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Tom Whipple returns mid-week from a trip to China. Former ASPO-USA board member Steve Andrews prepared this and the last two issues of the Peak Oil Review, while Ray Long has been publishing the daily Peak Oil News.

1. Oil and the Global Economy

Newsflash: oil markets were volatile again last week. On the New York Mercantile Exchange, prices started at \$92.70, dipped as low as \$90 before closing up strongly to settle at \$95.61. That was the top closing price in a month, though still off from the year's high of roughly \$100. On the London futures market, Brent crude ended the week at \$104, also up modestly for the week.

Both the Dow Jones Industrials and the S&P 500 indexes hit new all-time highs after the Labor Department reported late last week that nonfarm payrolls grew by 165,000 in April—more than economists expected. The housing market also showed positive signs. Conventional wisdom says that, in the short term, oil markets are likely to follow economic perceptions and equity markets until some key fundamentals on the supply-side change.

Those fundamentals were all over the map though mostly bearish. Crude inventories gained 6.7 million barrels to 395.3 million, the highest level in the three-plus decades since records have been kept. Total oil demand in the U.S. fell by 3.6% to 17.9 barrels/day last week, according to the Energy Information Administration.

While the broadest labor market number—unemployment dipping to 7.5%, a four-year low—was clearly positive, analysts warn that the road to recovery remains bumpy. Most recent employment gains were in service and health care sectors, with no notable gains from better-paying manufacturing and construction jobs. The length of the workweek dipped slightly to 34.4 hrs and the number of part-time workers wanting full-time work increased by 278,000, both signs of weakness. Furthermore, cuts of government workers furloughed by the sequester are just now starting to hit the US economy. Equity and oil markets remain vulnerable these factors plus to budget debates in Washington and recessionary news from Europe.

After the announcement last Thursday that natural gas inventories rose more than expected, prices dropped 7% or 30 cents, the largest NYMEX futures loss in two years, settling flat Friday at \$4.05. Utilities continued their recent modest shift from natural gas to coal for power generation, with year-to-date coal generation up 13% and natural gas generation down 11%. Yet Goldman Sachs still expects prices to average \$4.50 in the

second half of the year, given lower than average amounts of gas in storage. ESA Inc. says gas prices in the Northeast this summer may average \$5 to \$5.50 due to increasing demand from power plants and limited pipeline capacity.

2. The Middle East and Africa

Iraq: On a positive note, Baghdad and the Kurds announced agreement on a provisional, seven-point plan that would lead to resumption of Kurdish oil exports to the south—suspended late last year—thereby increasing Iraq's overall imports. If the agreement receives final approval, the long-stalled federal hydrocarbon law would be revisited, funds owed the Kurds for oil exports would be paid and the two-month boycott of parliament by Kurdish deputies would end. Reports suggest Iraq exported 2.62 million b/day last month, up by roughly 200,000 b/day to reach the highest level since last November. Also on the upside, Iraq inaugurated a \$13+ billion natural gas project in Basra run by Royal Dutch Shell. The system will collect, process and deliver natural gas formerly flared from major oil fields and use it to fire desperately needed power generation.

On a more cautionary note, the central government is trimming its wildly unrealistic oil production schedule. Back in 2009, the announcement that Iraq intended to shoot for 12 million barrels a day by 2017, becoming the world's largest oil producer, was greeted with guffaws and widespread skepticism. Now that we're half-way there and production has increased 50% to roughly 3 million b/day, the government has scaled back its target to 8 or 9 million barrels/day during the 2017-2020 time frame. No small part of the downturn is due to fading interest from oil majors, thanks to endless political turmoil, worsening sectarian bloodshed, poor contractual terms, widespread corruption, and infrastructure bottlenecks. The revised target still appears highly unrealistic.

Iran: The nation's exports last year fell to a 26-year low of 1.5 million b/day, down 40% from 2011, according to estimates by the US Dept. of Energy. Revenues also dropped, from an estimated \$95 billion in 2011 to \$69 billion last year, though 2012's higher market prices softened that blow. While some of Iran's drop stems from older fields maturing, most of the decline ties back to tightened economic sanctions. And the new set of sanctions that started last month should further cut into exports that shipped last year to Japan, India and South Korea. This bind may in part account for the dozen large oil tankers loaded and anchored in floating storage for 28 days or more off Iran's coast.

