Oil at its peak

Production platform in the Heglig oilfield Photo: UNEP

The question of the security of supplies is still being neglected when it comes to fossil fuel reserves and uranium. Crude oil has been our most important energy resource, and is at the same time the first to go past its peak.

We must save, save, save", demanded Michel Mallet – a high-level manager at the French oil company Total – of oil consumers in mid-April in a magazine interview. The increasing demand in the threshold countries can only be met by doing this, as the companies are not finding enough new reserves. Despite increasing investments, the annual output is sinking. Total is no exception here, but is confirming the experiences of its competitors.

IEA starts warning of oil scarcity

Even the International Energy Agency (IEA), an organisation of governments representing the interests of 28 main consumer countries, and so far a professional optimist in energy security matters, is warning of dramatic shortages and is demanding a radical change in energy policies. In the current economic crisis the oil companies are throttling back on their investments. Nobuo Tanaka, head of the IEA, warns: "When demand grows again we could have supply shortages. We even forecast that this bottleneck could occur in 2013." According to the IEA, the price of oil would then even surpass the peak from 2008 and reach up to US$ 200 per barrel. "We could then steer towards a new crisis, the extent of which would be further than in the current one", warns Tanaka.

The IEA already showed how dramatic the situation is in its latest "World Energy Outlook 2008" from November of last year. It talks of an annual reduction in output of 6.7 % from existing fields. In 580 of the 800 largest oilfields in the world the amounts are steadily sinking. Chief Economist Fatih Birol briefly states: "Time is against us!" The IEA does forecast a further increase in worldwide oil consumption by almost a quarter by 2030, but "which oil reserves are to cover the increased demand, how much the extraction of this oil will cost and how much consumers will end up having to pay for it, is extremely uncertain, maybe more uncertain than ever before", states the IEA.

According to a study for the Energy Watch Group on the future of worldwide oil supplies, which has received a lot of attention internationally, we are currently at the peak of production and will have to reckon with a halving of output in the next twenty years. Also, the producing countries will themselves be using an ever-larger share for their own economic development. The supply for importing countries will thus be even more restricted. The German Federal Office for Geosciences and Resources (BGR) just recently confirmed the decline in worldwide oil extraction in 2007. BGR President Hans-Joachim Kümpel concludes from this: "Oil will be the first energy resource

for which a genuine scarcity of supply will become noticeable due to the finite nature of the resource."

Sources bubbling less

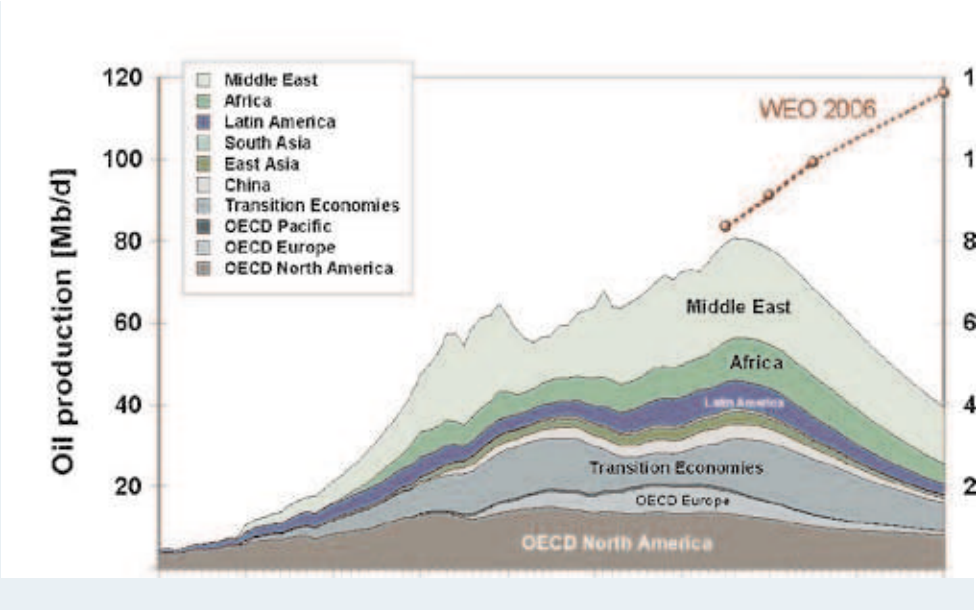
Being finite does not however mean that the bubbling sources will dry up from one day to the next. The question is thus not "how long will the oil last?", but "what amount will be available over which time period?". Scientists have provided detailed answers to this in a study commissioned by the EWG. Their methodology can be made clear by using the example of the typical active lifetime of an oilfield: when first tapped, the oil output climbs rapidly initially, soon reaches its maximum and then slowly declines. With the second, third and further boreholes the output still initially rises, however, until further boring can no longer match the decline in output and the oil field as a whole passes its peak. Despite ever-more boreholes, the oil output then declines in total. The result is a so-called bell curve. This principle is true not just for individual oil fields, but also for entire extraction regions and the whole worldwide extraction, because it is commonly known that there is a limited total amount for geological reasons.

