Petrocide: Hydrocarbons, Conflict and Climate Crisis

In the years between the fall of the Berlin wall and the September 11th attack on the WTO twin towers in 2001, western energy economists and military strategists alike had renewed their preoccupation with the 'Peak Oil' hypothesis. This theory, first propounded by US Shell economist MK Hubbert in 1956 suggested that global demand for hydrocarbons- and oil in particular- would begin to intersect with a peak in production from around 1992 onwards. Thereafter a declining supply base combined with problems of resource geographical distribution would make for increased security of supply for the major consuming nations- of which the US was by far the biggest.

But despite recent developments in 'unconventional' energy sourcing- oil and gas reserves trapped in shale deposits- the US has been unable to insulate itself from the consequences of its own imperialist adventures in the Middle East. In this article ***Jonny Jones*** *and* ***Brian Parkin*** *try to develop the concept of an emerging and potentially deadly intersection of further imperialist carbon wars against the inexorable threat of catastrophic climate change.*

This article is based on a paper by the authors presented at the November 2015 London conference of Historical Materialism.

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Keywords

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Behind the shale revolution

For over a decade the world had been undergoing a quiet revolution in the way that energy is produced thanks to the dramatic growth of the unconventional methods of accessing hydrocarbon energy sources of oil and gas: fossil fuels trapped in shale strata of previously inaccessible deep sedimentary rocks. For the US committed to hydrocarbon self-sufficiency since the 'peak oil' scare of the late 1990's, the exploration for such deposits gave rise to a speculative bubble, almost entirely bank debt financed and a sure bet as long as oil remained above $100 per barrel. Such a venture became a shared imperative of US governments- particularly as the electorate seemed wary of the prospect of oil wars without end.

Energy – access to and control over it – has long played a crucial role in geopolitics. Oil continues to be vital to the capitalist machine. Discussing the imperial powers' attitude towards

oil in the aftermath of the Second World War, and in the midst of decolonisation, Chris Harman pointed out that oil was:

> *the raw material of raw materials, the ingredient for manufacturing the plastics, the synthetic rubber and the artificial fibres, as well as providing for massively expanding energy needs and propelling the ever greater proliferation of motor vehicles, tanks and aircraft. And the supplies of it were increasingly to be found outside Europe and North America. In the early 1950s "gulf oil" referred to reserves to be found around the Gulf of Mexico, especially in Texas. It was cost of pumping out that oil that determined world prices. By the mid-1970s, as was shown by the temporary interruption of supplies during the Arab-Israeli war of 1973, the gulf that mattered was the Persian Gulf. Saudi Arabia, Iraq, Iran, Kuwait, the petty sheikhdoms around the Arabian Peninsula, were the countries that mattered.*[1]

Concerns about oil and access to it have been behind many US interventions since 1945. The 1953 coup against the democratically elected leader of Iran, Mohammed Mossadeq, was in response to his nationalisation of the county's oil wealth two years prior. The coup led to the restoration of the absolutist rule of the Shah of Iran and gifted "US oil companies 40 percent of the formerly British concession".[2] The importance of the Middle East was underlined in 1980 by President Jimmy Carter in his State of the Union address:

> *The region which is now threatened by Soviet troops in Afghanistan is of great strategic importance: It contains more than two-thirds of the world's exportable oil... The Soviet Union is now attempting to consolidate a strategic position...that poses a grave threat to the free movement of Middle East oil... Let our position be absolutely clear: An attempt by any outside force to gain control of the Persian Gulf region will be regarded as an assault on the vital interests of the United States of America, and such an assault will be repelled by any means necessary, including military force.*[3]

Fast forwards to 1998 and Bill Richardson, President Bill Clinton's energy secretary, spelled out his policy regarding a pipeline to transport oil from the Caspian region, saying:

> *This is about America's energy security… It's also about preventing strategic inroads by those who don't share our values. We are trying to move those newly independent countries toward the west. We would like to see them reliant on western commercial and political interests. We've made a substantial political investment in the Caspian and it's important that both the pipeline map and the politics come out right.*[4]

A note of caution should be sounded, as it would be a mistake simply to see US military intervention overseas as a crude extension of the oil and gas lobby:

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1 Harman, 2003.
2 Chomsky, 1992, p50.
3 Carter, 1980.
4 Quoted in Monbiot, 2001.

> *One recent version of this is the widely held belief that the real aim behind the Western attack on Afghanistan [in 2001] was the desire of the Bush administration and the oil corporations to which it is closely allied to build a pipeline through the country as a means of exporting the oil and gas of Central Asia. Now, undoubtedly the energy reserves of the region are an important factor in Washington's interest in the region, but to reduce the war in Afghanistan to this interest would be a bad mistake. The US attacked Afghanistan...primarily for political reasons focused on reasserting its global hegemony after 11 September. The greater access it gained to Central Asia was an important by-product of the overthrow of the Taliban, not the main motive behind this action. At the same time, however, it would also be a mistake to reduce US strategy to geopolitics: control over Middle Eastern oil [was] a major preoccupation in the Bush administration's war planning.*[5]

Securing US access to energy – and, often equally importantly, denying access to its competitors – has been an important factor in US policy making. In February 2006 Barack Obama, then a US senator, made a speech on energy independence in which he argued that US dependence on foreign oil was a major threat to national security: *"the Achilles heel of the most powerful country on Earth is the oil we cannot live without".* He went on to say that *"moving away from an oil economy is a major challenge that will require a sustained national commitment… Why can't we make energy security one of the great American projects of the 21st century*?"[6]

Just six years later, the International Energy Association released its *World Energy Outlook* (*WEO*):

> *The WEO finds that the extraordinary growth in oil and natural gas output in the United States will mean a sea-change in global energy flows. In the New Policies Scenario, the WEO's central scenario, the United States becomes a net exporter of natural gas by 2020 and is almost self-sufficient in energy, in net terms, by 2035. North America emerges as a net oil exporter, accelerating the switch in direction of international oil trade, with almost 90% of Middle Eastern oil exports being drawn to Asia by 2035.*[7]

In this scenario, far from living with the threat of being crippled by reliance on foreign oil, the US would become the world's biggest oil producer as soon as 2017.[8] This represented a staggering potential transformation in the US's energy independence.

In recent years, the rising cost of energy spurred exploration for unconventional energy reserves, while technological improvements in a process known as hydraulic fracturing (or "fracking"), meant that deposits which were previously inaccessible were becoming easier to exploit. Other countries were also eager to exploit hydrocarbon shale deposits to the extent that some energy experts began to forecast the imminent demise of OPEC.

