# Plan War and the Hubbert Oil Curve

## An Interview with Richard Heinberg

**by David Ross; April 17, 2004**

Richard Heinberg is a professor at the Santa Rosa branch of the New College of California, where he teaches courses on Culture, Ecology and Sustainable Community. In 1994, his monthly on-line newsletter, called MuseLetter (**www.museletter.com**), received an Alternative Press Award from Utne Reader. He is the author of five books including, A New Covenant with Nature: Notes on the End of Civilization and the Renewal of Culture and Cloning the Buddha: The Moral Impact of Biotechnology. His latest book is titled, The Party's Over: Oil, War, and the Fate of Industrial Societies (2003).

**David Ross:** How important is oil to industrial societies?

**Richard Heinberg:** It's about as important to industrial societies as water is to fish. We wouldn't be talking right now if it weren't for oil. The industrial revolution was, basically, all about fossil fuels. Coal came first, but when oil was harnessed things really heated up. With oil humankind discovered the cheapest, most abundant source of energy ever.

Energy is everything. Literally. I happen to teach ecology, and in my field we study population and resource balances in nature—which is really just another way of talking about energy. Human societies, like ecosystems, are fundamentally just energy processing systems. With the industrial revolution, human beings discovered an energy subsidy like no species has ever found before in the history of our planet.

As a result, we've increased our human population from just a few hundred million, at the start of the industrial revolution, to over six billion, three hundred million now. And of course the total is still growing: we're adding about a billion people every twelve years at current rates. This is something that's never been seen before. We've added more people just since 1999 than even existed in the world just a few hundred years ago. This is an indication of the incredible impact that fossil fuels have had on human societies.

Additionally, we've invented all sorts of technologies to take advantage of this energy subsidy through transportation, communications, manufacturing, etc. Machines now do things that were formally done by human or animal muscle power. We also do all sorts of things with machines that we didn't do at all before. So fossil fuels have changed our way of life, our view of the world, how many of us live on the planet, how we live, and where we live.

Think of the Arizona desert, for example. How many people could live there without fossil fuels? Not many. But with the enlarged scope and speed of transportation resulting from oil, we can transport materials and resources from where they're abundant to where they're scarce and support a city like Phoenix. We can cut down forests in British Columbia and use the wood in Southern California, or transport water over long distances, wherever we need it. So, we end up with cites in places where nature ordinarily would not permit very many people to live. All these things together have created our way of life as we know it today, and oil is central to that way of life.

**David Ross:** Can you talk about the Hubbert oil curve and its implications?

**Richard Heinberg:** M. King Hubbert was a petroleum geologist whose life spanned most of the twentieth century. He was the most famous and renowned petroleum geologist of his time. He worked for Shell Oil Company and also taught at Massachusetts Institute of Technology, UC Los Angeles, and a number of other schools. He was the first geologist to make a fairly accurate estimate of the total ultimately recoverable quantity of oil, first in North America, and then later on, in the world as a whole. He also was the first petroleum geologist to understand the principles of oil depletion.

Hubbert realized that, for any given oil province, when about half the oil is gone production tends to peak. The reason for that is that we naturally we go after the easy, cheap oil first, and by the time about half of the total amount of oil is gone, the cheap, easy stuff tends to run out; then it becomes more difficult to extract what's left. So there's a bell-shaped curve to production that seems to apply across the board. Economic and political factors can change the shape of that curve: if there's a war or the price of oil changes or a country voluntarily decides to restrict exports, those can alter the oil extraction profile. But even so, what goes up must eventually come down, and so depletion can be mathematically modeled even if the graph is fairly bumpy.

When Hubbert applied his methods to the United States, which was the world's foremost oil producing nation for many decades, he determined that the halfway point of extraction would occur around 1970. Sure enough, just as Hubbert predicted, U.S. oil production peaked in 1970, and it's been going down ever since. We're extracting about as much conventional onshore oil in the U.S. now as we were in 1940, which is much less than was being extracted in 1970, and that's the reason that we're more and more dependent upon imported oil from places like Saudi Arabia, Venezuela, and Iraq.

Using Hubbert's method, it's also possible to predict when global oil production will peak. The scary thing is, the peak is likely not that far off. No one is absolutely sure, because it is impossible to determine exactly how much oil is yet to be discovered. Some countries have political motives for underreporting or overreporting their reserves. But the best guesses are that we're only a few years away from the global oil production peak.

**David Ross:** What will happen when we pass the peak of the Hubbert oil curve?

**Richard Heinberg:** Once we hit the peak, every year thereafter we will be unable to find and pump more oil. If the demand continues at the present rate or grows, the supply will be inadequate. And that will have tremendous economic implications for the whole world. As I explained earlier, our whole industrial way of life is largely based on petroleum. So either we have to find other energy sources to make up for what we lose from petroleum as it begins to run out, or else we will go into permanent economic decline with vast implications for the economy, food production, transportation, and so on.

