



The World according to Gave

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Charles Gave a partner in [GaveKal Research](#), and co-author of the book "Our Brave New World" has been on a lecturing tour of the UK sharing with others, amongst other things, his unique view on World energy and oil. This has been the subject of some debate around the TOD office in recent days and it was therefore fortuitous when an article detailing his insight fell into our mail box affording us the opportunity to examine some of this influential character's analysis of world energy trends. Given my location in the UK, I had at least six hours head start on my US based colleagues and the opportunity to pass the TOD ruler over Charles Gave fell to me.

The article [Oil: Will the Malthusian View Carry The Day?](#) appeared on [InvestorsInsight](#) on 26th September. Editor John Mauldin had this to say:

Today's "Outside the Box" will be one of the more controversial pieces that I have sent out over the past year. My long-term readers are well aware of my views on oil and energy, yet despite my beliefs, I find it valuable to read thoughts from those who have different views. These challenging view points come from my good friend, the very intelligent and always thought-provoking Charles Gave.

Thank you John for providing us with the opportunity to put the record straight on some fundamentally important issues.

In his essay on [Oil: Will the Malthusian View Carry The Day?](#) the respected Charles Gave lays out his vision for energy in the 21st Century. This vision to a large extent seems to be modeled on France, where he maintains a home, a country that he considers to have already achieved energy independence. He sees a future powered by nuclear electricity, a future that is no longer dependent upon energy from countries that are run by what he describes as "unsavory characters" and "unreliable lunatics".

This critique of what Charles Gave has to say is incomplete. Quite simply, I do not have the time nor space to address all of the inaccuracies and inadequacies in his essay on Oil. I have chosen to focus on several key issues. In ignoring other issues, I invite my-co-contributors and readers to have their say.

Gave on new oil recovery technology

With the price of oil where it is, it makes a lot of sense to invest substantially to try and optimize the output from any individual well. In the past 25 years, we have seen the average extraction at existing wells climb, thanks to technology, from 25% of known reserves to 40% of reserves. Norway has set a target of 65% to 70% recovery for a good part of its reserves and is already achieving that in some fields. Where do the improvements come from? Technological progress!

Promising technologies include digitalization, whereby numerous fiber optic temperature and pressure sensors are placed underground in a field and connected to the surface. Data from sensors is sent to operations centers and fed into computerized optimization models. The combination of real-time, belowground data and sophisticated modeling then allows engineers to optimize ongoing pumping and future drilling schedules and thus capture a larger percentage of the oil that's in the field.

Gave is of course right to draw attention to new technology that enables higher recovery factors. I believe he is referring to down hole pressure, temperature and flow monitoring technology that actually has little to do with improving overall recovery. The big technological developments in this regard have been the development of inverted 3D seismic techniques that allow engineers to actually image fluid distribution in the sub-surface, running these seismic imaging surveys at regular intervals to build a picture of fluid movement through reservoirs with time (4D) and horizontal wells and the drilling and steering technology that has made these wells possible. All this has been combined with an explosion in computing power and the development of reservoir modeling tools that allow the data to be displayed and simulated. An array of other techniques such as miscible gas flood, hydro fracturing of reservoirs and under-balanced drilling have all played a role in increasing recovery factors.

So geologists and engineers can now build an accurate picture of the subsurface oil and gas distribution and drill the wells to get at and produce the oil and gas. And these technologies have existed and been deployed for many years. There are physical limits determined by reservoir watability and capillary forces that determine how much oil can be recovered from a reservoir and it is quite wrong to offer hope that these technology developments can drive up recovery factors forever. Norway is a fine example where all the available technologies have been deployed and high recovery factors attained. Norway, however, has some of the best oil and gas reservoirs in the world and it is wrong to suggest that by applying technology that the Norwegian example may be replicated at will. Many poor quality reservoirs will never produce more than 10% of the oil they contain.