Syria: Two new developments last week have the potential to impact Syria's ongoing civil war in unforeseeable ways. First, new accusations surfaced regarding use of chemical weapons by the government against rebel forces. If substantiated, this would dramatically increase pressure for a military response by the US; the most recent reports, however, indicate that western investigators lack confirming evidence regarding the accusation, including which side might have used the chemical weapons. Second, two Israeli airstrikes on targets in Syria—including one on a military base in the Damascus area—raised concerns about an expanded conflict. The Arab League Secretary General plus foreign ministers in Egypt and Iran were quick to condemn the attacks.

Saudi Arabia: Oil minister Ali Al-Naimi delivered some intriguing remarks last Tuesday at the Center for Strategic and International Studies in Washington. While lauding the US oil industry's innovative recovery through its rapid ramp-up of shale oil production, he stated it would be unrealistic to believe that shale oil plays would eliminate oil imports. "Talk of US energy independence disregards inter-linked markets. Just as I

didn't accept the peak oil argument years ago, I reject the US energy independence idea now... This talk of ending US reliance on imports is naïve and simplistic.”

As a very experienced petroleum geologist used to warn, “When you are evaluating statements from other oil men, first figure out whether they are buying or selling.” In this case, it was important for the Kingdom’s oil minister to stand up for their long-term interests (selling). But twice in the previous decade, the Saudis warned the US about misguided long-term views. The first was during 2004 when, often behind closed doors, they disabused the US EIA of its fantasy-like forecast that Saudi Arabia would be supplying 22 million barrels of oil by 2025; the EIA backed off. Second, during 2008 the Saudi king said simply that he had told his oil professionals “we must save some [oil] for the grandchildren.” Ever since, while the Saudis often imply they will expand production as needed to keep markets stable, their public statements sound more cautious. Another remark last Tuesday from Naimi is the latest such informative statement: “We'll be lucky to go past 9 million b/d by 2020. We're pleased to see production coming from so many other suppliers, and see no need to go beyond our 12.5 million b/d capacity.” That will likely be Aramco’s long-term supply ceiling.

Libya: The nation’s oil industry has restored oil production to levels approaching those achieved before the overthrow of its former president, but recurring violence is a major and growing concern to both the citizenry as well as oil and natural gas importing clients. With their current weak government, the proliferation of armed militias poses an increasing threat to the working environment for employees of international oil companies operating in the region. A pair of prolonged firefights by militias last month killed one and wounded several but worried the broader populace. While the government has an 18,000-man force dedicated to protect petroleum operations, the militias still manage to threaten oilfields, and protests at export terminals are hampering operations. The total revenue lost last month: \$1 billion, from reduced sales.

East Africa: Mozambique, Tanzania, Uganda and Kenya should become significant oil and gas producers later during this decade. After two years of exploration, roughly 80 Tcf of natural gas have been found in Mozambique and 20 Tcf in Tanzania; 3.5 billion barrels of oil were proven up in Uganda’s Lake Albert region back in 2006; and hopes persist that Kenya’s Great Rift Valley could contain up to 10 billion barrels of oil. Last week, Britain’s BG Group announced new gas finds in the waters off Tanzania near the Mozambique water. Statoil and BG Group are among the companies currently looking for sites for possible LNG terminals that would serve Asian markets.

3. New USGS forecasts for Bakken

Last week the US Geological Survey released updated oil and gas resource assessments for the two key producing shale oil formations—the Bakken and the Three Forks—in North Dakota, Montana and South Dakota. The formations hold an estimated mean of 7.4 billion barrels of undiscovered, technically recoverable oil, split evenly between the two. That’s a significant increase, roughly doubling the USGS’s previous mean estimate of 3.65 billion back in 2008.

Since the previous assessment, thousands of wells have been drilled in the two formations and some 450 million barrels of oil have been extracted. Key information from those wells helped the USGS refine their estimate. The bottom line from this latest data analysis: the resource potential of the two formations is much larger than the USGS previously estimated.

4. Quote of the Week

“The people who were talking about peak oil 20 years ago are eating their words.”

- *Fadel Gheit, senior oil-and-gas analyst at Oppenheimer & Co (Peak Oil News 5/1 item #6)*

“[There] is a huge surge in commentary... lauding the boom in ‘unconventional’ oil finds as completely debunking the fashionable "peak oil" concerns of the mid-aughts....[W]e're in nothing like the peak oil nightmare that a naive forward projection of the 2003-08 hockey stick would have led you to expect. But we've hardly conquered oil scarcity either. New discoveries are having trouble keeping pace with rising car ownership in Asia and declining production from many established oil sources.”

