

Depletion Changes the Script

a report by

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The Cultural Economist

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Of all the issues that people confront in the 21st century, resource depletion promises to have the greatest impact on economic and cultural destiny. Of the world's dwindling resources, none will have a greater impact on the future than the decline of oil and natural gas.

The economic impact of oil and natural gas depletion is not a future event. It is happening now. Days of surplus are coming to an end. Although the impending decline of oil production is perhaps 20 years ahead of a similar decline in the production of natural gas, upward pricing pressure on the oil market will drive a similar increase in natural gas energy costs.

World oil and natural gas markets are in transition. Historically, consumer demand usually established the parameters of consumption and pricing but, in this new era, consumption will be limited by producer capacity. Oil and natural gas prices will be highly volatile because of the inevitable mismatch between demand and supply.

Exporting countries will be in a position to control the price and availability of increasingly scarce commodities. As a result, corporate behaviour, government action, cultural stability, economics, legal agreements, geography, weather, transportation, military diplomacy and the always potent combination of religion and politics are now more important than geology in developing resource production forecasts. Call these the derivative factors of doing business on a global scale. Each one could disrupt the flow of oil and natural gas. As a result, proven or identified reserves are less important than accessible reserves – i.e. the oil and natural gas that can actually be found, produced and transported without disruption.

Cultural conflict is a barrier to oil exploration and production (E&P). Most of the world's existing conventional oil is controlled by political regimes that are vulnerable to religious fanaticism. Islamic extremists obviously understand that oil is a weapon of war. They have the motivation, the means and the opportunity to disrupt the flow of oil. This takes us to Saudi Arabia – and Iraq. Future supplies of oil –

i.e. enough oil to meet the growing world demand – teeter on the political stability of these two countries.

Vulnerability of the World Economy

National selfish best interest will also play an important role in natural gas E&P. There is a growing realisation that a nation's oil and natural gas reserves should be retained for internal consumption. Canada, for example, will eventually set limits on its oil and natural gas exports to the US. In addition, nations that conserve their natural gas and oil reserves will be in a position to exert political power over those that have none of their own – a fact that virtually guarantees that Western Europe will be forced to move politically closer to Russia.

Of immediate concern, of course, is oil depletion. The question is how much oil there is left. There are those who claim that the Earth contains up to 10 trillion barrels (Tbl) of oil. The question is where it is, and how much of this windfall that is technically and economically feasible to produce. For example, it will be practical to develop only a small fraction of the world's enormous deposits of oil sands and shales. Deep-sea and arctic deposits are both difficult and expensive to reach. Declining discovery rates appear to indicate that most of the easy-to-exploit pools of oil have already been found.

Upper Limits of the Reserves That Can be Produced

Better information is needed, but is not available. Nations tend to treat resource statistics as classified information, which leaves the rest of the world with currently available reserve data. Total world resources of conventional oil and natural gas liquids appear to be just over 1.4Tbl. If estimated producible non-conventional oil resources are added, there are approximately 2.3Tbl of economically viable oil left on the planet.

However, the key issue is not how much oil is left in the ground. Going forward, the key issue is how much oil can be produced. That is an entirely different

and very difficult question. In order to evaluate how much oil can be produced over the next 20 years, the entire supply chain – from exploration to consumption – must be examined and, then, the impediments of potential conflict must be factored in.

Disaster prophets have predicted that, once oil production peaks, it will decline at a rate that is equal to, or greater than, the rate of increase experienced when there was a surplus of reserves. This is the very sharp ‘peak’ of oil production so often seen in various articles on oil depletion. If geology and the mechanics of extraction were the only variables, this would probably be the case. A sharp peak would occur, and oil consumption would appear to fall off a cliff because of a rapidly growing delta between demand and production. However, due to the fact that neither production nor consumption have historically followed a smooth curve – up or down – and due to there being an economic interaction between demand, consumption and production, the peak of consumption should be expected to be characterised by a series of alternating cycles. Periods of shortage

For the world economy, restrictions on consumption will be recessive. Almost every industrialised nation will experience declining rates of gross domestic product (GDP), along with higher rates of inflation and unemployment. Chronic recession, perhaps punctuated by depression and a period of sharp deflation, loom on the economic horizon. The cultural fall-out promises to be chaotic. New lifestyles will be adopted, along with new values, new social customs and new political philosophies. The options are to try to manage a ‘soft landing’ by taking action or to let nature take its course. ‘Taking action’ means encouraging oil and natural gas production, fuel efficiency and energy conservation. It means actively investing in the development of alternative energy resources. It also means new opportunities for E&P companies.

- Once public opinion reaches critical mass, there will be broad political support for a less restrictive E&P policy. These attitudes are already changing. Environmental sensitivity, however, remains a key concern for any development.

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will be separated by periods of surplus. Shortages will curtail economic activity. As oil production recovers, it will become available to a market where demand has been decreased by the recessionary influence of the previous shortage. Surplus oil decreases prices. Economic theory suggests that the combination of lower prices and surplus oil should stimulate demand – assuming, of course, that there are no peripheral events to limit an economic recovery. The recovery will continue until increasing oil demand again exceeds production. If production then decreases, or fails to keep up with demand, consumption will, again, be restricted by shortages. Restricted oil consumption, along with the associated increase in petroleum prices, will cause a corresponding decrease in economic activity. The cycle will thus be repeated.