The most pertinent and sobering aspect of applying technology in oil field development is that it does not prevent the inevitable peak and decline in individual fields, sedimentary basins and countries. Despite all the technology deployed in Norway, oil production peaked in 2001 and has now began fairly rapid decline - 7% in 2005. It has been a recurrent theme here on TOD that enhanced oil recovery technology (EOR) tends to borrow production from the future and that once peak is passed, decline may be more rapid than had technology not been applied in the first place. That I believe is one of the main lessons to understand about EOR - once decline starts it may be very rapid.

Gave on oil and politics

"But of course, there is more to oil than a simple supply and demand equation for God, in His infinite wisdom, put oil reserves under the control of some of the more unsavory characters out there (or did they become unsavory because of oil?) After all, oil has been a curse to most countries endowed with it."

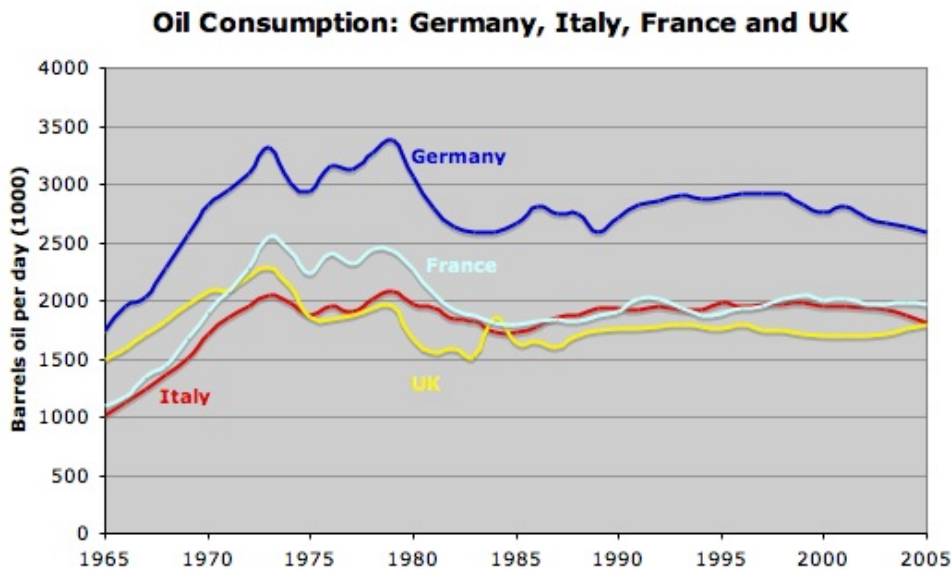
On this I must agree in part. The USA was of course endowed with far more than its fair share of oil and gas, as was the UK and Norway. And this has proven to be a curse, breeding dependence upon this resource, leading to a life style and transportation infrastructure that is totally dependent upon oil.

"The fact that oil is mostly controlled by unreliable lunatics (Iran, Venezuela, Russia,

Iraq...) should lead the non-lunatic parts of the World to invest - regardless of the costs involved - to achieve energy independence (this is what France did in the 1970s and 1980s with its nuclear program, though few countries decided to follow this path). This process will likely involve massive wastes of capital (but then, that is the price of independence). It will also push oil-producing nations towards political irrelevance."

Of the many dubious statements made here, the one I want to focus on is Mr. Gave's notion that France some how achieved energy independence. This is a ludicrous notion.

Unlike some of its neighbors (the UK, The Netherlands and Germany), France has little by way of indigenous energy resources - oil, gas and coal. Faced with the crippling rise in energy costs following the oil shocks of 1973 and 1979 France opted for the nuclear route, whilst others turned to coal and natural gas for electricity generation.



