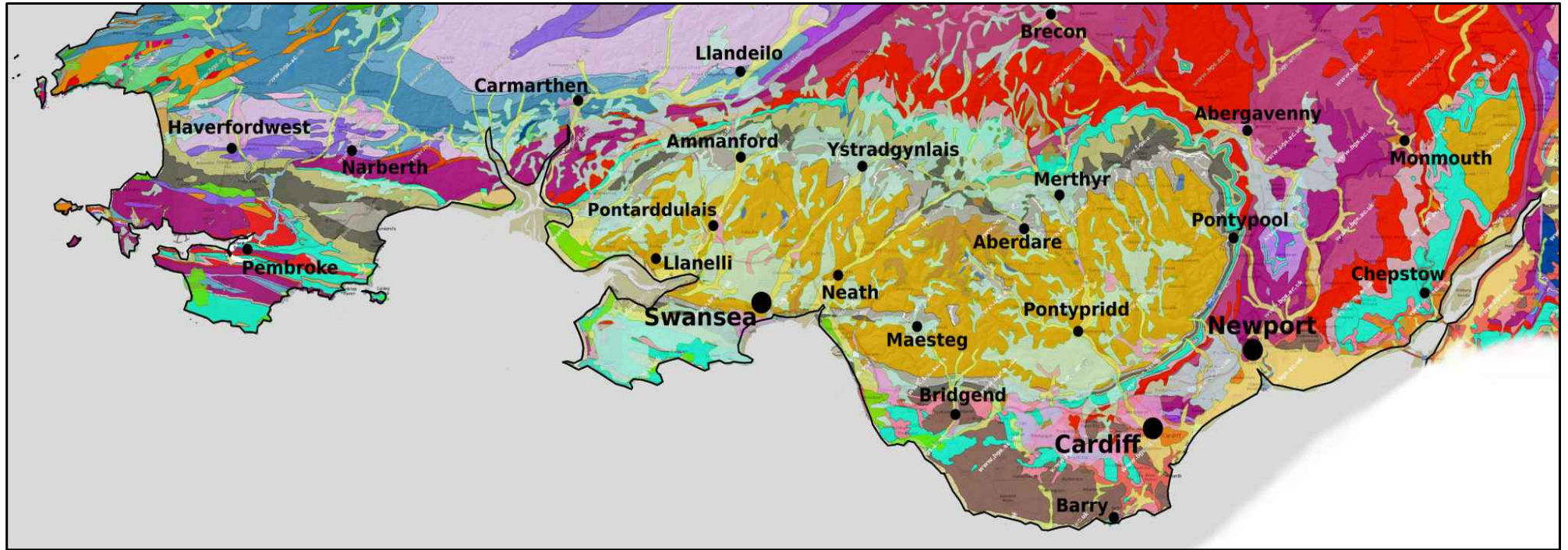
## “Unconventional” resources

Unconventional oil and gas can't migrate to form underground reservoirs because the source rock has a low permeability. Instead the rock strata where the oil/gas is formed must be mined directly.

The existence of unconventional oil and gas is related to the types of rocks that make-up the UK. Like other minerals, unconventional fuels can only be worked where they are found – and so we have to start by looking at a geological map of Britain.



# Sources of unconventional gas:



Differences in the underlying geology mean that the likelihood and impacts of unconventional gas development will differ across the area...  
*there is no “simple” explanation of potential or effects.*

## Sources of unconventional gas:

### Shale gas

Produced from impermeable “black” shales, mudstones and clays – all of which have a high organic content. Impermeable nature of the rock prevents migration of the gas generated to a reservoir strata.

### Coal-bed methane (CBM/CSG)

Methane gas trapped in coal. Due to variations in coal seams and their history, not all coal seams contain usable gas, and variations in geology give very differing quantities of gas.

### Underground coal gasification (UCG)

Gasifying the coal in-situ underground, starved of oxygen, to produce methane, hydrogen & carbon monoxide rich “syngas”.

