Panel Discussion of 'The Integration of Scandinavia with the European Natural Gas Market' by MARIAN RADETZKI

Panelists:

I. BERTIL AGRENIUS and INGELA HEDGE

1. Introduction

Marian Radetzki's analysis contains a number of valuable insights on the unimportance of gas so far in the Scandinavian market, and on the preconditions for and features of a large scale expansion of this fuel in the energy systems of the Scandinavian countries. Our company, Vattenfall, the major Swedish power producer, has been deeply involved for a number of years in the analyses and discussions of the role of gas in Sweden, of the plausible sources of gas supply, and of the integration of the Scandinavian gas pipeline grid. Hence, we do have a set of comments, elaborations and disagreements to voice in relation to Radetzki's findings and conclusions. These deal predominantly with Sweden. We have organized our comments under two headings: the reasons for the unimportance of gas so far, and the preconditions for a large scale expansion of gas usage.

Bertil Agrenius is Senior Vice President, Energy, Vattenfall, and Ingela Hedge is Executive Vice President, Fuel Strategies, Vattenfall Fuel.

2. Reasons for the Unimportance of Gas

There are a number of reasons for the unimportance of gas in the Swedish energy system, and Marian Radetzki brings them out clearly and forcefully. We have no major quarrel with his findings, and our comments under this heading should be seen mainly as elaborations and additions to what he has to say.

The reasons are so strong that a large scale expansion of gas has not been possible, although it is not for lack of trying. The Nordic Council of Ministers has, for instance, on several occasions, made strong recommendations in favour of a gas grid that would connect the Nordic countries.

The Sparse Population Density and the Size of the Market

The following scatter diagram reinforces the arguments made in Radetzki's paper. It shows a strong correlation between economic density, defined as $M of GDP/km^2, and gas intensity, expressed in TOE/$M of GDP. The strength of the correlation suggests that Sweden is not an anomaly at all, but forms part of a general pattern. Other countries with a similarly low economic density are Norway, Portugal and Greece. In those countries the gas intensity is low as well, while the gas intensity is much higher in countries like the Netherlands and the UK with a high economic density.

The Dominance of Hydro and Nuclear in the Electricity Sector

The Swedish electricity system is dominated by nuclear and hydro. For an extended period of time there has been no need to expand the electricity generation capacity any further, nor to introduce more natural gas on account of the power sector.

Natural gas is an attractive fuel for electricity generation, however, with several positive properties like low capital costs, short lead times for construction of new plants and high efficiency. Should the need for new capacity in the electricity sector arise in the future, natural gas will certainly be considered among the options.

Support for Biomass in District Heating

For a number of years, there has been a strong political support in Sweden for the use of biomass. It has taken the form of grants and subsidies as well as exemptions from energy taxes. This has meant that virtually all new plants for district heating in Sweden are now built for biomass. Substantial investments in district heating have already been made. The plants are fairly new and are built to use solid fuels. It would be very difficult for natural gas to compete in the heat market under the present circumstances. For gas to be competitive, its total costs would have to be lower than the marginal costs of existing plants using biomass.

Political Unwillingness and the Tax System

The Swedish politicians have shown no inclination to favour natural gas, for instance by giving tax incentives etc. There is also a great uncertainty regarding the directions of future energy policy. As Radetzki points out in his paper, this makes large scale investments in new infrastructure in the energy system extremely risky. No commercial actor would be willing to assume that kind of risk without very far-reaching government guarantees.