In 2005 France consumed and imported more oil than the UK and Italy

In 2005, France consumed more oil than Italy and the UK, but unlike these countries that both have indigenous oil industries, virtually all of France's oil was imported. So French automobiles and planes run on imported oil. The big difference in France is that 80% of their electricity is generated from nuclear. So where does nuclear energy come from? At the present time, virtually all commercial reactors run on enriched uranium. Like oil, the bulk of global uranium reserves lie outside of the OECD:

Country	Tonnes	U% of world
Australia	1,143,000	24%
Kazakhstan	816,000	17%
Canada	444,000	9%
USA	342,000	7%
South Africa	341,000	7%
Namibia	282,000	6%
Brazil	279,000	6%
Niger	225,000	5%
Russian Fed.	172,000	4%

Uzbekistan	116,000	2%
Ukraine	90,000	2%
Jordan	79,000	2%
India	67,000	1%
China	60,000	1%
Other	287,000	6%
World total	4,743,000	



French TGV trains run on nuclear electricity produced from uranium that is probably imported from Africa

[Only 3 OECD countries have significant U reserves](#) representing 40% of the World total, thanks to Australia being particularly well endowed in this respect. This needs to be offset against the fact that the Australians have had a moratorium on opening new uranium mines for many years. In general, within the OECD there is reluctance to open new uranium mines because of environmental concerns and this means there is a growing reliance upon non-OECD supplies. This gives rise to energy security concerns of the conventional type, i.e. reliability of supply, but has the added concern of enriched uranium ore (yellow cake) falling into the wrong hands.



Langer Heinrich, the World's first new uranium mine for decades is located in Namibia

France once had indigenous uranium deposits but these are now depleted. So [France now imports uranium ore](#) from Niger and Gabon in Africa (former colonies) and is looking to expand supplies from countries such as Kazakhstan, Uzbekistan, Mongolia and Madagascar.

[In 2005 France generated 57 Terawatt-hours of electricity from hydroelectric power](#) (compared with 453 Terawatt-hours from nuclear). France is one of the largest hydroelectric generators in Europe but apart from hydro and some other renewable sources France is totally dependent upon imported energy. In short, among the large OECD countries France is probably the most reliant upon imported energy and therefore has the poorest energy security. This vulnerability may in part explain why France is often keen to explore diplomatic routes to resolve conflict.

Gave on oil exploration

"In the world today, there are massive possibilities to explore for oil, and there is

certainly no shortage of oil discoveries to be made. However, almost everywhere there is a chance to find oil, the underground has been nationalized. As a result, the oil companies that have the technology can not drill, while the countries that have the oil do not have the technology, nor the will to look for it."

Whilst I sense where this statement is coming from, it falls well wide of reality. Lets look at how this statement stands up against Russia and the USA.

Russia is the world's second largest oil producer with a daily average of 9.6 million barrels per day in 2005. The Russian Empire (known to most as the Soviet Union) collapsed when it could no longer sustain its satellites and republics with cheap oil - a direct result of US foreign policy. It is naïve to think that the Russians didn't do everything they could to find new oil reserves in the decade leading up to this collapse? Whilst working under a medieval political system, Russia had and has a superior education system and turned out world class scientists. The notion that Russia has not been comprehensively explored for oil and gas, therefore, is quite simply untrue.

What is true, is that much of Russia's unexploited but discovered resources lie in extreme inhospitable environments. Like the Shtokman gas condensate field, 530 km from land, north of the arctic circle in the Barents Sea. This is the new frontier in oil and gas development - and it is called the bottom of the barrel.



