

ecoLonomics

Paul Mobbs' newsletter of thoughts, ideas and observations on energy, economics and human ecology

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Hype, hearsay and hyperbolæ – shale gas and the UK energy economy

Out of the house, onto a bus and away to a distant hill; I've run off for the day to escape my work, but it seems to have followed me. I take the first out-of-town bus to arrive at the bus station; not caring where it was going, I just want to go "out in the sticks" and walk home again. Disembarking at [Farthinghoe](#)¹, a small village between Banbury and Brackley, I get out my sheaf of local maps and arrange them to chart a route home. Whilst doing so I find that I'm "in the zone" – an area [currently under review](#)² for the licensing of oil and gas production using the [hydraulic fracturing](#)³, or "fracking", method.

Banburyshire, 2nd November 2011.

I take the first random bus and here I am, within one of the areas that might soon be licensed for unconventional gas production. Is there no sanctuary for the weary researcher? This has been my work for the last few months, and even when I try to get away from it, it won't let me go!

I'm just over five miles from home as the crow flies – far too short to take a direct route. I sit for a few moments in the bus shelter, contemplating my options. In the end I sketch out a nine mile winding route, taking in the hills and ridge routes between here and the town. I set off towards [Clarke's Lane](#)⁴ where I can get a clear view towards to Banbury (below). It's a perspective I've seen before; and in fact the reciprocal view is something I see almost daily as this is the farthest point I can see from my workshop window.

I'm on the path to Astrop Hill, a see-saw route that takes me from Farthinghoe to the top of a long ridge that marks the end of the ironstone plateau which dominates the landscape around Banbury. I'm starting off at Clarke's Lane, a little over 500 feet above sea level, and over the next two miles I'll climb almost 300 feet crossing the undulating hills until I reach Astrop. No made roads, just a progression of fields and farm tracks, and with great views over the surrounding area – extending for up to twenty miles in places.

This view represents the watershed of England – this area is the hydrological centre (although if you want to narrow that down to within just a few fields, you need to go about 12 miles north to [Arbury Hill](#)⁵). I'm now standing in Northamptonshire, in the East Midlands region, and behind me the streams drain to The Great Ouse and The Wash. Defining the horizon twelve miles to the north-west – the true distance



foreshortened by the perspective and the haze⁶ – is the ridge and escarpment that divides Oxfordshire from Warwickshire, the South East region from the West Midlands. The streams in front of the ridge drain to the River Thames; beyond the ridge everything drains to the River Severn. The highest point, Shenlow Hill (to the right of the middle in the picture on the previous page) is almost 750 feet, and a few hills to the left Sibford Heath rises to 715 feet.

We can easily measure the physical landscape; *if only the same were true for government policy!* It would be nice *not* to think about such abstract ideas today; it would be nice to let go and simply enjoy the landscape around me (perhaps literally so – as I pass a hedgerow I grab a bunch of fat, ripe hawthorn berries, suck on their lush tasting pith and then spit out the pips). The difficulty is that I can't escape the problems presented by my current work because they make no sense; and things that make no sense – *especially when hyped to the heavens by governments and corporations* – are something that I find truly annoying. Unlike F. Scot Fitzgerald⁷, I can't hold two contradictory ideas in my head and function. That's possible in the abstract world of ideas, but not within the physical reality of the human system and the environment that supports it; such contradictions are not tenable – *well, not for very long, as contradictions usually precede/precipitate a crisis.*

To map the problem I need to start at the beginning, just like I'm starting from the beginning of this walk. As I proceed down this path I hope that, by setting out the evidence, I can connect the dots and map out a means of addressing these problems. This is all about the defining the facts that exists beneath the simple, basic truths of the unconventional gas issue – but which many people seem to ignore because they're too busy thinking about the “bright spots” (such as water pollution or earthquakes).

To define the reality of our predicament we must consider the relevant data as a whole. I'm trying to find a template on which to hang these ideas when the ethereal words of Blake cross my mind...

A truth that's told with bad intent beats all the lies you can invent.

Blake's Auguries⁸ express the shifting reality of the world within a series of poetic paradoxes, created by the dramatic tension between alternate propositions. In his time, at the height of the early Industrial Revolution, he describes the stark social changes wrought by economic 'progress'⁹. That's analogous to the ecological problems of today, as we approach the end of this arc of industrialisation. The paradox of the economic imperative for growth, and the physical realities of ecological limits, creates similar strife; the accelerated development of unconventional gas (and other novel energy sources, even renewable) are the phenotypical expression of this physical paradox at the heart of the modern human system.

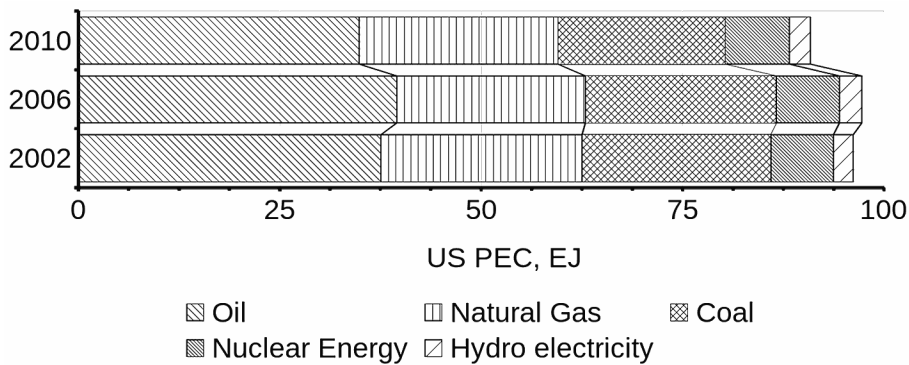
“He who replies to words of doubt, doth put the light of knowledge out.”⁸ **Blake's words ring true in the modern world! – in the media-led world of politics and economics, such “words of doubt”**¹⁰ **are the means by which the powerful exert control over the powerless.** For example, take the statement “Shale gas is a game changer”. How often I've seen that of late, but how do we define “game changer”? It's the potential to change the market that attracts political support to the case for shale gas – but does that potential for change really exist, and can it be demonstrated? Is their analysis correct, or does it hype the reality of what might be achieved? And does a “game changer” in the context of the USA produce the same results if we compare it to the economy of Europe, or the UK?

