



Will the UK Face a Natural Gas Crisis this Winter? (Part 1 of 2)

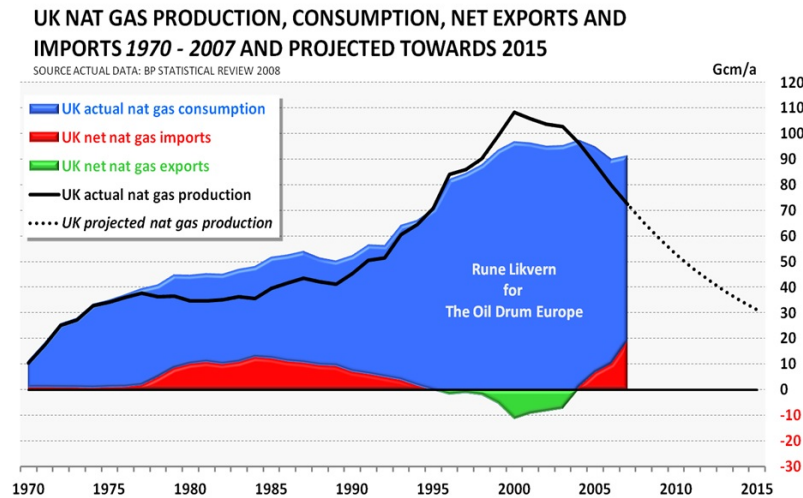
Posted by [Rune Likvern](#) on October 28, 2008 - 11:15am in [The Oil Drum: Europe](#)

Topic: [Supply/Production](#)

Tags: [depletion](#), [energy mix](#), [interconnector](#), [Ing imports](#), [natural gas](#), [original](#) [[list all tags](#)]

In recent years, natural gas consumption in the United Kingdom has grown rapidly. At the same time, there has been an abrupt change in UK natural gas supplies, brought about by depletion and decline. In the first part of this two part series, I look at historical developments in EU and UK natural gas consumption, production and imports and the challenges posed by declining production.

In the second part of the series, I use a simulation approach to test the likely adequacy of natural gas supplies during the upcoming heating season. In these simulations, I use data from the UK Department of Business, Enterprise, and Regulatory Reform (BERR), UK National Grid, as well as information about recent UK Continental Shelf (UKCS) and Norwegian Continental Shelf (NCS) developments. Based on what I refer to as the reference scenario, it seems likely that the UK will increasingly have to rely on Liquefied Natural Gas (LNG) imports to secure adequate supplies.



NOTE: Click this and other images for larger version.

EXECUTIVE SUMMARY

In recent years, the UK has become increasingly dependent on natural gas as its primary energy source. This strategy may soon be found to be based upon poor assumptions/perceptions regarding development of domestic and neighbouring natural gas reserves and, in general, regional and global supply capabilities.

- UK marketable nat gas production (also gross) peaked in 2000 close to 110 Gcm/a.

- During the last three years, UK nat gas production has declined at an annual rate of 8 - 10 %, which many energy analysts expect will continue.
- Nat gas constituted more than 38 % of the UK primary energy consumption in 2007.
- Several analyses expect UK to import 80 % of their nat gas consumption by 2020.
- UK was a net exporter of nat gas for a brief period.

In 2007, more than 38 % of the UK's primary energy consumption came from nat gas. Of the EU/OECD countries, only Italy has a higher portion of nat gas consumption. In comparison, the USA gets 25 % of its primary energy consumption from natural gas; France, 15 %; and Germany, 24 %.

In general, high nat gas usage is primarily found among countries with huge nat gas reserves like Russia, where nat gas amounted to more than 57 % of primary energy production in 2007. Russia is the world's largest exporter of nat gas and second largest exporter of oil, so this high domestic usage frees up oil for export. Since oil generates more income than nat gas, based on units of energy exported, this approach maximizes export revenue.