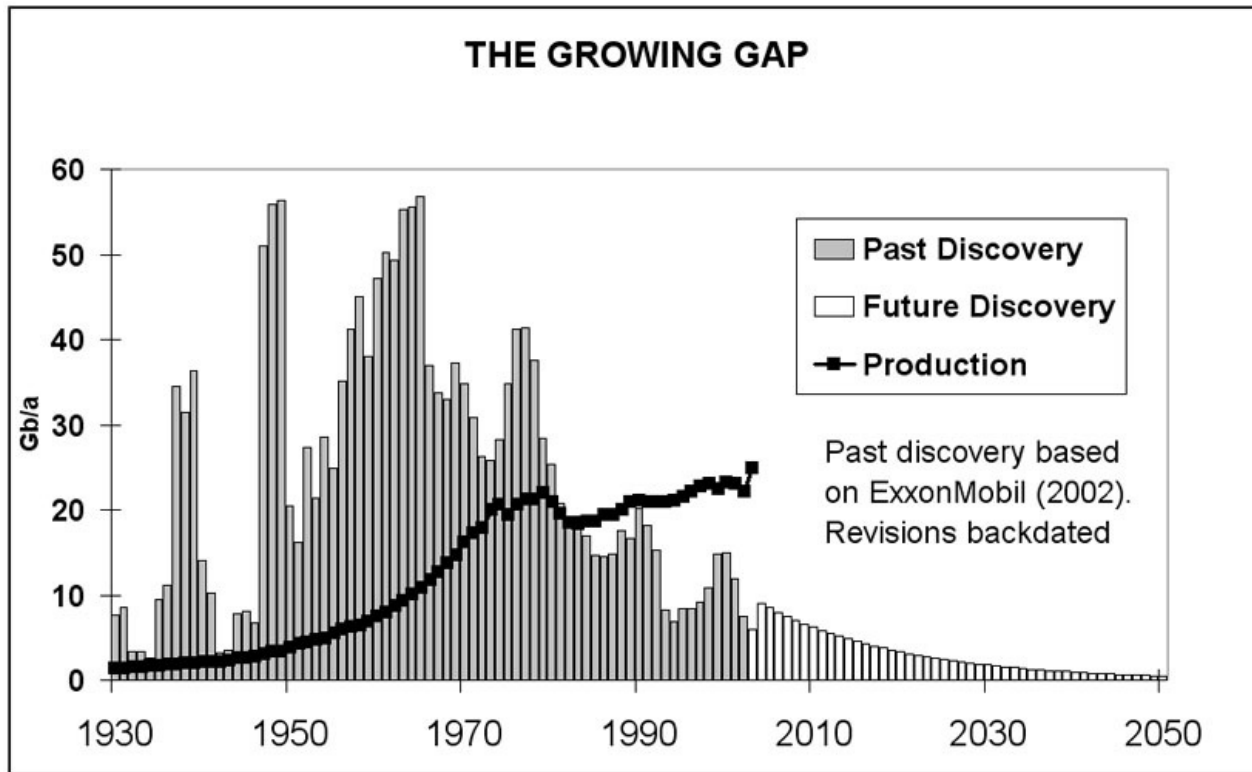
The Shtokman gas condensate field in the Barents Sea, offshore Russia. 113 tcf of gas, 350 m water depth, 535 km from shore in a land inhabited by ice bergs and polar bears - the new frontier in oil and gas development.

This needs to be compared with the exploration strategy of the USA. Vast tracts of prospective acreage lie off the East and West coasts of the USA and in the Arctic refuge of Alaska. These areas may, or may not, contain significant amounts of oil but remain unexplored. Not because the ground is nationalized but because Americans are afraid that oil exploration and production in these areas represents a threat to the environment. I can respect the views of the American public wanting to protect their natural environment, but I find it hard to tolerate the view that other countries are being obstructive to the OECD's God given right to rape them for their natural resources.

The majority of developing countries welcome foreign exploration companies for both the capital and technical expertise they bring. Much of the new oil coming to market today is from countries like Kazakhstan, Azerbaijan, Libya, Algeria, Mauritania, Congo and Angola. These countries have been and are being extensively explored by OECD oil companies. The trouble is, they are just not making big discoveries any more.

