A Comparison Between the Security of Supply of Electricity in South Korea, Japan and the United Kingdom.

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Summary.

In their recent Submission to the UK Government's Consultation on Energy, BNFL quoted from an analysis that I have made of the Security of Supply (SoS) in the UK. In this article I summarize conclusions for the Security of Supply in South Korea over the period to 2020. For the purposes of comparison, I have performed a similar analysis for Japan. I also present a summary of the findings concerning the UK, again for the purposes of comparison.

The following conclusions are arrived at:

- ***There is currently one chance in fifty that politically motivated interruptions of fuel supplies will reduce electricity output to less than 50% of the rated output of power stations in Korea and Japan, for several months in a given year.***
- ***By way of contrast, there is no chance of such interruptions to UK supplies, currently.***
- ***However, the Security of Supply is slowly improving, for South Korea and Japan. By 2020 it will have risen by about 10% in both countries.***
- ***Simultaneously, the Security of Supply in the UK is falling, rapidly. In 2015 it becomes equal to that for Japan and in 2016 to that for South Korea.***
- ***By 2020, Security of Supply for the UK has fallen below 40%, which is lower than the Security of Supply in Japan and Korea today.***
- ***By 2020, the Security of Supply in Korea will have risen to over 50% and that in Japan to nearly 60%.***

Introduction.

In their recent Submission to the UK Government's Consultation on Energy, BNFL quoted from an analysis that I have made[1] of the Security of Supply (SoS) in the UK. I showed that at present the SoS is excellent, largely because the UK is self sufficient in natural gas, oil and coal; and obtains the uranium for its nuclear power stations from friendly countries such as Australia and Canada.

However the UK's supplies of oil and gas will be exhausted during the next decade and the supposition is that the UK will import natural gas through pipelines, mostly from Russia. This I show reduces the SoS substantially, largely because of the risk that gas supplies from Russia will be interrupted for political reasons, either in Russia or in countries such as Ukraine and Belarus through which the pipelines pass.

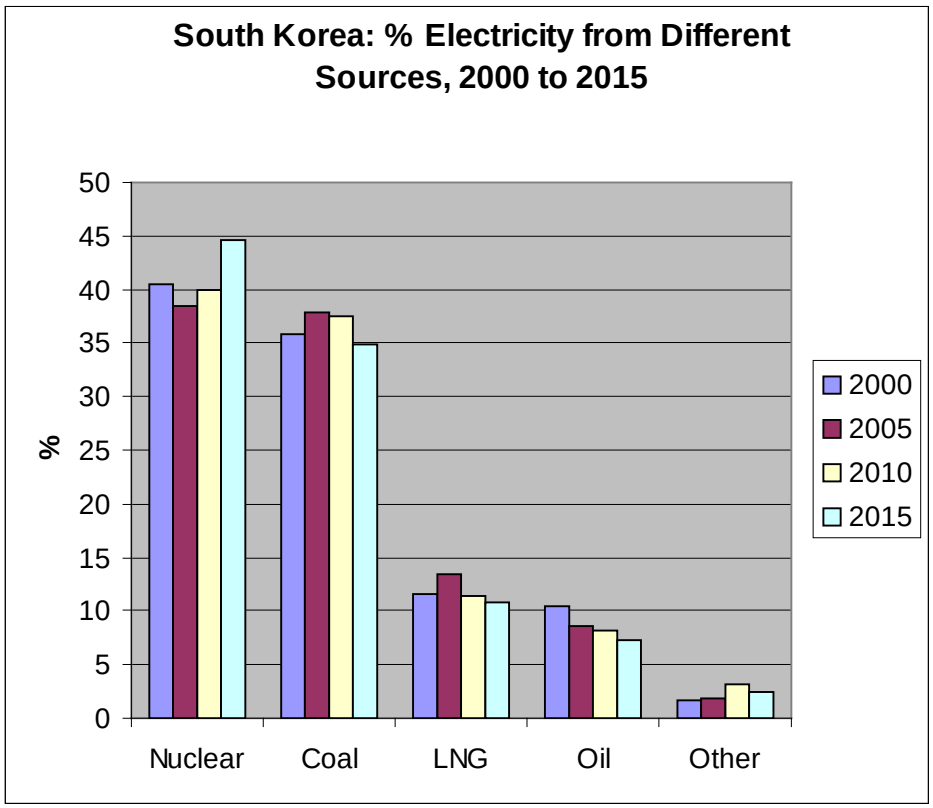
To form these numerical forecasts of the likelihood that gas and oil supplies will be interrupted I make use of extensive databases concerning political risk that have been assembled by businesses and insurers. These databases summarize a wealth of experience. They have been prepared from data on the interruption of businesses of all types, not just the oil and gas industry. These interruptions have all occurred as a result of the political aspirations of governments and disaffected minorities in various countries. In the two databases that I use, there is information concerning 137 different countries, including the countries from which the UK and other countries such as Korea and Japan, import, or will import, gas, oil, coal and uranium.