I pass over the first hill of the day, a rounded form capped with sandy limestone; on the far side, Sandy Lane will take me westward towards Astrop. From the top of the hill, a few miles to the south east, I can see the masts and radomes of RAF Croughton¹¹ – although “RAF” is a bit of a misnomer as it's a United States Air Force communications hub that links the USA to Europe and the Middle East. In fact Croughton is only “half” the base – *the receiver*. A few miles to the south west is RAF Barford¹², in part famed for its use in old war films and for Britain's first jet aircraft, it's now the transmitter half of the USAF's radio communications hub – the distance between them being essential to prevent cross-interference.

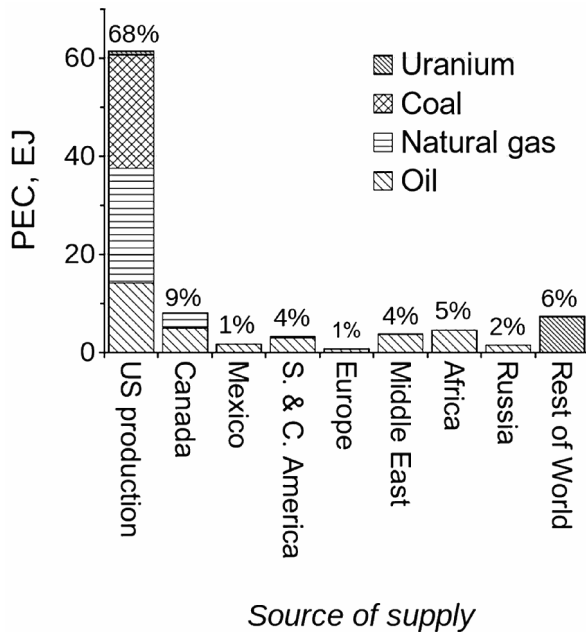
It's no accident that this base is here, and why it's important within the global energy and economic process that American foreign policy supports. Why is a link between the USA and the Middle East so important in the context of energy? The popular view is that America depends upon Middle East oil; *how often have you heard the media repeat this fact as received knowledge, and use it as the reason why America must protect its links with the Middle East?* Obviously, anything which affects that relationship, to diminish the American reliance on Middle East oil, could be described as a “game changer”.

The problem with basing the “game changer” of shale gas on the reliance of the USA on Middle East oil is that it's not strictly true. Consequently, any deductions that flow from this erroneous view are also invalid, and need to be revised.

If we look at primary energy¹⁴ supply in the USA (see the graph at the top of the next page) about two-fifths of the energy used in the economy is oil. The USA was the world's leading oil producer, but after production peaked¹⁵ in 1970 it's progressively imported more oil ever since. Natural gas and coal each represent almost a quarter of energy use, and nuclear is less than ten percent (the rest is renewable energy, mostly hydro-power). Where does most of that energy come from? Well, if we look at the data for the 2010, *it wasn't the Middle East!*



US Primary Energy Supply¹³ – 2002, 2006 and 2010 (source, BP)



US Energy Sources¹⁶, 2010 (source, BP/WNA)

If we only consider oil, just over 10% of America's oil came from the Middle East region – less than from Africa (13%), Canada (15%), and from the USA's own production (42% of supply). So in the grand scheme of things the situation in Canada and Africa is more significant than the Middle East; and in fact America is – in terms of all developed nations – in the economically enviable position of being able to source two-fifths of its oil from within its borders.

If we look at all energy sources, then the Middle East is even less significant. Only 4% of American energy (in the form of oil and [liquefied natural gas](#)¹⁷) is supplied from the Middle East. Two-thirds of America's energy supply is produced from within the USA – again, a fact which many of the world's industrialised nations would be envious of. This relationship also means that the policy of America's leading energy suppliers, such as Canada, is [increasingly dictated by the needs of the American economy](#)¹⁸ rather than their own national interest. So, if we look at the data, the idea that somehow the Middle East has a strangle-hold over the American economy is

wrong – or rather, *it's more complex than the terms of the original argument imply.*

America isn't physically dependent upon Middle East oil; Middle Eastern production doesn't provide the physical bulk of their needs. The reality is that America depends on the *economic balance* of world oil production, of which the Middle East is part, to set the economic price for oil. It doesn't matter what the USA does within its borders; US energy companies produce oil,

gas and coal priced at levels which reflect the global market price. Therefore it doesn't matter if they physically receive the oil from the Middle East or not, since a shortage in China or Australia would hit the price in America too. As the Middle East is part of the global energy system, any Middle Eastern crisis will precipitate a global change in price, and that will affect the US economy irrespective of whether they're buying oil from the Middle East or not.

America's political interest in the Middle East isn't about physical oil supply – *it's all about the price of oil.* Traditionally the Middle East's position as the [swing producer](#)¹⁹ of oil meant that the oil producing states could control global prices – and America's political involvement in the region, especially in Saudi Arabia, focusses on that role. However, there is a growing body of evidence that the expected role of the Middle East in setting the economic price for world oil, changing production levels to float the global oil prices at a stable level, is [likely to falter in the near future](#)²⁰ – irrespective of [present US plans](#)²¹ to reduce their dependence upon oil.