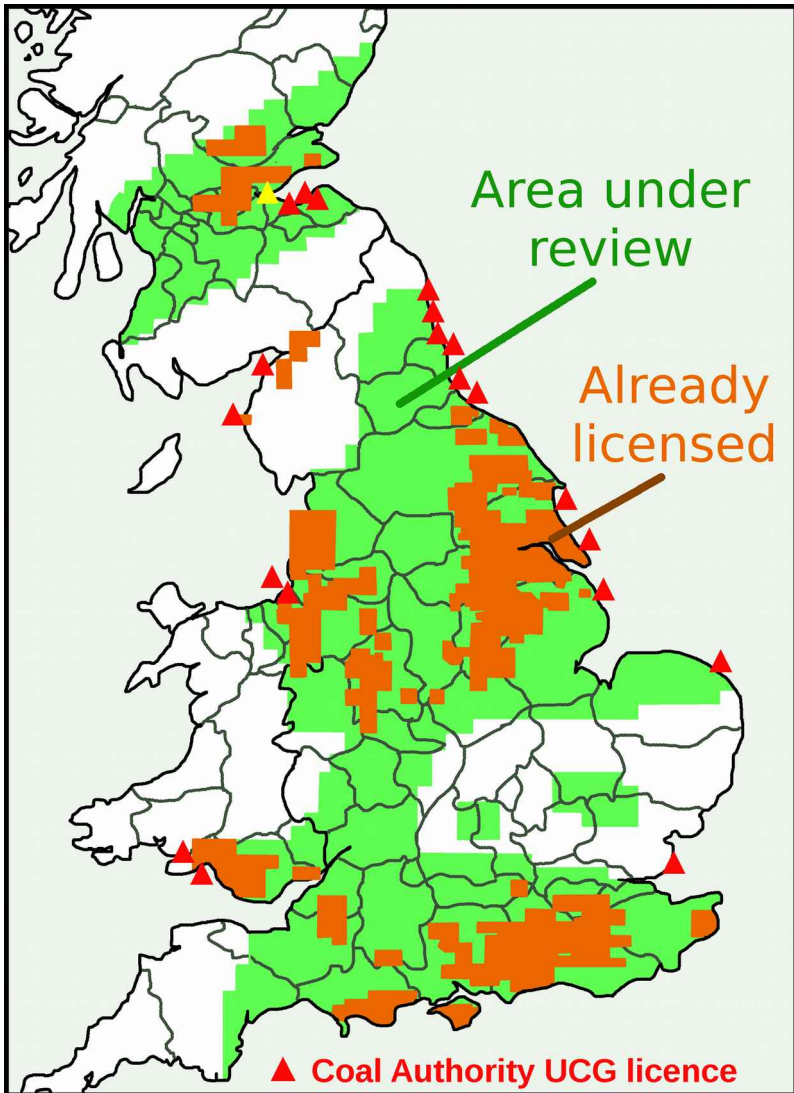


# 14th Onshore Licensing Round

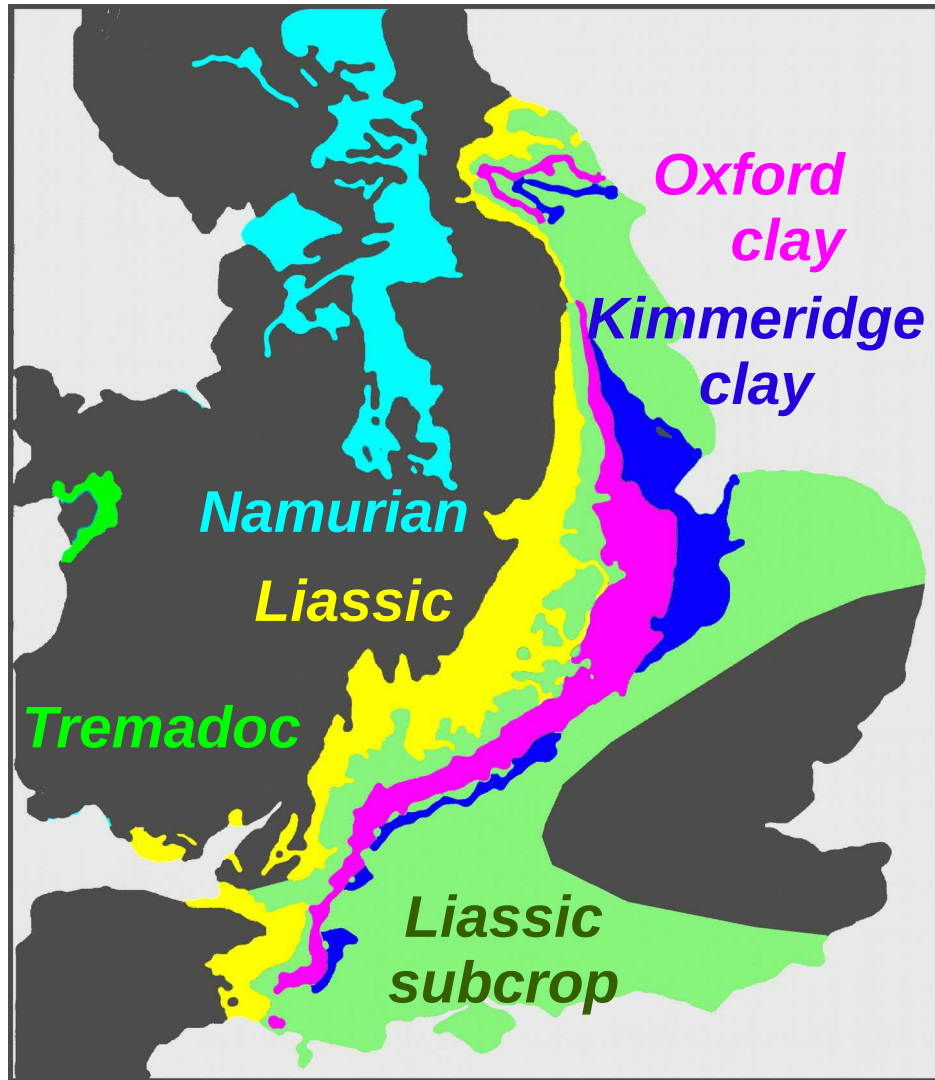
In the UK most mineral rights are controlled by the state. The rights to exploit minerals are auctioned-off in regular "rounds". Many areas of Britain are already licensed, mostly for oil and gas (the North East and the Weald).

The last round granted licences for shale gas and CBM in Somerset, Lancashire, Wales, Nottinghamshire, Derbyshire & Scotland. The 14th round seeks to open-up the rest of the UK to unconventional gas extraction.

The 14th round licences were due to be announced in 2012. The controversy over fracking has delayed that process, and the results have still not been announced.



## Shale gas



The generic term "shale gas" is used to cover methane gas which can be recovered from a number of different low permeability rocks – shales, mudstones, siltstone and clays.

The most important characteristic is that they have a high organic content that has been "cooked" through the gas window – older rocks may contain more gas, younger rocks less.

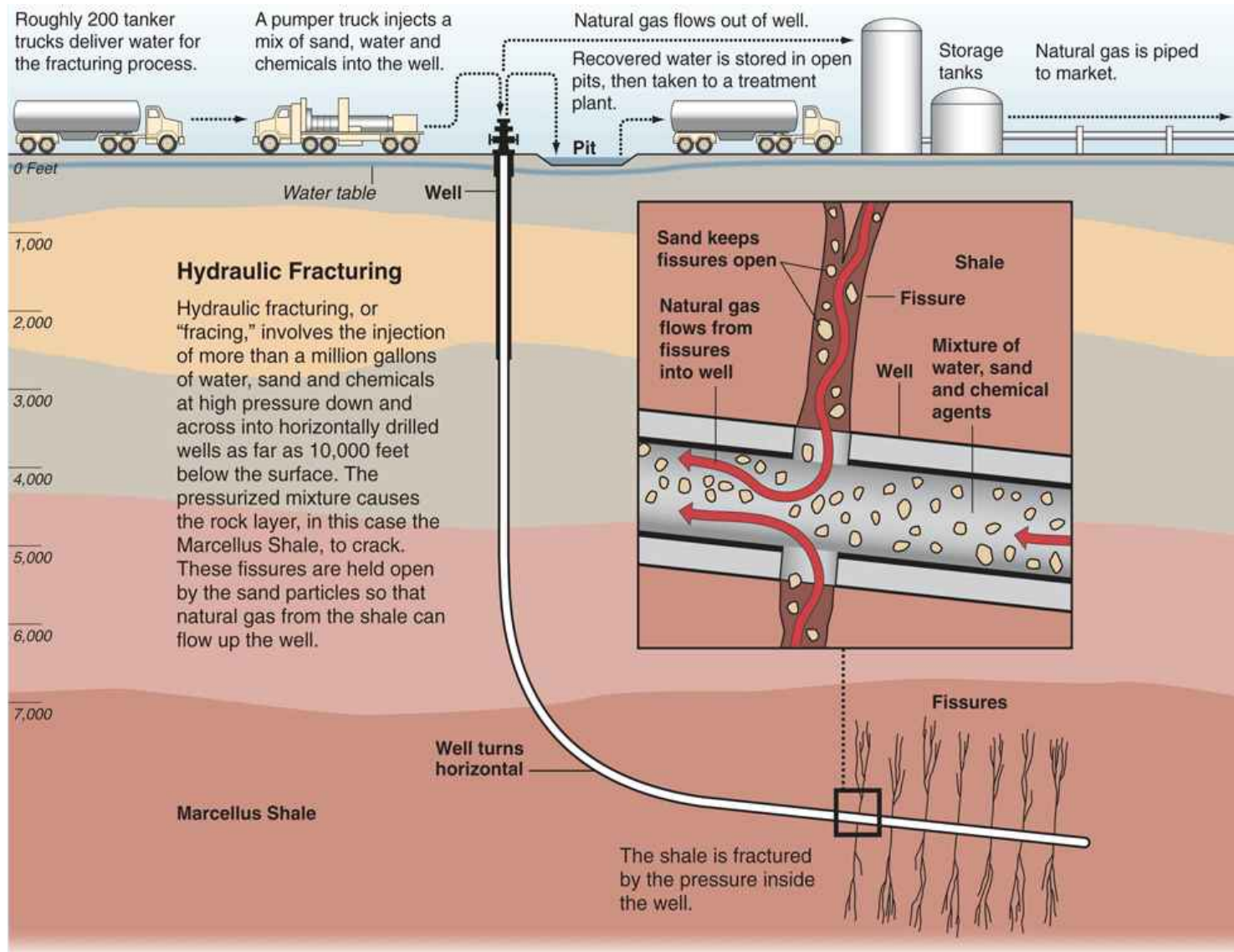
Shale gas is produced using hydraulic fracturing (aka. 'fraccing' or 'fracking') processes.



# Shale gas

Most media representations show a directional well, or talk of earthquakes. This is a major underestimate of the impacts of the fracking process.