**David Ross:** Can we find alternative energy sources in time that could replace oil?

**Richard Heinberg:** That's a surprisingly tough question because there are very few scientists out there who are really doing good comparative studies of the various energy alternatives. We have companies that are invested in particular energy alternatives, that are doing their own studies, but they understandably have a certain bias. What we need are really objective studies comparing the alternatives on the basis of a series of clear, transparent criteria, like: Are they renewable? What's their environmental cost? What's their energy profit ratio?

You see, it takes energy to get energy. It takes energy to drill an oil well, it takes energy to manufacture a photovoltaic solar panel. But the energy profit ratio is different for each of the alternatives, and that figure needs to be objectively determined. Suppose we were to invest $100 billion dollars over the next ten years in making a transition to a hydrogen economy, and then discovered that, in fact, hydrogen has a lot of hidden costs. Well, we can't afford to lose ten years and $100 billion dollars going down the wrong road at this point.

So: Are there alternatives that can replace oil? Well, the answer is: We don't know for sure, but there's little cause for complacent assurance right now. The reason I say that is that most of the renewable alternatives like nuclear, wind, and solar have various drawbacks.

Nuclear power is expensive and dangerous, and the problem of radioactive waste storage has not been solved. With wind, you can only place turbines in certain places (wind is probably the best of the alternatives, by the way, in my view). With solar, the sun only shines part of the day, and some regions are often cloudy. Photovoltaics, right now, are still quite expensive. I speak from experience: I've got PV panels on the roof of my house right now. I'm glad I installed that system, but it's an expensive way to go and not very many people are willing to make the investment.

Hydrogen is not even an energy source; it's just an energy storage medium. Yes, we could run cars on hydrogen, but where are we going to get enough hydrogen to run millions of autos? Either it has to be made either from fossil fuels—which are the source of nearly all commercially available hydrogen today—or from water using electrolysis. But making hydrogen from water takes a lot of electricity; in fact, it takes more energy in the form of electricity than the hydrogen will give you later on.

Again: where will we get all of this extra electricity? We're not going to get it from natural gas, because we in North America are starting to run out of natural gas. Are we going to get it from nuclear, solar, or wind? If we choose any of these alternatives, it means dramatically increasing our energy budget for electricity production at a time when we're going to be suffering from the economic effects of petroleum and natural gas depletion. We're not prepared to make a huge investment in new electrical generating capacity now, and we will be even less prepared then.

**David Ross:** How does human carrying capacity fit into the context of the Hubert oil curve?

**Richard Heinberg:** We have artificially increased the carrying capacity for human beings on planet earth. Carrying capacity is how many individuals of a given species can be supported by the environment. That number tends to vary, depending on weather, rainfall, etc. Carrying capacity changes for just about every species from year to year. Well, we human beings have found a way to artificially—and probably only temporarily—enlarge our carrying capacity with industrial agriculture, expanded transportation networks, technology, better sanitation, better medical care, etc.

The problem is that this expanded carrying capacity is dependent on a non-renewable resource, namely, fossil fuels. So this is not permanent carrying capacity that we've created; this is what William Catton—who wrote the wonderful book, Overshoot, back in the 1980s—called phantom carrying capacity. It's carrying capacity that may vanish as fossil fuels disappear from our lives.

What's the size of that phantom carrying capacity? Nobody knows for sure, but if we look back to how many people planet Earth supported before we started using oil, we find it was fewer than two billion. We now have over six billion. So, even granting that we've discovered ways of keeping people alive through better sanitation and so on, ways that might be sustainable using relatively little energy, the fact is that we've probably overshot our carrying capacity, and we may need to find ways to reduce the human load on the environment if we're all going to survive.

**David Ross:** Can you talk about the different options for our future as we pass the peak of the Hubbert curve?

**Richard Heinberg:** Plan A, or what I call Plan War is what we're pursuing right now in Iraq. Whoever has the most guns and bombs will compete with everyone else for the remaining resources, and use them till they're gone.

Of course, the situation is a bit more complicated than that. Obviously, the U.S. didn't conquer Iraq so that we could just literally build a pipeline directly from Basra to Houston. It's more complicated than that. I think the U.S. has economic and geopolitical reasons for wanting to control the price of global oil, and have its hands on the spigot, if you will. Iraq is a pivotal country in terms of the future of oil production. It has the second largest reserves, and it's sitting right there between Saudi Arabia and Iran.

Saudi Arabia has the largest reserves, but it's politically unstable, and it's unclear what would happen in Saudi Arabia if the government there were to fall, whether supplies would be cut off at least temporarily. So, having a large military presence next door to Saudi Arabia must make a lot of sense in the minds of the geostrategists.

U.S. geopolitics in the Middle East is complex and multi-layered, but it's not really an oversimplification to say that it's fundamentally all about oil. The U.S. would not be interested in the Middle East if there weren't a lot of oil there, and the main reason the U.S. is interested in places like Africa and South America, again, is for the resources.