The fact is that since 1983, the world has consumed more oil every year than it has discovered. This has nothing to do with national politics or culture, it is a plain fact of life that big fields are easy to find and most of the big fields were found early on in the oil exploration of the world. It is of course true that if western companies had access to parts of the Middle East and Russia that

exploration success may be improved at the margin. But it is naïve to believe that this would produce an oil bounty that would solve the World's second biggest problem right now - which is the imminent peak in global oil production.



Each year since 1983, the World has consumed more oil than has been found. For over 20 years, a back log of old discoveries have been developed but now this back log is running thin. By 2010, the cupboard will be virtually bare and it will be increasingly difficult to replace production losses from thousands of declining fields with production from a diminishing number of new field developments. [Data from the ASPO web site](#). [Click to enlarge](#).

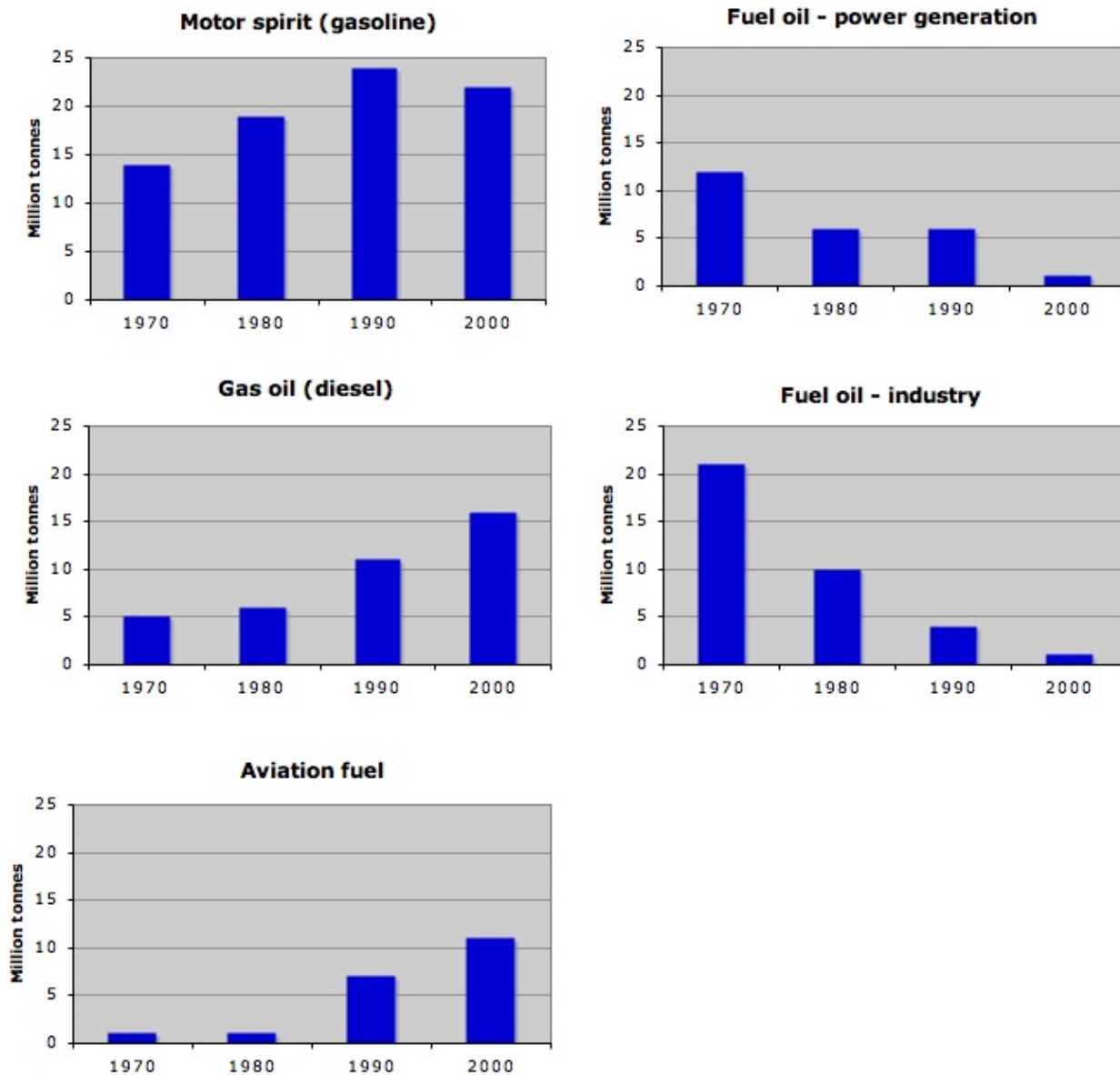
Gave on prices and substitution

"Production of energy at the individual and local levels: everywhere we go, especially in Europe (where the price of energy, on top of being very high, is also heavily taxed), we find new and interesting forms of energy production: in Scandinavia geothermal energy (one drills in the rocks, and gets the heat coming from below); in France, a massive movement towards heating pumps (exchanging heat between a source of water and the atmosphere - in fact, after a brutally hot summer in Provence, I am biting the bullet and having such a system installed in my Avignon house); in Denmark, there are quite a lot of wind turbines; in Spain, you can see solar panels on a growing number of roofs. All these systems enjoy huge tax breaks, and, once they are put in, they are here to stay; markets lost for oil, forever."

"The first conclusion that one has to reach is that the use of oil (and natural gas) outside transportation is thus going to go down structurally. Oil will increasingly be used for what it should, namely 'movable energy' and transportation. But even there, big changes could be unfolding."

In these two statements Mr Gave provides a view that a variety of alternative energy sources being developed and deployed in Europe, and indeed throughout the World, will lower our