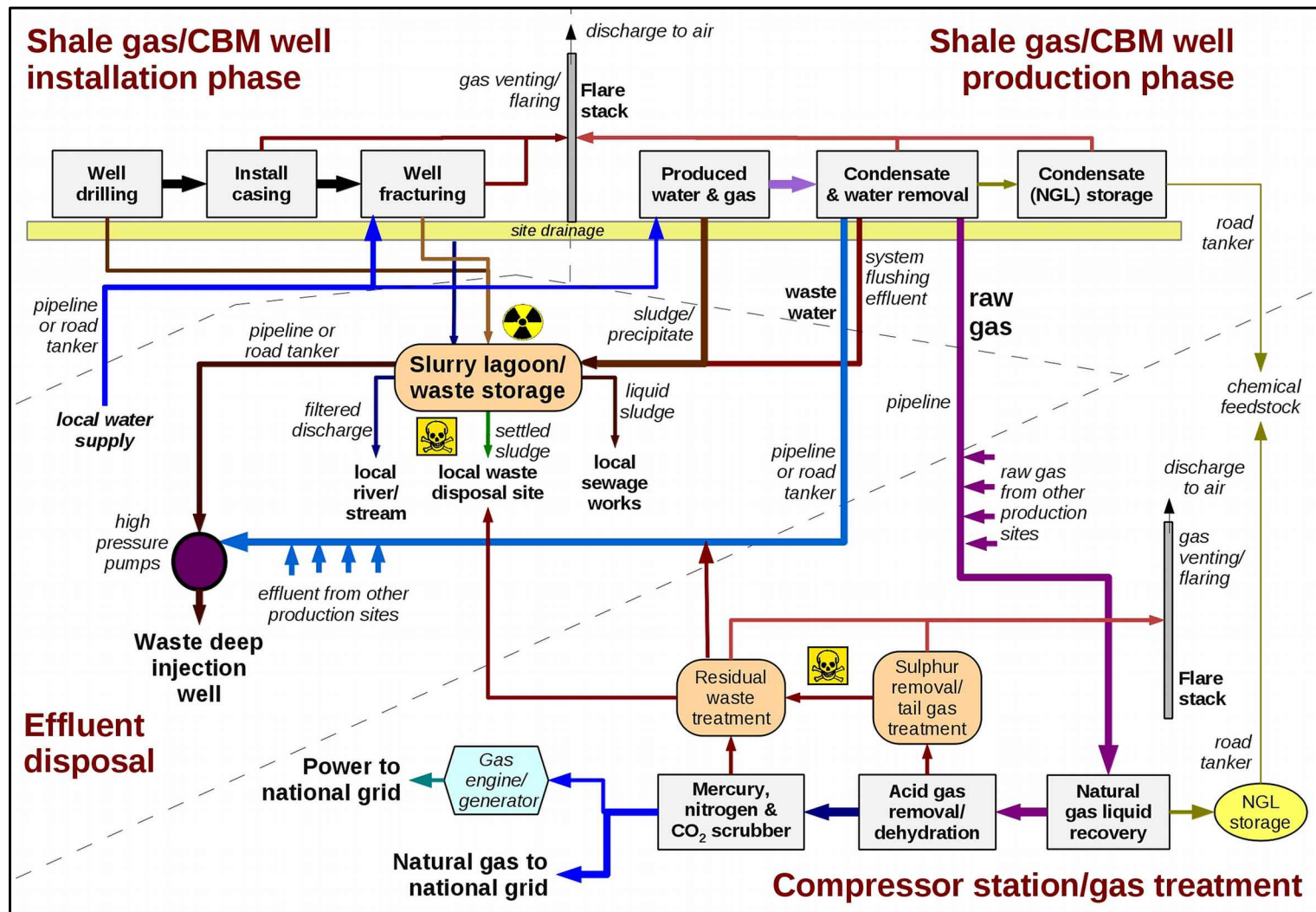
The most impactful parts of the process have little to do with the gas well.



# Shale gas

Most media representations show a directional well, or talk of earthquakes. This is a major underestimate of the impacts of the fracking process.

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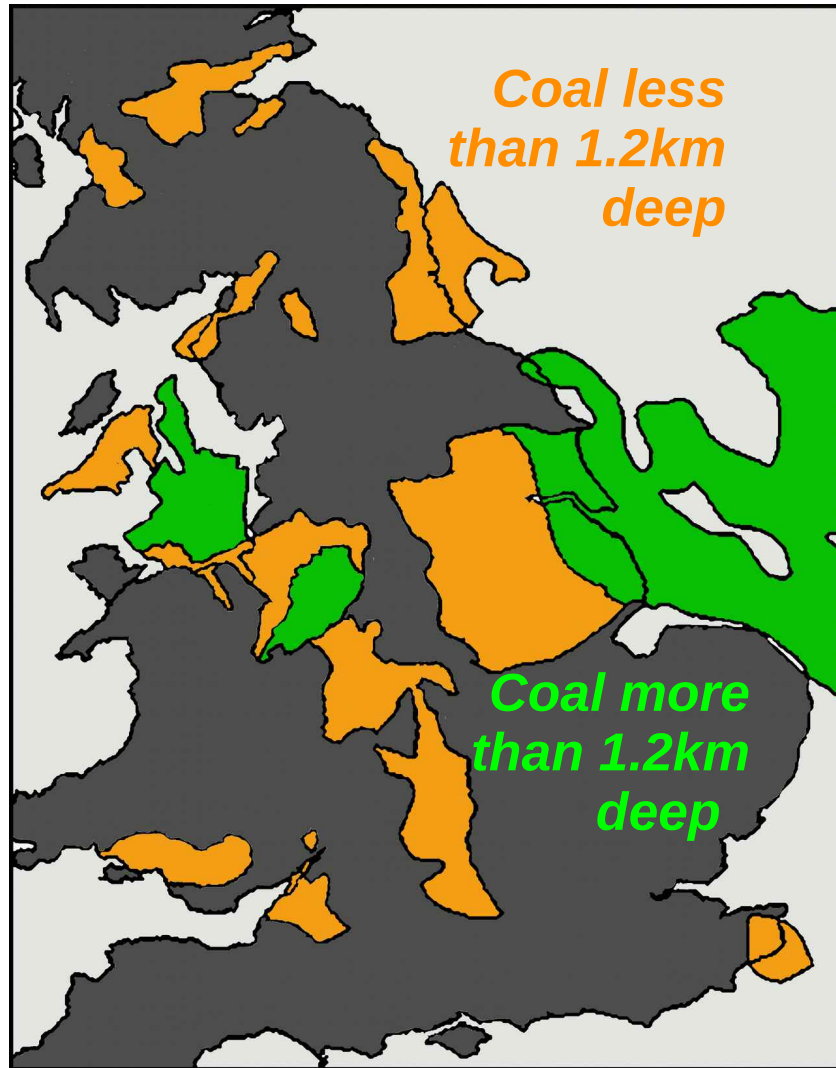


