

Japan and the End of Cheap Oil

by Tony Boys

The world annual extraction ("production") of conventional oil looks set to peak sometime between 2005 and 2010. This does not mean that oil will "run out," but that it will no longer be cheap. Why? After the peak, extraction volumes will fall by 3% to 6% per year, but in order to maintain or stimulate economic growth, world demand for oil will continue to rise.

Demand will therefore outstrip supply. We can expect not only price hikes, but also "oil shocks," supply disruptions, and resource wars for the control of the remaining oil reserves.

Natural gas will help keep the economies running for a little longer. The world peak of natural gas extraction is expected to occur somewhere around 2020 to 2025. That means that the peak for all hydrocarbons (all fossil fuels except coal) will occur sometime around 2010 to 2015. However, the extraction peak of conventional oil will be a major event, firstly because of its huge share in world primary energy consumption (about 40%) and secondly because of its versatility as a fuel. On this second point, as a fairly clean-burning, liquid fuel, oil provides an easy-to-handle, cheap, and efficient fuel for transportation, heating, electricity generation and so on. It is also the basis of the petrochemical industry, where it is the raw material for over 500,000 everyday chemicals such as paints, glues, plastics, agricultural chemicals, pharmaceuticals and so on. Although natural gas (perhaps with less CO₂ emissions and pollution) and coal (with more CO₂ emissions and pollution) can take over some of the roles of oil, these are very limited in their usefulness in the chemical industry. Oil is the basis of our advanced consumerist lifestyle, and was the driving force behind the economic engine of prosperity in the 20th century. Increasing difficulty in obtaining cheap and abundant supplies of oil spell the beginning of the end of the consumerist party.

Japan's Precarious Energy Lifeline

What does this mean for Japan? Japan's oil lifeline extends over 12,000 km from the Middle East. Japan is over 85% dependent on the Middle East for oil. 67% of Japan's natural gas supplies come from Indonesia, Malaysia, and Brunei. (Japan's primary energy consumption is about 53% oil and 11% natural gas.) When oil prices leap following the peak of world extraction, prices of all energy forms will rise sharply as demand shifts in order meet requirements. For a time, Japan will have financial resources to buy oil, natural gas, and coal, but as the economy slumps (lack of energy means less production, fewer exports) this will become increasingly difficult. Supply disruptions will be inevitable, or perhaps regional wars will make shipping impossible, resulting in a once-and-for-all termination of oil and natural gas supplies to Japan.

Japanese newspapers have carried articles recently about natural gas supplies from Sakhalin via pipeline to Hokkaido and Honshu. The plan calls for deliveries of gas to begin in 2008 and for 7.5 million tons to be delivered each year for 30 years. Fine until you know that Japan's current imports of natural gas are over 50 million tons per year. 7.5 million tons of natural gas amounts to about 1.5% of Japan's current primary energy supply. Perhaps nuclear power can help Japan maintain her economy. The problem here is that nuclear power probably could not exist without cheap energy inputs from oil or natural gas. Uranium mining and refining, nuclear fuel manufacture, nuclear power plant construction, treatment and/or storage of nuclear waste all require energy, and most of these things are more easily carried out using oil than any other energy source. I would estimate that nuclear power could not operate in Japan for much more than a year following termination of oil

supplies to this country. Effectively, this could mean the collapse of society as we know it now.

You are surely not thinking that the current Japanese economy can be run on wind turbines, solar panels, and hydroelectricity?! If we were now "banking" currently cheap oil into the manufacture of turbines, panels, hydroelectric generators and so on, these might then be used to provide some very basic services (lighting, pumps for water systems) but not very much more. But we're not, and after the end of cheap fossil energy, it will become very difficult to manufacture these items.

An idea originally proposed by Buckminster Fuller in the 1930s, a Global Energy Grid, may make a bit more sense. Large areas of solar panel arrays, wind turbines, and so on, could be located in deserts, coasts or mountainous areas, and the electricity generated there transmitted by international grid to populated areas. If there were a cheap and easy way of making a superconductive grid (at present there isn't), transmission losses could be held to a minimum, but the plan would still be feasible with an ordinary electrical grid. There are of course the usual problems of international cooperation to be solved, and you would be justified in being skeptical about whether this would work in an energy-short world. Presumably, Japan would receive electricity from the Chinese deserts via the grid across the Tsushima Strait, again placing Japan at the terminus of a long and precarious energy lifeline.