dependency on oil. At the heart of his argument is the notion that Europe still uses oil for electrical power generation and space heating. This of course is fantastic nonsense. In Denmark, following the oil shocks of 1973 and 1979, virtually all oil fired power generation was closed down (the Danes now rely upon coal [supplemented dubiously by wind](#)). In the UK, the use of oil in power generation and in industry has already been reduced to near zero. The Norwegians of course are near 100% dependent upon hydroelectric power and the Swedes use nuclear and hydroelectric power. The French, as already discussed, rely mainly upon nuclear and hydro power for electricity generation. Whilst I have not had time to check all OECD countries, I think it is likely that the majority will follow these trends having converted to coal, natural gas, nuclear and renewables in the wake of the 1970s oil shocks. Some oil will still be used of course for space heating and back up-power generation, but I believe that in most the demand for oil in industry and power generation has already been destroyed - and cannot be destroyed again.



In the UK, the 1970s oil shocks destroyed demand for fuel oil used in power generation and industry. Transportation now accounts for most oil use. The 2010s oil shocks will likely destroy demand for transportation - starting with the poorer countries and poor consumers. [Click to enlarge.](#)

Thus, if significant cuts are to be made in our oil consumption these must bite into use of oil for

transportation. Ironically, Mr Gave seems to understand this point, but offers the empty chalice of oil consumption cuts elsewhere.

I also feel compelled to comment on Mr Gave's point about geothermal energy being used in Scandinavia. Geothermal energy is a viable alternative energy source where, through volcanic activity, hot rocks from which energy can be extracted, occur at shallow depths. This energy may be tapped by drilling, and pumping water down the wells that returns to the surface as super heated steam.

In a plate tectonic context, there are three geological environments where volcanic activity occurs - at destructive plate margins such as the subduction zones that surround the Pacific ring of fire, at mid-ocean ridges - where new ocean crust is formed by the up-welling asthenosphere and in hot spots, such as Iceland and Hawaii. Scandinavia, I'm afraid, does not fall into any of these environments.