## Coal-bed methane

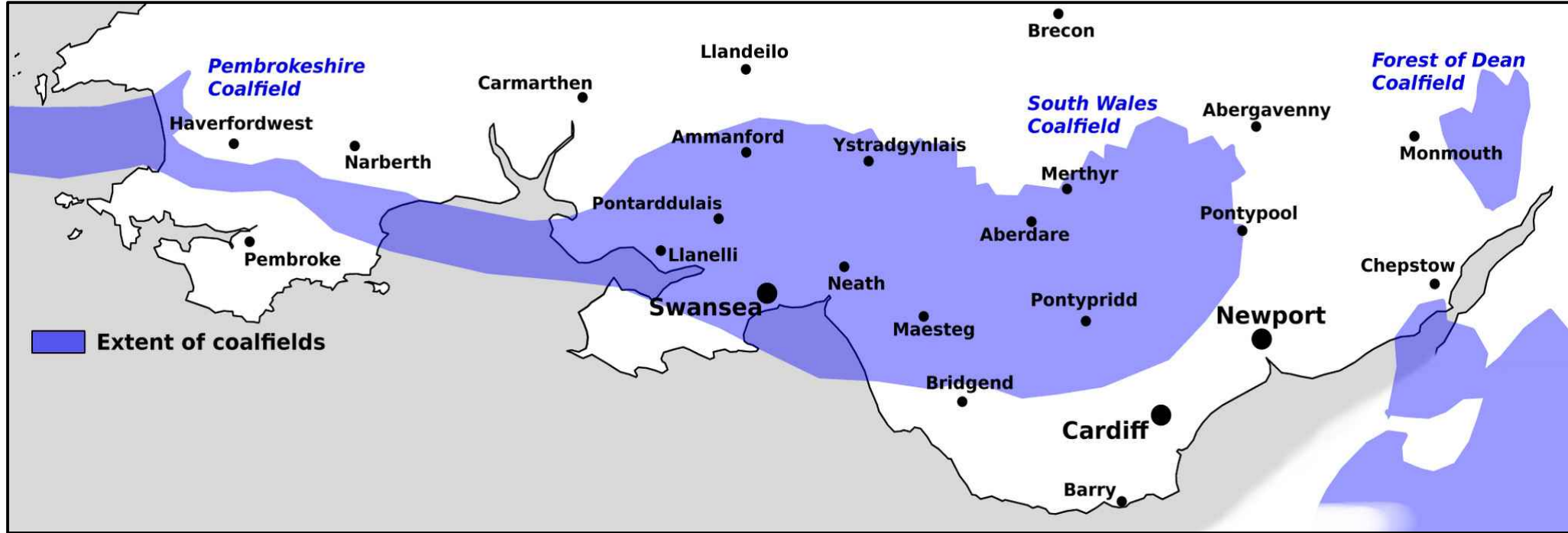
Coal-bed methane (CBM, but in Australia usually called 'coal seam gas', CSG) uses similar techniques to shale gas wells to remove methane trapped in coal seams.

Rather like home water filters, the carbon in coal mops up the methane and binds it within the rock; CBM systems use drilled wells and chemicals to dislodge the gas and extract it. This can use 'fracking' technology, but need not where gas levels are high.

In the UK CBM currently being considered in former coalfield areas.



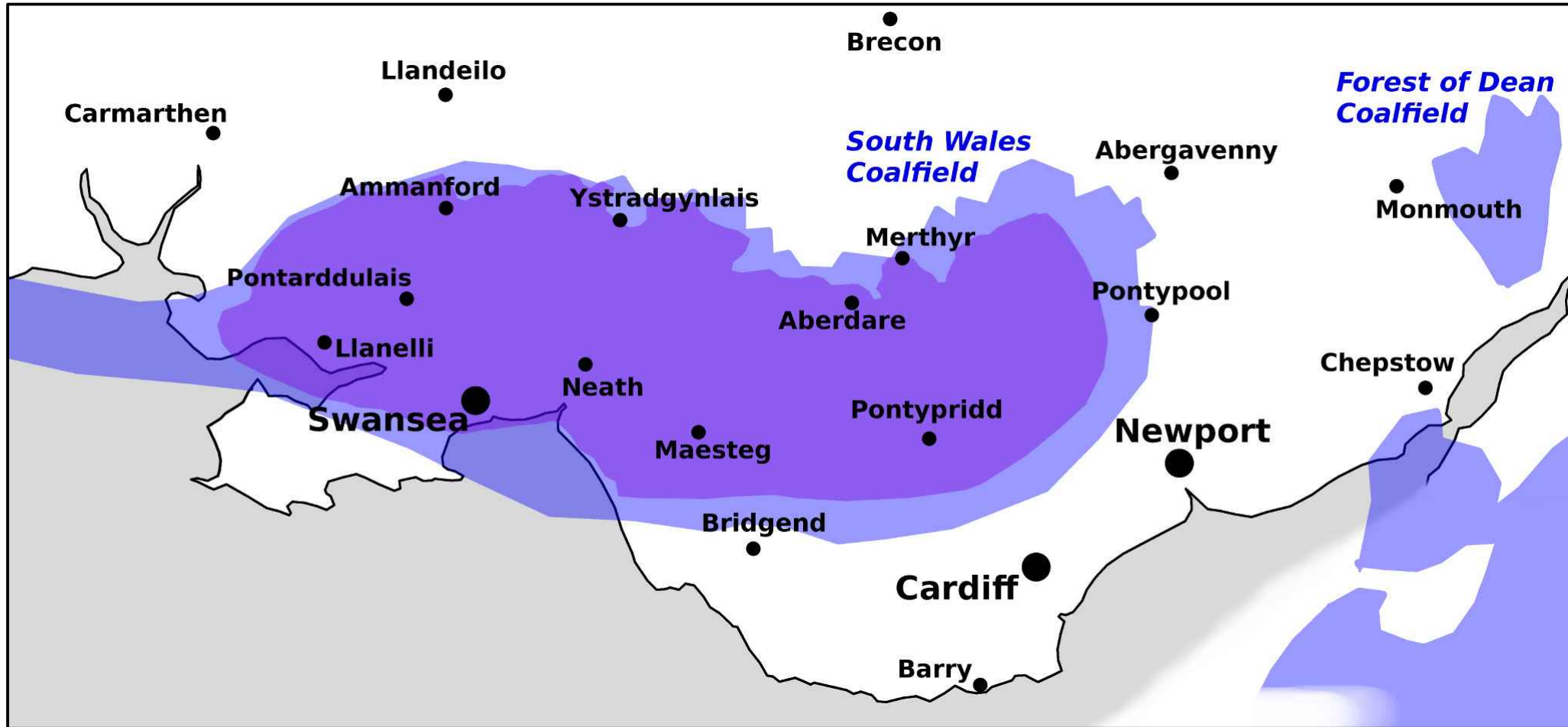
# The driver for local gas development will be coal seams



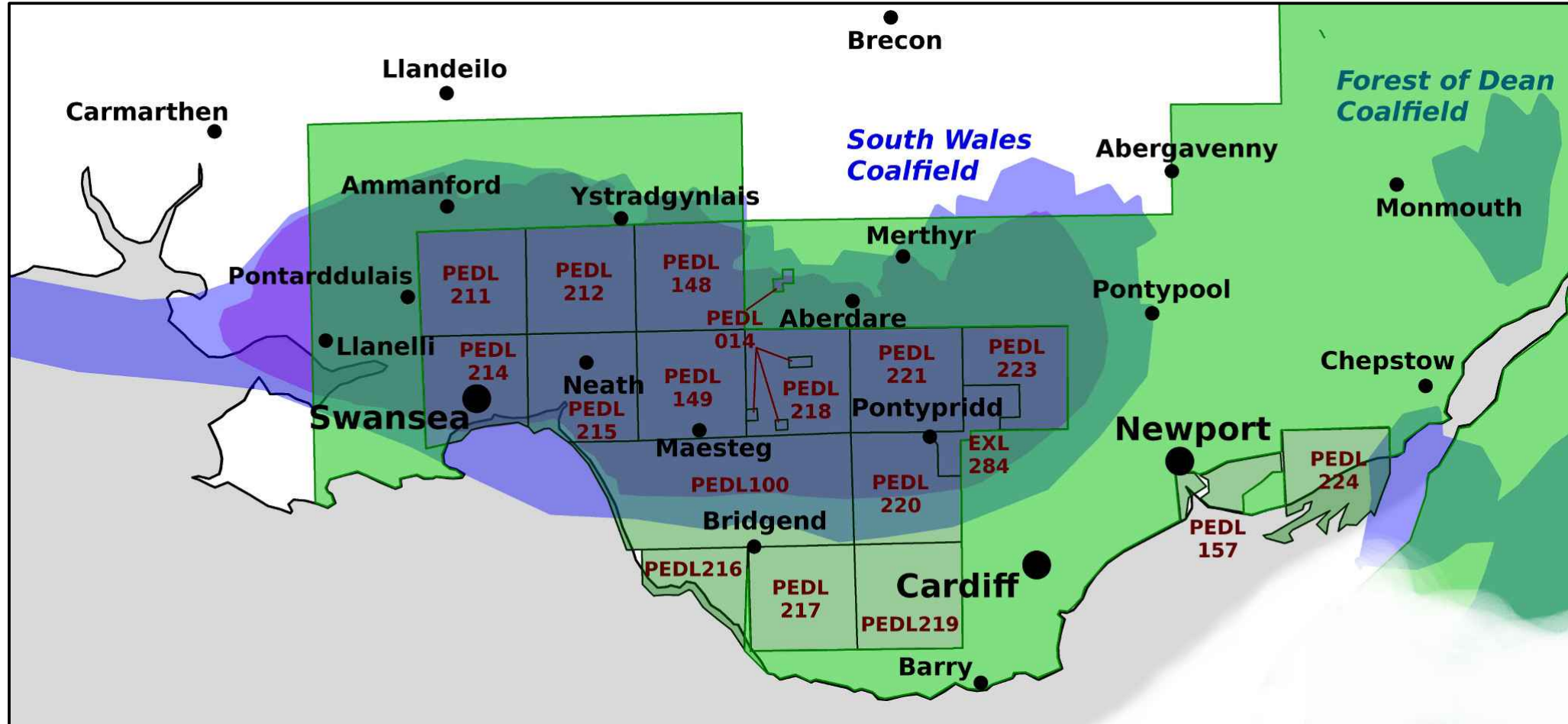
This region is underlain by large areas of coal, in many places un-worked because they are too deep, or geologically problematic to be economically viable. The region has some shale gas potential, but it is difficult compared to other areas. Therefore CBM exploitation – such as that seen in Australia – is the most likely development.