Another problem: Manufacturing and Food also Depend on Oil

Electricity is a wonderfully versatile energy carrier. But you have to make the equipment to generate it, construct the grid to distribute it, and then when you have it coming into your house or factory you have to have the machinery or appliances to run on it. That means these machines and appliances (including electric cars or the facilities for producing hydrogen for fuel cells) also have to be manufactured. All of this requires energy for extraction of the raw materials and their transformation into final products. How much electricity will remain for actually running the machines? Precious little, perhaps. In practice this will mean that the machines and appliances will have to be limited in number and performance. Hopefully, they would be more efficient, but it does not look like household appliances will be anywhere near as universal as they are today. I do not mean by this that renewable energy (either on a large or a small, local scale) is a waste of time. What I am saying is that there will be major adjustments in lifestyle.

Readers in Japan will by now have noticed another problem. A severe energy crunch will not only make life hard by affecting transport, lighting, heating, water supplies, and electricity supplies, it will make it hard to eat. Japan is the world's largest importer of food. Only about 40% of food calories consumed here are produced in this country. This can probably be raised quite quickly to 50% or 60% by elimination of luxuries (cultivation of flowers and some fruits and vegetables) and by bringing abandoned farmland or other suitable land (golf courses?) under cultivation. However, in the event of disruption or termination of international food trade (quite possible as the result of a world energy shortage) it will be very hard indeed to feed Japan's 120-something million people on domestic resources alone.

Don't just take my word for it, look at North Korea. That there has been starvation there for the last six or seven years is well known, but the reasons for it are generally not well understood. In the 1950s and 60s, North Korea "modernized" its agriculture. This means that they abandoned traditional agricultural practices for "more efficient" chemical (chemical fertilizers, pesticides and herbicides) and fossil fuel-based (mechanical) agriculture. They were doing fairly well; in 1989 the total production of maize and milled rice was over 6.7 million tons, or about 290 kg per person. Quite enough for an adequate diet when vegetables and fruit are added in. Of course, some of the grain was fed to animals for animal protein (eggs, meat and milk). In 1990, the Soviet Union collapsed, and with it North Korea's energy supply and its preferential trade terms with eastern Europe. Unwilling to bear any extra burden, China also turned a cold shoulder on its neighbor.

Weather irregularities have also helped to push North Korea over the edge. Because of severe droughts, it is estimated that North Korea will produce less than 3 million tons of grain this year. This is about 60% of the minimum harvest necessary for basic survival of the North Korean population. The rest must be met by international aid donations. Norbert Vollertsen is quoted as saying, "There are gaunt children, full of infection, malnutrition, just 10 km away from the people in power in Pyongyang who are enjoying caviar." (Washington Post, Wednesday, May 16, 2001; Page A20)

But the main problems have been caused by the energy shortage. Nitrogen fertilizer (the main chemical fertilizer) is made either from natural gas or petroleum. When production plummeted in North Korea, so did the fertility of the soil, and therefore harvests. Fields are replanted without the replenishment of nutrients, causing ever lower yields on ever more barren fields. Organic (traditional) farming is now non-existent, and because of the food shortage animals are in desperately short supply. Lack of energy has also meant lack of motive power; in the late 90s it was estimated that only 20% of farm machinery (including trucks, tractors and irrigation pumps) was in working order. Lack of farm animals has meant that virtually all work has to be done manually, resulting in crop wastage at harvest times. It is still possible that North Korea can be helped out of this tragic systemic crisis, but in the event of a global energy shortage there will be nothing to prevent the same problems occurring here, and no hope of international aid.

I'm not "predicting" doom and disaster. I'm saying, "Look at the trends and draw your own conclusions." From the above, unless steps are taken soon to avoid disaster, it looks to me as if the problems mentioned above will begin to occur in Japan as early as 2005, and almost certainly by 2015. There needs to be a massive public discussion of this in Japan, based of course on freely available and reliable information. In the meantime, what can you do? The first thing you can do is check for yourself that what I say does represent reality. Please do not either dismiss what I say out of hand, or believe everything without confirming it for yourself. This will help you to begin mental preparation for the changes to come. Concrete things you can do include:

- Start reducing your dependence on electricity and fossil fuels by all forms of energy saving.
- Diet change; eat more rice, local and seasonal produce, and give priority to organic produce.
- Support local organic farmers and farming groups by buying directly or at farmers' markets.
- Think about creating the future self-sufficient lifestyle of your family by growing just some of your food, making some of your own clothes, thinking how you would obtain water, and so on.
- Participate in activities with others to do something about raising the level of local self-sufficiencies in basic areas (food, clothing and shelter).
- Look at your current surroundings and try to see the potentials (and pitfalls) for a more self-reliant lifestyle. If you live in one of the very urbanized areas of Japan, try to think how you can relocate to the countryside if and when the time comes.
- Help your children to understand the kind of social changes that are likely to happen in the future. (Unfortunately, schools may not be of much help as they are not geared to teaching value systems of societies that do not yet exist!)
- Read newspapers and books, and watch the TV news and documentary programs. Try to develop your own information gathering system concerning food and energy trends.

Good Luck!

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