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AMMONIA BALANCES AND GLOBAL TRADE PATTERNS

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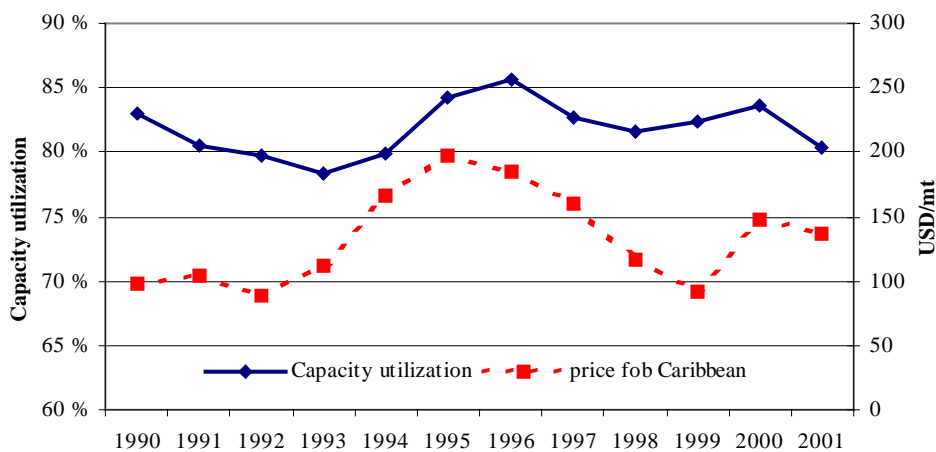
INTRODUCTION

This paper will focus on two topics, the global supply and demand balance for ammonia, and the developments in trade patterns. As only 12% of ammonia production in the world is traded, trade balance developments are not good indicators for the changes in the global supply/demand balance, and therefore the topics have to be treated separately.

One common way of following the supply/demand balance is through the capacity utilization rate.

Figure 1 shows the historic developments in the world utilization rate, and the price development of ammonia in the Caribbean.

Figure 1: Capacity utilization and price



Source: IFA, CRU, Fertecon, Hydro

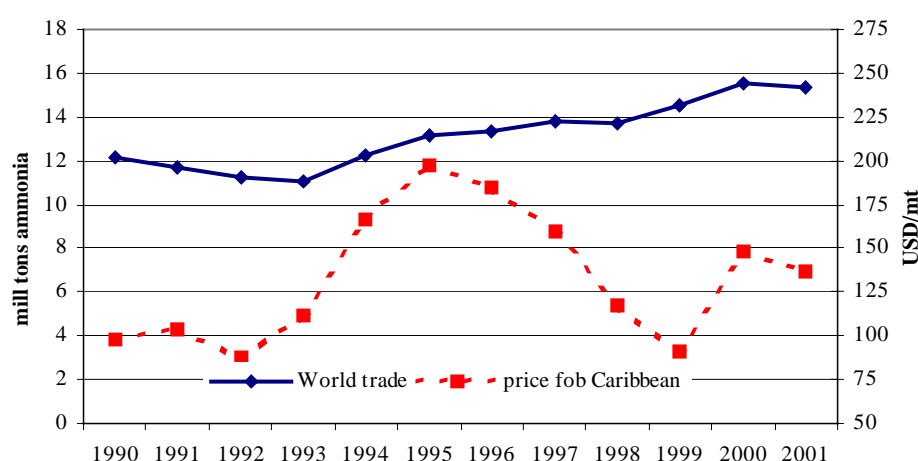
After continuous tightening from 1993 to 1996, the supply/demand balance has since worsened every year from 1996 to 2001, with the exception of a slight improvement in 2000. The worsened balance is, in simple terms, caused by too much new ammonia capacity and, from 1999, zero to negative consumption growth.

Although a relationship between the utilization rate and the ammonia price is easily visible from the graph, it is not terribly strong. Less than one third of the variation in the price is explained by the utilization rate. Over two thirds are explained by a number of other factors. For one, there are several measurement problems. Stated capacity is higher than production capability, which is the correct capacity number, when capacity is idled due to factors other than price. It is difficult to assess this correctly, and it does vary considerably from year to year. Another measurement issue is changes in stocks. Build-up of stocks increases the utilization rate, but it is not an indication of a tightening market, quite the opposite. Probably of greater importance is that the utilization rate does not reflect shifts in the supply curve, caused by alterations in the variable cost of producing the ammonia. The high ammonia prices in 2000 and 2001, high in relation to the low utilization rate, were mainly caused by increased energy prices, particularly gas prices in North America. Particularly in today's situation, with plenty of excess capacity, production costs and production capability are the most important price influencers, and not the utilization rate itself.

The development in global trade is shown in Figure 2.

World trade has increased relatively steadily since 1993, by roughly half a million tonnes of ammonia a year. There are several reasons for following developments in world trade closely but understanding longer term price development is not one of them. From Figure 2, it is clear that world trade does not explain yearly variations in the ammonia price. In the short term, however, even minor shifts in the trade balances might have substantial price effects.

Figure 2: World trade and price



Source: IFA, International publications

With these historic relationships as a background, the supply and demand balance, as well as developments in trade, will be discussed in more detail.