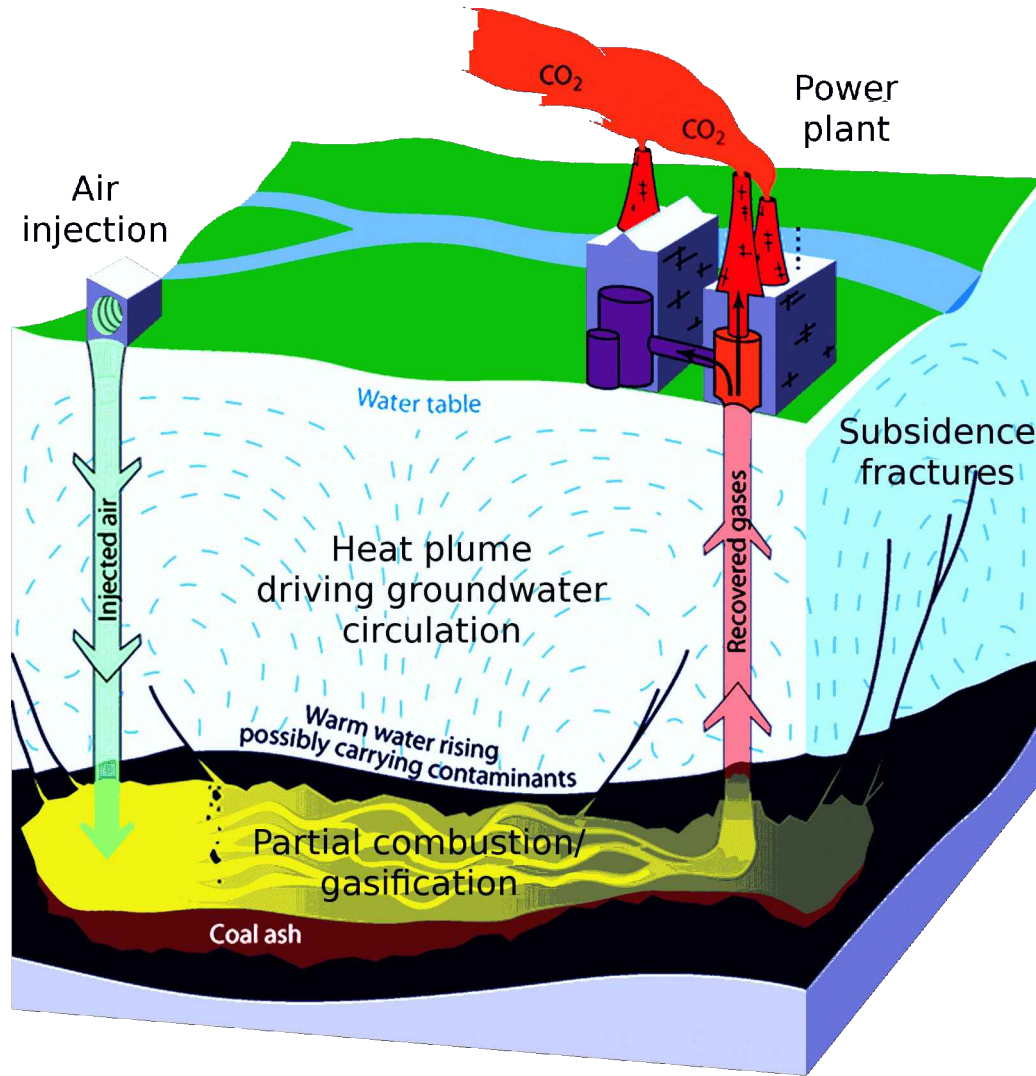
# The driver for local gas development will be coal seams



# South Wales



# Underground coal gasification (UCG)



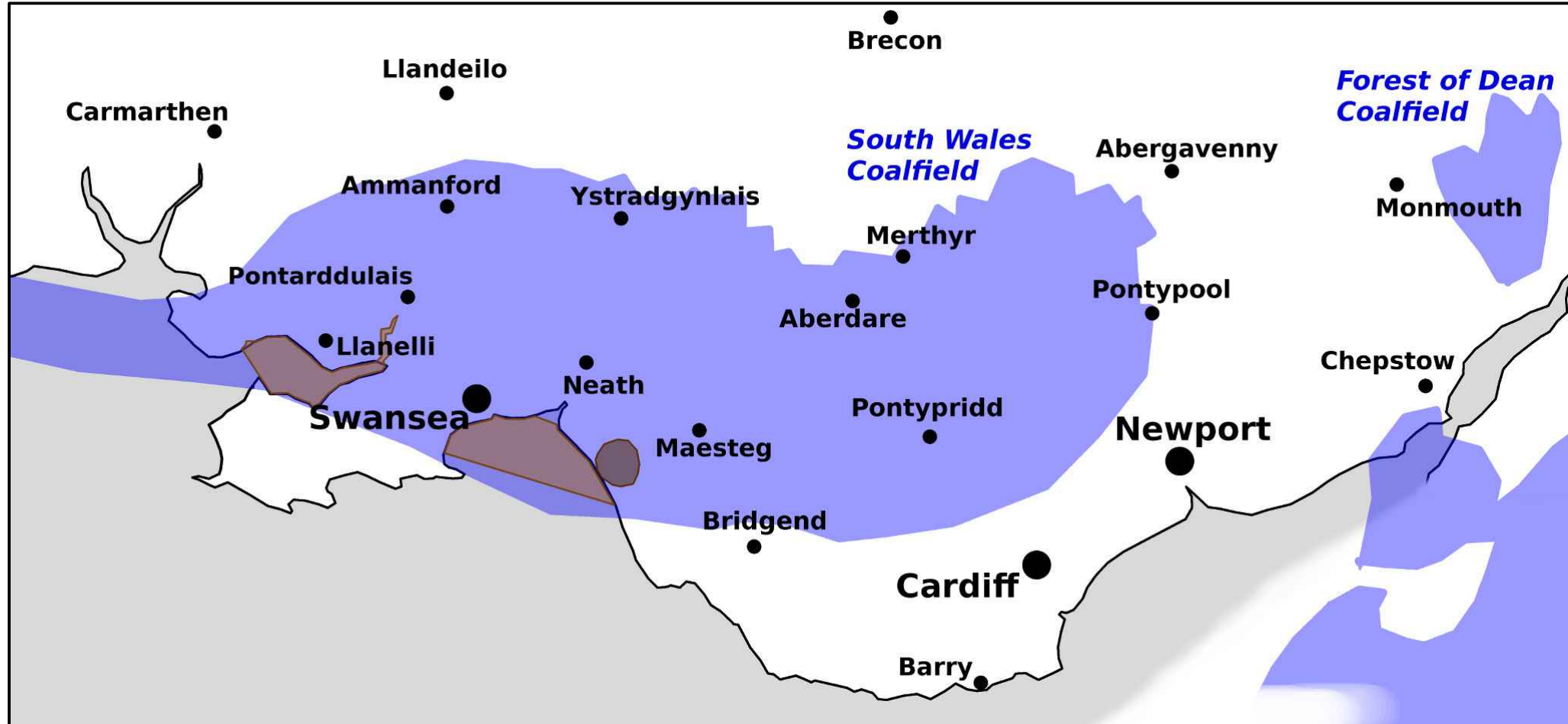
UCG "burns" coal underground, starved of oxygen. This creates carbon monoxide, hydrogen and methane gases – called *syngas*.