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5 Callinicos, 2002.
6 Obama, 2006.
7 IEA, 2012.
8 Harvey, 2012a.

Cumulatively, these changes seemed to point towards enormous geopolitical shifts, as energy exporters vied for new markets and importers for influence.

Behind the headlines, however, were serious concerns. Worries about the environmental impact of the shale revolution arose from the impact on local communities and landscapes. And also fears about the damage that would be done to the climate by such a massive extension of fossil fuel combustion. These unconventional fossil fuels, *"much higher in carbon than their conventional counterparts, are likely to unleash runaway climate change that could put paid to any hopes of a low-cost – and low-risk – energy future".*[9] Indeed, the promise of a hydrocarbon bonanza promised by the shale revolution began to push the debate about renewable energy to the sidelines.

And although the hype surrounding the shale revolution seemed to allay fears of an immediate oil crisis, the notion of peak oil – the time at which oil production reaches its highest point before entering terminal decline – were put on hold. So far from being able to rely on declining oil reserves to counter global warming, the environmentalist George Monbiot's warned of, "*enough oil in the ground to deep-fry the lot of us, and no obvious means to prevail upon governments and industry to leave it in the ground".*[10] For these reasons, the critics of carbon-capital saw the shale revolution as a renewal of the threat of global warming, promising as it did a seemingly boundless supply of cheap oil and gas. Then in November 2014 the OPEC states fearing denied access to the markets of North America ramped up production in a bid to cripple the US shale producers- the result of which was a world awash with hydrocarbons down in price by over 70 percent in just 13 months.

An unconventional truth

An initial impetus for shale oil and gas production was rising oil prices. Oil prices depend on a number of intertwined factors, such as demand, financial speculation, and output decided by the Organization of the Petroleum Exporting Countries [OPEC]- the cartel of 13 major oil producing states.[11] Oil prices reached a low of $10.72 in December 1998 and hit a peak of $147.30 in July 2008[12] - after which they sustained a price of around $115 per barrel until late 2014. The price increase was largely due to China and India's dramatic growth rates, instability in the Middle East and lower than expected output from Iraq's oil fields.[13] However, the global economy had already begun to slow well before the peak in July 2008. So what had propelled the spike?

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9 Harvey, 2012b.

10 Monbiot, 2012.

11 Many environmentalists and promoters of peak oil theory argue that OPEC's room to manoeuvre is increasingly limited by declining reserves of easy to access oil. See, for example, Chris Nelder's interview in the *Washington Post*, in which he argues: "the world can no longer increase its production of 'easy' oil—many of those older fields are stagnant or declining" - Plumer, 2013. This perspective is challenged by by many. See, for example, John Kemp, who argues that previous oil scares and spikes in prices "were followed by a surge in new discoveries and field developments that brought prices back down in real terms and pushed fears about peaking supplies back to the margins of the debate. Exploration found substantial new deposits, while improvements in technology allowed more oil to be recovered from existing and new reservoirs" - Kemp, 2013.

12 Prices given in Tuttle and Galal, 2010.

13 See http://news.bbc.co.uk/1/hi/business/7387203.stm

> *Although the EIA [Energy Information Administration, the US government body responsible for statistical analysis of energy information] pinned part of the blame on volatility in Venezuela and Nigeria, it warned of an influx of investment money into commodities markets. Investors were stampeding out of the falling real estate and stock markets. Instead, they diverted their funds to oil futures. This sudden surge drove up oil prices, creating a speculative bubble.*[14]

The collapse of Lehman Brothers and the precipitous decline in global production that followed caused oil prices to plummet rapidly, hitting just $32 a barrel by December 2008.[15] But speculation, reduced output from OPEC (who cut production quotas at a meeting in December 2008 after the price crash) and continuing demand from China meant that oil prices soon began to rise again. By May 2013, Brent crude prices were at $99 a barrel.[16]

This trend of high oil prices led to the growing profitability of unconventional sources of fossil fuels. Also, the danger of deep-sea oil drilling was revealed in April 2010 when an explosion on the Deepwater Horizon oil rig, killed 11 workers and caused an enormous oil spill in the Gulf of Mexico. The *Onscene Coordinator Report* into the disaster estimated that the equivalent of 4.9 million barrels of oil were released during the spill.[17]

Arctic drilling also became an increasingly attractive prospect. Despite industry claims that the process is straightforward, John Sauven described the process in the *Guardian*:

> *While icebergs the size of football stadiums are towed out of a rig's path, ships equipped with high-pressure water cannons blast smaller chunks into submission. And all the while the clock is ticking. As the winter freeze edges nearer, this frantic exploration company rushes to finish the job before sheet-ice cuts off the region completely*.[18]

Yet recent evidence of ice sheet melting seemed to offer enhanced opportunities for Arctic oil exploration and extraction. The twisted logic at play being that global warming leading to the shrinkage of the Arctic ice sheet would make it easier to drill for more oil in the region!

Tar sands in Alberta, Canada, once hyped as the largest single hydrocarbon resource in the world was, from the start, and easy target for environmentalists. Protesters highlighted not only the danger of increased carbon emissions, but also the risks presented by leaking pipelines: in 2010, a tar sands pipeline running through Michigan burst, dumping 877,000 gallons. A clean-up has so far cost over $1 billion and is still not completed.[19]

The most significant US development in unconventional energy exploitation, however, was the dramatic increase in production of shale oil in fine-grained sedimentary rocks that traps oil and

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14 Amadeo, 2013.
15 Tuttle and Galal, 2010.
16 Elliott, 2013.
17 Report available at http://www.uscg.mil/foia/docs/dwh/fosc_dwh_report.pdf. For more on the Deepwater Horizon spill, see Jones, 2010.
18 Sauven, 2010.
19 *Socialist Worker* (US), 2013.

gas within them.[20] Fuel can then be released through fracturing the layers of shale using a high-pressure injection of water, chemical solvents and sand.

Hydraulic fracking has been used in the US since 1949 when Haliburton began the first two fracturing treatments in Texas and Oklahoma in conventional oil reservoirs as an 'enhanced' recovery technique. But since 2006 with what looked like a permanently high oil price the use of fracturing has spread across much of the northern and eastern US where shales containing often as little as 5 percent Total Organic Content (TOC) had previously been regarded as uneconomic.

These developments are what lie behind the headlines about a shale revolution and US energy independence. However, there were some who believed that the figures were too good to be true and that the shale revolution was in fact a bubble eventually due to burst.

Revolution or mirage?