3. A Large Market Potential is a Necessary Prerequisite for Sizable Gas Infrastructure Investments

We need to voice our disagreement with one of Marian Radetzki's key conclusions, that there is a need for a large scale introduction of natural gas even with the nuclear power staying intact. This conclusion is not valid. Without the need for substantial new electricity generating capacity, the market is too small to justify the investment in new gas infrastructure. Taking into account the fuel substitution in the district heating sector away from oil and, in favour of biomass, the market for gas is currently even smaller than it appeared 10

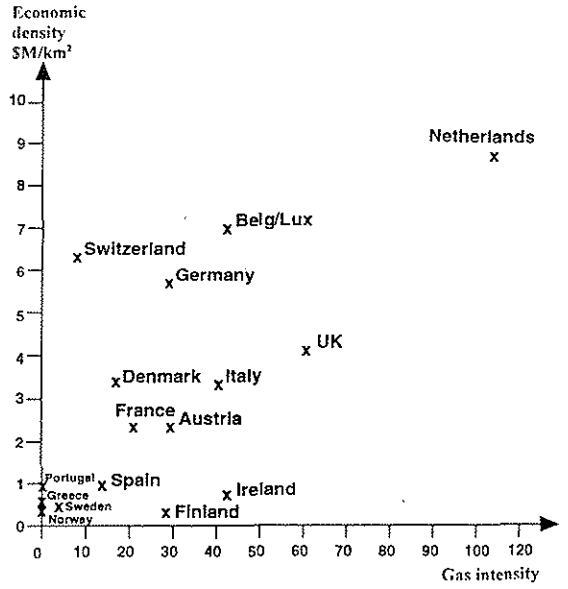

Figure 1: Economic Density and Gas Intensity in Europe, 1994

years ago. In industry, too, changes have taken place that diminish the market potential for gas, for instance increased energy conservation, and the use of process heat and heat pumps.

For natural gas to be introduced on a large scale into the Swedish energy system in a commercial manner, there have to be requirements for very large volumes of gas and these volumes have to start flowing soon after the pipelines are in place. In our opinion, there is no way in which this large scale market for natural gas can materialize in the short run with the nuclear power industry remaining in place.

A further dimension, which is lacking in Marian Radetzki's paper is an analysis of the consequences of a liberalized, competitive electricity market. The electricity markets in Sweden and Finland are being opened up for competition. Norway has had a competitive electricity market for some time.

Customers of electricity will shortly be free to sign contracts with suppliers of their choice throughout Scandinavia. Producers of electricity will be free to supply anywhere in this region. The opening up of trade in electricity will reduce the need to build new gas pipelines to supply new gas fuelled power plants. It may be cheaper to supply electricity directly, e.g. from gas fuelled power stations in Norway to industrial centres in Sweden.

In conclusion, there are a number of valid reasons why the Swedish gas market is still "semi-virgin." We believe that it will stay semi-virgin, until such time when there is a substantial need for new power generation. Only then, will investments in new gas infrastructure be economically feasible.

II. MAGNUS BUCHERT

Among the panelists discussing Marian Radetzki's paper I appear to be the only one representing the true consumer side. My comments, therefore, reflect a Finnish consumer's perspective.

Background

When Finland first got natural gas in 1973 there were lengthy discussions about the organization of imports, which in the end led to the choice of our state oil company (a monopoly then) to handle also the gas trade. At that time and all until September 1992, we had a very weak legislation on competition and the abuse of dominant market positions. We have faced the whole pattern of monopolistic behaviour. The pricing mechanisms moved from firm ties to the oil price, to customer netback pricing and transparent pricing in the 1990s, the latter only after a legal process to remove the monopoly's unwillingness to see the gas market as an entity on its own, instead of as an integrated part of the total energy market. So now we have the tools ready also for gas to gas competition, when this option will reach us and the customer's power of choice becomes a reality.

Some years before Finland joined the European Union, discussions started concerning the liberalization of our electricity market. Our new legislation on competition had already an important impact on both oil, gas and electricity market behaviour, but special legislation for the 100 year old monopolistic electricity market was considered necessary. There were also the examples from England and Norway and the parallel debate in Sweden, fuelled by EU energy market politics in the same direction. We finally got our new Electricity Market Act in June 1995, and liberalization has really come into effect, with TPA in the whole electric grid. Grid transportation, though, is remaining a monopoly under public surveillance, while energy trade is free.

There has been an incredibly busy time for renegotiating all power contracts, and the behaviour and feelings resemble those of the American Gold Rush and the Wild Western times.