The UK and Continental Europe have both benefitted from the bidirectional Interconnector that since 1998 has allowed for increased flexibility in nat gas supplies. Due to the decline in UK indigenous supplies and a tighter supply situation on Continental Europe, the importance of the Interconnector is expected to slowly diminish unless future Russian supplies are shipped through the system to UK.

NAT GAS WITHIN EU

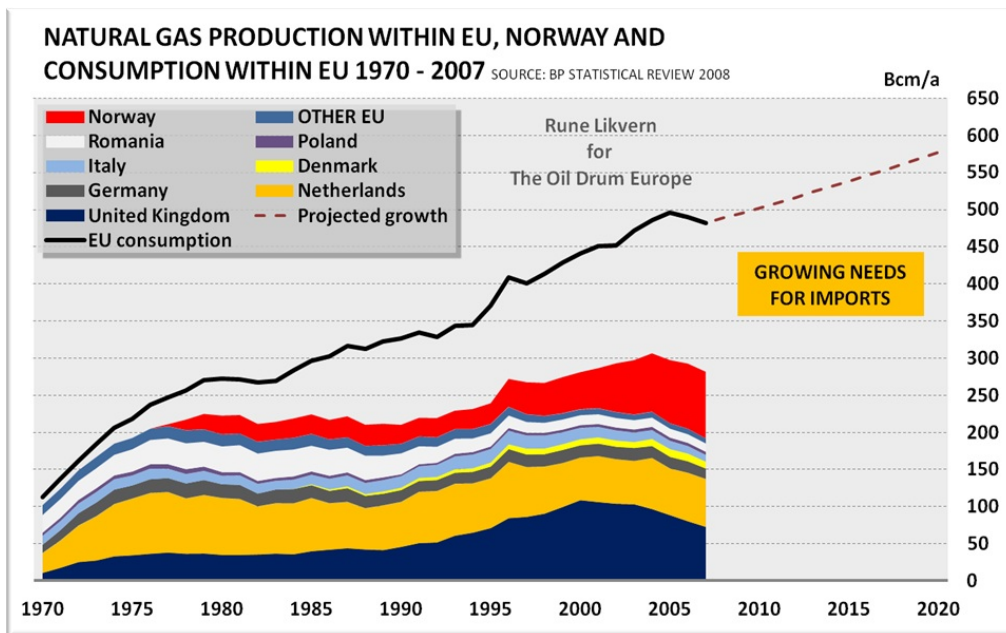


Figure 1: The diagram above shows the development in nat gas consumption for EU, production within EU and Norway and projected growth in consumption (1,4 % annually from EIA IEO 2008) for EU towards 2020.

Nat gas production within EU was on a plateau from 1996 to 2004 and has now entered into terminal decline. Increased nat gas production from Norway (which is not a full EU member) has slowed the decline. The balance of consumption within EU has been secured through increasing imports, primarily from Russia, North Africa and LNG. The diagram above suggests that imports into EU will need to grow quickly, from 200 Gcm/a at present to projected 400 Gcm/a by 2020, to fill the rapidly growing gap between declining supplies and projected growth in consumption.

If projected growth in EU nat gas consumption by 2020 is to be met, it will be necessary to double present imports of 200 Gcm/a from Russia, North Africa and LNG, a challenging task. With the ongoing credit crisis still unfolding, an increase in imports that allows maintenance of present EU consumption levels may turn out to be a major accomplishment.

As of 2007, 25 % of EU's nat gas consumption was imported from Russia. Russian nat gas exports to the EU grew substantially after the completion of pipelines between Western Siberia and Europe by the mid 80's.

There are good reasons to believe that the Russians (meaning Gazprom) planned their exports to the EU based upon available official data and forecasts from amongst others, EU members and Norway. This is of course a sensible thing to do if the goal is to maximize the profits from the Russian resource base and to optimize the allocation of investment funds. Why invest in expansions of production and infrastructure, if these investments are likely to contribute to an oversupply and a subsequent downward pressure on prices?

Perhaps what is needed is an energy czar. I think it was Matt Simmons who first used the expression "energy czar", perhaps with a hidden meaning that Russians leaders far better understand the strategic nature of energy than their western counterparts, even though their access to data is not as good.