Among the most vocal critics of the shale revolution is the geologist and energy consultant Arthur Berman.[21] Berman argued that the rapid development of shale "plays" – the name given to areas where oil and gas can be extracted from shale formations – had similarities to a gold rush:

> *U.S. shale plays share many characteristics with the gold rushes of the nineteenth and early 20th centuries. Both phenomena result from extreme promotion. Anyone can join. Every participant believes that they will get rich. Great amounts of capital are destroyed as entrants try to get a position. The bonanza is exhausted sooner than most expected...and few profit in the end except for the vendors that serve participants.*[22]

Small operators who were able to use technological developments in horizontal drilling and fracking to increase extraction to meaningful levels, at first from the Barnett oil field in Texas and then at other plays around the country, soon found themselves attracting a flood of investment from Wall Street and increasing competition. Natural gas prices reached an all-time high in the US of $10.80 per thousand cubic feet in June 2008. In line with global oil prices, this had crashed to $5.87 by December, a drop of 46 percent.[23] Unlike oil prices, however, the price of gas continued to drop, reaching a low of $1.89 in April 2012.[24]

As the *New York Times* reported in October 2012:

> *The drillers punched so many holes and extracted so much gas through hydraulic fracturing that they have driven the price of natural gas to near-record lows. And because of the intricate financial deals and leasing arrangements that many of them struck during the boom, they were unable to pull their foot off the accelerator fast*

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20 Strictly speaking, the proper term for oil that has been released from shale rocks is "tight oil". Shale oil is oil that is created by processing organic material within shale rock to create a synthetic compound similar to crude oil. There are multiple ways of exploiting and processing fuel trapped in shale rocks, but in this article I refer to shale oil and gas to refer collectively to these varying types of fuel.

21 Berman blogs at http://petroleumtruthreport.blogspot.co.uk/

22 Berman, 2012.

23 EIA, 2009.

24 http://www.eia.gov/dnav/ng/hist/n9190us3m.htm

enough to avoid a crash in the price of natural gas, which is down more than 60 percent since the summer of 2008.[25]

Arthur Berman argued at the time that, *"While the continued drilling has been funded by debt, share offerings and joint venture agreements thus far, the trend is unsustainable given the steep decline in prices. Drilling, therefore, must decrease in order to shrink the present over-supply and so that prices can rise".*[26]

Gas producers were feeling the pinch: Rex W. Tillerson, the chief executive of Exxon Mobil, which spent $41 billion to buy XTO Energy, a giant natural gas company, in 2010, when gas prices were almost double what they are today, minced no words about the industry's plight during an appearance in New York [in summer 2012].

"We are all losing our shirts today," Mr. Tillerson said. *"We're making no money. It's all in the red'.*

A more pressing objection to the viability of the shale revolution was that shale plays tend to decline in output very rapidly. Studies by Berman, as well as by David Hughes, suggested that decline rates were so precipitous, and capital investment required for new wells so high, that the massive amount of oil and gas in the ground was simply uneconomical to process. Hughes calculated decline rates of between 79 percent and 95 percent in 36 months, requiring $42 billion investment to maintain output – higher than the total value of shale produced in 2012.[27]

The rate of rig and operating company attrition has led one pundit to suggest that this is "the core issue currently reshaping the shale revolution" in an analysis that deserves quoting at length:

> *The revolution began with a small independent oil and gas company, Mitchell Energy. Its success in cracking the code of the Barnett Shale led to its acquisition by Devon Energy, a rapidly expanding independent that was seeking new exploration opportunities. As the shale boom mushroomed beyond the Barnett to the Haynesville in East Texas and Louisiana, the Fayetteville in Arkansas and finally the Marcellus formation of Appalachia encompassing Pennsylvania, New York, West Virginia and Ohio, aggressive independent operators, including newly formed companies backed by private equity funds, were leading the parade. The high initial production of newly drilled wells in these fields excited investors who were willing to provide tons of capital to these small companies... As production from gas shale fields began to climb, natural gas prices began to slump... However, early shale well results began to reveal that shale formations were not evenly distributed throughout a basin. Some areas proved much more prolific than others, something more similar to conventional reserves...*
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> *The larger, aggressive independents moved...to secure stable sources of capital in the form of joint ventures with major integrated oil companies seeking reserves, production and technological knowledge, and national oil companies seeking financial returns and*

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25 Kraus and Lipton, 2012.

26 Berman, 2012.

27 Hughes, 2012, p50.

shale intelligence. Some of the small, aggressive operators elected to sell out to these larger oil and gas companies. With gas prices at distressingly low prices, companies of all sizes began sorting out their asset bases and selling less desirables properties. Today, we are in the midst of a major restructuring the domestic [energy and petroleum] industry as shale technology leaders, saddled with a high cost of capital and large debt burdens, are being absorbed by larger oil and gas companies with low costs of capital, large research and development budgets to fund further improvements in drilling and extraction technology and the financial staying power to withstand the time until natural gas prices rise to support the shale gas economic of this.[28]

Thus we saw an increased centralisation of capital[29] in the sector as the smaller pioneers in the shale business were driven out by larger energy firms. Despite proven reserves (that is, oil and gas that is both technically and economically recoverable) continuing to grow, the slump in US rigs in operation fell dramatically from 1,910 in Dec 2014, to 1,310 in Feb 2015 to a mere 413 by Feb 2016. And although this has meant a decline by around 10 percent in output, the increase from Gulf of Mexico deep water rigs has largely compensated for the fall in onshore US production that has risen by over 350,000 barrels per day.

The US's new-found energy abundance also impacted on Russia's gas industry as demand for its output fell. But the continued economic slowdown has exacerbated the problem as crisis-hit Europe saw an initial decrease in LNG imports. Given Russia's reliance on energy exports as both an economic motor and a means of developing political leverage across the world, these events are a major challenge to Putin and the Kremlin. But Russia's 'break-out' into a decisive 'diplomatic' and military role in December 2015 combined with the US's apparent paralysis over the Islamic State in Syria may well bring about realignments.

US shale gas LNG export capacity is now poised to make inroads into Europe[30]. As early as 2012 the *Financial Times* stated, *"Europe will become the only big economic bloc without significant energy resources. The US, India, China and Latin America will all have access to shale, as well as offshore fossil fuels".*[31] Already, attempts to develop shale plays in Poland have turned out less successful than hoped, with estimates of reserves slashed by 90 percent last year. Two energy firms from Canada and the US pulled out of fracking operations after "unsuccessful attempts to find commercial levels of hydrocarbons".[32] In Britain, "a recent British Geological Survey report put the amount of shale gas under the UK as 250 times that of previous estimates, enough to make us self-sufficient in gas for centuries".[33]

But fracking in Britain faces a different set of challenges to the US. Areas where there are shale deposits, such as Lancashire, are far more densely populated than the shale fields in the US. And well ahead of licences being granted, anti-fracking campaigns were well established across much

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28 Brooks, 2013.