While waiting for the same liberalization to happen in the gas market, there are still no signs of defining the gas pipeline transportation business separately from the gas energy business, in order to give customers direct access to imports. Other competitive measures are also slow in emerging in the gas market. This is partly because we still are relying on one single source of supply, Gazprom in Russia. On the other hand, we have already experienced a minor sort of vertical integration in the gas market; a development that, according to Javier Estrada's contribution in this issue, could become a common pattern in the future in Europe. This happened when the producer, Gazprom, became a shareholder in our national gas monopoly company Gasum, which is still a subsidiary of our national oil company, Neste.

Expectations

Experience from the very small Finnish gas market shows that every time the monopolistic hold on the customer increases, it means a stagnation of market development. In the long run, this cannot benefit the monopoly. One of the biggest future gas market potentials lies in the production of power. Nuclear, hydro and coal are politically very difficult. Gas, in contrast, is politically accepted. In addition, it enables short lead times and low capital investment suitable for the free power market where investors can no longer pass on the economic capacity risks to the consumers.

With the electricity market now opened for competition and the gas option being so attractive as a source for additional supply of power, the boom is just around the corner; however, there still will be difficulties and discrepancies with monopolistic gas contracts when fitting them to the new type of shorter time electricity sales reality.

Magnus Buchert is Director, Corporate Energy, A Ahlstrom Corporation.

I feel that the monopolistic gas market, feeding the gas fuel on its own terms into a power plant for conversion into electricity, which is then sold in the competitive power market with quite different market terms, raises important contradictions and marketing obstacles. Sooner or later, these obstacles will have to be removed, if the huge gas market potential is to develop in full, and provide a politically accepted solution to the increasing power demand.

The European gas markets are beginning to reach the same maturity as the electricity markets. Hence, the time is now ready, and the pressure will grow for the same liberalization of the gas markets, as is occurring in the electricity markets. Such liberalization is essential for smoother interaction between gas and electricity markets. The main problem in this development is to get the monopolistic companies to understand their own benefits in the long run from the expanding liberal markets.

In my opinion, liberalization of the natural gas market is the key to a healthy development and expansion of gas usage. I think that liberalization will also be the key to a Scandinavian gas pipeline network and an integrated Scandinavian gas market. (Later on we might see a further extension of this network to the Baltic region.)

A crucial question is if we will have to wait for a common EU directive on internal gas energy market liberalization, or if the Scandinavian countries could be forerunners in this process in the same manner as we have been in the electricity markets. The nuclear issue in Sweden is another time span question, and also a key trigger for a Scandinavian gas pipeline network.

A common Scandinavian gas market is very much wanted among Finnish consumers. But Marian Radetzki is right in noting that Finland's own gas market expansion potential is too small to make a connection feasible to Norwegian supplies. We have to wait for a Swedish decision before Norwegian gas can flow to Finland.

I do not think the "fear of having only one source" and this source being inside a country with maybe an unstable political and economical future, is so widespread in Finland, nor of the magnitude, as suggested by Radetzki. In fact, I believe there are real possibilities for political acceptance of some domestic gas market expansion relying on this only source. Russia's gas industry is in a better shape than its oil industry, and as new gas pipeline capacity is being installed along our import link, it is likely that the confidence in continuing smooth supply will be sufficient for some further market expansion. But the real market boom will come only through market liberalization and an integrated Scandinavian gas pipeline network.

I sincerely do hope that what is good for the consumer will soon also be seen as good for both producers and transporters.

III. KURT LEKÅS

To begin with I would like to express my appreciation of Marian Radetzki's initiative to pick up the trends of the natural gas market in Europe in this conference. Technical improvements in gas exploration, along with an increased awareness of the threat of global warming have improved the attractiveness of natural gas. In the course of the present year, I have personally become more convinced than I was before about the possibilities to introduce gas in the Stockholm region in an economic way.