Rather like the process of making 'town gas', this option creates a complex mixture of pollutants – which can be flushed from the area by groundwater movement.

UCG is not a stable technology, and is one of the most 'extreme' of extreme energy sources.



# South Wales



“...government can still be far too slow at getting stuff done... I am determined to change this.

Here's how:

- Cutting back on judicial reviews.
- Reducing government consultations.
- Streamlining European legislation.
- Stopping the gold-plating of legislation at home.

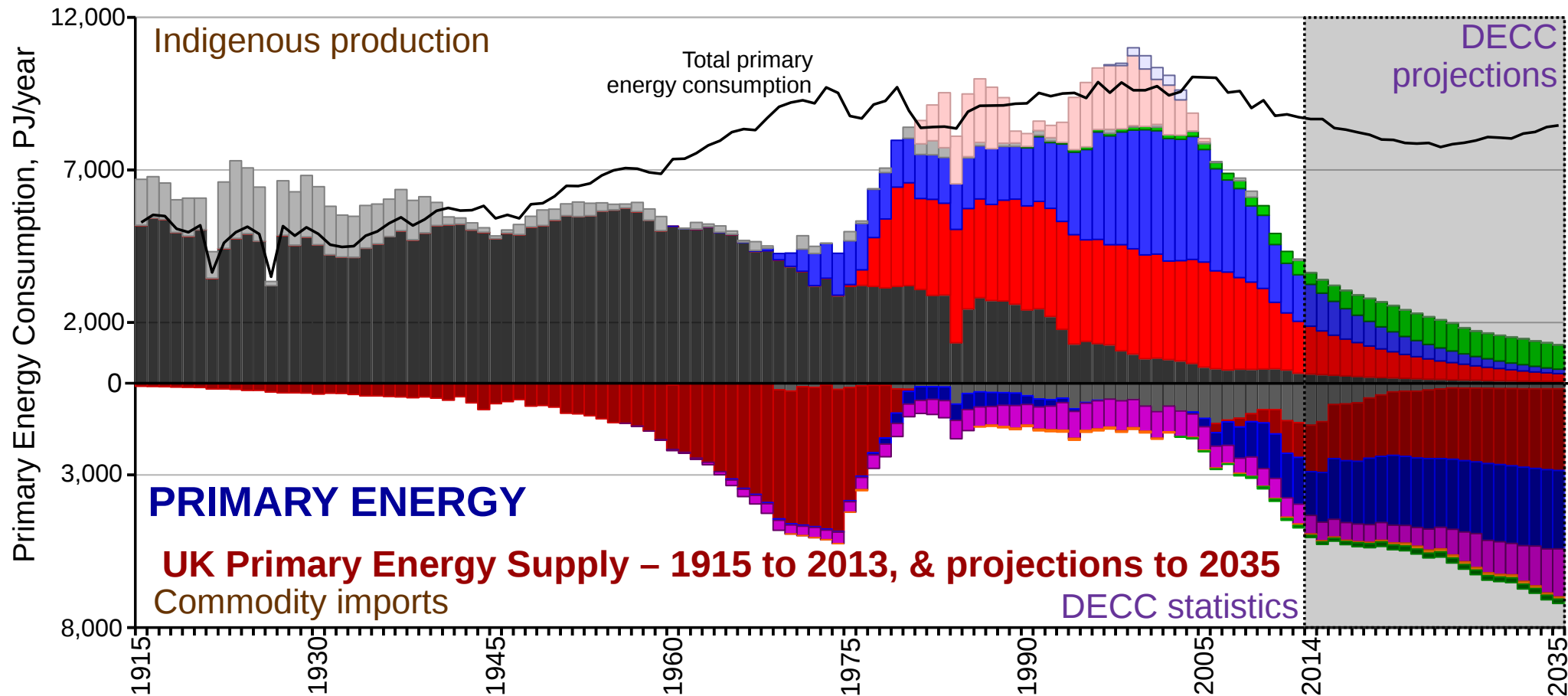
Well, this country is in the economic equivalent of war today – and we need the same spirit. We need to forget about crossing every 't' and dotting every 'i' and we need to throw everything we've got at winning in this global race.”