29 What Bukharin summarised as "the joining together of various individual capital units which thus form a new larger unit" - Bukharin, 1917.

30 In February 2016 the petrochemical company Ineos began offloading US Marcellus shale derived LNG at its Grangemoth plant on the Firth of Forth in Scotland.

31 Riley, 2013.

32 http://www.bbc.co.uk/news/business-22459629

33 Hanlon, 2013.

of the UK. While Europe will benefit from lower LNG prices due to greater US exports, it will also be expected to pick up more of the cost – both economically and militarily – of overseeing the stability of oil flows from the Middle East which it will become increasingly reliant on. As Robert McNally, head of the *Rapidan Group* energy consultancy and a former White House policy official, says: *"The prospect of energy self-sufficiency is going to reinforce calls to reduce the expenditure of US blood and treasure to protect the Middle East and the sea lanes that link it to its main consuming markets".*[34]

This is also a major issue facing China. While China is reckoned to have abundant energy available in shale formations – 50 percent more than in the US according to the EIA – exploiting it is taking far longer than had originally been hoped. Partly the problems are geographic – shale deposits are in remote areas which lack abundant water supplies required for fracking. There are also bureaucratic problems presented by the state machine itself.[35]

China has become increasingly reliant on imports of crude oil from the Middle East and has been building political relationships to help underpin this changing situation, most notably with Iraq- and more lately, Iran. Iraq's first major oil deal was a $3 billion contract with the China National Petroleum Company was in 2008,[36] and more recently the IEA's chief economist spoke of *"a new trade axis is being formed between Baghdad and Beijing".*[37] For one thing, *"because oil is traded globally, a supply disruption or development anywhere in the world affects oil prices for all consumers. Even if the United States were to import little oil because of a home-grown energy boom, Americans would still be vulnerable to global events that raise the price of oil".*[38]

And the more the US remains attached to the Middle East 'tar baby', then the greater the slippage in the 'Pivot to Asia' project intended to rebalance growing Chinese hegemony in South East Asia. Consequently, it is less likely that the US will be able to use its own hegemony in the Middle East as leverage with Beijing. In addition, the US's Pivot to Asia is adding to tensions in the South China Sea, an area China is keen to exploit – its Ministry of Land and Resources estimates around 40 billion tonnes of oil equivalent in the area.[39] However, the area is also claimed by Vietnam, which has accused China of harassing its oil-prospecting ships. Already China has fired diplomatic shots across the US's bows, saying "We hope that countries that are not parties to the South China Sea dispute truly respect the efforts of the countries concerned to resolve their disputes through consultation".[40]

For over a decade the shale revolution has both dislocated energy policies and stressed geopolitical alliances. This is a matter of great concern. But the fundamental challenge it poses is that even when conventional resources decline, shale deposits of oil and gas remain in sufficient abundance to threaten continued climate change. And even now the shale revolution is still advocated by some as a means of reducing emissions, since natural gas is less polluting than coal and oil. To the extent that William Press, a member of Obama's Council of Advisors on Science

34 Chazan, 2012.
35 Mufson, 2012.
36 Jones, 2010.
37 Chazan, 2012.
38 Yetiv, 2012.
39 Hook, 2012.
40 Hille and Bland, 2011.

and Technology, said that natural gas is the only way to achieve the president's climate change goals.[41] Even the environmentalist Fred Pearce has argued that fracking for shale gas can provide a crucial bridging role until renewables come online.[42] However, shale gas is not being lined up as any kind of bridging fuel – if anything its abundance will kick large scale development of renewables further into the long grass. As such it is yet another factor in an emerging global carbon crisis.

OPEC and the oil price crisis

Virtually overnight in early January 2015 the price of world traded crude oil dropped by 50%. For the high-cost producers, this was bad news. But, as long as it seemed to be a market blip then most producers could take a 'hit'. Initially the oil price 'shock' seemed to be a short-term over-supply problem caused by evidence of global recessionary trends and signs of a Chinese economic slow-down. Yet on closer examination it was clear that the OPEC[43] states led by Saudi Arabia were actually increasing output in order to drive down prices.

OPEC, and Saudi Arabia in particular, were attempting to recover market share by driving out the higher cost US shale oil and gas[44] producers - most of them debt financed- and thus eliminating the competition from 'unconventional' hydrocarbon fuels[45].

Saudi Arabia also intended to use low oil prices to destabilise the economy of Iran, which although an OPEC member state, is a relatively high-cost producer[46].

The low oil price- by July 2016 still below $50 dollars per barrel has hit high-cost US producers hard but the impact on some OPEC states dependent by up to 90 percent on oil or gas export revenues is starting to tell. But here a seemingly paradoxical 'fix' comes into play: although the high-cost states are losing dollar revenues, they have to produce even more in order to maintain their income. With its very considerable petroleum derived reserves Saudi Arabia increased oil production because it could and it *wanted* to. As the price fell, the other, less well-endowed producers increased production because they *needed to.* The result, as never before, were hydrocarbon markets awash with cheap petroleum and gas just at a point when the world through a predictably ineffectual Paris COP21 recognised the need to kick its high-octane carbon habit.

Iran' case for nuclear power

Iran has been seeking access to nuclear technology for over 30 years. Although initially more driven by military than civil nuclear ambitions, the post-Iran/Iraq war period of international quarantine and subsequent sanctions have brought about a shift in priorities. Iran now declares its

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41 McKie, 2013.

42 Pearce, 2013.

43 OPEC. Organisation of Petroleum Exporting Countries- a 12 member cartel comprising Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela.

44 All fossil fuels are traded on the basis of oil- and in particular two grades (N Sea Brent and West Texas Intermediate) providing price bands effectively coupling coal and gas to the daily traded price of oil.

45 Hydrocarbons- fossil fuels with a molecular structure of carbon bonded by hydrogen atoms. This includes oil, natural gas (methane) and 'condensate' gas- a naturally occurring wet gas that is liquid at ambient temperature. Hydrocarbons do not include coal, anthracite and lignite.

46 Several of the bigger OPEC producers have high production costs, among them Nigeria, Venezuela, Iran and Algeria.

nuclear technology needs are for power generation purposes and was prepared to submit to quite invasive UN inspections to get it. And a quick look at the ramshackle state of the country's power generation and distribution sectors is enough to know why. With 78 million people- of whom 60 percent are under 30 years old- Iran is second in size only to Egypt in the wider MENA[47] region. Also in terms of industrial activity Iran is by far the most economically developed and diversified. And with the highest regional literacy rates and the greatest proportion of women attending university - at 58 percent then by most standards Iran is a highly developed society.