- [Matthew Yglesias, Slate](#) (Peak Oil News 5/1 #12)

5. Briefs

- **Russia**, the world's biggest oil producer, boosted crude and condensate production 1.5% in April from a year earlier to 10.47 million barrels/d, near the post-Soviet era record. (5/3 #17)
- Cash-strapped **Japanese power utilities**, which in the past week reported \$13.34 billion in annual pretax losses, will likely face the added burden of shutting down aging nuclear-power plants. A new set of safety requirements is expected to shut down at least 10 of the country's 50 licensed reactors. (5/3 #5)
- **Venezuela's** state oil company PdVSA said Friday its oil and liquefied natural gas output fell 3% in 2012 compared with a year earlier, while exports rose slightly. (5/3 #4)
- **In Venezuela**, Chavez's heir, Nicolas Maduro, appears to have done little to address declining production, billions in debt, or infrastructure deficiencies that have caused major accidents. National oil company PDVSA no longer generates enough income to cover all its costs. The oil minister said that a rise in daily domestic oil consumption to 650,000 barrels this year is expected to drive down exports by 7.8 percent to 2.36 million barrels a day, inevitably damaging revenues for PDSVA and the broader Venezuelan budget. (5/4 #5)
- **OPEC** remains relatively complacent that North American production gains will continue to meet global demand, and that OPEC (largely Saudi Aramco) can back away from full production in order to balance supply and demand at a price level that keeps the OPEC bankers happy. Aramco will likely not boost their crude oil production above 10 million b/d, despite the wishes and projections of others that they will do so. (4/30 #14) U.S. crude imports by tanker have fallen about 13 percent this year. (5/3 #3)
- **Egypt** is working to secure oil supply deals on favorable credit terms from major Arab producers in an attempt to ease fuel shortages and a government cash crunch that have proved damaging for the country's Islamist president, Mohammed Morsi. (4/29 #4)
- **Israel:** Israeli company Energy Initiatives hopes to start a pilot project soon to tap into a large oil shale resource discovered in 2009. They talk of reaching production of 50,000 to 100,000 barrels a day of production within a decade. (5/1 #6) *[Editor's note: They plan to use technology similar to Shell's approach, developed over the course of decades; that technology still hasn't produced economical oil in the USA where it was developed.]*

- **In Norway**, an oil and gas leak at BP's Ula field could have caused a deadly explosion, regulators said. They ordered the company to review maintenance procedures after discovering "serious breaches." (4/29 #15)
- **China**: While the US EIA reports that China may hold twice as much shale gas as the US, so far—after 60 exploration wells drilled over the last two years—there has been no Chinese shale gas production. (5/1 #7)
- **China** emerged as the top performer globally in domestic passenger air traffic in March with a 16% year on year rise, propelled by strong economic growth. (5/4 #7)
- **China's** growth in oil consumption has been stable in a band between 6% and 8% for several decades, with 7.2% being the figure for the latest decade available. Going forward, that's another 15mbd in the next thirteen years or so. Just for China. If you compare this to things like the extra 4 million b/d you might hope for from tar sands in this time frame, or the 2 mbd that global crude supply has increased since 2005, you can see that this is going to stress the global oil system a lot. (4/29 #8)
- **World oil supply and demand**: Given China's rate of rocketing demand, something has to give. Either oil supply has to grow a lot faster than it has in the last eight years, or the OECD has to go on a crash conservation program, or developing regions, especially China, have to grow their consumption much more slowly than they did in the last decade (despite the oil shock and financial crisis). Or some combination of all three. (5/1 #13)
- Excluding the US, **rest-of-world crude oil production** in the 2nd half of 2012 was on the same level as in the 2nd half of 2005, despite 85% higher oil prices. (4/30 #13)
- **Rig count**: The US natural gas rig count fell 12 to 354 rigs, a nearly 18-year low Friday, said as Baker Hughes. But with oil rigs up by 22, the overall rig count rose to 1,764 from the previous week, which is still down by 201 rigs over last year at this time. (5/3 #13)
- **In Alaska**, oil production from the North Slope declined nearly 6 percent last month to around 546,000 barrels/day. Alaska's oil production is now down roughly ¾ from its peak more than 20 years ago at just over 2 million barrels/day. (5/3 #6)
- **In Alberta**, Exxon Mobil said it has started production from the Kearl oil sands project. Kearl is estimated to reach its full design capacity of 345,000 barrels of oil per day by 2020. (4/29 #12)
- **Texas**: The chairman of the Texas Railroad Commission has said that oil production in Texas could roughly double by 2020. Much of that could come from lesser-known shale oil formations in early stages of development such as the Cline and the Tuscaloosa Marine shales. (4/30 #12)
- **Off Virginia's coastline**, potential oil and natural gas reserves must be included in a comprehensive energy plan, the oil industry said. U.S. Rep. Scott Rigell, R-Va., introduced a bill last week that would open areas off the Virginia coast to energy explorers. (4/29 #11)
- **Technology** created an energy revolution over the past decade - just not the one we expected. Fossil fuels? They were going to be expensive and scarce, relics of an earlier, dirtier age. But in the race to conquer energy technology, Old Energy is winning. [5/3 #2]