*David Cameron's speech to the CBI  
Monday 19<sup>th</sup> November 2012*

Unfortunately  
politics is  
in denial

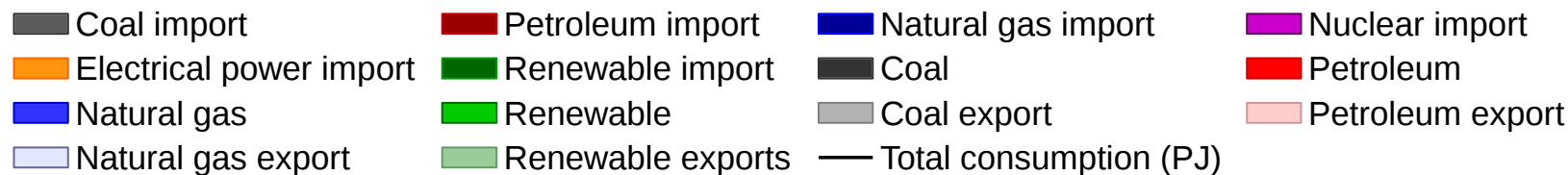
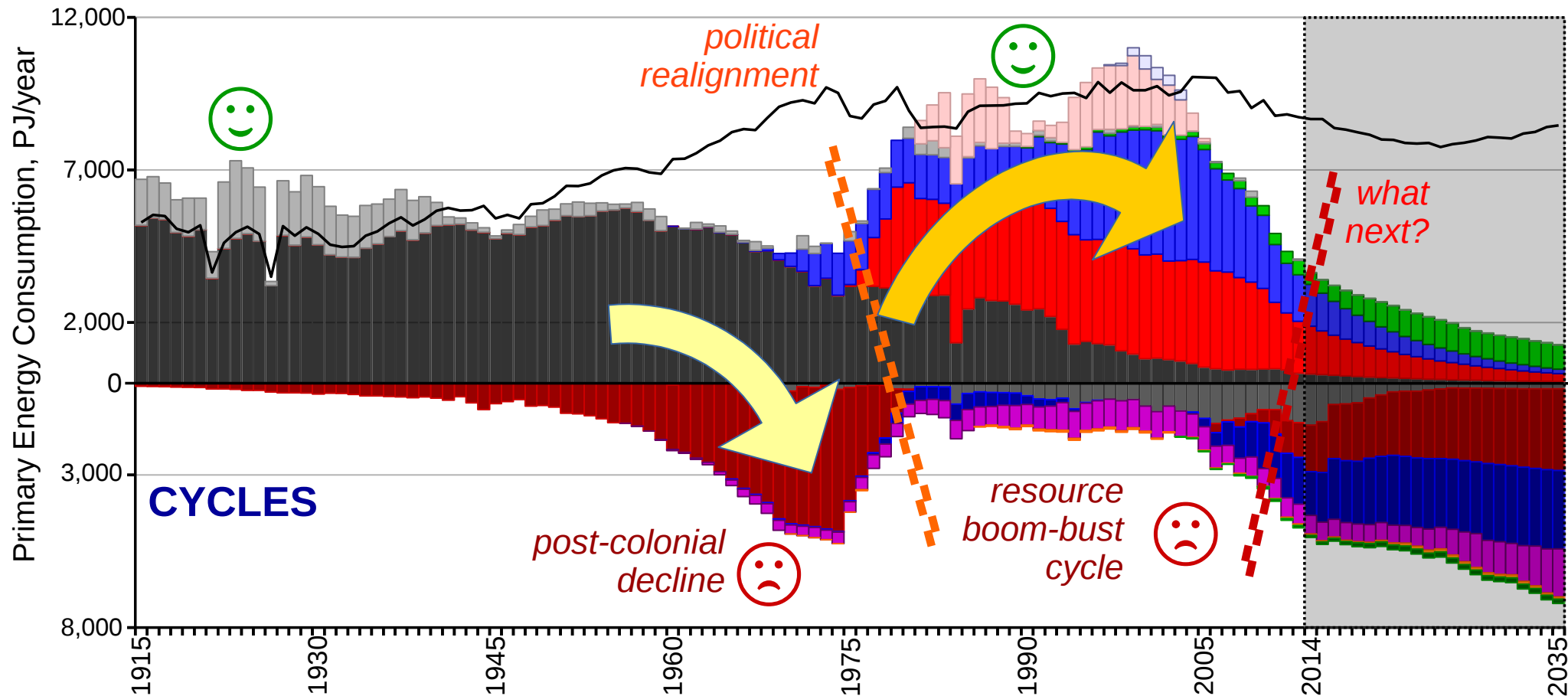
Experience tells  
us that these  
technologies are  
highly damaging  
to human health  
and the natural  
environment...

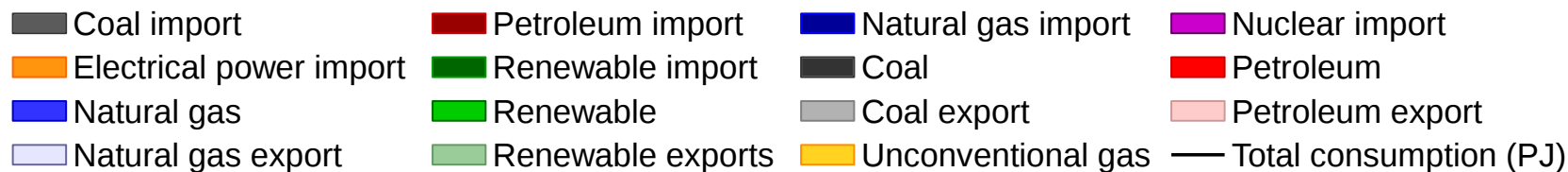
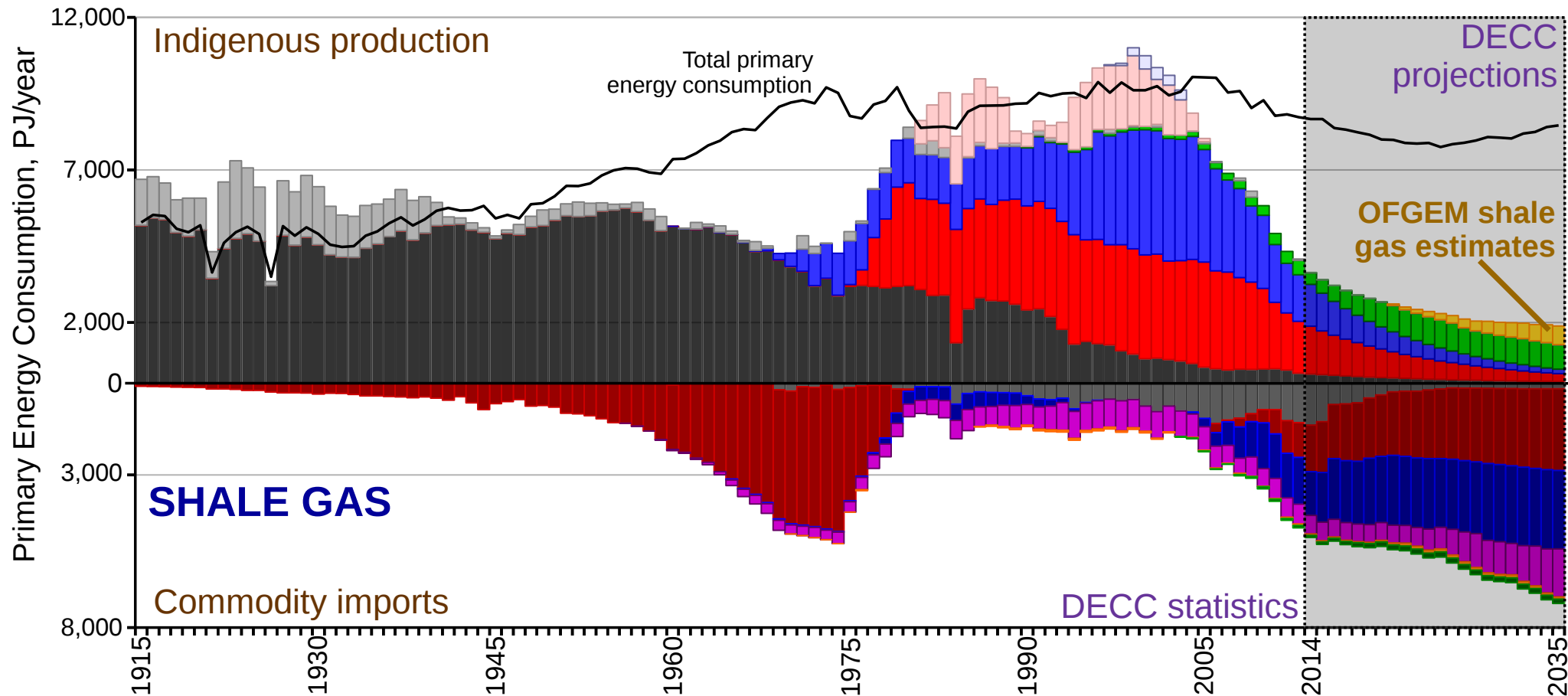
*...so why are we  
going ahead  
with these  
projects?*



- |                         |                   |                        |                  |
|-------------------------|-------------------|------------------------|------------------|
| Coal import             | Petroleum import  | Natural gas import     | Nuclear import   |
| Electrical power import | Renewable import  | Coal                   | Petroleum        |
| Natural gas             | Renewable         | Coal export            | Petroleum export |
| Natural gas export      | Renewable exports | Total consumption (PJ) |                  |









