Jam Tomorrow:
Unconventional Gas and Britain's Energy Future

A presentation/discussion on shale gas, coal-bed methane, gas "fracking" and the future of Britain's energy economy

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This presentation is about the gap which exists between the reality of our present energy situation, and the facts about present policy choices.

"The rule is, jam tomorrow and jam yesterday – but never jam today."

"It MUST come sometimes to 'jam today,'" Alice objected.

"No, it can't," said the Queen. "It's jam every OTHER day, today isn't any OTHER day".
Fracking & Coalbed Methane
Unconventional gas in the UK
 SHEET E11

When gas-fracking and other ‘unconventional’ energy resources are discussed in the media, the focus is usually on the technology used to produce the energy, or the impact this might have on the environment. In fact, the scientific literature of the exploitation of unconventional energy resources in the present energy scenario is a peculiarity that companies and governments have failed to consider or understand. Public concerns about the development of unconventional energy resources are widespread and are increasing. Unconventional energy resources are being developed to supplement existing fossil fuel resources, but, arguably, due to their lower energy return and higher ecological impacts, they exacerbate the energy crisis by giving rise to a false sense of energy security.

Depressing upon what you learn, unconventional gas resources such as shale gas fracking and coalbed methane are often an economic boon to the local community. In some places, however, the local community might suffer from increased pollution and health risks, as well as economic and social disruption. As the uncertainty grows, the public is more likely to focus on the benefits of the unconventional gas resources. While there is no clear evidence of the benefits of unconventional gas resources, it is certain that the geopolitical implications of unconventional gas resources are significant, and will have far-reaching consequences. As a result, the debate over unconventional gas resources needs to be carefully considered and balanced.

Sheale gas resources in the UK

Shale gas resources in the UK are considered a potential source of energy. The UK government has been promoting shale gas as an alternative source of energy, but there are concerns about the environmental impacts. Shale gas extraction involves the use of chemicals, such as water, sand, and proppant, to create cracks in the rock formation, allowing natural gas to escape. This process is known as hydraulic fracturing or fracking.

The main environmental concerns are related to the release of chemicals and proppant into the environment. The chemicals used in hydraulic fracturing can contribute to soil and water pollution. Additionally, the disposal of the waste water and proppant can also pose environmental risks.

Moreover, the extraction of shale gas involves the use of a large amount of water, which can lead to water scarcity and depletion. The extraction process also produces a significant amount of greenhouse gases, such as methane and carbon dioxide, which contribute to climate change.

The government has been promoting the development of shale gas resources in the UK, but the public is concerned about the potential environmental impacts. It is important to conduct thorough environmental assessments and ensure that the extraction process is carried out in a sustainable manner to minimize the negative impacts.
This presentation raises some difficult realities about our future choices...
“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:

<table>
<thead>
<tr>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shale gas</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Coal-bed methane (CBM/CSG)</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Underground coal gasification (UCG)</strong></td>
<td>Gasifying the coal in-situ underground, starved of oxygen, to produce methane, hydrogen &amp; carbon monoxide rich “syngas”.</td>
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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.
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.
Underground coal gasification

Underground gasification "burns" the coal underground, starved of oxygen. This creates a mixture of carbon monoxide, hydrogen and methane gases – called syngas.

Rather like the process of making 'town gas', this option creates a complex mixture of pollutants. The pollution from gasification can be flushed from the coal seam by groundwater movement.

UCG is not a stable technology, and can be considered the most 'extreme' of extreme energy sources.
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.
...but we're missing something very important here.

Why are we trying to exploit “unconventional” energy sources in the first place?
We're reaching the “Limits to Growth”

Energy is not like other resources – it's an essential pre-requisite of economic activity and growth. The problems foreseen by the 1972 *Limits to Growth* report are happening roughly as predicted; the shift from “conventional” to “unconventional” energy and mineral resources is an indication of the limits to human development.

Planning a sustainable future requires that the political process accepts there are limits to growth. Unfortunately the political world chooses to ignore the growing body of evidence on these trends.
Unfortunately politics is in denial

“...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 19th November 2012
When “there is no alternative”, when we are in “the economic equivalent of war”, any level of dissent is by its nature a threat to “business as usual”.

We are entering a time when even well-founded objections are no longer valid if they cast doubt upon the over-riding goal of economic growth at all costs.
What difference will shale gas make?

Let's base our projections on Cuadrilla's reported shale gas find in Lancashire...

5.6 trillion cubic metres

Only 10% of the gas is likely to be produced (15%-20% at best), so 10% of the figure is... 0.56 trillion cubic metres

In terms of energy, the total calorific value of that volume of gas is around 20 exa-joules (EJ) of energy, or around five times annual gas use. However, it'll take 20 to 30 years to get the gas out, so the average contribution is about 0.67EJ/year, or 17% of annual gas consumption.

Just to replace the gas production lost from the North Sea following “peak gas” in 2003 requires 3 Lancashire-sized fields, each developed sequentially to their average output value in four or five years – and that doesn't address the problems with oil – and after 30 years it's gone!
What will shale gas 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 high global energy and resource prices – simply increasing UK energy supply isn't the solution.

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 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.*