Yet Iran is barely sufficient in power production with winter peak times of demand punctuated with rota power cuts and with 30 percent of its populated areas without reliable supply. Presently around 400 separate 'generating units' make up just under 70GWe[48] which means that a dispersed and poorly integrated power system will have a low overall efficiency and reliability. Subsequently with a large number of ageing 'power units' and a margin of only 3 percent, power supply is insecure.

A major problem for Iran as an oil and gas export revenue dependent economy is the sheer amount of annual hydrocarbon output that has to go into domestic power production- currently 45%. With 58% of Iran's power coming from gas, 40.8 percent from heavy fuel oil and the rest from diesel generating sets, the retail cost of power has to be heavily subsidised with power costs of 8 cents per kw/hour being priced at 1.6 cents to the consumer[49].

For the 'modernisers' in the Iranian leadership the case for new nuclear base-load generating capacity is two-pronged:

Firstly to release the massive proportion of hydrocarbon output 'wasted' on domestic energy production and redirect it into more lucrative exports, and **secondly** to use a reliable non-fossil source of power production to modernise the overall Iranian economy. There is also a **third** dimension to this strategy which is that by increasing oil and gas exports, revenues can be directed into large scale investments in the extraction, storage, refining and pipelines infrastructure so neglected in the long years of war, embargoes and sanctions. An illustration of the present problem is the amount of natural gas now being injected into oil wells in order to maintain production pressure. This wasteful redirection of gas (the injected gas tends to remain trapped in the oil bearing strata) is yet another loss of Iran's export earning potential[50].

Exporting climate crisis

In terms of restoring Iran's hydrocarbons export earnings, a quick fix will be the completion of the so-far stalled pipeline and **LNG (Liquefied Natural Gas)** projects which although restoring the country's economic fortunes will make a significant contribution to global warming emissions.

[47] MENA. Middle East and North Africa. As a non-Arab state on the Caspian Sea, Iran is on the Northern margins of this region.

[48] GWe. Gigawatts of electrical capacity. A standard measure of a power station output is measured in Megawatts- one thousand watts. A Gigawatt is one million watts.

[49] IEA. International Energy Agency. World Energy Outlook 2014.

[50] Isia Almedia, Bloomberg July 15th 2015.

In recent years Iran's hydrocarbon reserves estimates have been progressively upgraded. This has in part been due to the depletion of some reserves elsewhere whilst Iran's output has been constrained by a combination of embargoes and investment starvation. Certainly, in terms of gas, Iran with most output going into domestic power generation, industrial and household distribution[51] and oil well injection, the volume remaining for exports is paltry[52]. In 2014 82% of Iran's export earnings came from hydrocarbons of which 78% were from crude oil and condensates and only 8% from gas[53]. According to the latest energy intelligence data Iran could be set to dominate the world gas market due to some countries displacing coal as the fuel of choice in power generation.

Table 1.World gas reserves. Estimates 2014. (Trillion cubic metres)[54].

Russia	47.8
Iran	33.8
Qatar	25.07
US	8.73
Saudi Arabia	8.23
Turkmenistan	7.5
UA Emirates	6.09
Venezuela	5.57
Nigeria	5.18
Algeria	4.5

An even more recent estimate has revised these figures:

Table 2.Top four natural gas reserves (Trillion cu/m)[55].

Iran	34.0
Russia	32.6
Qatar	25.0
US	9.7

In addition to Iran's dominant position regarding gas reserves, its oil reserves are now ranked as the fourth biggest[56] in the world which in terms of combined hydrocarbon resources places it in an emerging dominant position. These estimates are now providing a post-sanctions investment rush with $185bn designated to go into Iranian gas and oil production facilities by 2020[57]. Additionally, the **Iranian Gas Corporation** is reported to have secured credit of over $100bn

[51] Bloomberg, Almedia, ibid. On current estimates non-power generation demand for gas within Iran is set to double every decade to 2030.
[52] Bloomberg, ibid.
[53] Bloomberg, ibid. Also Stephen O'Rourke, Wood Mackenzie, Middle East bulletin, 2014.
[54] US Central Intelligence Agency, *Energy Intelligence Yearbook 2014,* Langley,Virginia.
[55] BP Statistical Review of World Energy 2015.
[56] International Energy Agency (IEA), Paris, 2015.
[57] Shadia Nasralla, Reuters 23rd July 2015.

for immediate gas industry improvements with the aim of increasing gas production from 800mcu/m per day as June 2015 to 1.2bn by 2020[58] .

Another development that could see Iran break into farther flung gas markets would be the completion of the above mentioned huge LNG facility at Abadan which on commissioning in 2018 will open up the possibilities of lucrative markets in South East Asia and Japan. There is also being planned a trans-continental pipeline development in partnership with Oman, Iraq and Pakistan, which with a northern spur, will feed into the burgeoning markets of the Indian sub-continent and China[59].

In terms of the joint ventures in both oil/gas and nuclear projects, it is probable that Iran will use revenues from hydrocarbon sales - or in the case of China - petroleum or gas credits written into either the construction times or operational lives of the plant. This is currently the case with much of Iran's oil production infrastructure where Royal Dutch Shell, BP, Total and Eni (of Italy) are now entering into contracts from which the return on investment will be in the form of revenues from output. These contracts came into effect in February 2016[60], after which Iran has been able to produce oil at a rate of an extra 1m/bpd[61].

The impact of Iran into full production of both oil and gas is having a two-fold effect. One is that additional capacity on a weak market has dampened the recovery of prices[62]. And the second is the inevitable stimulus in demand and consumption that sustained sub-$50 fuel prices will create.

The regional nuclear domino effect: Saudi Arabia and 'friends'.

To a large extent, eclipsed by Iran's more controversial bid for nuclear technology, Saudi Arabia's nuclear ambitions - although well advanced, have largely gone un-noticed[63]. Although its nuclear interest has been partly driven by fears of an Iran with nuclear weapons at some future date, the Saudis have also been pre-occupied with maximising hydrocarbon production for export earnings. And although much smaller than Iran in terms of population (25 million compared with Iran's 78), the energy load and demand characteristics of Saudi Arabia still means around 25 percent of oil and gas output is consumed for domestic power needs.

With its population being largely located in the South East desert region of the Arabian Peninsula and mainly living in new modern, high energy consuming cities, Saudi Arabia has a high energy demand per head of population. Power demand for air-conditioning is actually higher than the winter energy demand of most North European countries and when the absence of any substantial natural aquifer resource is added, the power for water desalination represents a high year-round cost.