So that's Plan A, and it doesn't look like it's going to have a very happy ending because one can foresee more and more armed conflicts between heavily militarized consuming nations and poorer resource-rich producer nations. And eventually, there will be conflicts between competing consuming nations. China, for example, wants to industrialize. China is using more and more oil every year. If the Chinese are going to raise their standard of living and industrialize, they're going to need lots of oil. But if global oil production peaks, that means the Chinese will be in direct competition for every barrel of oil with the already developed countries like the U.S. So, how are we going to work that out? Using nuclear bombs? I hope not, but right now I don't see any other thinking going on.

Plan B, or what I call Plan Powerdown, would entail some kind of national and global process for deliberately reducing our dependence on fossil fuels. It would require changing our economy so it's no longer a growth economy. It would require dealing with population issues, so that we're putting less of a load on existing resources. It would require dealing with the problem of economic inequality within and among nations, because the more economic inequality we have, the higher the likelihood of conflict.

Powerdown would require changing our whole way of life, going from a consuming society to an efficient society, going from a growth society to a society that's steady-state and even reducing its scale year after year. That's politically very difficult. The last person to attempt something like that, in this country anyway, was Jimmy Carter—and look what happened to him, when a political opponent came along promising a return to times of plenty. Still, if the American people realized what's at stake and what the long-term consequences of their path will be, I think many if not most would be interested in following Plan B.

Plan C is what I call Plan Snooze. This is the real path of least resistance. It entails doing little or nothing while the problem is temporarily denied or wished away. There are all sorts of people assuring us that the market can take care of any resource shortages. Or that all of the intelligent people working on the problem will surely come up with an easy solution. Or that we will see an effortless transition to a hydrogen economy.

If you watch television and read the newspapers, you will see that this is a popular message. It's what the corporations are telling us, and it's what we all want to hear: Somebody is going to take care of the problem, so don't worry about it. Unfortunately, the problem with Plan C, as far as I can tell, is it's probably wishful thinking. It merely locks us into the path we're already on, which leads us back to Plan A, back to competition for the remaining resources. Plan Powerdown requires hard choices, political will, and effort; if we avoid those because we're convinced that there's an easy way out, we will squander the little time we have left for maneuvering. Then the only option we will likely have left is military confrontation over the remaining resources.

The Hubbert oil peak is predicted to occur in 5-10 years. You've written that natural gas will go through the same peak in supply even sooner.

In North America, it's happening right now. We're in the middle of a natural gas crisis, but you have to read the business pages of the newspaper to find the evidence for that. Alan Greenspan has gone before Congress twice now to say that we have a big problem here, and that he doesn't have the solution to it. This summer, Energy Secretary, Spencer Abraham convened a blue ribbon panel in Washington to address this. Abraham essentially said: Look folks, I need some short-term solutions. And the rest of the day, people from industry offered long-term partial solutions, but nothing that could make much difference in the next couple of years.

Currently, the market is dealing with the gas shortage through what's called "demand destruction." That means that prices rise sufficiently—and natural gas prices are about twice what they were a year and a half ago—to drive whole industries out of the market, so that the folks can heat their houses in the winter. Currently, 20 percent of the fertilizer industry in the U.S.—which uses natural gas to make ammonia-based fertilizers—is gone permanently. Another 30 percent is closed down temporarily until gas prices go down, which they probably won't. So probably half the fertilizer industry is gone. The chemical industries and a lot of manufacturers are teetering on the brink right now because they can't afford natural gas at current prices.

So what's going to happen? All those industries are going to go overseas. Fertilizer will be made for us in the Middle East, Trinidad, and other places that have natural gas, and then it will be shipped here. But even so, the natural gas situation is going to get worse because we're generating a lot of our electricity with gas-fired power plants, and it's entirely possible that, even as soon as later this summer may start to experience brown-outs or rolling black-outs.

Next summer is likely to be a lot worse, because, as I said, there's no short-term solution to this. The U.S. has already peaked in natural gas production, and Canada—we've been importing 16 percent of our natural gas from Canada—has peaked this year too. They're forecasting that their natural gas production this year will be down 3 percent from last year.

So we're looking at a big problem, and it's not going to be solved by importing liquefied natural gas in tankers. That will help, but it's expensive, and years are required to build all the new tankers, the new special off-loading terminals, etc. The natural gas industry's solution is to get more permits from the government to drill in Colorado, offshore, etc., but it's unlikely that enough natural gas will be found in those places to really make that much of a difference. In Colorado, there's coal-bed methane, which causes huge environmental problems to extract. Offshore of California and Florida, the estimates of what's actually there are not all that encouraging.

**David Ross:** Where can readers go for more information?

**Richard Heinberg:** If they want more information on natural gas, I would recommend information from Julian Darley of **www.globalpublicmedia.org** . There you'll find audio and video interviews with a lot of very knowledgeable experts on energy resource depletion. If you want more information on the social, economic, and political implications of all of this, go to my website, which is **www.museletter.com**