I wish to congratulate Marian Radetzki on the many pertinent and interesting findings contained in his paper. These findings tally broadly with the ones reached in the investigations concerning the prospects of gas, launched in the recent past by my company, Stockholm Energi.

Nevertheless, I feel that Radetzki is too optimistic about the timing when natural gas can penetrate the energy markets in Mid-Sweden. It will be a time consuming and arduous task to overcome the tremendous threshold posed by the huge required investment, totally in the order of SEK 20 billion.

Gas, in my view, has a definite place to play in the future energy system in Mid-Sweden. The main question is the timing of its introduction. Two factors could trigger a fast introduction of gas:

a. a decision by the government of Sweden to purchase some of the nuclear reactors, and then to close them down; and
b. a Gazprom initiative to open a new route for Russian gas via Sweden to Western Europe.

In both cases, it is essential for the Swedish actors to cooperate with their Finnish counterparts, primarily Neste and IVO. Radetzki underlines the importance of such collaboration. Essentially, the new market is in Mid-Sweden (3 BCM) and in south-west Finland (perhaps 4 BCM), with potential links to the Baltic states. The gas purchasing procedures have to be carefully designed, so as to assure that the prices paid by Sweden and Finland do not exceed the border prices in Western Europe in the mid-1990s.

In discussing Marian Radetzki's paper, my colleagues from Vattenfall, Bertil Agrenius and Ingela Hedge, have suggested an important future role for gas in Sweden as a fuel in new condensing power stations. I do not agree with this view. Environmental considerations and pressures suggest cogeneration of power and heat, using gas as fuel, or some similar arrangements, as the longer term solution to satisfying Sweden's power needs.

Institutional issues are of great importance for a successful large scale introduction of gas in Sweden. To ensure the necessary institutional needs, Stockholm Energi, along with several other energy companies, have approached the Swedish government with proposals to establish an independent and neutral owner of the main gas grid, and to assure neutrality with regard to CO_2 taxation among alternative fuels.

Sweden presents favorable preconditions for creating one of the first deregulated gas markets in Europe. This would offer substantial advantages to suppliers as well as to gas users. The opportunity should not be missed.

Kurt Lekås is Director, Business Development, Stockholm Energi AB

IV. ARNE WESTENG

My views on the evolution of the Scandinavian gas market diverge in some respects from those presented in Marian Radetzki's paper, as will appear from the following comments. Establishing a new supply source for a gas market is a demanding and capital intensive venture. Numerous plans and studies have been conducted related to possible gas supply from Norway to its neighbour countries Sweden, Finland and Denmark. Gas sales negotiations between Norway and Sweden had to be abandoned late 1989. What then has changed since 1989? Is there a reason to be more optimistic now than before?

At least three important developments with a strong bearing on the Scandinavian gas market are taking place:

- First, there may now be a need for more electricity generating capacity in Norway and Sweden.
- Second, the gas supply/demand balance in Denmark may result in gas imports to Denmark by the turn of the century.
- The third important factor is the cost of offshore gas pipeline construction, which has been reduced significantly in the last few years due to improved technology and project management.

I will consider each of these developments in turn.

The Electricity Market

Most of the electric energy produced in Norway and Sweden is transported through the high voltage grid from the production areas to the densely populated consumption areas. In Norway, there is a net flow of energy from the west coast to eastern Norway; roughly 40% of the consumption in eastern Norway comes from hydro power plants on the West coast. In Sweden, the hydro power plants are located in the North while the market is in the South.

Arne Westeng is Vice President, Natural Gas, Saga Petroleum a.s.

Trade in electricity has undergone drastic changes in Norway, and Sweden has now approved its deregulation. The result is that starting in 1996, the Norwegian and Swedish markets can be regarded as fully open, constituting an integrated, common market. This may cause the actors in these markets to think differently when new capacity is planned. Looking at the energy flow picture, it appears that new power generation plants located on the Swedish West coast would reduce transfer losses and improve utilization of the grid. Due to the integration of the two electricity markets, the market for electricity generated in Sweden may also include Eastern Norway.