In the kaleidoscope of inter-imperialist rivalries in the region combined with the increased uncertainties of world energy markets, Saudi Arabia has been vying for advantage - both as the

[58] Azizollah Ramanzi, deputy head, Iranian Gas Corp. Reported in Wood Mackenzie, ibid.
[59] Chatham House, un-attributable source March 2015, London.
[60] Oil and Energy Insider. Energy Intelligence report, 11th August 2015
[61] OPEC Quarterly Oil Report July 2015. This showed that Iran produced 2.86bpd throughout June 2015 and also boosted sales by releasing stocks onto the market in anticipation of a further easing of sanctions.
[62] Anjil Raval, Financial Times 14th July 2015, *Iran's return to oil market will weigh on crude prices'.*
[63] Northern Star, issue 12, 27th July 2015, *Saudi's Make Oil and Nuclear deal with Russia,* p.6.

dominant hydrocarbon player in OPEC but also for its leadership position in the Muslim world through the stewardship of the sacred Muslim sites of Mecca and Medina and through its wholly owned Sunni Wahhabi ultra-conservative Muslim franchise which spreads largesse far and wide to the poorer regions of Islam.

In 2013 Saudi prince Bandar bin Sultan met Russia's Vladimir Putin to explore the possibility of co-operating on matters of mutual interest - not the least of which being how to contain Iran's huge oil and gas potential in the post-sanctions era. Of common concern was the prospect of the markets being overwhelmed by US shale production: for the Saudis, the loss of North American oil markets and for Russia, the prospect of US shale derived LNG challenging OPEC's prospective European market.

For any of these things to work, Saudi Arabia risked the wrath of the US regarding an oil price war, whilst for Russia, the price to be paid could be a withdrawal from Iran's nuclear programme in which it had been the principal technical vendor[64] (with already advanced preparations for two VVER reactor stations at sites on the Gulf coast). This would also mean Russia having to abandon its nuclear co-operation with Iran and with certainty this would create a nuclear business opportunity for China. This did indeed happen when on July 22nd Iran's Atomic Energy Agency struck a deal with China to build two twin-reactor stations at Makran on the Gulf of Oman[65]. The next day it was announced that Iran had also put out a tender for two further stations based on the same design[66].

But by way of compensation for the probable loss of future Iranian nuclear business, Saudi Arabia offered Russia much more. In June 2015, Saudi Arabia confirmed an order for two twin reactor stations from Russia's Rosatom state owned nuclear development agency who in the initial $10bn phase will be a 49 percent stakeholder[67]. In the meantime Russia has also agreed to partner Saudi Arabia to the full extent of its nuclear ambitions which will total 21 Gigawatts of capacity. On the basis of the standard VVER/PWR[68] design the overall programme will entail 30 reactors in 15 station sites[69]. Russia is now also involved in negotiations with Turkey, Egypt, Jordan and Algeria regarding nuclear programmes and on 14th April Turkey announced a $20bn deal with Russia for a four reactor development at Akkuyu on the Mediterranean coast[70].

These developments mean that the wider MENA region will be unique in being the only part of the world destined for major nuclear power growth. And where nuclear capacity is installed it will not result in a reduction of hydrocarbon production. It will simply reduce domestic hydrocarbon consumption, thus allowing a growth in exports and with the new revenues, further investment in the hydrocarbon infrastructure which in turn will lead to greater export volumes.

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[64] Russia had built Iran's first twin-rector nuclear power station at Bushehr which under UN sanctions was unable to receive fuel.
[65] International Business Times (New York) 22nd July.
[66] Indo Asian News Service 23rd July 2015.
[67] Michael Tanchum, The Diplomat Magazine 31st July 2015, '*China Iran deal spur to Russian nuclear agreement with Saudi Arabia'.*
[68] This design is fully approved and licensed by the International Atomic Energy Agency (IAEA).
[69] Due to the very high demand for secondary circuit cooling water and with the Peninsula having no river sources, Saudi Arabia nuclear stations will have to be located at coastal sites.
[70] World Politics Review 23rd April.

Calculating the fuel equivalents for installed nuclear capacity is difficult - largely because nuclear stations rarely perform to specification both in terms out attained output or planned availability. But if we give the new Saudi reactors the benefit of the doubt and assume an 80 percent load factor and a 70 percent[71] availability, then on the basis of net calorific values we can obtain the following:

Table 3. Nuclear fuels displacement effect. 21 Gwe planned Saudi Arabia nuclear capacity.

21Gwe capacity by fuel equivalent[72] per annum.

Coal	**52.5 million tonnes**
Oil	**40 million tonnes or 293.2 million barrels**
Gas	**31 million tonnes oil equivalent or 1,935.12 billion cubic metres**

By opting for nuclear power Saudi Arabia (and its Gulf friends and Iranian foe alike) are taking a considerable risk. Certainly, a very large base-load capacity is useful for 27/7 power demand for continuous processes such as petroleum refineries and LNG terminals. And certainly, for Saudi Arabia which is the hub of the Gulf Cooperation Council states shared grid, there is the prospect of power sales to its other hydrocarbon neighbours. But, as with all nuclear programmes to date, back-end radiological waste costs and environmental impact and safety implications are unlikely to have been factored in. As the real cost of its nuclear choice becomes apparent, covering the cost through bigger oil or gas export revenues is bound to ramp-up production.

Saudi Arabia: counting the cost of US wrath

According to many analysts, Saudi Arabia is about to pay the price of the oil price war against US shale producers as well as its continued role in destabilising the MENA region through prosecuting its proxy war against Iran in particular and Shia Islam in general. Some analysts are also suggesting that under Saudi leadership OPEC is becoming a busted flush[73].

Saudi Arabia unbelievably is now on the verge of a major fiscal crisis as its economy enters both recession, and for the first time ever, a budget deficit. On its 2015 current account a deficit had grown within six months to 20 percent of GDP - or $140bn. Entirely petroleum generated reserves which stood at $737bn in August 2014 fell to $672bn by July 2015 and by January 2016 were falling at $12-15bn per month.

In an economy which has no income from income tax, interest on dividends, internal corporation tax or VAT, this is bound to impact hard on domestic finances. Hitherto subsidies have pegged electricity at 1.3 cents/kwhour and petrol at the forecourt has sold at 12 cents/litre. Petroleum surpluses have also bankrolled the tradition of Wahhabi ‘charity’ which has done so much to

[71] These performance data are based on current IAEA performance assessments of this reactor type.

[72] Figures based on net calorific values of fuels as follows:

Coal	40 kw/kg
Fuel oil	43.6 kw/kg
Natural gas	51.6 kw/kg

[73] Bank of America. Interim Energy Digest, New York July 2015.

keep the lid on social tensions as well as spread the House of Saud's influence elsewhere in Islam.

