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Bleak Energy Outlook: Decline and Fall of Major Reserve Energy Sources

Disruption to oil supply sends market prices upwards

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Energy Outlooks: The Decline & Fall of Practically Everything

Introduction

In this short paper, we will attempt an overview of our energy outlook, globally, and in particular with regard to North America. We will concentrate on major reserve energy sources — that is, energy sources of which the Earth has major stockpiles that are readily accessible. We will focus on these energy sources and ignore other various alternatives and renewable sources for the very simple reason that it is these resources which will dominate the energy market for the foreseeable future.

Certainly, there is a lot of talk about renewable energy sources (wind, sun, tide, geothermal, etc.), and various other energy schemes such as hydrogen fuel cells, methane hydrates, and — the alternative de jour — biofuels. Yet, when you take a hard, close look at these various alternatives and the amount of energy we currently consume, you find that at best none of these alternatives will ever replace more than a fraction of our current energy usage.

In the past, we have analyzed the amount of energy available from sunlight and compared it to our current oil consumption.1 In doing so, we demonstrated that our basic energy problem is one of over-consumption. To replace US daily oil consumption with the products of photosynthesis would require 46% of the planet's entire surface area. The world would require the entire surface area of the planet and then some.2 This is a direct appropriation of the entire product of photosynthesis, leaving nothing but a barren Earth.

Biofuels transform the products of photosynthesis into a useable fuel. They do so at an energy loss. If the direct energy of photosynthesis is not enough to replace our current oil consumption, then biofuels will never do so. Furthermore, biofuels are dirty and environmentally destructive.3 And biofuel production will compete with agriculture for prime farmland, exacerbating a rise in hunger as oil-based modern agriculture begins to fail. Biofuels will harm the poor, as a study by economists at the University of Minnesota contends.4

Using photovoltaics, the US would require 17% of the planet's entire surface area, or 59% of the land surface to replace its current daily oil consumption. The entire world would require 40% of the entire planet's surface are, or 1.37 times the entire land area.5

While some industry insiders are pushing for more nuclear plants, this is not really an

economically viable alternative, let alone environmentally. A recent analysis suggests that the construction costs of a new nuclear building spree could be much higher than in the past, and that the cost of electricity generated by these plants could likewise explode.6

While we certainly should expand our usage of renewable resources, we cannot realistically expect them to replace hydrocarbons. So long as our consumption remains at anything near its current level, we will be dependent upon oil and natural gas for the majority of our energy needs, along with coal. And so we will focus on these three energy sources for the remainder of this article.

Oil

Evidence suggests that we are currently at the peak of oil production. World oil production is more and more constrained, unable to keep up with demand. And every possible disruption to the oil supply sends market prices upwards.

Colin J. Campbell's model of world oil production continues to point to late 2005 as the peak date for conventional oil. In his model, the continued growth of overall production is due largely to the increasing production of heavy oil (including tar sands and Venezuela's Athabascan reserves) deepwater and natural gas liquids. These sources are more expensive and will become increasingly so. And they peak by 2011 and then follow conventional oil into decline.7

The model of Walter Youngquist and Richard Duncan continues to suggest that 2007 will be the peak for oil production.8 Their model marks this date as the peak of all oil production. In this model, peak is determined by conventional oil, nonconventional sources only serve to help broaden the downward slope somewhat.

In the latest issue of **The Mountain Sentinel**, we look at the decline of Mexico Cantarell field, once the second most productive field in the world. We also look at Saudi Arabia's declining production.9 The collapse of Cantarell will have enormous consequences for Mexico and the US. The Decline of Saudi Arabia's Ghawar will have consequences for the entire world. As we have stated before, the world's oil production hangs on the fate of a handful of aging super-giant fields. And those fields are showing signs of their age.10

Prices will continue to fluctuate for the time being; always trending upward, however. Every rumor of a disruption will likely send shockwaves through the market. We expect that when gasoline prices in the US reach $5/gallon and stay there for more than a month, the economy will unravel. At that price, people in the US will not be able to go to work or do their grocery shopping.

Natural Gas

It is much more difficult to determine the peak of natural gas. Jean Laherrere has done the best job to date of analyzing the data.11 In comparing annual discovery with annual production, we discover that natural gas discoveries peaked in the early 1970s. Since then, they have plummeted. Currently, we are consuming more gas than we are discovering.

Laherrere's analysis suggests that natural gas may peak around the year 2030. There is a

lot of uncertainty about this date, largely because the data on natural gas reserves is not very good. However, we feel safe to say that natural gas production will not be smooth sailing for the hundreds of years that some analysts contend.