The three oil peaks

Conclusions for the worldwide peak of extraction can be drawn from the historical pattern. Commercial oil extraction began on several continents simultaneously in around 1859 – exactly 150 years ago. Geologists date the peak of worldwide finds, i.e. the highest annual rate of finding oil, at around 100 years later, as early as the mid-sixties. The first oil peak thus already lies over forty years behind us. The largest oil fields found so far, which are still mainstays of worldwide oil production, were discovered as far back as the end of the 30s in Kuwait and the end of the 40s in Saudi-Arabia.

While new finds declined, consumption continued to rise. It was thus no surprise that just twenty years later, in around 1986, the annual extraction of oil surpassed the annually discovered amount. The unavoidable consequence: the remaining amount of extractable oil passed its peak ("peak two"). The reserves have been declining since then. Today we use four to five times as much as we discover. The discrepancy between these facts and the often-published data from the oil industry, for example, can be explained. The difference lies in the way you look at it. But the economically reserved figures of the oil companies are getting closer and closer to the realistic data of the geologists.

Hardly more than twenty years later and we are now seeing the third peak, the peak of worldwide oil extraction. This inevitably has to follow on from the peak in finds and the peak in remaining reserves, as one after the other all the oil sources go past their peaks. Opposing this are many voices which claim



Overview of worldwide oil extraction up to 2030

Source: EWG Oil Report/ Ludwig-Bölkow-Systemtechnik

that oil extraction may still be considerably increased. Often it is denied that oil price rises are a sign of an increasing scarcity. They say that the problem is not the reserves, but a lack of investment. The business figures of the oil companies contradict this. At Shell, for example, oil extraction has dropped by a fifth in the last few years, even though investments in looking for oil and tapping reserves have increased fourfold. What are rising as a result are the costs and thus the oil price.

The situation has come by no means as a surprise. The fairy tale of never-ending oil was spread for far too long. And yet the geologists saw the peak in new finds as early as the 60s. The remaining reserves have been declining since the mid 80s. Although new technologies have made it possible to extract more from known fields faster, large new finds have not been expected for decades. Even the opening up of ecologically and technologically difficult fields, such as in the Arctic or the Canadian oil sands, will not be able to stop the downward trend.

Extraction as a driver of prices

The temporary drop in oil prices is also no sign of an easing of tension. The hopes of the bursting of a supposed bubble of speculation are in vain. Higher investments in looking for oil and its extraction will also not turn around the tendency towards higher prices. Quite the opposite: if the amount of oil extracted sinks despite increased efforts, the costs will rise, and analysts have stated that in some oil regions extraction even today will only be economical at oil prices of up to US$ 100. The times of cheap, easy to extract oil, are thus over for good.

An example: the IEA assumes the installation of new extraction capacity between 2007 and 2030 to the tune of three quarters of what exists today. This is almost six times the current extraction capacity of Saudi Arabia. Apart from a huge capital requirement, finds of relevant amounts of new oil reserves are neither known nor expected. The IEA figures for this come from resources figures that are much too high, ones which oil geologists have declared to be “unlikely amounts”. But even without such assumptions, the investments in oil and gas fields were nominally trebled between 2000 and 2007. By 2012 alone these are expected to rise by a further 50 %.

Politics and the economy have ignored these warnings for far too long. But now even the head of the oil company Total, Christophe de Margerie, reckons that we will never again be able to extract the current amount, firstly because the peak has been passed and secondly because oil is only available with an increasing amount of technical effort. The current situation thus marks a turning point and paradigm shift. If the continued increasing demand can no longer be met through increased supply, prices will reach unpredictable heights. “The market”, complains the Swiss economist and top consultant Fredmund Malik, “doesn’t prevent mistakes – it merely punishes them”. And so the oil price explosion before the financial crisis was just a taste of things to come, and possibly the needle which burst the financial market bubble. In the future the shears will open up in two directions and throw up the question: how can we cover increasing demand and at the same time make up for the shortfall from the reduction in oil extraction?

Fossil-atomic energy peak

In this, the shortage and rise in prices of oil is just the beginning of the peak for conventional energy reserves. Natural gas and coal will follow some years behind. The question is thus how a growing world population can be supplied with enough energy in the future. The UNO reckons with a quarter more inhabitants of the planet by 2030, namely over 8 billion people. How, you have to further ask, can economic output be doubled again by then, as economists have forecast? At the same time the climate should be protected and carbon dioxide emissions be reduced by 85 % (IPCC recommendation). How is that going to be possible when today still over 80 % of our energy comes from fossil fuel sources and the IEA expects a further increase in consumption of 45 % over the next twenty years (WEO 2008)?

The world economy is in a unique situation in terms of its industrial development. Population growth and the financial economy demand economic growth – but more energy will be required for this in the future. At the same time we are experiencing a shortage in energy reserves, on which we have been almost totally dependent in the past. Nothing less than an energy revolution will be required to solve this problem. You can find out more on the supply situation for coal, gas and uranium, as well as the opportunities for expanding renewable energies, in the upcoming parts of this series.

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