Now that my work on the Security of Supply in the UK is complete, I have turned my attention to the Security of Supply in other countries. In this article I summarize conclusions for the Security of Supply in South Korea over the period to 2020. For the purposes of comparison, I have performed a similar analysis for Japan. I also present a summary of the findings concerning the UK, again for the purposes of comparison.

[1] The Future Security of UK Electricity Supplies; An Analysis. By Professor John H Gittus. August 2002. Available from British Nuclear Fuels Ltd.

Sources of Electricity in South Korea.

In the Annual Report of Asian News Service, I present forecasts of the contributions of oil, gas, coal, nuclear, hydro and other sources of electricity for South Korea and the other seven countries of the Asian News Service. These forecasts are based on information from the utilities in these eight countries. The following diagram is based on these forecasts.



The diagram is for the number of TWe.h that will be ***generated*** each year, not for the actually total ***capacity*** of the power stations. It shows that the contribution of nuclear is set to rise by a modest amount over the coming decade.

Coal and nuclear will provide roughly equal amounts of Korea's electricity. They are the two largest sources of electricity. Almost all of the gas is imported as Liquid Natural Gas, LNG. LNG and oil provide approximately the same amounts of electricity. There is a small amount of hydro and other minor sources of electricity.

With no domestic oil reserves, South Korea must import all of its crude oil. South Korea is the seventh largest oil consumer and fourth largest crude oil importer in the world. Seoul imported 859 million barrels of crude oil last year of which 77 per cent came from the Middle East. Strategic stocks are roughly equivalent to a 90-day supply.

South Korea currently relies on imported liquefied natural gas to meet its entire demand for natural gas, though a project currently under development will make the country a minor natural gas producer by early 2003.

Bituminous coal supplies (steam coal for power plants and industrial boilers and metallurgical coal for steel making) come mainly from Australia and China, with the United States also among the suppliers.

The electric power imported to South Korea from neighboring countries was 2 to 3GW in 2000 and could be 3 to 4 GW in 2015. This is only about 5% of the installed generating capacity and does not have a significant impact on national energy security.

Political Risk Premiums for Main Middle East Oil Producers Compared to the Interruption of Oil Supplies, 1954-2002.

700 billion barrels out of the world's 1,000 billion barrels of oil reserves are in the Middle East and nearly three quarters of South Korea's oil imports come from the Middle East. When oil imports have been cut off, historically, it has been the countries of the Middle East that have cut them off, for political reasons.