[According to BP](#) in 2005 The World had 8938 MW of installed geothermal generating capacity. The USA was top with 2544 MW, followed by The Philippines with 1931 MW and Mexico with 953 MW. These figures need to be compared with other forms of electricity generation and for example a large coal fired station is typically 2500 MW. So all the installed geothermal capacity in the World is equivalent to between 3 and 4 large coal fired plants - not very much! Furthermore, Scandinavia has zero reported installed geothermal capacity (unless you include Iceland which is geologically unique on planet Earth). So the geothermal energy result is:

Rest of the World 8938 MW - Scandinavia 0 MW

The main point I want to make here is that the respected and influential Charles Gave doesn't have a clue what he is talking about with regard to energy substitution and geothermal energy. He is offering the world non-existent solutions.

Gave on the future and the motor car

A lot of oil is used in short-haul transportation (commuting). The hope here lies in the fact that the technology in batteries is changing fast. Next year, in the US, the first electric car with a range of more than 300 kilometers (a two seater, very exciting sport car) is going to be produced in California. Granted, it will be very expensive (over US\$80,000), but all inventive new products are, at first, very expensive. With time, and greater production, prices collapse.

The emergence of the electric car will be a huge bonus for the nuclear power industry, the cars recharging at night, when the demand for power is the lowest, hereby guaranteeing an optimum use of the power grid infrastructure. Within a little more than a decade, one could see the use of oil for short-distance commuting absolutely plummet.

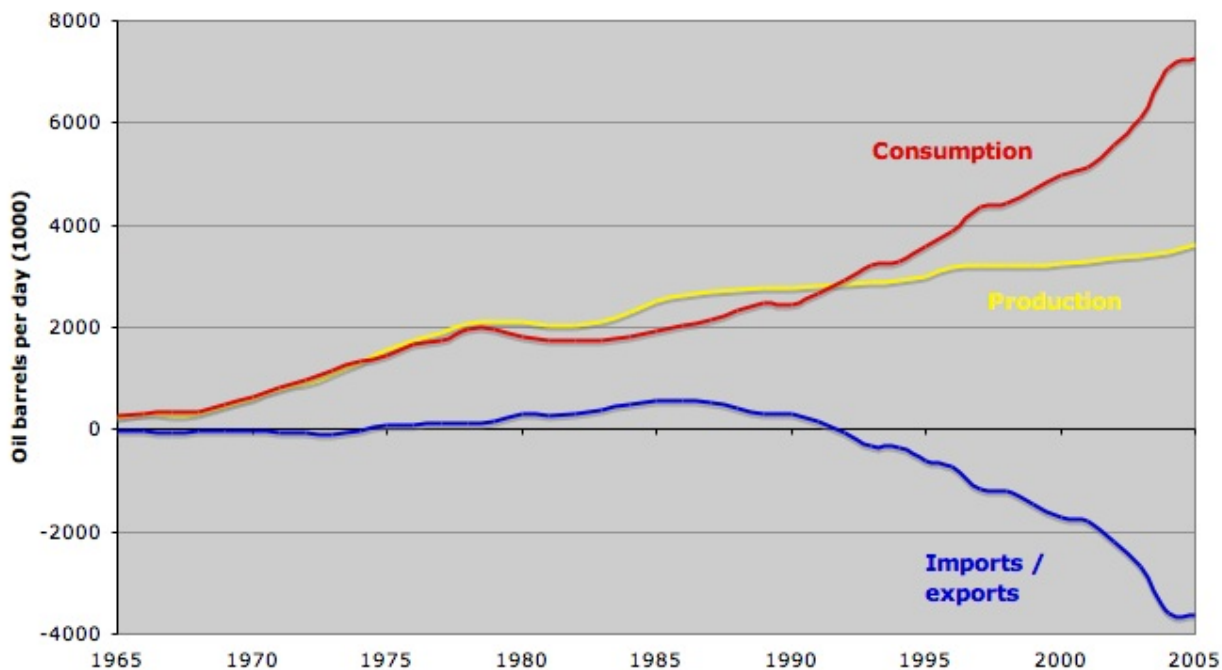
The long haul will remain the undisputed domain for oil, whether for trucks, cars, boats or planes. But here also, technology is going to bring about quite a few changes on the demand side of the equation. One only needs to think of the hybrid car, or the growing dominance of the diesel engine, or the fuel-efficient Boeing Dreamliner, or of the substitution of gas-guzzling SUVs (for example, I traded in my Avignon Range Rover for a far less chic new Diesel Citroen. The Citroen literally uses a fifth of my old gas-guzzler... and will most likely break down a lot less too).