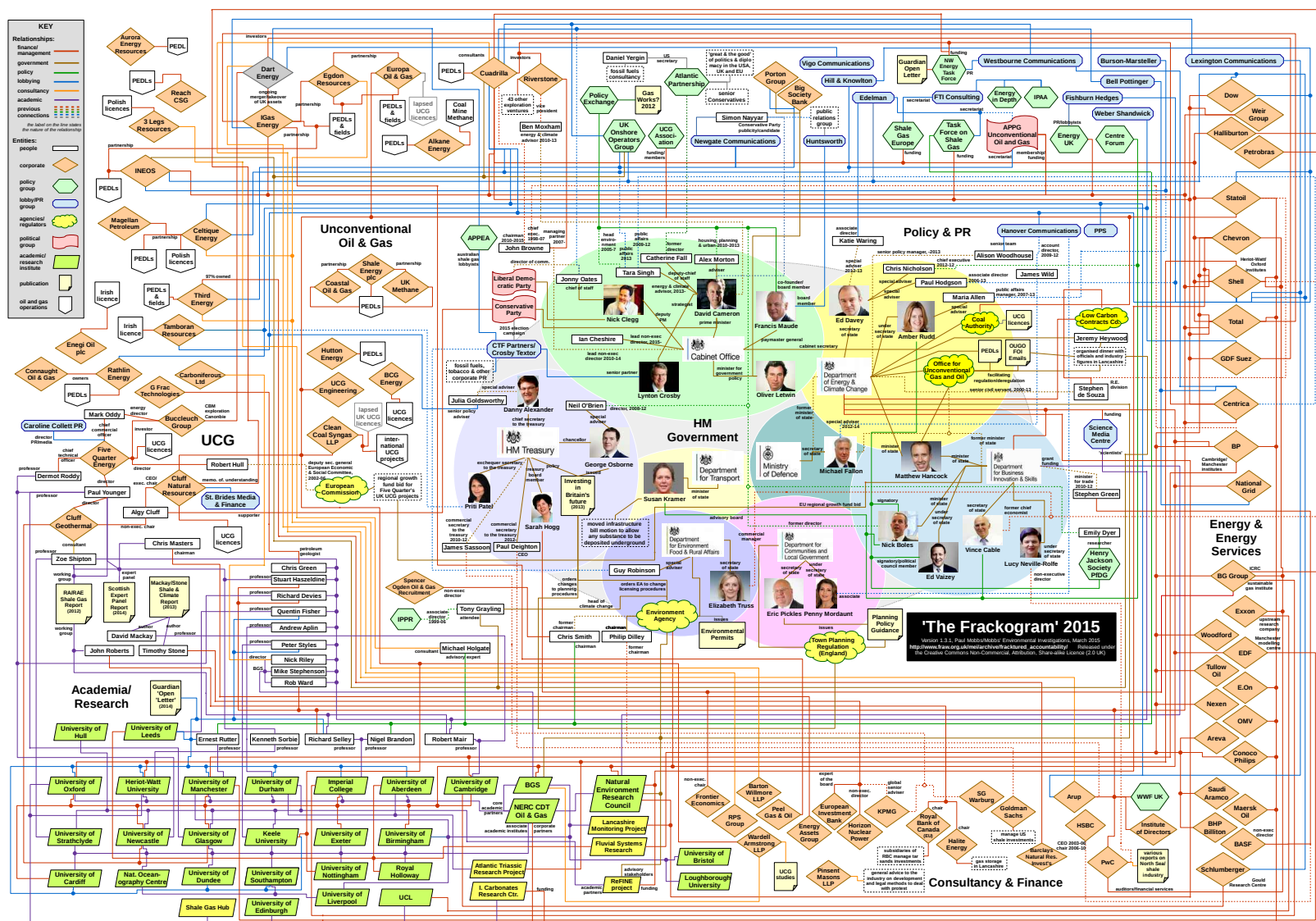


# 'The Frackogram 2015'

## March 2015

*...because  
sometimes a  
flowchart just  
isn't enough!*

Available to  
download as  
an A3, A2 or  
A1 poster  
from my  
web site.



# What will 'extreme energy' do for us?

## × Energy security?

We'll still have to import significant quantities of energy from outside the UK, especially oil (or uranium if the government tries to go nuclear).

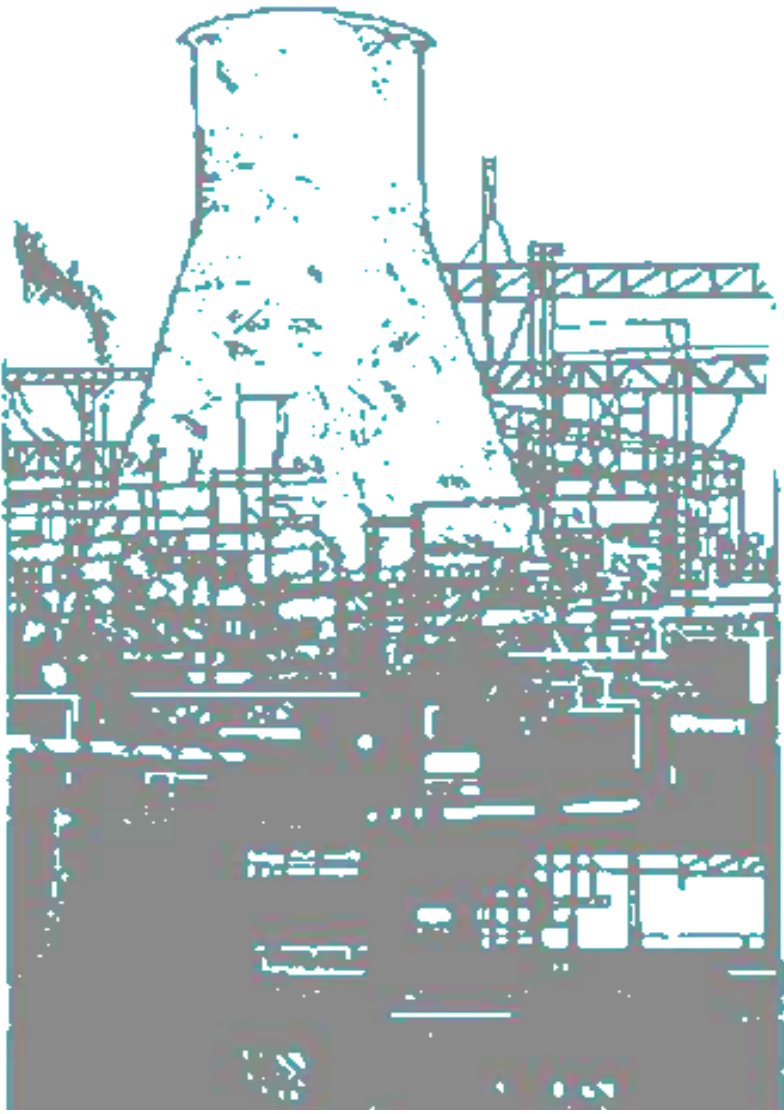
## × Prices?

The market is fully globalised, so we'll still pay a price related to global oil/gas prices – unconventional gas doesn't mean lower domestic gas prices.

## × Economy?

Economic problems are created by the imbalance between global growth, energy/resource prices, and ecological limits which creates “uneconomic growth” – simply increasing UK energy supply isn't the solution to that greater problem.

**The current debate ignores the fact that the demand for resources is rapidly depleting supply – we're at the “limits to growth”**



## To conclude...

Our present economic difficulties will not go away if we try to apply the “old” economic rules – developed in an era where limits to resource production/use did not apply.

Our future economy depends on internalising ecological limits to our demand for energy and resources.

What we're talking about is not “de-industrialisation”, it's a retooling of economics and commerce to work within ecological limits...

***Developing every last drop of fossil fuels does not help to do this.***





**Paul Mobbs**  
Mobbs' Environmental Investigations  
<http://www.fraw.org.uk/mei>