Anticipating US shale and oil penetration into the European markets and denying Gulf oil or gas a share of the North American market, Saudi Arabia took a gamble by driving down world oil prices by increasing output to 10.6m barrels per day. Using its dominant position within OPEC it encouraged the other petroleum states to do likewise. In a short time, much US high cost production was either capped or in the case of many US shale debt financed projects, bankruptcy threatened.

By February 2015 the low oil price had taken some significant scalps. Projects in Northern Siberia were suspended, deep-water exploration in the Gulf of Mexico was all but abandoned, the Canadian tar sands were put on hold, deep-water exploration in Brazilian waters was suspended and the North East Atlantic (Scotland) exploration and developments were halted. According to one analyst[74] the oil 'majors' between them had abandoned some 46 large scale projects amounting to a $200bn of investments. The same sources have suggested the total capital write-off to be nearly $800bn. The latest estimate of world oil business asset value losses since November 2014 put to write-off to July 2016 as high as $2 trillion.[75]

But the Saudi gamble has in part been a pyrrhic victory. The US shale sector has proved to be more resilient and although the US rig count has fallen from 1,910 in Dec 2014 to 1,310 in Feb 2015, output in June reached a record high of 9.6m barrels per day[76]. And although many small drillers have gone bust, this has meant a considerable availability of cost written-down rig equipment which the bigger producers have cashed in on. This means that rig costs per barrel have come down from $8 to just $2.78, which has seen output rise over 30 percent above the June 2009 level[77]. It is now estimated that with a sustained oil price as low as $55 per barrel most US shale producers could at least break even - although the IEA suggests a sustained drop of 600,000 barrels per day until 2017.

US shale producers have also been able to benefit from a number of technical innovations[78] as well as increasing the number of wells per platform up to 10 - which according to some industry sources has resulted in savings of $300,000 per well[79]. This means drilling cost savings of 50 percent with further cuts of 30 percent in the near future. Also drilling times have been cut drastically with a 18,000 ft deep well in the Permian Marcellus Shale of the Appalachian basin being cut from 30 to 16 days[80].

Saudi Arabia's price war gamble has had a range of unintended outcomes. Firstly, it has exposed how high cost and vulnerable many OPEC producers actually are and the extent to which they

[74] Wood Mackenzie. May 2015.
[75] R Katakay and J Carroll, Bloomberg 'Next week is as Good as it gets for Big Oil', July 22nd 2016.
[76] Rex Tillerson, Exxon Mobil quarterly report August 2015.
[77] Wood Mackenzie, ibid.
[78] Enhanced Oil recovery (EOR) methods such as Plasma Pulse Technology is now being deployed for 'revisiting' existing well and 'unclogging' oil-bearing strata, thus avoiding repeat the high capital costs of opening up new wells. At a later stage (when higher costs permit) further EOR like high pressure CO^2 injection may be considered.
[79] John Hess, CEO Hess Corporation. Quoted in Oilprice.com July 2015.
[80] Pioneer Natural Resources. Quoted in Daily Telegraph 5th August 2015.

were forced to the edge of ruin within a year. Secondly, this development has brought into question the long-term viability of OPEC as well as the fitness of an increasingly capricious Saudi Arabia to lead it. And thirdly, it has shown how resilient and potentially long-term[81] the US shale sector has proven to be[82]. A recent survey of the Permian basin of West Texas has revealed a field that could yield between 5-6 mb/per day and could hold reserves in excess of the giant Ghawar field in Saudi Arabia[83].

But the oil price gamble plus a more wayward foreign policy drift has probably done much to undermine the trust between Saudi Arabia and the US. Hence Obama's nuclear diplomacy initiative with Iran and the drift towards a reliance on Iran for training anti-ISIS Shia militia in Iraq. Then the sudden and bloody 2015 assault on Yemen and the increased tendency of Saudi Arabia to use armed force as a first resort, must be worrying US strategists who through Obama's 'strong power'[84] variant of the Munroe doctrine have clearly been placing more effort on diplomacy - albeit a diplomacy backed up by regular drone strikes.

Meanwhile Saudi Arabia's foreign policy drift to Russia and its long-term grudge match against the US shale oil and gas sectors may further distance it from Washington. But whatever the medium-term developments, we are likely to see a heightening of competition within the global hydrocarbon markets that in holding down prices will drive both production and consumption of oil and gas in the opposite direction of the global CO^2 targets needed to arrest an accelerating trend to irreversible global warming.

Imperialist dimensions of a hotter world

When J. A. Hobson first penned the term *Imperialism* in 1899, Otto Benz had just invented the reciprocating internal combustion engine powered by 'benzole' - an oil derived fuel and Joseph Djugashvilli (Stalin) had yet to start his career as a fund-raising bank robber in the oilfields of the Caucasus around Baku on behalf of the Russian Social Democratic Labour party. Teddy Roosevelt had just fought a war with Mexico over oil and William Knox D'Arcy was rummaging the wilderness of Persia on behalf of the British government in order to appropriate it[85].

Such references are far from frivolous in that they underline a reality of the modern age: oil was the founding global commodity of imperialism and still as a life-blood of industrial capitalism it remains the stuff over which most blood continues to be shed. Oil whilst transforming much of the technical means of production it is also the stuff of gangsterised client states, despots, tyrants and the cause and curse of arrested development for many producing countries. The 'majors' -

[81] An interesting and, so far, unpublished paper on the 'shale revolution' by Jonny Jones, *What the Frack? Behind the shale revolution*,2013 has examined the possible impact of unconventional oil and gas producers and also regarding the long-term impact on fossil fuel economics. Unfortunately, this draft was written before the oil price crash of early 2015. However much of the analysis of that paper forms much of the opening part of this article.
[82] Gaurav Agnihtri, *'The Saudi oil price war is back-firing',* Oilprice.com 6th August 2015.
[83] Pioneer Natural Resources. Report quoted in Daily Telegraph, 5th August 2015.
[84] A doctrine of 'strong power' was what Obama used to allay Israeli concerns over the Iran nuclear power deal. Probably in order to give Obama a lasting place in the history books, more sycophantic supporters have hailed strong power as the 'Obama doctrine'.
[85] Charles More, *Black Gold: Britani and Oil in the Twentieth Century*, London 2009.

the principal corporations that dominate the world hydrocarbon business have annual turnovers and surpluses that many modest size nation states would envy and they enjoy a privilege of access to the highest levels of government and military authority that circumvents any pretence to democratic accountability. Though environmental responsibility is respectfully nodded to, in practice it is both begrudged and frequently flouted.