In Norway, reduced precipitation and a sharp increase in electricity demand led to an approximate balance between production and consumption in 1994. With a continued growth in demand and few new projects being developed, the electricity balance in years with normal rain fall conditions will be tighter in the years ahead.

In Sweden, an annual growth of the electricity market of 0.9% until 2005 has been projected. Gas seems to be a viable alternative fuel in new power stations or heat/power plants in Sweden.

Possible decommissioning of nuclear power in Sweden is presently being evaluated. Total nuclear decommissioning by 2010 has been suggested by some political circles, but is hardly the most likely outcome. In our studies we have included the effect of decommissioning two of the 12 reactors, both located in the southwest of the country.

These assumptions may be added up to form scenarios for gas consumption in power production in Sweden. It is not impossible, in our view, to see close to 3 BCM of gas used for power production after year 2005, increasing to more than 4 BCM by the year 2010.

What effect will such developments have on electricity prices in Sweden or Norway? This is mainly a commercial question. Currently, the wholesale price of electricity in Sweden is about 0.20 SEK/kWh. A new combined cycle gas fired plant would be able to pay about $ 3/mmBTU to obtain a real 7% rate of return, at these power prices. Whether gas

producers would be willing to sell gas at the power station at $3/mmBTU is a different question. Higher prices have been obtained for gas sold for power production on the Continent, while the market value of gas sold to transmission companies on the Continent is lower than the above price.

Denmark

Radetzki's paper described Finland as the key to reasonable cost transportation of gas to Sweden. In my opinion, the development of the Danish market will be more important to the development of a Nordic gas grid than what happens in Finland in the foreseeable future.

Denmark has been successful in developing its domestic market. The supply/demand balance in Denmark indicates that Denmark needs to identify new sources of supply or reduce its exports to Germany from year 2000. As the Tyra gas field goes off its plateau level around 2005, significant new sources of supply will be required.

The cost of bringing gas from Fredrikshavn in Denmark to Göteborg in Sweden, represents less than 20% of the total cost of bringing Norwegian gas to the Swedish west coast. The evolution of the Danish market is therefore an important factor in developing a Scandinavian gas grid.

Several alternative routes must be evaluated before a recommendation can be made related to transporting Norwegian gas to Denmark. A minimum investment case can be obtained by going via Emden, through the existing German pipelines and into the Danish pipeline system. A second alternative would be to tie in to Tyra or lay a new connection from existing Norwegian pipes to Nybro. By landing a pipeline in northern Denmark, maximum utilization of the existing grid in Denmark and flexibility and reliability can be obtained.

What about the market in Finland? Firstly, it seems quite obvious that the attractiveness of supplying a future market increase in Finland is more promising seen from a Russian perspective than from a Norwegian perspective. The choice of source, therefore, is a question of the value of diversification. Finland would, like most gas consuming countries, prefer a diversified portfolio of supplies. The cost of diversification can be reduced to manageable levels only through a massive introduction of gas in the power generating sector.

The Cost of Offshore Pipeline Construction

The cost of offshore pipe laying has been reduced significantly during the last 20 years. If we compare the costs of the first major export lines from Norway with the latest being installed or planned, we see that the costs have been reduced by a factor of three. Similar developments are also seen in smaller diameter pipelines.

Conclusion

In one important respect I concur with Radetzki's conclusions: according to our studies, acceptable economics can be achieved by exporting Norwegian gas to Sweden and Denmark.

In two other respects, my views diverge from those of Radetzki. First, a phased development of the market is possible with only limited pipeline investments through utilization of the existing German and Danish gas network. Supplying Norwegian gas to Finland should be regarded as a future opportunity, after gas has been supplied to Denmark/ Sweden.

Second, I wish to add a final conclusion of significance to the subject, but not dealt with by Radetzki; additional gas fuelled power generating capacity on the Swedish west coast to supply both Swedish and West Norwegian needs appears attractive since it will reduce losses in the electric grid in both Norway and Sweden.