Of more concern with natural gas is regional production. The North Sea production for Great Britain peaked around the beginning of the decade, and is now in decline. Norway will peak within the next decade. Europe as a whole is at its peak. And Russia will peak within the next decade.

North America has already peaked as well. Canada is currently exporting about half of their natural gas to the US. As Canadian production declines, this may cause problems with tar sands production, which is heavily dependent upon natural gas. And Mexico imports natural gas from the US. In the US, new natural gas wells are being brought online as quickly as possible. However, the new fields are small and are so efficiently produced that they tend to play out very quickly. The average decline rate for new fields is 56% in the first year.12 As a result, we are bringing running on a treadmill, bringing more and more new wells online in an effort to keep production from faltering.

Compare this chart of US production with the following chart of projected Russian production. It is clear that within the decade, Russia will find themselves in the same situation.

The US is going to turn to liquid natural gas (LNG) to make up the difference. The industry has plans to construct 40 new LNG terminals to supply this demand. LNG terminals cost between $500 million and $1 billion to build.13 They are having diffculty sitting these new facilities because nobody wants to live next to an LNG terminal.

If construction of these new terminals goes forward, along with all the refrigerated tankers needed to transport the LNG, they would not be completed until 2020 at the soonest. And if Laherrere's calculations are correct, they will only have a decade to pay back their investment before world natural gas production falls off the cliff. After which time, natural gas prices will skyrocket and the US will find itself in competition with Europe and Asia for shrinking LNG shipments.

Coal

The Energy Watch Group has performed the most thorough survey and analysis of world coal reserves to date, and we finally have some idea of when world coal production will peak.14 They warn that data on coal reserves is very poor. Resources tend to be widely overestimated. As a result, in recent years a number of countries have made major downgrades of their reported reserves. Germany has downgraded proven reserves 99%. The US has downgraded its reserves several times. China, on the other hand, has not updated their coal data since 1992, though they have produced 20% of their stated reserves since then. Overall, world coal assessments have been downgraded by 50% since 1980.15

85% of global coal reserves are concentrated in just six countries, in descending rank: US, Russia, India, China, Australia, South Africa. China has half the coal reserves of the US, but produces twice as much coal on an annual basis. They are followed by US, Australia (half of

US production), India, South Africa, Russia. Throughout the world, only 15% of coal production is exported. The leading exporters are: Australia, Indonesia, South Africa, Colombia, China, and Russia.16

Because of overestimation, the authors contend that the data provides a best case scenario for coal production, sort of an upper limit on what we can expect. And they find that global coal production will peak in 2025 and 30% above current production in the best case.17 In all likelihood, the peak will arrive sooner than that.

China is likely to face major problems as it continues to rapidly deplete its coal reserves. There are plans at present to further boost Chinese coal production by several 100 million tons per year to supply coal-to-liquid-fuel plants. This would quickly push that country's reserves into decline.

The US peaked in production of high quality coal (anthracite & bituminous) in 1990. Volume-wise, production continues to increase with large quantities of subbituminous coal from Wyoming. In volume, if reserve figures are not further downgraded, coal production will peak in another 10 to 15 years. However, energy content varies tremendously from one grade of coal to another. In terms of energy content, US coal production peaked 5 years ago. Furthermore, production per miner has been declining since 2000.18

Over 60% of US coal reserves are located in just three states: Wyoming, Montana and Illinois. Oddly, Montana and Illinois have not increased coal production in 20 years. In Illinois, it has steadily declined by 50% since 1986.19 This strongly suggests that coal reserves for both of these states are overstated.

Conclusion

By 2030 all three of the major fossil fuels that supply the vast majority of our energy needs will be in decline. Oil leads the way, with conventional oil already peaking in 2005, and nonconventional oil peaking by 2011 at the latest — possibly as early as 2007. Natural gas in North America is also currently in decline, as is coal in terms of energy production. World coal production will follow by 2025 at the latest. And world natural gas production will probably peak by 2030.

All three of these declines are likely to reinforce each other and complicate the difficulties of each. Major investments in LNG and coal-to-liquid production are unlikely to pay off and will only tie up funds that could have been used for other preparations. The same goes for biofuels, hydrogen fuel cells, and nuclear plants.

The only solution is to decrease consumption and relocalize. However, this option has no appeal to corporations or governments, as it will mean giving up on the dominant socioeconomic system and decentralizing political power and industry. Therefore,

relocalization and conservation depend upon grassroots initiative and community organizing. We give useful advice on the subject of community organizing in the latest issue of The Mountain Sentinel.20

Notes

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2 Ibid.

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5 Op. Cit. See note 1.

6 Energy costs may explode in switch to nuclear power, Hoffman, Ian. The Argus, April 4th 2007. http://www.insidebayarea.com/argus/localnews/ci_5590033

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