

Peak Oil

A turning point for humankind

by Colin J. Campbell

The fundamental driver of the 20th century's economic prosperity has been an abundant supply of cheap oil. At first, it came largely from the United States as it opened up its extensive territories with dynamic capitalism and technological prowess. But U.S. discovery peaked around 1930, which inevitably led to a corresponding peak in production some 40 years later.

The focus of supply then shifted to the Middle East, as its vast resources were tapped by the international companies. They, however, soon lost their control in a series of expropriations as the host governments sought a greater share of the proceeds. In 1973, some Middle East governments used their control of oil as a weapon in their conflict with Israel's occupation of Palestine, giving rise to the "first oil shock" that rocked the world.

The international companies, anticipating these pressures, had successfully diversified their supply before the shock, bringing in new

productive provinces in Alaska, the North Sea, Africa and elsewhere. These deposits were more difficult and costly to exploit, but production was rapidly stepped up when control of the traditional sources was lost. In part that was made possible by great technological advances in everything from seismic surveys to drilling. Geochemistry and better geological understanding made it possible to identify the productive trends, once the essential data had been gathered. The new knowledge showed both where oil was and where it was not, reducing the scope for good surprises.

The industry found and produced the expensive and difficult oil from the new provinces at the maximum rate possible, leaving the control of the abundant, cheap, and easy oil in the hands of the Middle East OPEC countries. The latter were accordingly forced into a swing role, making up the difference between world demand and what the other countries could produce. It was contrary to normal economic practice and concealed the gradual impact of depletion, growing shortage, and rising cost, which would otherwise have alerted us to what was happening. But these new provinces faced the same depletion pattern that had already been demonstrated in the United States. The larger fields, which are found and exploited first, gave a natural discovery peak.

Advances in technology and operating efficiency also reduced the time lag from discovery to the corresponding production peaks. Whereas it took the United States 40 years, the North Sea, which is now at peak, did it in just 27 years.

As discovery in the accessible areas dwindled to about one-quarter of consumption, the industry, which fully appreciated this obvious link between discovery and production, turned its attention to the last remaining frontier, namely the ocean depths. It is axiomatic that no one would look for oil in 6,000 feet of water if there were any easier places left. The deepwater domain is also subject to depletion with an even shorter time lag between the peaks of discovery and production. Although much of the ocean is deep, only a few areas have the essential geology, giving a potential of not more than about 85 Gb (billion barrels) – enough to supply the world for less than four years. It is no panacea.

Price Falls

A combination of circumstances led to a dramatic fall in the price of oil in 1998. These included unseasonably warm weather; an Asian recession that reduced the demand for swing Middle East production; the collapse of the ruble; encouraging exports; overestimation of supply by the International Energy Agency (IEA), which misled OPEC; and further turns in Iraq. Furthermore,

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there were motives to talk down the long-term price of oil as oil companies and their financial advisers planned acquisitions. Major companies, plainly seeing that exploration could no longer underpin their future, took the opportunity of the price crisis to merge, successfully concealing their real predicament from the stock market. Budgets were slashed and staffs purged in a climate of uncertainty leading to an improvident draw on stocks.

The OPEC countries themselves did everything possible to foster the notion that they could flood the world with cheap oil at the flick of a switch. It was a strategy aimed to inhibit investments in natural gas, non-conventional oil, renewable energy or energy saving that they feared might undermine the market for their oil, on which they utterly depend.

But it was a short-lived price collapse. Before long, the underlying resource and depletion pressures manifested themselves again with prices rebounding in a staggering 300 percent increase in 12 months, when another anomalous fall occurred at the end of 2000. It was partly triggered by profit taking for year-end financial reporting and partly by the hope of a brief reprieve as spring demand traditionally falls.

The underlying trend is due to reassert itself, leading to the resumption of soaring oil prices. The Middle East is working flat out to try to offset the decline of its old fields. In large measure, new production in Venezuela can come only from in-fill drilling in old heavy oil fields, which is dependent on the

amount of effort and investment. It does not sound as if it has many shut-in wells either. Its oilmen speak of reduced capacity.

The market may hope that some important recent discoveries tell a different story with a happier ending. The long-known Azadegan prospect on the Iraq-Iran border was at last tested, delivering some 5 Gb of reserves to Iran. Kashagan East in the north Caspian found about 7 Gb of high sulfur oil at great depth, demonstrating that the prospect was not one huge structure as hoped, but several independent reefs. The disappointment caused two major companies to withdraw from the venture.

Promising deepwater finds continue to be made off West Africa, but it is becoming clear from the experience of the Gulf of Mexico that deepwater operations do test technology and management to the absolute limit. Small accidents or setbacks can have devastating consequences in this extreme environment. Petroconsultants recently announced the total oil discovery for 2000 at 11.2 Gb, less than half consumption, and of that much was in the former Soviet Union and in deep water off West Africa.

