



## Looking Back at Peak Oil: The Coming Crisis in Energy Supplies

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Peak Oil – the maximum sustainable rate of global oil production – happened in 2012. That's one of the main conclusions of a new report, [Fossil and Nuclear Fuels – The Supply Outlook](#), released in March 2013 by the [Energy Watch Group](#) (EWG). This event will have profound long-term implications for how advisors should manage clients' portfolios, and how clients should plan their future expenses.

A clear awareness of a client's resources is essential before developing a forward-looking strategy. Our national conversation around energy has become one of anticipated abundance, despite many who express concerns about limits. Yet all advisors have worked with people who seem prosperous, only to discover that they are living beyond their means. When financial advisors begin working with clients, one of the first tasks is creating an honest balance sheet. We must understand a client's resources before developing a forward-looking strategy. That understanding is what EWG attempts to provide for America and the whole world in this report.

EWG is a group of independent scientists funded by a private German foundation. From 2006 through 2009 EWG issued a series of reports on supply projections for uranium (2006), coal (2007), oil (2008), and wind (2009). The group's stated mission is to provide objective information about energy and the limitations of energy supplies, to assist in good decision-making at all levels.

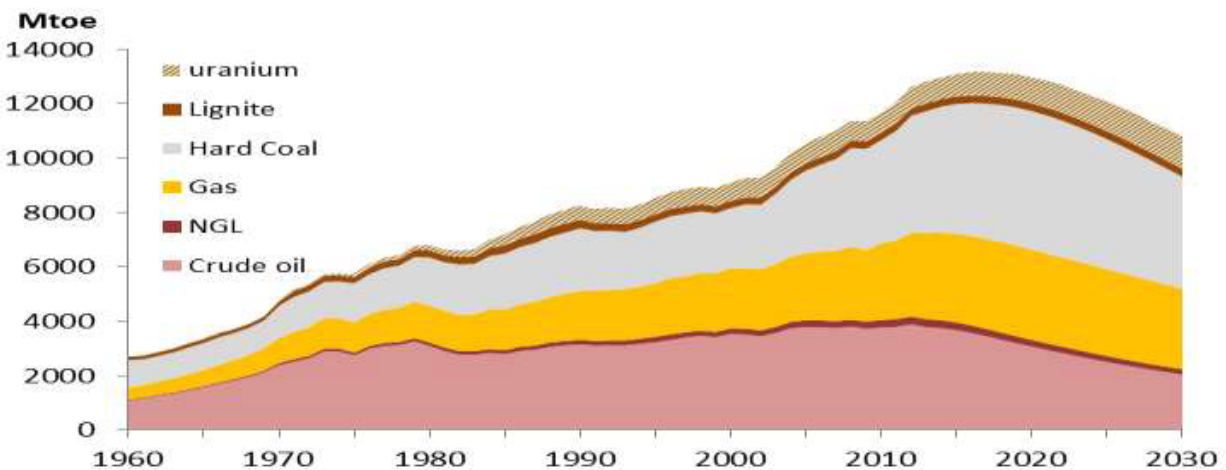
Based on close examination of data from all over the world, EWG concludes that the world reached its maximum level of oil production in 2012. The report also states that US natural gas production has [gone about as far as it can go](#), and the world will see [peak everything](#) – the highest level of fossil-fuel production globally – by the end of this decade. In their words, from pages 13-14 of the report:

*According to our study, coal and gas production will reach their respective production peaks around 2020. The combined peak of all fossil fuels will occur a few years earlier than the peaking of coal and gas and will almost coincide with the beginning decline of oil production. Therefore, the decline of oil production – which is expected to start soon – will lead to a rising energy gap which will become too large to be filled by natural gas and/or coal. Substituting oil by other fossil fuels will also not be possible in case gas and coal production would continue to grow at the present rate. Moreover, a further rise of gas and coal production soon will deplete these resources in a way similar to oil. Total world fossil fuel supply is close to*



*peak, driven by the peak of oil production. Declining oil production in the coming years will create a rising gap which other fossil fuels will be unable to compensate for.*

For those who prefer pictures, the graph below shows their prediction of global production of key energy-related natural resources:



As I have written [previously](#), there is a close link between a society's economic growth and the amount of energy it has available. Fossil fuels make up the vast majority of our energy sources. When they stop growing, so will our overall economy, radically revising our expectations. From another perspective, however, the coming involuntary peak of fossil fuel use could slow the rise in greenhouse gasses and partially ameliorate the problem of climate change.

All of the world's economies and societies are currently operating on the inaccurate assumption that energy limits are not real, at least in the coming few decades. The consequences of whether we get this right are staggering.

### **Back to the report**

The EWG analyzed resources, reserves, and production data from all regions of the world, including government data and data from major oil companies. Overall totals were tested against granular-level data, and differences were pointed out and explained where possible. Interestingly, the group also compared its current report with its projections from the last decade and with forecasts made by the US Energy Information Agency and the International Energy Agency (IEA) of the OECD. It is transparent and honest, although the tabular data underneath the many charts was not included. (There are limits to what can fit in a 178-page document.)