In 1995 - 1998, the UK exported nat gas to Ireland. In 1998, the Interconnector, the bidirectional pipeline between Bacton in UK and Zeebrugge in Belgium, started to flow. After that, the UK became a moderate exporter of nat gas to Continental Europe.

EU production of natural gas has peaked, and is expected to decline. EU exclusive of UK nat gas production peaked in 1996. Since then, natural gas production has been in a general decline and is expected to continue to decline. Recently Dutch authorities confirmed that their nat gas production is set to decline. These milestones were passed without much attention. For the next several years, projected increases in Norwegian nat gas production are expected to partly offset declines in production in the EU, but the overall production trend is expected to remain downward.

UK has for some years had an important role in securing a unique flexibility with respect to the EU nat gas supply chain. The combined effect of the declining nat gas production in UK and the rest of the EU has already tightened the supply situation for EU (ref the recent price growth within the liberalized UK market), and has the potential to develop into a severe nat gas supply crunch. Such a supply crunch could have cascading effects, and may affect other energy systems. These interrelationships seem to be poorly understood among those responsible for developing energy supply strategies.

THE UK ENERGY MIXTURE

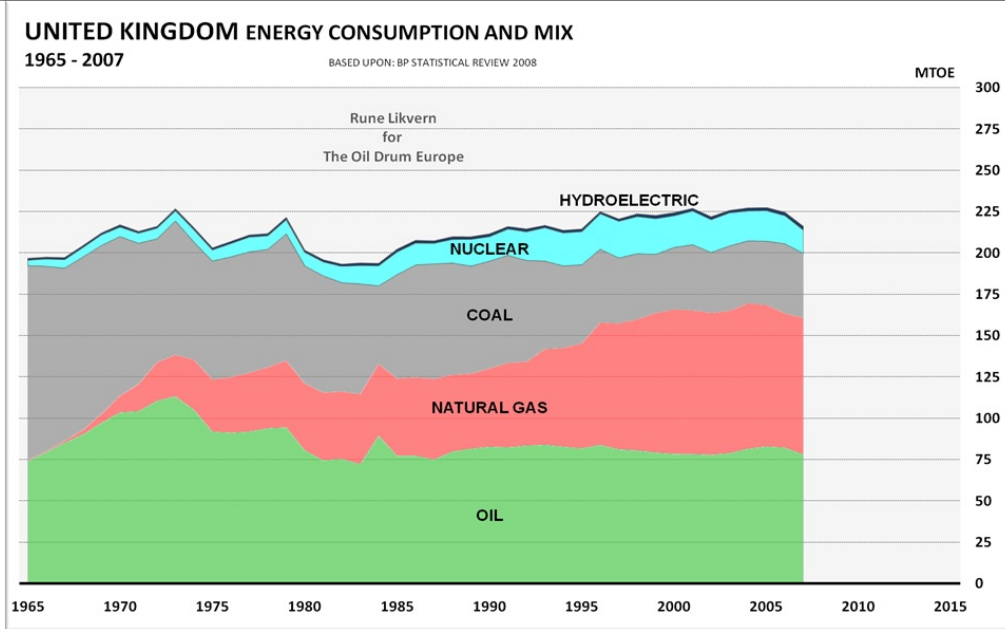


Figure 2: The diagram above shows the development in total energy consumption in UK between 1965 and 2007, split among primary sources. Total UK energy consumption has seen little or no growth; however nat gas has increasingly been substituted for coal, and to a lesser extent, oil. The switch from coal to nat gas has also had beneficial effects on the emissions of greenhouse gases.

There is no doubt that nat gas is an efficient, cleaner source of energy when it comes to cooking and heating. More recently, it has also gained popularity for electric peak shaving and electricity production due to the low initial investment required and its responsiveness.