Within the idea of “energy independence” we see the first flaw in the role of shale gas in the US economy. If shale gas were able to support American natural gas needs, or even help to decrease oil imports, it might be a game changer. The reality is that:

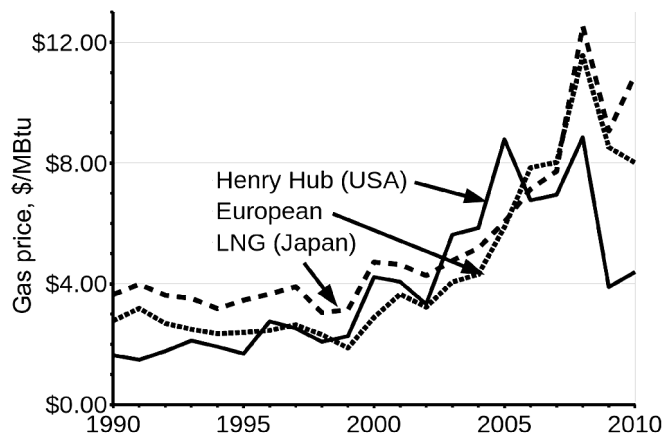
- ◆ Shale gas isn't significant enough a change in the sources of US energy supplies to affect the global energy balance, and therefore prices;
- ◆ Even if shale gas made a difference within the USA, it doesn't change the global dynamics of the energy market in order to change the way that market functions; and finally,
- ◆ The idea that the US needs to develop greater [“energy independence”](#)²², when it's already producing more of its own energy sources than other leading industrial nations, doesn't stand up to examination – what benefits could America gain in comparison to Germany, Japan, or even the UK, where they have to import far more of their energy supplies?

I've climbed [Astrop Hill](#)²³ and, as I pass the farm, I

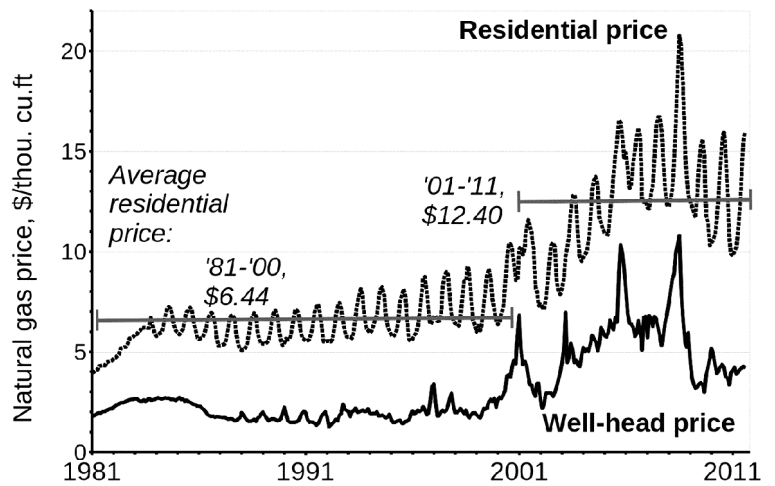
have a view straight down the Cherwell Valley towards Oxford. This line is the western edge of the area that might soon be licensed for gas fracking. I'm walking over ancient lands: Astrop, Newbottle on the other side of the valley, and Purston in the valley on the other side of the hill, are Medieval manors; Kings Sutton had its earliest beginnings as the place where the Roman salt road from Droitwich crossed the river Cherwell; older by far, about two miles south behind Newbottle Wood, [Rainsborough Camp](#)²⁴ is an Iron Age hill fort built around 2,500 years ago – about the same time as the ancient Athenians were thinking up ideas such as [direct democracy](#)²⁵.

Pondering that long history, it puts the [250 years of industrialisation](#)²⁶, the last [century of the electrical technology](#)²⁷, and the last four or five decades of “consumerism” and the [agricultural green revolution](#)²⁸ into perspective. As a species we've lived so short a time, only a few generations, with the plentiful potential energy of fossil fuels; in contrast to the 100 generations since Rainsborough Camp was built, or the 400 generations since settled agriculture was developed at the end of the last ice age. And now we're getting all het up about a two or three decades-worth of shale gas?

“One mite wrung from the lab'rer's hands, shall buy and sell the miser's lands; or, if protected from on high, does that whole nation sell and buy.”⁸ Even in Blake's time, it seems people appreciated not just the exploitation of resources, but also the fact that when protected by the state the assets of the nation can be bought and sold. The other great “game changing” argument about shale gas is the effect it's had on energy prices in the USA. Is this correct, or just another example of powerful forces, [protected by the state](#)²⁹, selling “words of doubt” for their own gain? Developing shale gas at home, argue companies such as [Chesapeake Energy](#)³⁰, saves the US economy from “[expensive](#)



Global gas prices, 1990-2010 (source [BP](#)³¹)



US Natural gas prices, 1981-2011 (source [USEIA](#)³²)

[foreign oil](#)³³. Again, is this true, or is it a distortion of the facts?

I rest at the top of the hill. As I look across the landscape, the undulating hills turn my thoughts into graphs. The shapes of the landscape can tell you about changes in the rocks beneath, and the geological processes that have shaped the land; likewise graphs can show how less obvious trends can change over time – especially when what you're looking at involves reams of dense numeric data.

If we graph the change in natural gas prices around the world, what we see is a gradually increasing trend until the financial crash of 2008 – when the prices of many commodities collapsed, reflecting the collapse in demand as the world economy imploded. American gas prices have usually been lower than in Europe, or Japan where much of their gas is imported in [liquefied form](#)¹⁷ (which is more expensive than piped gas). Over the last three years US gas prices have fallen, in part reflecting the uncertain economic outlook and lower demand. To say that shale gas has caused this fall would be entirely wrong; this same trend is replicated in the global gas market, and the fact that prices are rising in the USA (according to [BP's annual data](#)³¹) suggests that unconventional gas isn't significantly changing the dynamics of the gas market.

The most expensive supplies of natural gas are to domestic users – commercial users often get a lower price, and industrial users receive a substantial discount because of the large volumes of gas they use. If we look at the “well-head” price (the cost of production from the gas plant) and the residential price in the USA, the [figures show](#)³² a fairly consistent trend – it's difficult to argue that the industry is making a significantly different return from selling to residential customers. However, if we look at the long-term variation in prices there's a definite step-change. Whilst in the twenty years before 2001 the gas price in America was fairly static – except for the regular seasonal variation (high in winter, low in

summer) – over the last decade natural gas prices have almost doubled. What's happened is that the global jump in all fossil fuel prices has pushed up US domestic prices – even though they have a fairly captive market with a low level of imports.