The reality is that there is no real reprieve. Gradually the market – and not just the oil market – will come to realize that OPEC can no longer single-handedly manage depletion. It will be a dreadful realization because it means that there is no ceiling to oil price other than from falling demand. That in turn spells economic recession and a crumbling stock market, the first

signs of which are already being felt.

The United States is perhaps the most vulnerable to the coming crisis having farther to fall after the boom years, which themselves were largely driven by foreign debt and inward investment. The growing shortfall in oil supply since its own peak of production was made good by soaring oil imports, now contributing more than half its needs, and a move to natural gas. The rate of import cannot, however, be maintained as other countries pass their own production peaks, putting ever more pressure on the Middle East. The North Sea is now at peak, with the United Kingdom being off 7 percent in 2000 and 16 percent off from October to October, meaning that production is set to fall by one-half in ten years. For every barrel imported into the United States, there will be one less left for anyone else, a situation inevitably leading to international tensions.

The move to natural gas proved to be only a short-lived palliative. Gas depletes differently from oil. An uncontrolled gas well would blow it all away in one big puff. Production is, accordingly, capped by infrastructure and market, leaving a large, unseen balloon of readily available spare capacity. In a privatized market,

trading on a daily basis, production becomes cheaper and cheaper as the original costs are written off and as this almost free spare capacity is drawn down. There were no market signals of the approach of the cliff at the end of the plateau. It accordingly came without warning, causing prices to surge through the roof, and bringing power blackouts to California. Canada is trying to make good the shortfall, but its stocks are failing fast too.

The U.S. has to somehow find a way to cut its demand by at least 5 percent a year. It won't be easy, but as the octogenarian said of old age, "the alternative is even worse." Europe faces the same predicament as North Sea production plummets. Although it may draw on gas from Russia, North Africa and the Middle East to see it over the transition, assuming that new pipelines can be built in time, that creates a new and unwelcome geopolitical

dependency.

All of this is so incredibly obvious, being clearly revealed by even the simplest analysis of discovery and production trends. The inexplicable part is our great reluctance to look reality in the face and at least make some plans for what promises to be one of the greatest economic and political discontinuities of all time. Time is of the essence. It is later than you think. •

Experts Warn Ecosystem Changes Will Continue to Worsen, Putting Global Development Goals At Risk

London, UK (3/30/05) – A landmark study released today reveals that approximately 60 percent of the ecosystem services that support life on Earth – such as fresh water, capture fisheries, air and water regulation, and the regulation of regional climate, natural hazards and pests – are being degraded or used unsustainably. Scientists warn that the harmful consequences of this degradation could grow significantly worse in the next 50 years.

"Any progress achieved in addressing the goals of poverty and hunger eradication, improved health, and environmental protection is unlikely to be sustained if most of the ecosystem services on which humanity relies continue to be degraded," said the study.

Although evidence remains incomplete, there is enough for the experts to warn that the ongoing degradation of 15 of the 24 ecosystem services examined is increasing the likelihood of potentially abrupt changes that will seriously affect human well-being. This includes the emergence of new diseases, sudden changes in water quality, creation of "dead zones" along the coasts, the collapse of fisheries, and shifts in regional climate.

The Millenium Ecosystem Assessment (MA) Synthesis Report highlights four main findings:

- Humans have changed ecosystems more rapidly and extensively in the last 50 years than in any other period. This was done largely to meet rapidly growing demands for food, fresh water, timber, fiber and fuel.
- Ecosystem changes that have contributed

substantial net gains in human well-being and economic development have been achieved at growing costs in the form of degradation of other services. Two services – capture fisheries and fresh water – are now well beyond levels than can sustain demands.

- The degradation of ecosystem services could grow significantly worse during the first half of this century and is a barrier to achieving the UN Millennium Development Goals. In all the four plausible futures explored by the scientists, they project progress in eliminating hunger, but at far slower rates than needed to halve number of people suffering from hunger by 2015. Experts warn that changes in ecosystems such as deforestation influence the abundance of human pathogens such as malaria and cholera, as well as the risk of emergence of new diseases.

- The challenge of reversing the degradation of ecosystems while meeting increasing demands can be met under some scenarios involving significant policy and institutional changes. However, these changes will be large and are not currently under way.

"The over-riding conclusion of this assessment is that it lies within the power of human societies to ease the strains we are putting on the nature services of the planet, while continuing to use them to bring better living standards to all, Achieving this, however, will require radical changes in the way nature is treated at every level of decision-making and new ways of cooperation between government, business and civil society. The warning signs are there for all of us to see. The future now lies in our hands."