Figure 2 also illustrates how slowly changes in the energy mix take place. It is often stressed that investment in energy infrastructure is a long term undertaking. A homeowner who buys a new appliance or a business that invests in an industrial application will have to live with the decision for decades. If the chosen energy source becomes less available or loses price competitiveness over time, it becomes hard to switch to alternatives.

Imagine a household that has based its cooking and heating needs on nat gas--what would it take (meaning cost) to change to electricity or coal or any combination of other energy sources?

THE UK NAT GAS PRODUCTION HISTORY

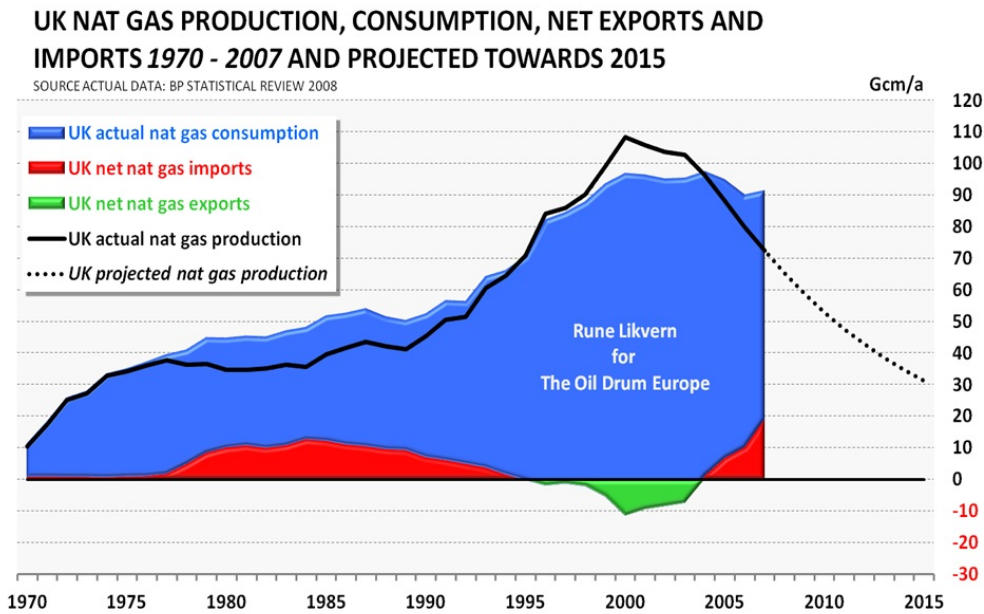


Figure 3: The diagram above shows the history of UK nat gas production, consumption, net exports and imports for the years 1970 - 2007 and projected production to 2015.

UK nat gas production grew rapidly in the 70s and 80s, with a steep build-up towards 100 Gcm/a in the 90's. The UK had a high degree of energy self-sufficiency during this period. In the late 70's and early 80's, UK production was mainly complemented with nat gas from the Norwegian part of the Frigg field, which has now closed production.

The projected decline in indigenous production will have to be met with a steep growth in imports to maintain or grow consumption. It is now estimated that imports will have to grow from the present 20 Gcm/a to 60 Gcm/a by 2015. Most of this growth is now expected to come from LNG.

NOTES: The remainder of the diagrams in this post are based upon the most recent monthly data from BERR converted to daily volumetric figures. The conversion applied is 1 Scm nat gas approximates 11 kWh, based on an industrial standard. The monthly figures from BERR are divided by the number of days (thus creating daily averages) in the respective months. This means that the consumption/supplies on any day may be higher or lower than depicted in the diagrams.