As noted earlier, US fuel prices reflect the prices on the global market. Therefore, irrespective of the level of imports, the domestic price in the US varies alongside the global price. There have been noises recently about the conversion of US [LNG import terminals](#)³⁴ to export unconventional gas to the global market. This would strengthen the link between domestic and global prices; domestic consumers would [have to compete alongside](#)³⁵ the price that could be secured for the same gas on the international market. Unless the US government were to nationalise energy assets, or demand that the companies supply the domestic market at far lower price, then this will always be the case. And, with the present political culture of the USA, this situation's unlikely to change as it would involve divesting energy companies of either their assets or their profits.

To change domestic fuel prices using ordinary market mechanisms there would have to be a very large source of cheap-to-produce domestic gas to change the dynamics of the market – *which arguably there isn't*. There's been a lot of hype about how much energy unconventional gas contributes to the US economy which isn't borne out when we look at [the official statistics](#)³⁶. The US Energy Information Agency (USEIA) didn't start officially reporting coalbed methane production until 2007, and shale gas until 2008. In 2009, the last year of data, shale gas produced about 13% of domestic supply and coalbed methane 8%. If we express that figure in terms of total gas production and imports – that is, the total volume of gas available to the market – that falls to 11% and 7% respectively (imports made up 13% of the gas used in the USA in 2009).

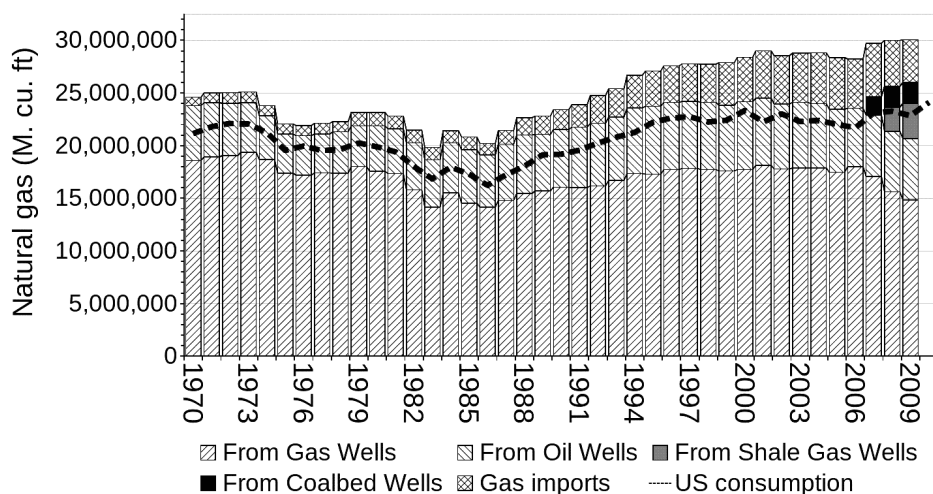
What's more shocking are the “losses” from the

system. Inevitably some gas is lost by flaring or leaks, some is used to power the processing plants and to drive the turbines that pump the gas, and a small amount is removed as the result of gas purification. However, if we look at the difference between the gas supplied to the system, and the amount consumed, the in-system losses are running at between 20% and 24% – far higher than the 14% figure from 1970 (you can see this on the graph as the difference between the dashed “consumption” line and the top of the supply columns). So the problem with the American gas system isn't just consumption; it's the inefficiency of how the system produces and transports gas to the consumer.

The other factor working against the expansion of unconventional gas is the change in the dynamics of gas production. As shown in the graph below, production from conventional gas wells has begun to decline after a long period of relatively stable production. Whether this signals the arrival of “[peak conventional gas](#)”³⁷ in the USA, with gas production now falling over the “[gas cliff](#)”³⁸, is an interesting issue to debate – it has great implications for the global gas market over the next decade. Likewise, as production from oil fields continues to fall (US [oil production peaked](#)³⁹ in 1970) so gas production from oil fields will fall too. Therefore unconventional gas has to make-up for the depletion of existing gas fields, as well as providing for new demand as America seeks to re-inflate its economy after the crash. And as for [gas-to-liquids conversion](#)⁴⁰ – to replace [lost oil production globally](#)⁴¹ or [just within the USA](#)⁴² – the effect of trying to make up for the depletion of oil fields by converting shale gas to oil would make the global resource disappear in a few decades.

What's really interesting is the way that US gas consumption has changed over in last four decades. From the early 1970s gas consumption in all sectors consistently fell – in contrast to Europe where consumption has continually risen. Whilst residential,

commercial and industrial users have seen a small bounce in their gas consumption (again, the result of fuel switching in response to higher oil prices), electricity generators have begun a large shift from coal to gas. In 2009, for the first time, the US produced less than half its [electricity from coal](#)⁴³. The proportion of gas-fired electricity has risen from 9.5% in 1988 to 19% in 2010. This is eating up a lot of the new capacity created by unconventional gas. As a result, unconventional gas isn't adding new energy capacity to



US natural gas production, imports & consumption (source USEIA)

the economy in a way [which makes prices fall](#)⁴⁴; it merely redistributes demand from coal to natural gas (there are also problems with [US coal production](#)⁴⁵, raising questions whether output can be sustained).

Today America is experiencing its own [“dash for gas”](#)⁴⁶. If we look at [installed generating capacity](#)⁴⁷, in 1990 about 20% was natural gas-fired and 42% was coal; by 2009 those figures were 41% natural gas and 30% coal. If we look at [future construction](#)⁴⁸, between 2010 and 2014 half of new capacity will be gas-fired and only a quarter will be coal. Irrespective of the scale of US shale gas resources, fuel switching in the power sector will gobble up that new capacity, negating its effect on gas prices.