The issue here is when the peak of world oil production is reached. On a rate-of-change basis, history will probably show that production peaked sometime between 2003 and 2010. Unless there is a deep worldwide recession, the absolute peak will occur before 2020. If the peak is graphed, it will look like a broken tooth. A relatively insignificant high point will be followed by an irregular pattern of decline.

- There will be an increased focus on the re-development of mature oil fields, the liquefaction of stranded natural gas and the exploitation of non-conventional fuel resources. Found resources will be more expensive and difficult to produce.
- Financial risk remains. Long-term loan and investment commitments should be sought. Lenders must understand that the long-term upward trend in the value of found oil and natural gas assets will be interrupted by occasional energy market volatility. Temporary periods of surplus will occur. Furthermore, increasing price pressure will eventually reduce the consumption of oil and natural gas.
- Energy return on energy invested (EROEI) must not be ignored. Although people tend to think of energy in terms of dollar costs, it takes energy to produce energy. The energy return for any new energy resource must be significantly higher than the energy required to find, produce, transport, refine, distribute and consume the resulting energy product. Thus, projects must have both a positive financial return and a substantial net energy gain.

- There is another looming risk for oil and exploration companies – at some point, oil and natural gas will become much too expensive to use as a source of domestic heat or as the feedstock for vehicle fuels. Consumer demand may be elastic, but the consumer's ability to pay higher fuel prices is not as flexible. Thus, it does no good to simply find oil and natural gas; rather, it must be affordable oil and natural gas.
- To encourage risk financing, E&P companies in the US should be lobbying for a revival of the energy tax shelter that gave wealthy individuals a motivation to invest in higher risk projects. If these projects are successful, the investor wins big. If they fail, part of the investment can be written off against other personal income.

Public Education

Another challenge that must be addressed is public education. The oil and natural gas industry faces an era of deep and growing public hostility, fuelled by ignorance and confusion. When times are good for the industry, they will be bad for consumers – and vice versa. The industry will be demonised for its apparent profitability during periods of shortage and its destructive environmental impact during periods of surplus. Although demonisation is nothing new, human suffering during shortages will be magnified by the media looking for a cheap way to fabricate a story and by pandering charlatans seeking political power. Shortages, rising prices and misconceptions will exacerbate the acrimony against industry participants.

A consumer backlash is already developing. Many choose to ignore the reality of depletion. People want the prosperity to go on forever. People like their energy-intensive lifestyle. If the price or availability of fuel threatens to disrupt the fabric of people's existence, they will look for someone to blame; 'bad' energy companies are an easy target. The Internet boils with proposals for retaliation and politicians debate 'windfall profits' taxes once again.

There are no easy answers, no instant satisfaction. Moving the world economy to a new energy paradigm will take too long. Even if it is possible to find a new way to produce an abundance of cheap energy, the process of implementing a new system of energy delivery will force significant cultural change. This, in turn, will lead to confusion, apprehension, suspicion and hostility.

The oil and natural gas industries must launch a credible response. The issues of reserves, production and depletion must be addressed with candour. The challenges of alternative fuels must be examined. A

comprehensive programme of public education must include a positive endorsement of prudent energy resource management, energy efficiency and conservation, ecologically responsible energy production and consumption and the development of alternative energy resources. Oil and natural gas depletion will inevitably force extensive cultural change. Of particular interest is the development of a constructive response within the local government infrastructure, the implementation of a pragmatic national agenda and the formation of productive partnerships between public and private organisations. As it is obvious that no country will be able to resolve its energy challenges without due consideration for the energy needs of other nations, international co-operation in the development, production and consumption of the Earth's energy resources must be encouraged.

While E&P companies are preoccupied with the day-to-day problems of running a business in challenging times, the world is facing an impending crisis of incredible dimensions. The public needs to know the truth. Consumers need to be prepared for a new energy age. The oil and natural gas industry needs to establish a credible and responsive organisation whose mission is the dissemination of fact-based analysis. This organisation could draw from existing information resources, such as the American Association of Petroleum Geologists (AAPG), the International Association of Drilling Contractors (IADC), the International Association of Oil and Gas Producers (OGP), Halliburton, Exxon Mobil, BP Amoco, Schlumberger, Statoil, Anadarko, TotalFinaElf, and so on. This organisation must be independent, non-partisan and very proactive.

Conclusion

Conservation, increased fuel efficiency and the sourcing of a growing volume of energy from alternative fuel resources will provide a buffer against the impact of depletion. If the oil industry can supply at least 720Bbl of oil over the 20-year period from 2005 to 2024, there is a reasonable chance that the impact of depletion can be minimised. However, everything has to work – on schedule. This will put a lot of pressure on E&P companies.

World oil consumption increased at roughly 1.7% per year from 1985 to 2004. Assuming consumption increases at the same rate to 2024, and assuming that existing reserve depletion averages 4% per year in the same timeframe, E&P companies must add at least 333.6Bbl of oil to the world's proven reserves between 2005 and 2024. That is a minimum requirement of 45.7Mbl of new proven reserves each and every day to sustain the world's economy. It is time to get busy. ■