THE DYNAMICS OF UK NAT GAS PRODUCTION

UK, DEVELOPMENT IN SEASONAL MARKETABLE DOMESTIC GAS SUPPLIES
 2002 - 2008 vs AVERAGE CONSUMPTION 2002 - 2007

SOURCE: BERR

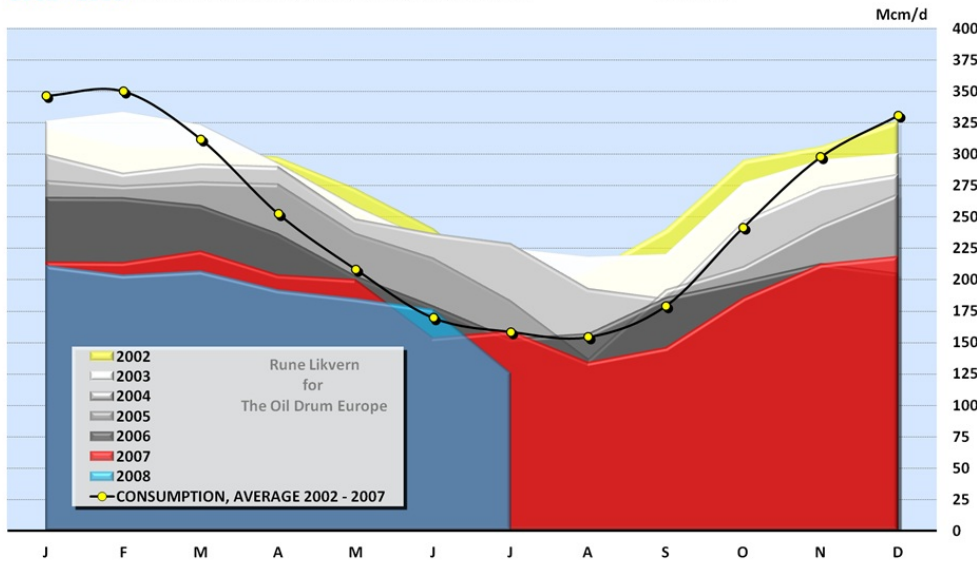


Figure 4: The diagram above shows the variations in the UK nat gas marketable supplies through the year and the year over year decline from 2002 until recently. It also shows the average consumption for the years 2002 - 2007 throughout the year.

For the upcoming heating season, National Grid expects the indigenous supplies to decline by 10 % relative to the heating season of 2007/2008 according to this [article from Forbes](#).

This suggests increased reliance on imports and increased storage withdrawals during the upcoming heating season if consumption remains close to what has been reported in recent years.

THE SEASONAL SWINGS IN UK NAT GAS CONSUMPTION

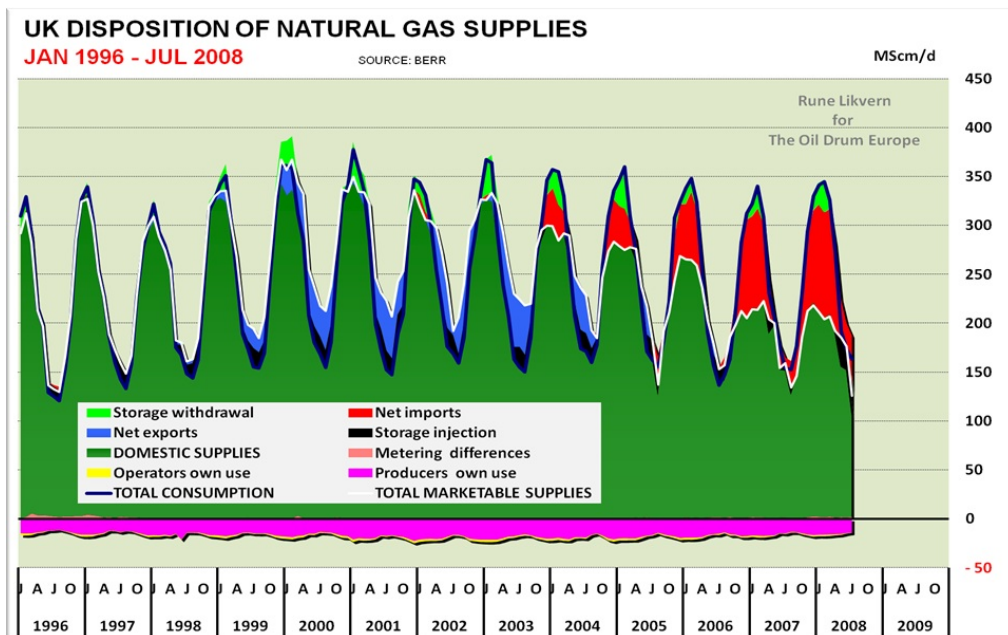


Figure 5: The diagram above shows the disposition of UK natural gas supplies from January 1996 to July 2008. It is worth noticing that as the production grew, the need for storage withdrawals was limited as the fields themselves acted as swing producers.