[“To see a world in a grain of sand, and a heaven in a wild flower, hold infinity in the palm of your hand, and eternity in an hour.”](#)⁸ **I've been sitting at the top of Astrop Hill for at least twenty minutes, lost in thought, musing on the view across Banbury and the hills beyond. I really should move on but, after all, to [“stand and stare”](#)⁴⁹ (or even sit) is a traditional measure of “leisure”.** As a place to day-dream it's a little jaded compared to when I first came here 30 years ago. A couple of miles away, where it crosses the valley on an embankment, the roar of the M40 is building towards the evening rush hour; in the arable fields either side, which 20 years ago were cattle pasture, tractors are spraying Autumn-sown crops. Behind me the wind whistles through a rural junction on the local electricity grid. *Energy might be very expensive these days, but it hasn't killed the demand for it!*

Down the hill towards Purston two small twin-blade wind turbines spin – but from this viewpoint, their hubs hidden just below the hill side, the blades rise and fall above the ridge line. Another recent change in the villages around this area has been the proliferation of large PV installations on roofs. If we isolate the issue just to the power generated then obviously PV is a very good thing; it produces power from the sun, and emits less carbon than fossil fuels. However, as within the recent coverage of unconventional gas by the media, that's possibly the worst way to examine the benefits of PV.

It's fair to say that a lot of the houses I pass with PV installations are more affluent than most; in the villages around Banbury especially, those with PV on the roof often have a luxury car in the driveway. The basic facts of the PV/feed-in tariff issue are not whether PV produces electricity, but whether PV *changes the lifestyles* of those who adopt it in order to significantly reduce their carbon emissions – *and around here, I'd have to say that's a definite “no”*. That's because PV is one of the most [expensive ways of cutting carbon](#)⁵⁰, and the most affluent have the highest carbon emissions not simply because of electricity use, but because of their [higher level of general material and energy consumption](#)⁵¹.

In the current debate about [solar PV and feed-in tariffs](#)⁵², there's a lot of people promoting the idea that PV is an intrinsically beneficial because it produces power – but they're ignoring the economic and social context within which those systems are installed; such arguments are easily invalidated when we [widen the analysis](#)⁵³ to look at other [options to reduce carbon emissions](#)⁵⁴ or manage energy supply. The same situation is true of the unconventional gas issue; if all you base the decision on is whether the technology produces gas or not, you're going to take some pretty stupid decisions. That's because the test of whether an [energy source “works”](#)⁵⁵ isn't just its production capacity, we also have to evaluate its [wider economic impacts](#)⁵⁶. Arguably the [energy return](#)⁵⁷ on unconventional gas is going to be lower than that for conventional sources, and therefore the [exergy value](#)⁵⁸ delivered to the economy will be lower. Therefore unconventional gas isn't just a more expensive technology at the well-head, its lower EROEI delivers intrinsically [less benefits to society](#)⁵⁹.

I have now moved off the hill top, and I'm thinking about these ideas as I cross the valley floor and come to the small bridge which takes the footpath under the former [Banbury to Verney Junction branch line](#)⁶⁰. In an era of expanding energy consumption and cheap oil, closing railways such as this made economic sense; especially to a government which, through transport minister [Ernest Marples](#)⁶¹, had strong connections to the various business interests which were lobbying for roads and power plant construction at that time. Marples commissioned the infamous [Beeching Report](#)⁶². This line closed in 1961, before Beeching's final report, because road transport had taken away much of the passenger traffic.

Then, as today, special interests ensured that Government's always gave priority to large, expensive building projects. For example, the Government's current proposals for nuclear power plants, or the [proposed HS2 rail link](#)⁶³ – the route of which passes just a few miles east of here. The purpose of such questionable projects, often with limited or negative ecological benefits, isn't solely to create new public infrastructure; it's also to dole out a generous helping of [“corporate welfare”](#)⁶⁴ to the companies who provide political party funding and the work of political lobbyists. Politicians talk of supporting jobs, but the skewed wealth distribution of British business ensures that shareholders, banks and finance institutions all cream-off a good proportion of that funding before it reaches the bank account of the average British worker.

For example, why is there a large and [well-financed political lobby](#)⁶⁵ in the USA to reduce dependence upon [“expensive” Middle East oil](#)⁶⁶?; and why do they described Middle East oil revenues as [“putting a terrorist in your fuel tank”](#)⁶⁷, when the data

on energy imports show that the Middle East is a minuscule part of the USA's energy mix? As far as I can see it's quite simple; the US Government gives tax breaks for developing energy resources in the USA. If lobby groups can demonise foreign oil states then they can direct the more tax subsidies for energy production into the coffers of [the companies they represent](#)⁶⁸. From the point of view of those companies, spending a few million dollars on a PR front campaign is worthwhile if they stand to make tens or hundreds of millions of dollars in return.

It's not just America where this is a problem – it's happened over here too. Not just the Beeching Report, but many other projects and programmes – not least all those highly subsidised PV panels mentioned above. The difficulty is that, under the Government's current regulatory policies, building new capacity is inherently better for the utilities concerned than cutting demand. This isn't just in terms of the energy market either. For example, in the water industry the profits to be made from building new water supply capacity, and the economic returns that the regulator allows for such activities, is greater than the allowances for [managing water consumption in order to reduce demand](#)⁶⁹.

As we enter a world of tightening ecological limits, the reality is that new build capacity will either be very expensive, or just not feasible. Therefore we should be restructuring the regulation of utilities to favour [demand management](#)⁷⁰ over the current "predict and provide" model. Whilst there have been some changes in [roads policy](#)⁷¹, and some more recent research in [relation to aviation](#)⁷², there are few politically-connected advocates of demand reduction, and the issue rarely form a significant part of the agenda of campaign groups.

As I climb the hill towards [Middleton Cheney](#)⁷³ I ponder where this is all going; at the top of the first slope I take a pause and survey the landscape around me. Perhaps I'm getting a little off-track; rather than focus on the minutiae, we have to take the broad view – as I'm doing now, sat on a gate, surveying the view all around. I carry on across the next valley, and then take a left on reaching the Middleton bypass to follow the route to Overthorpe.

After a couple of hours away from roads the sensory impact as I walk along the A422 disrupts my train of thought. It would be very easy to list all the flaws of gas fracking in relation to the environment and pollution, iterating the same arguments – as so many [other reports](#)⁷⁴, video [documentaries](#)⁷⁵,

[investigative reports](#)⁷⁶ and [academic commentators](#)⁷⁷ have already done. Like so many of these studies and investigations, it's easy to get bogged down in the detail of the [impacts of fracking](#)⁷⁸ – from [contaminated water supplies](#)⁷⁹, to the discharge of [radioactive material into the environment](#)⁸⁰, to the growing evidence of the [economic difficulties of shale gas production](#)⁸¹ – but that won't tell you what fracking contributes to the energy economy.