The consolidation of the petroleum industry resulted in the formation of massive companies, which although initially locating their business in a particular region, soon became the first truly trans-continental corporations. Central to the well-being of their host nations, these companies inevitably became instruments of government foreign policy. The continual process of consolidation gave rise to corporations in which it was often difficult to distinguish between commercial business and high affairs of state. British Petroleum (BP) started life as a swashbuckling venture as the Anglo Persian Oil Corporation (APOC) in which the Persians had no say. Buying the highest favours in high office APOC could persuade one of its earliest imperialist advocates Winston Churchill; the first Sea Lord of the Admiralty to convince the Royal Navy to convert their ships to oil firing. Which they duly did and with APOC having exclusive contract rights[86].

But the real hey-day of the petroleum period came after the Second World War and the spoils arising from the infamous division of the globe into respective 'spheres of influence' in which the major powers were designated post-colonial fiefdoms. It was in this period of monopoly capitalism that the oil interests morphed into the 'Seven Sisters'[87], forming a cartel which, whilst carving out regions ripe for exploitation, also contrived to minimise exploration and extraction costs whilst fixing the price downstream to the consumer[88]. These arrangements survive relatively intact despite the passing of the post-war corporatist and mixed economy.

The 1973 Yom Kippur war and the subsequent massive oil shock did much to cement further the relations of oil and state and subsequent events up to 2003 and the invasion of Iraq have deepened the symbiotic relationship[89]. But the intervening years have seen concerns regarding energy security compounded with alarm regarding unfettered carbon emissions. Here again the embrace of oil and state has tightened with governments initially prepared to risk their reputations by endorsing climate change denial[90], as persists to this day with the US Republican party proud to be the voice of 'big oil'. This particular phase of neoliberal imperialism renders electoral 'power' impotent in the face of the national interest merging seamlessly with the corporate priorities of energy corporations[91]. And where energy corporations fear to tread there is always the defence lobby that can provide the latest in hi-tech counter-insurgency kit to quell the occasional rash of local anti-corporate trouble[92].

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[86] Charles More, ibid, Ch 1, *Governments and Oil* pp, 11-22.
[87] Anthony Barnett, *The Seven Sisters*, 1974
[88] Timothy Mitchell, *Carbon Democracy: political Power in the Age of Oil*, 2011, revised 2013.
[89] Greg Pallast, *Vultures Picnic*, 2012. Also Barnett, ibid.
[90] This has been most notable in the case of right-of-centre political parties who have often commissioned quite bogus scientific climate denial 'evidence'.
[91] Tariq Ali, *The Extreme Centre: A Warning.* Ch 4, *Natopolis*, pp 109-121. London 2015.
[92] Haliburton, the oil industry services contractor is reputed to 'employ' more private security personnel in Iraq than the US did between 2006-08.

In whatever period, imperialism had little regard for the electoral mandate or sovereignty of the territories to be plundered. But in a period where enemies within and threat from without can be conjured by a compliant media for repetition in the hollowed-out democracy of parliamentary chambers, the prospect of reforming the institutions of an 'extreme centre' are negligible. In an age in which an imperialism can at a whim call upon 'the mandate of markets over that of the ballot box'[93], then the insurgency of the masses as the agent of fundamental change is long-overdue.

Climate change.

In the energy wars and crises of the past 30 years we have seen hundreds of thousands killed, millions displaced, battlefields irradiated with depleted uranium, aquifers exhausted and polluted, oil field fires burn out of control for months on end and river deltas such as the Niger - previously rich ecosystems of great bio-diversity with nutrients so capable of supporting abundant agriculture - polluted beyond repair.

For countries like Nigeria - the biggest and potentially richest economy in Africa, the position of being a client state to the Shell petroleum company is both a blessing and a curse[94]. A blessing in that it tantalises with the promise of jobs and a better life. And a curse in that only a few will prosper and the shanty town twilight zone between the rural poverty they flee and the bright lights of the city they yearn for becomes a degraded and permanent reality. Yet in such a situation they come to realise that oil and gas - resources well beyond their immediate control - offer the only possible means economic progress and a better life.

The enormity of the environmental crisis now confronting humanity needs little elaboration here. But what needs to be said is that the knowledge of the problem has eventually penetrated the more sceptical of quasi-scientific bodies such as the **International Energy Agency[95]** (IEA). However, their forecasts for 2014-40 in terms of fuel production against a background of proven levels of global temperature rise are alarming.

[93] Mario Drahgi, European Central Bank, speech on the need for deficit control 2011.

[94] Nigeria as a high-cost OPEC member state has suffered enormously from the oil price collapse of Jan 2015. The country presently has an inflation rate of c.60 percent but for some essentials such as clean bottled water, the rate of inflation is around 300 percent. Under the stewardship of Shell Nigeria's markets have shifted to South East Asia where gulf producers, now excluded from North American markets, are now competing for market share and at a lower price that Nigeria can produce at.

[95] The IEA is the energy advisory body to the OECD. In terms of regular summaries on the world's energy resources and industries its *World Energy Outlook* is an invaluable resource. But it is only recently that the IEA have begun to caution on the consequences of unregulated energy production. Also for most of its climate modelling, the IEA relies on data from the International Panel on Climate Change (IPCC).

In their 2015 offering the[96] IEA proposed a central case in which:

- Energy demand will grow by 37percent to 2040 with a projected annual growth of 1.1 percent;
- The world supply of oil will rise by 14 million barrels per day until 2040;
- By the mid 2020's the main source of oil will slip back to the MENA region;
- In all major regions except Europe there will be a 50 percent increase in natural gas production to 2040;
- Combined UN efforts to curb CO^2 emissions will fall short of the 2^{o}C target;
- Emissions will rise by 20 percent to 2040;
- Current emissions now put the world on track for a **3.6^{o}C** rise in global temperature;
- Even by reducing carbon fuels by 25 percent now we would still fall 50 percent short of limiting temperature increase to 2^{o}C;
- US shale gas will continue year on growth until mid-2030's;
- Gas will grow and be sustained at **5 trillion cu metres per year** to 2040;
- World electricity demand is set to increase by **80 percent** during period 2015-40;
- Power station CO^2 emissions with rise from 13.2 gigatonnes to **15.4 gt** by 2040.

On the basis of the above it is clear that under the continued stewardship of rapacious capitalism that the global greenhouse we inhabit is fast becoming a madhouse.

Capitalism long ago became incapable of ensuring human well-being. Now through the wilful mismanagement of our planet the time has come to relieve it of any future responsibilities.

[96] IEA. *World Energy Outlook 2015 Factsheet.* www.worldenergyoutlook.org

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