Because of the use of nat gas for heat, nat gas consumption typically shows considerable variation

THE UK AS A NAT GAS IMPORTER

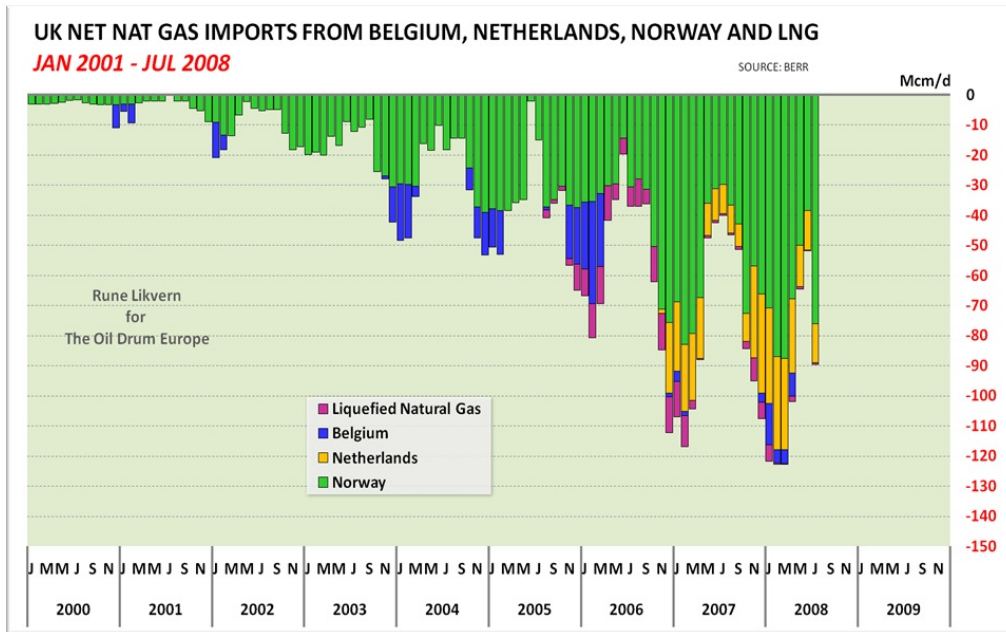


Figure 6: The diagram above shows the development in UK net nat gas imports by source from January 2000 until July 2008.

UK imports have recently shown strong growth, but nat gas imported through the Interconnector has not grown proportionally. Imports from Norway have grown substantially in recent years. For the upcoming heating season, there is reason to believe that that Norwegian imports will not grow because of a pipeline leakage affecting production from the Kvitebjørn and Visund fields. The operator of the Ormen Lange field (second largest on NCS and in build-up phase) feeding into Langedale that terminates at Easington has indicated that the drilling program has experienced delays.

The Bacton - Balgzand pipeline (in Netherlands) started to flow in November 2006. It is not clear where this natural gas originates from, but in the recent past, these deliveries have played an important role in UK nat gas supplies.

LNG imports started in 2005 and grew for a while, but have recently added little to UK nat gas supplies. If the UK is to have adequate nat gas this heating season, greater LNG imports are likely to be required.