The impacts of fracking are process specific, rather like nuclear power or wind turbines, but that data doesn't tell you whether the process itself works to support the economy and society's need for energy sources. The tide is turning in the US, as the [public understand more](#)⁷⁸ about what unconventional gas entails. Even the technologically bullish [Scientific American expressed concern](#)⁸². How now do we develop and press these arguments further?

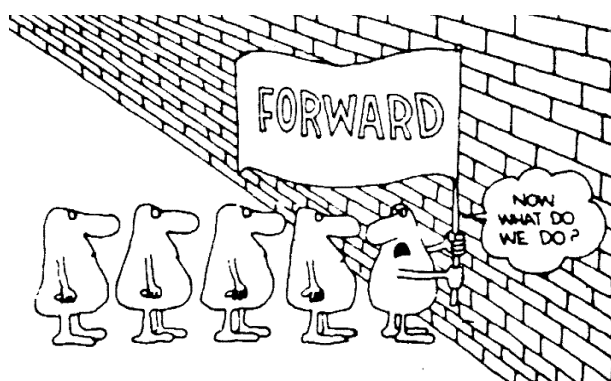
"A dog starv'd at his master's gate predicts the ruin of the state"⁸. **As Blake indicates, the outward appearance of society can often give away the deeper troubles within. If we turn away from the problems of fracking in the US, and focus on what it means to Britain, then it's our current energy and economic difficulties which describe a deeper, structural problem with the way our society functions.** As I climb to-

towards the top of [Overthorpe Hill](#)⁸³ from Middleton, the red rays of the setting sun begin to pick out the ochre stain of the soils, and more dramatically the brown and gold hues of the Autumn leaves; sunset is upon me, but I've no desire to rush home.

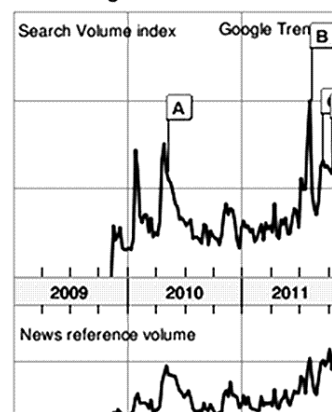
As a metaphor, the low angle sunlight against the tired Autumn leaves returns my thoughts to the projected long-term economic contraction of

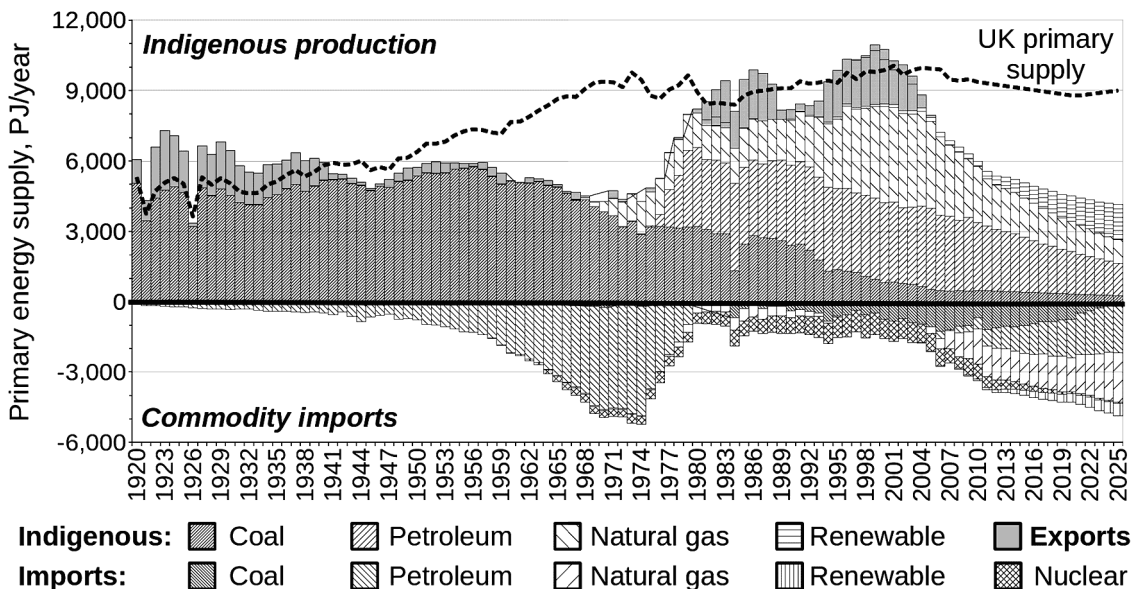
the global economy – first because of the rising prices of scarce commodities, but ultimately due to the physical lack of supply. Britain is already in the grip of this decline; most of our energy resources having been exhausted over the past 250 years of industrialisation.

In 2009, I gave a presentation at Parliament on [energy supplies and the UK economy](#)⁸⁴. For me it's notable because I gave one of my prophetic one-liners during the talk – "watch out for the debate over sovereign debt" (see [Google Trends](#)⁸⁵ graph) – that



● sovereign debt





UK Energy Balance⁸⁶, 1920-2025

This graph has been created from historical data produced by the Dept. for Energy and Climate Change (DECC) and National Statistics. Projections are based on DECC's analysis of the UK energy supply until 2025.

has since mushroomed into a big issue. Looking back, what really stood-out from that presentation was a graph of the UK's primary energy supply balance⁸⁶ which formed the main "hook" of my arguments (the updated version is shown above) – and which has since become a major talking point at many of my presentations.

In many ways the UK is, for once, years ahead of the American economy. We abandoned coal in favour of natural gas during the 1980s – in part the result of declining coal production, but also as the result of a political decision to challenge energy industry unions. Britain is also well ahead of the USA in terms of the depletion of our indigenous energy resources: We reached peak coal in the mid-1920s, whilst the US might get there in a decade or so; the US has had a longer history of oil production, peaking in 1970, but British oil production peaked in 1999 after only three decades; and whilst US gas production may have recently peaked, UK production peaked in 2003 and has been falling off the gas cliff ever since – prompting some to believe that the [development of shale gas in Britain is an inevitability](#)⁸⁷ in order to maintain our energy supplies.