Oil production globally has been on a plateau since about 2005. Oil here is defined as “crude oil plus concentrate,” or generally what can be used for transportation fuels. Some production reports use “total liquids,” which includes natural gas liquids that are not equivalent to conventional oil in form or energy content. There are frontier areas (the deepwater Gulf of Mexico, the Caspian Sea basin, offshore Brazil) that offer hope for new supplies, but these are all coming in more slowly, with less production and higher costs, than was expected a decade ago. The OECD economies of Europe, North America, and the Pacific have not recovered their consumption levels of 2007, and it is not clear they ever will.

Global oil production reached a maximum, according to the EWG, in 2012, and they expect a 40% decline in production by 2030. This is radically different from the 2012 IEA World Energy Outlook, the semi-official annual energy document, which forecasts production continuing to grow until at least 2030. (This IEA report is also the main source for the idea that the US will briefly become the world’s leading oil producer.) Notably, however, the IEA’s 2012 report projected much lower global oil (total liquids) production numbers than its 2006 report did. Its forecasts for 2030 dropped from 113.8 million barrels per day in the prior report to 95.1 mbpd. By comparison, average production in 2011 was 84.3 mbpd. (EWG, p 61.)

The EWG report said that natural gas production will begin to decline soon in North America and Europe, but global production will continue to grow, reaching a maximum around 2019 due to increases in the Middle East and Russia. US shale gas production will likely be unable to expand significantly because of high costs and rapid decline rates of individual wells. Increased prices could lead to higher US production, but higher prices would also reduce the demand for gas in the US and probably moot the prospects of major US exports of liquified natural gas.

Globally, coal is a challenge, in part because a relatively small part of coal production is available for international trade. It could be hard to match production in Australia and Indonesia with demand in China and India. China’s economic boom has been fueled by coal, but China’s domestic supplies are limited. China has switched from being a coal exporter to the world’s largest importer in less than a decade. The EWG report shows total world coal consumption at about 4 billion tons per year in 2000, rising to 8.5 billion by 2020, but then falling back to 4.5 billion by 2040.

Uranium and nuclear power are also limited in a number of ways. Massive delays and cost overruns are common with uranium mines, with uranium production is now below current demand. There are many cost, safety, and regulatory issues around the construction of nuclear power plants, and existing plants are running past their designed



lives. There is a high risk of a supply gap in uranium if a major expansion of nuclear power were to take place.

It is unlikely that nuclear power will be able to substitute for the fossil fuel decline. Further, coal, natural gas, uranium, and renewables mainly produce electricity at this point, and cannot be used for transportation fuel.

### **Will the US achieve energy independence?**

The report comments on a number of interesting popular assumptions, notably around the idea that the US will soon exceed Saudi Arabia in oil production. Oil reserves in the US are about 31 billion barrels, compared to claimed reserves of 265 billion in Saudi Arabia, yet the IEA's 2012 World Economic Outlook expects US production to rise in this decade by over 25% compared to 3% for Saudi Arabia. (EWG 62-63)

Turning to the US, the report looks in detail at our production and reserve situation. The entire increase in American oil production over the last three or four years has come from Texas and North Dakota, with production elsewhere on balance continuing to decline. In fact, the growth is only from parts of those states – specifically, 10 counties in Texas and four in North Dakota. The decline rates on those fracked oil wells and the limited areas still offering economic production opportunities suggests that shale (or tight) oil production will only grow for a few more years, and peak by 2017. (This is consistent with the conclusions of David Hughes' recent report on shale gas and oil, [Drill, Baby, Drill](#), as well as data published by the [North Dakota Department of Mineral Resources](#).) The US maximum production will occur around 2015, the report says, as slower shale growth is unable to counter depletion elsewhere. We will never approach the all-time 1970 peak of US production of about 10 million barrels of oil per day.

Surprisingly, the natural gas situation in the US is even worse. Total American gas production has sharply increased due to the fracking boom, but the EWG sees a brief topping out of gas between 2012 and 2014, followed by a sharp decline before the end of this decade. (EWG 153-66) As I [wrote](#) here in January, the fracking reality is vastly different from the public's perception. Wells are expensive and production volumes decline rapidly. People relying on plentiful and cheap gas for the long term will be very disappointed.

Beyond the broad conclusions in this report, EWG points out that, especially for oil, measuring production by volume is not the same as measuring energy content. Much of the "oil" production in the new Texas wells is actually the production of natural gas liquids and gas concentrates, which either cannot be used as transportation fuels or have a much lower energy value per barrel. There are several references to the rising cost of energy production, whether as fewer tons of coal produced per miner or the rising cost of each



new well or reactor. This illustrates the decline in net energy, or energy return on energy invested (EROEI).

### **Thinking about the future**

Let's return to the idea of basic financial reports. When evaluating fossil fuel supplies, what matters is not so much top-line production as bottom-line net usable energy. For net energy, the news is even worse – the peak will come quicker, and new investments will be less attractive, because more money will be required to produce the same result.

The EWG report is an important, wide-ranging (and free) document with sobering conclusions. Hopefully other experts will review it, assuring that the data and conclusions withstand scrutiny. We can expect energy surprises in the future, both positive (like shale production) and negative (like delays in Brazil's offshore oil), but we cannot rely more of the plentiful cheap energy that has driven our prosperity and growth for decades.

Financial advisors, policymakers, and others should all take this report seriously and think about how to build the best possible future. This is especially true given the recent flurry of investment perspectives built on promises of growing US energy production and independence. Advisors should consider the other side of the marketing hype and rely on data-based analysis.

When looking at the future of energy and the economy, we have neither a lot of time nor a lot of surplus energy to work with.

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