THE UK AS A NAT GAS EXPORTER

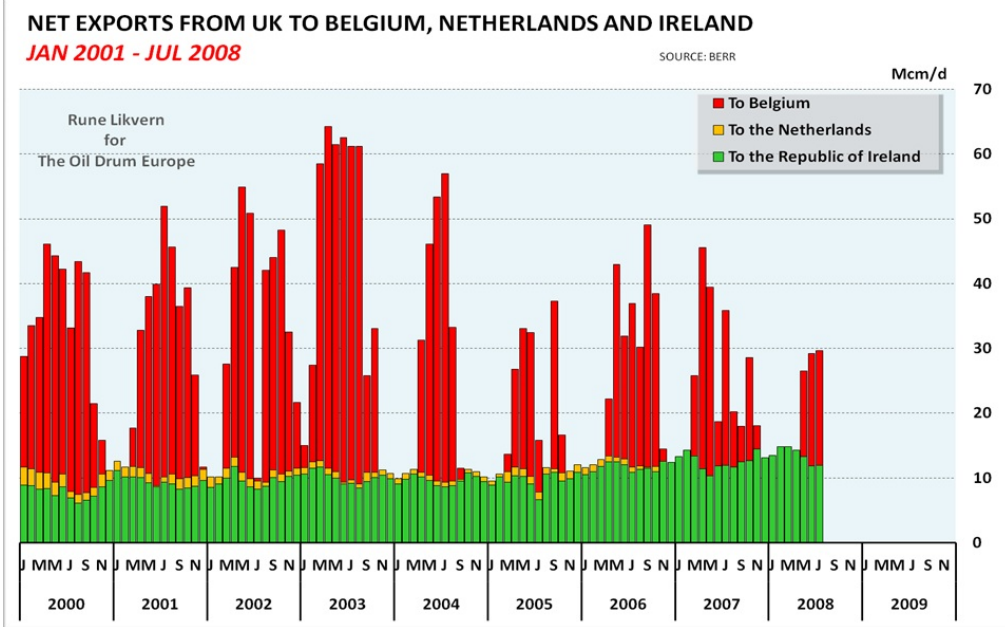


Figure 7: The diagram above shows the development in UK net nat gas exports by destination from January 2000 until July 2008.

Figure 7 shows that nat gas exports from UK to Continental Europe have taken place mainly during the summers. These exports are shrinking, and at some point will come to an end. This loss of supply can be expected to increase Continental Europe's demand for gas by a corresponding amount. The loss of UK exports to Continental Europe will put additional pressure on other sources of imported nat gas (North Africa, Norway, Russia and LNG).

As long as the UK had a surplus from indigenous production, it exported a small amount to the Netherlands, which is itself an exporter of nat gas.

The UK exports nat gas to Ireland year-around. Ireland is at the end of the pipeline, and depends on UK's exports. Ireland has recently seen strong growth in its nat gas consumption. Presently more than 28 % of Ireland's primary energy consumption comes from nat gas.