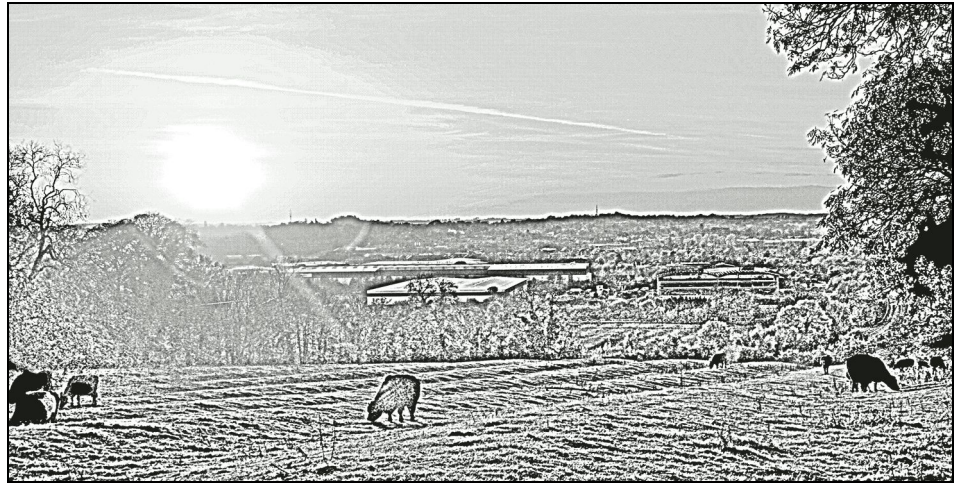
However, such a simplistic analysis – that shale gas is in because North Sea gas is going out – ignore the mechanics of how energy supplies interact with the economy. Energy is considered by many economists to be just another commodity, when in fact research shows that [energy has a special role](#)⁵⁵ in the economic process – [leading the process of economic activity](#)⁵⁶ rather than following it. The idea that we can simply add more energy to the economy and carry on regardless is based upon a [cornucopian view](#)⁸⁸ of the economics process, which ignores reality of UK energy demand/future economic performance, and the role of ecological limits in raising prices and curtailing future energy supplies.

The greatest influence within the UK energy economy, which is driving both supply difficulties and our infrastructure development problems, is the depletion of our existing energy sources. For example, as coal declines we might build more renewable sources; but whilst coal plants are based in the middle of the UK land mass, renewable sources are primarily at the periphery – and so building more renewable generating capacity requires that we rebuild the structure of the national grid too.

Likewise, as indigenous sources deplete, we have to make up not only for new energy demand, but also for the annual drop in indigenous production. For example, look at the graph of US natural gas production on page 5. The peak of production was in 2001, and since then production from conventional gas and oil wells has decreased by nearly 16%. This was, in part, one of the reasons for the spikes in US gas prices over the past decade. New unconventional production in the US would have represented and extra 21% of production in 2009, but because of the decline in conventional gas in the interim it only adds 6% compared to the production level of 2001.

Of course, if we believe the media hype then we're on the [verge of a shale gas boom in Britain](#)⁸⁹; but there's no substance to these claims – based largely on the [statistics produced by Cuadrilla Resources](#)⁹⁰ – than there is to the claim made about shale gas in the USA. The facts are very different to the media's very poor analysis of the reported discovery of shale gas in Lancashire; in fact it's only equivalent to a few years worth of the UK's annual gas consumption. And as production will be spread out over a long period of time, in a single year it doesn't represent a large quantity of gas. In more [critical media analyses](#)⁹¹, it has been noted that the company was deliberately "talking-up" the discovery because of the financial difficulties of the project's backers.

In 2010, [Britain's economy was supplied](#)⁹² with 9.5 exa-Joules (EJ) of [primary energy](#)⁹³ – consisting of 3% renewable energy and waste incineration, 7% nuclear, 14% coal, 35% petroleum products and 41% natural gas. In 2003, the year that British [North Sea gas production peaked](#)⁹⁴, Britain produced over 20% more natural gas than we consumed in 2010 – at the time we exported gas to Europe. In the seven years from 2003 to 2010 North Sea gas produc-



tion halved, and production [continues to decrease significantly year-on-year](#)⁹⁷. If we look at the reported 5.6 trillion cubic metres of gas discovered by Cuadrilla Resources, that might seem a lot but, assuming a 10% recovery rate it's only about five years of current gas consumption; and spread over a 30 year production period that's around 0.67EJ/year – or less than a fifth of annual natural gas consumption.

However, note again the decline in natural gas production from the North Sea. **To make up for the loss of North Sea production between 2003 and 2010 we need another four Lancashire-sized shale gas fields. Then, to make up for the loss of North Sea production in coming years, we'll need to find another three over the next two decades.**

The fact is (as in the USA), the greatest energy problem in Britain is that we consume too much... *full stop!* Developing shale gas will not allow us to escape the economic problems created by the depletion of our indigenous energy resources. For example, the largest sector in the UK economy is transport, and nearly all the energy used in that sector is petroleum. Shale gas does nothing to address the [global plateau in global oil production](#)⁹⁵, and the high prices this creates. If we shifted from oil to [compressed natural gas](#)⁹⁶ in the transport sector, we simply add more to UK natural gas demand.

And of course, opting for shale gas will cause carbon emissions to rise. On that point, there is already a [debate over new gas-fired power stations](#)⁹⁷, and the [need to curb development](#)⁹⁸ and develop [carbon capture systems](#)⁹⁹ (assuming, which is not proven, that is technically and economically feasible). The industry lobby in favour of shale gas has been alleged to have [used 'biased' data](#)¹⁰⁰ in its assessment of climate impacts; and as for those who want to promote gas because it's better for the climate than coal, some recent research suggests that the higher emissions from unconventional gas production can mean the [impact is equally as bad as coal](#)¹⁰¹.