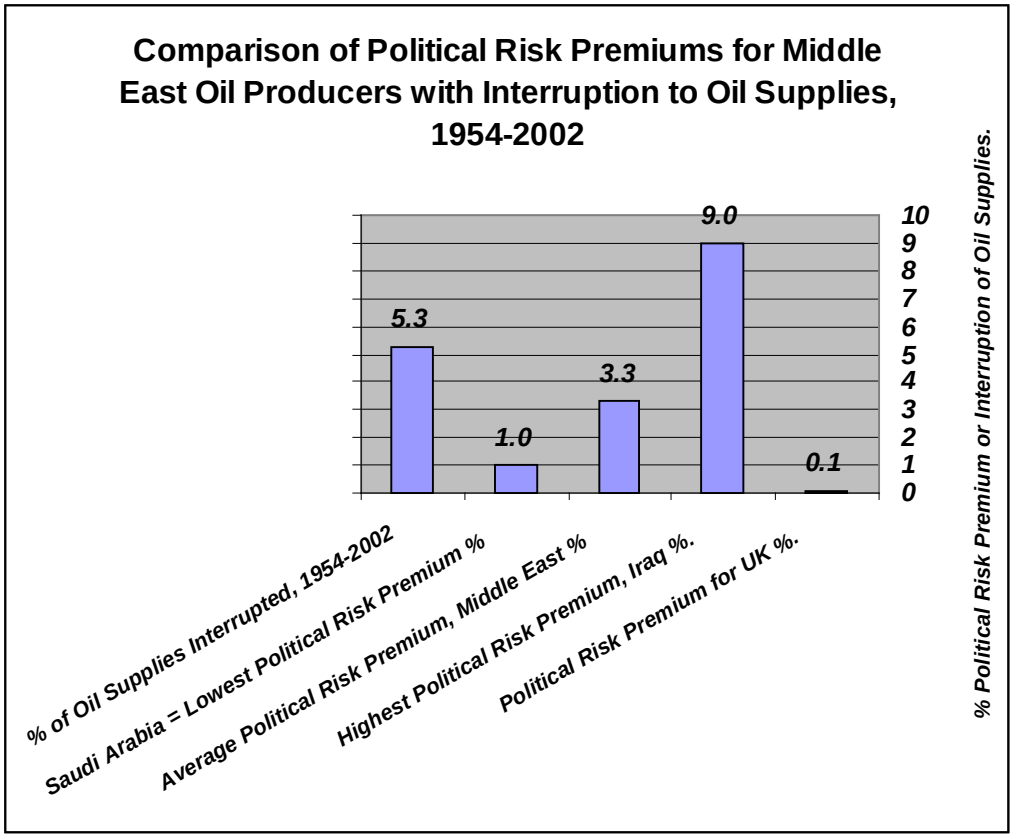
One of the two databases that I use to estimate the risk of politically-motivated interruptions in oil, gas, coal and uranium supplies has been developed, with my assistance, by insurers in the Lloyds of London Insurance Market. This database gives Political Risk Insurance Premiums, which reflect the annual percentage losses that insurers have had to pay.

Some of these Premiums, for the countries of the Middle East that have the greatest oil reserves, are shown in the following diagram. The average Political Risk Insurance Premium in 2002 for these oil-exporters is 3.3% and the range is from 1% for Qatar to 9% for Iran.

The figure also shows that 5.3% of the oil supplies from these countries have been lost, through politically-inspired interruptions, each lasting some months, over the last 48 years.

This figure of 5.3% may be compared with the Premiums, average 3.3%; range 1% to 9%: clearly there is a measure of agreement, indicating, as might be expected, that the Premiums reflect the losses in the oil sector.

Similar patterns emerge when the gas, coal and uranium export trades are analysed.



The Security of Electricity Supplies in South Korea, Compared to Japan and the UK.

From the analysis of Political Risk, exemplified above, the likelihood that imports of oil, gas, coal and uranium will be interrupted by politically motivated activities has been calculated. The calculations have been made for the present year and for the period up to 2020, using forecasts of the sources of electricity that will be used in future years. The forecasts for Korea were summarized above.