THE INTERCONNECTOR

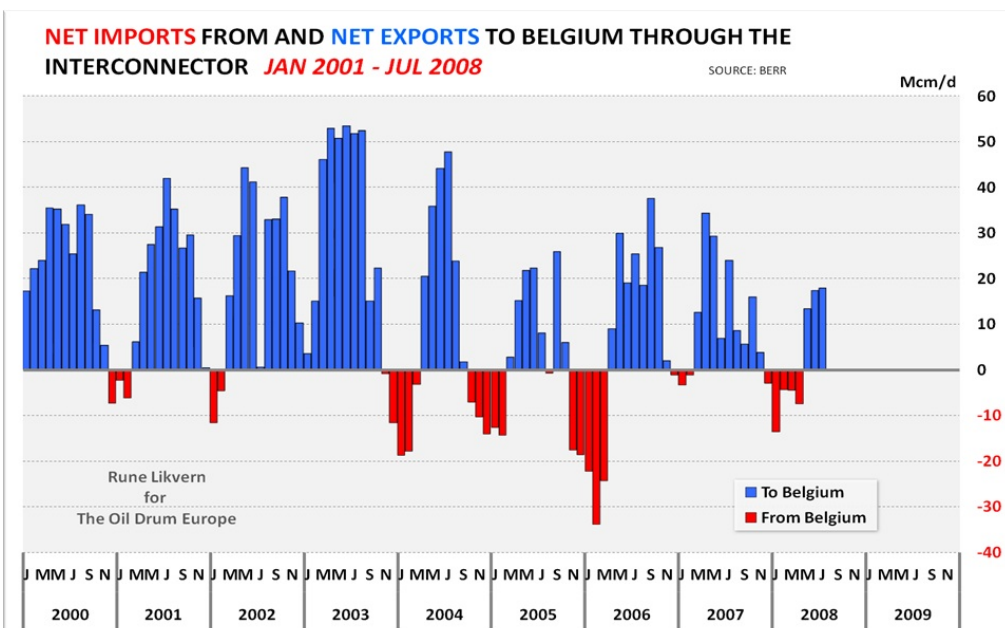


Figure 8: The diagram above shows the direction and net flows of nat gas through the Interconnector between January 2000 through July 2008.

The diagram above illustrates the diminishing flows in the Interconnector and may serve to illustrate that even if the transport capacities are there, nat gas does not necessarily need to be there. During the heating season, UK nat gas supplies have benefitted from imports from Continental Europe.

THE UK AS A NET NAT GAS IMPORTER AND EXPORTER

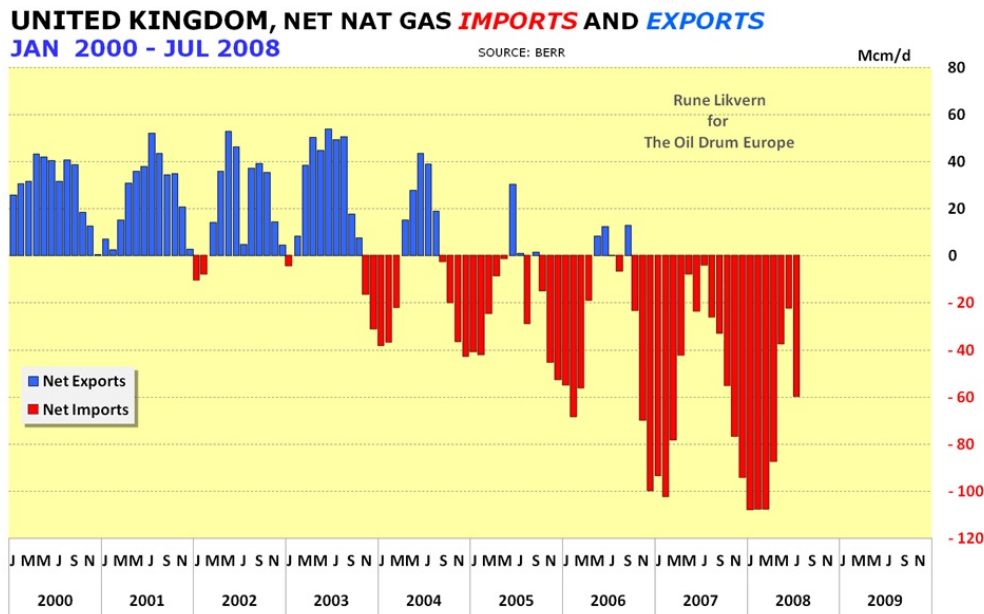


Figure 9: This diagram is the resultant of figures 6 and 7 above. It illustrates how UK rapidly transitioned from an important exporter of nat gas to becoming a year-around major net importer as of 2007.

UK has for some time simultaneously acted as both an exporter and importer of nat gas. For the upcoming heating season, it is expected that UK net imports of pipelined nat gas will remain at pretty much the same level as the previous heating season.

May the UK reliance on and dominance of nat gas within its energy mix soon prove to become its Achilles heel?

That will be further explored in the second part of this post.

SOURCES:

- [1] [BERR, Energy Statistics, Gas](#)
- [2] [BP Statistical Review of World Energy 2008](#)
- [3] [EIA International Energy Outlook 2008](#)

More posts on UK nat gas supplies;

[Why nat gas will move north of 100p/therm](#)

[Daddy will the lights go out this Christmas?](#)



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