We have to ask the question, “why do this”; pursuing growth, against the limits of the environment, will

lead us into a [Canute-like crisis](#)¹⁰² with nature.

“It is right it should be so; Man was made for joy and woe; And when this we rightly know, Thro' the world we safely go”⁹⁸. I too have travelled across

the countryside, and have nearly reached home. As I emerge from the tight alley that takes the footpath from the middle of [Overthorpe village towards Banbury](#)¹⁰³, I'm dazzled by the sun setting over the town. At the foot of the hill, by the M40, the steel skeletons of a new distribution centre frame the sprawl of the town beyond, running up to the heights of Crouch Hill on the horizon. A pleasing vista at the end of my walk, but then, presented with the hard structures before me, and the noise of the motorway, and contrasting that to the rest of the afternoon, I [think of Ginsberg](#)¹⁰⁴,

What sphinx of cement and aluminium bashed open their skulls and ate up their brains and imagination?

[Moloch](#)¹⁰⁵ indeed!; we're sacrificing our children's future to the insatiable God of economic expansion!

I return to the “why” issue. As noted at the beginning of this ramble, my current difficulty working on the unconventional gas issue is that the available official and peer reviewed data doesn't correlate to the industry's position on the fundamental characteristics of shale gas production. The political establishment too, who appear to supporting any putative energy source in their desperation to keep the present economic process ticking over, are ignoring the reality of our present position. Even with your fingers craftily crossed behind your back, you can't in all seriousness make any valid pretence that today's energy and economic difficulties are manageable within the the acceptable boundaries of neoliberal economics.

Again, “why?” Is it, as Ginsberg infers, because they're devoid of any sense of reality?; their senses having been mangled by the consensual delusions of consumerism? Surely they can't be that oblivious to the realities of both resource depletion, its economic effects, and the adverse impacts of unconventional gas, simply because its politically problematic

to admit we must change long-supported policies?

Of course, such prognostications on the potential role of shale gas assumes that it's there for us to produce – and again, recent developments in the USA cast great doubt upon many recent estimates of how big the shale gas resource is. There has been a growing condemnation of the [shale gas industry's cavalier approach to factual reporting](#)¹⁰⁶. This has been supported by a serious downgrade in the size of [Marcellus shale](#)¹⁰⁷ resource by the [US Geological Survey](#)¹⁰⁸; a revision which forced the [US Energy Information Agency](#)¹⁰⁹ to downgrade their own assessment, only weeks old, by [eighty percent](#) – from 410 trillion cubic feet to 84! This throws into doubt a large proportion of the positive coverage of the unconventional gas issue, such as last month's [The Report programme](#)¹¹⁰ on Radio 4 (which mentioned the revision, but completely missed the significance of this change to natural gas supplies overall).

At the same time, new studies of the operation of shale gas plants in the USA have shown that they're not performing as anticipated. For example, if we look at the need to “re-frack” the well to keep gas flowing, many industry reports initially suggested this would be done every four or five years. [Analysis from wells in Pennsylvania](#)¹¹¹ suggests that gas production from wells drops off relatively quickly, perhaps in as little as two years – and whilst horizontal wells might produce more gas than vertical wells, they also lose production capacity more quickly. This data is borne out by other [research on shale gas wells elsewhere](#)¹¹² in the USA, and this same research also suggests that the size of the shale gas resource is only half of that stated officially.

It's getting dark as I cross the railway bridge into the town centre, then take a left at the town hall towards home. I get in, dump my kit, make a drink, and head for the computer to see if there's been any new developments since this morning. There are. It seems that, reinforcing the initially cautious outlook a year ago from groups like [Chatham House](#)¹¹³, new research by [Deutsche Bank](#)¹¹⁴ suggests that shale gas [won't be such a “game changer”](#)¹¹⁵ in Europe. In many ways their headlines reflect my own thoughts –

Recent estimates of UK shale-gas resources raise the possibility that declines in existing domestic production may in the future be offset to some extent by unconventional gas, although many uncertainties remain. Prime among these uncertainties are the size of the recoverable resource, the rate at which production can be achieved, and the extent to which the concerns of local residents and environmental groups can be accommodated.

Such comments stand in stark contrast to some of the groups lobbying for accelerated development of shale gas in the UK, such as the [Institution of Gas Engineers and Managers](#)¹¹⁶. The reality is that we're on the cusp of a great social and economic change. Presently we're in the economic doldrums between the age of fossil fuels and the post-fossil fuels era; whilst it may take three or four decades for the world to accept that fact and move on – not helped by the limited imaginations of our political class – what we'll experience in the future will be a whole new relationship to our environment and the resources it is able to provide. There's no escaping that reality because of the limits being imposed by our environment. In that context unconventional gas isn't a “game changer”; it's not even a stop-gap on the way to some new future technological nirvana.

Not desiring to do more work, I scour the 'Net for a copy of [Blake's Auguries](#)⁸; reading through I find that my recollection of the ideas in the poem wasn't far off – and in fact, it was more relevant than I remembered. OK, so recent TV comedy might have tarnished the image of Blake and others when it said, [“the romantic poets were a bunch of EMO's”](#)¹¹⁷; but if we're lost for ideas and understanding of the human condition in our pressured present-day existence, we could do a lot worse than see how people dealt with their existential difficulties in the past.

The tapping of unconventional gas, like tar sands or heavy oil, represents the moment in time when humanity is forced to drink the dregs of the Earth's only (in terms of human existence) vintage of fossil fuels. This reality demands that humanity uses its alleged intelligence to think of new ways to organise itself, and meet its basic needs at a far lower level of material consumption. That's not impossible; the reality is that it's not “business as usual”, and so any scheme that seeks to perpetuate society without accepting this basic principle is working in ignorance of the facts. If the political and economic “leadership” of our world cannot grasp this reality from the body of evidence that now exists, then they have no legitimate claim to make future policy; we just have to get on and find our own independent solutions. Or, [as Blake put it](#)⁸,

*He who doubts from what he sees,
Will ne'er believe, do what you please.*

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