And so towards the end of his essay, Charles Gave begins to make some sense. I have to agree that the emergence of better batteries and short haul electric cars will solve part of the problem, that nuclear power will be greatly expanded and that fuel economy, especially in motor vehicles, should be one of the first measures introduced. The problem is that Mr Gave does not seem to understand why the world is moving in these directions. He seems to see a nuclear future emerging so that the OECD will reduce its dependency upon fossil fuels imported from developing countries - only to have this dependency replaced by importing uranium from developing countries.

The world is moving towards a nuclear future, mainly to reduce carbon dioxide emissions related to coal and gas fired power stations. To then make the transition to an electric transportation network will add significantly to grid demand requiring that nuclear and renewable electricity sources are expanded well beyond the current grid capacities. Making this transition will take decades. Not only do we need to build vast numbers of new reactors, we need to gain consent from a fearful public, and we need to find and mine the uranium resources to power this new electric future.

Gave seems to believe that this nuclear electric panacea can be delivered in a matter of years, marginalizing oil and bringing, in his opinion, deserved turmoil to countries upon which we are all still dependent for energy. He conveniently ignores the fact that rapidly developing countries like China have an accelerating thirst for oil. He seems oblivious to the fact that the energy debate revolves around how to get from current dependency upon oil for transportation to a CO2 free, nuclear / renewable energy future. This step will take decades to achieve and it is doubtful that the World Economy will survive intact, particularly if it listens to poorly informed advice from the likes of Charles Gave.

China - oil production, consumption and imports



Runaway chinese oil imports paused for breath last year, presumably as higher prices began to bite. With Chinese urbanisation and industrialisation continuing, how long will it be before the trend of rising oil imports is re-established? Falling per capita oil consumption within the OECD (which must happen) will be swallowed by rising per capita consumption in the industrialising world.

Our 19th century world was dominated by coal. Our 20th century was dominated by oil. It is our firm belief that the 21st century will not be dominated by oil. It will be dominated by electricity; and oil will become a marginal energy. This simple truth might help explain why, since 2001, uranium has not had a single down month, and since 2003, uranium has never traded down for even a single day, regardless of what was happening to oil prices.

In recognizing these simple truths, Charles Gave does not realize that he is adopting the Peak Oil position. He is of course right, oil will become a marginal energy form as the 21st century progresses and supplies fall year on year on the long journey down the depletion curve. But to suggest that it will become a worthless irrelevance denies the fact that for air travel there is no viable substitute for jet fuel on the horizon.



Running on alcohol, or even hot air? [Virgin plans to spend billions](#) developing new forms of aviation fuel brewed from logs and corn. [Click to enlarge.](#)

Conclusion

There is no doubt that we have been on the wrong side of the great oil bull market. And a number of clients have (rightly) taken us to task for this mistake. After all, oil was one of the more important calls for money managers in the past year.



Charles Gave - running on empty

Charles Gave opened his essay with an extraordinary admission that they (GaveKal) have completely misread the oil market so far this century - and their clients are rightly annoyed. These clients now need to ask themselves whether it is wise to continue accepting advice from a xenophobic organisation that seems to have little understanding of World energy resources.

Charles Gave represents a Cornucopian of the most dangerous sort, respected and influential in some circles and yet almost entirely ignorant on energy matters.



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