- President Obama is being pressed by opponents of the **Keystone XL pipeline** to tie any approval to measures that would curb climate change, reflecting mounting pressure on the administration to mitigate the \$5.3 billion project's impact if it goes forward. (5/3 #9)
- **Keystone XL:** Since TransCanada is awaiting U.S. approval for its cross-border Keystone pipeline, they announced a one-year delay in the pipeline's expected in-service date, pushing it back to late 2015. TransCanada already has \$1.8 billion in the project. (4/29 #13)
- **Pipeline company Enbridge** said that by 2015 it plans to increase the oil carrying capacity of its Alberta Clipper pipeline that runs from Alberta province to Wisconsin, from 400,000 to 880,000 b/day. That more than would be shipped through the Keystone XL line. (5/4 #11) . Enbridge's request for a permit has so far escaped controversy. That may change as the State Department begins to review the plan. (5/2 #7)
- **Coal plants:** the U.S. EPA will soon issue a standard that will effectively bar construction of new coal-fired power plants that lack carbon-capture technology. The rule won't cover older plants, though that issue may be addressed in subsequent rulings. (5/3 #9)
- **Water resources:** Rapid expansion of hydraulic fracturing to retrieve once-inaccessible oil and gas could put pressure on already-stressed water resources from the suburbs of Fort Worth to western Colorado, according to a new report from a nonprofit group that advises investors about companies' environmental risks and significant local effects. (5/2 #8)
- **BP** has been hit with a flurry of 2,200 lawsuits linked to the 2010 Deepwater Horizon disaster as individuals, companies and government entities scramble to meet a three-year deadline for spill-related claims against the energy group. (4/30 #8)
- **U.S. crude oil output** surged 15.3% year-on-year in February, exceeding net imports of crude oil for the first time since 1996, according to EIA data. Canada accounted for 38.7% of U.S. total crude imports, the most ever by a single nation. U.S. imports from OPEC by dropped 22.2% in February from a year earlier. (4/29 #2)

6. Commentary: Looking Back at Peak Oil By Richard E Vodra, JD, CFP®

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.

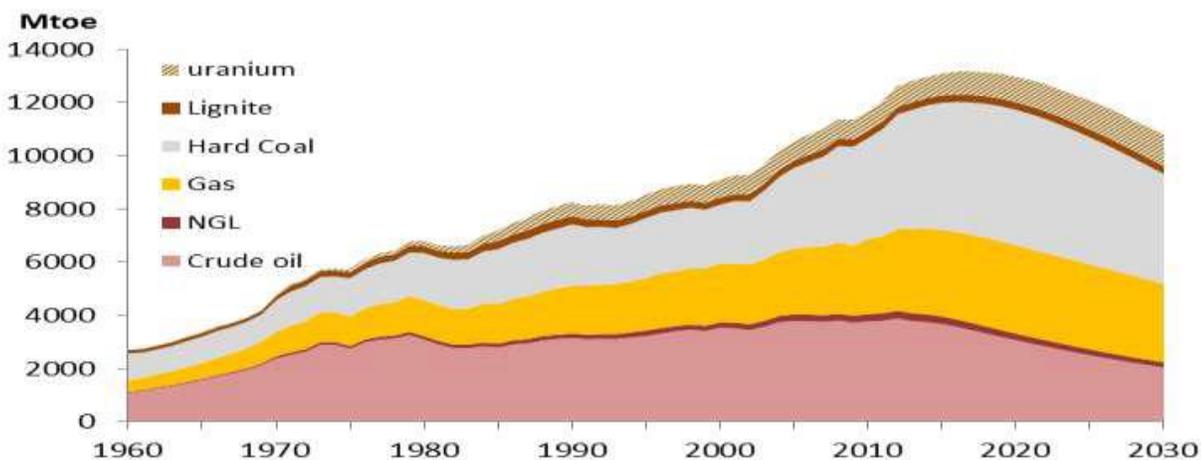
A clear awareness of a client's resources is essential before developing a forward-looking strategy. Our national conversation around energy has become one of anticipated abundance, despite many who express concerns about limits. Yet all advisors have worked with people who seem prosperous, only to discover 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 liquidified 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 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 on 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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