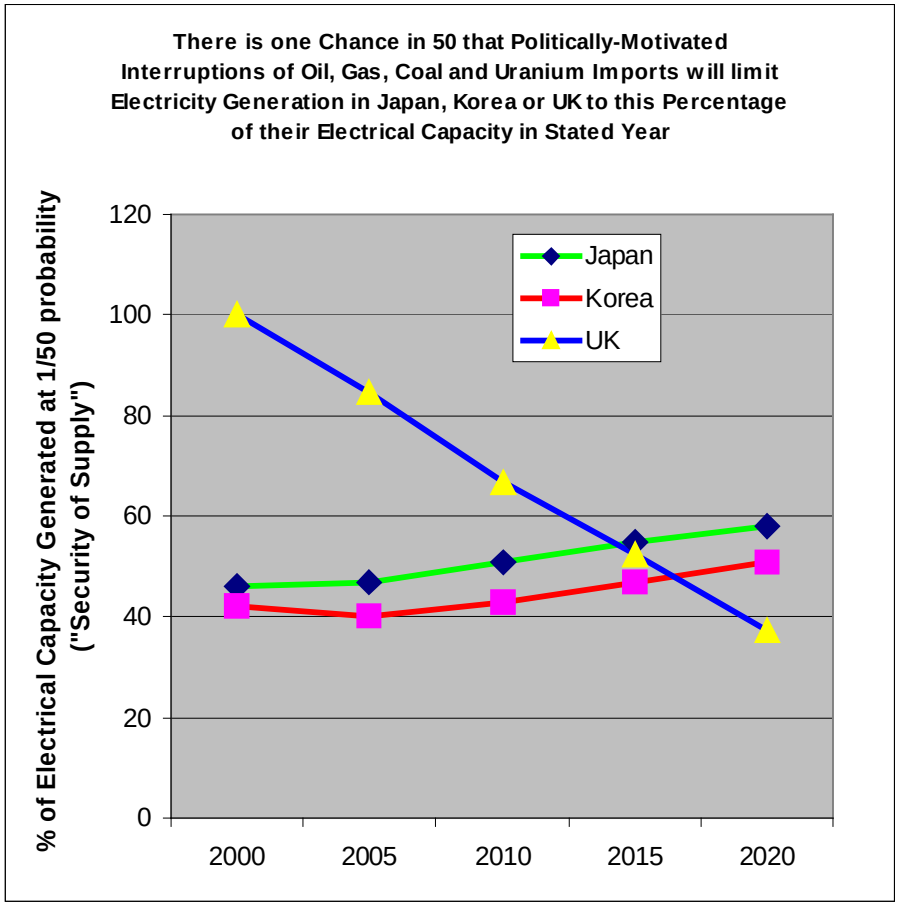
In the case of Japan; Japan imports about 96% of natural gas consumed, all in the form of liquefied natural gas (LNG). A large proportion of this LNG comes from Southeast Asia; 37% from Indonesia, 21% from Malaysia.

Japan is by far the world's largest importer of steam coal, mainly for power generation, paper pulp, and cement production.

Japan currently generates around 10 percent of her electricity from hydropower. There are plans to extend hydropower still further, but the limit would appear to be about 140 TWe.h.

As for the UK: the UK is currently self-sufficient in oil, coal and gas; the UK imports its uranium from politically-friendly countries such as Australia and Canada (Political Risk < 0.1%). However, by 2010 the UK will rely on imported fossil fuels.

The following diagram then shows the forecasts for the Security of Supply of electricity in South Korea, compared with Japan and the UK, up to 2020.



We shall term *the percentage of electricity generated at a probability of one in fifty* "The Security of Supply".

The following conclusions can be drawn from this figure:

- There is currently one chance in fifty that politically motivated interruptions of fuel supplies will reduce electricity output to less than 50% of the rated output of power stations in Korea and Japan, for several months in a given year.
- By way of contrast, there is no chance of such interruptions to UK supplies, currently.
- However, the Security of Supply is slowly improving, for South Korea and Japan. By 2020 it will have risen by about 10% in both countries.
- Simultaneously, the Security of Supply in the UK is falling, rapidly. In 2015 it becomes equal to that for Japan and in 2016 to that for South Korea.
- By 2020, Security of Supply for the UK has fallen below 40%, which is lower than the Security of Supply in Japan and Korea today.
- By 2020, the Security of Supply in Korea will have risen to over 50% and that in Japan to nearly 60%.

(ends)