OUTLOOK FOR SUPPLY AND DEMAND

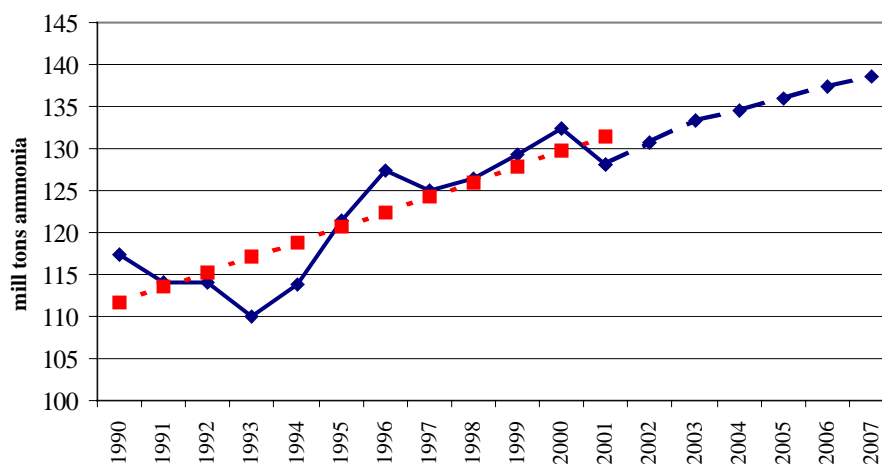
DEMAND

Since actual consumption is hard (almost impossible) to measure, apparent consumption (production + import – export) is a common way of measuring consumption.

Globally, exports and imports are equal, and production reflects consumption as well as anything else, and is shown in Figure 3.

A linear model (the trend line shown in the graph) has a growth rate of 1.5%/year but the growth rate on a year-to-year basis varies substantially. Low growth in the early 1990's was followed by very high growth in the middle of the decade. Since 1996, demand growth has been very low.

Figure 3: World ammonia production



Source: IFA, Hydro

Demand growth in the future is likely to be less than in the past, as the maturity of the industry is increasing. As a consequence of economic growth, food production is expected to grow faster than population growth.

However, fertilizer consumption will not necessarily outpace population growth, because of improved fertilizer efficiency. In the shorter term, over the next couple of years, consumption is likely to grow faster than the long term average, the main reason being improved agricultural commodity prices.

In the forecast in Figure 3, a consumption growth slightly higher than the historic trend is assumed. For the following years, consumption is in this scenario expected to grow slightly slower than the historic trend.

SUPPLY

The amount of cheap gas in the world is, in practical terms, unlimited, and this fact is clearly reflected by all the ammonia projects that are currently on the drawing board. Over the next couple of years, additional capacity is limited, but 2006/2007 looks gloomy. A lot of projects, where construction has not yet started, are likely to come on-stream during this timeframe. Among these are two projects in Australia ; at least one in Vietnam ; a couple of projects in Iran, Oman and Egypt ; at least one new project in Saudi-Arabia ; and several possibilities for new projects are under discussion in Trinidad.

It is also worth noting that some of these projects are larger than existing plants, with capacity 50%, or maybe even more, above the largest existing plants. They will have a substantial market influence when on-stream.

In the long run, ammonia prices will be determined by production costs of new projects in gas rich locations, like Middle East, Trinidad and Australia. Increased size of new plants, whether it will be 3000 tonnes/day or 4000 tonnes/day, will reduce capital and fixed costs.

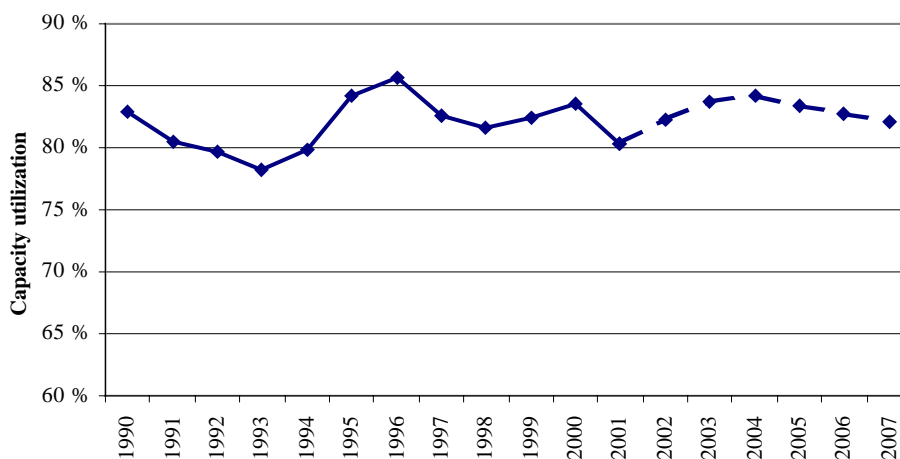
Over the last three to four years, capacity has been closed in high-cost areas, such as USA, Europe, and recently also in Japan and South Korea, due to high energy costs and low ammonia prices. This trend is expected to continue.

In addition, lack of sufficient maintenance, partly caused by low profitability, as well as the increasing age of existing capacity, will continue to keep production capability significantly below nameplate capacity. It is not easy to assess this factor with a high degree of certainty.

SUPPLY AND DEMAND BALANCE

Combining demand growth with assumed net changes in capacity, Figure 4 shows the forecasted future capacity utilization rate.

Figure 4: Capacity utilization forecast



Source: IFA, Hydro

A rebound for consumption growth, combined with limited additional capacity, is expected to improve the ammonia supply/demand balance towards 2004. Based on the large capacity additions expected in 2005 to 2007, the next downturn looks inevitable. Margins are expected to yet again put pressure on the highest cost producers, forcing temporary and permanent shutdowns. As has been the case in recent years, the ammonia price level will be determined by energy costs.

GLOBAL TRADE PATTERNS

As mentioned in the introduction, and illustrated in Figure 2, world trade in ammonia has increased by almost half a million tonnes a year over the last ten years.

The main trade patterns, however, have not changed a lot. This development is expected to continue for the foreseeable future. There will be more export from gas rich countries to consuming areas, particularly consuming areas where energy is costly. This is already an ongoing trend, and it is expected to continue.

It is useful to divide the world into regions as follows :

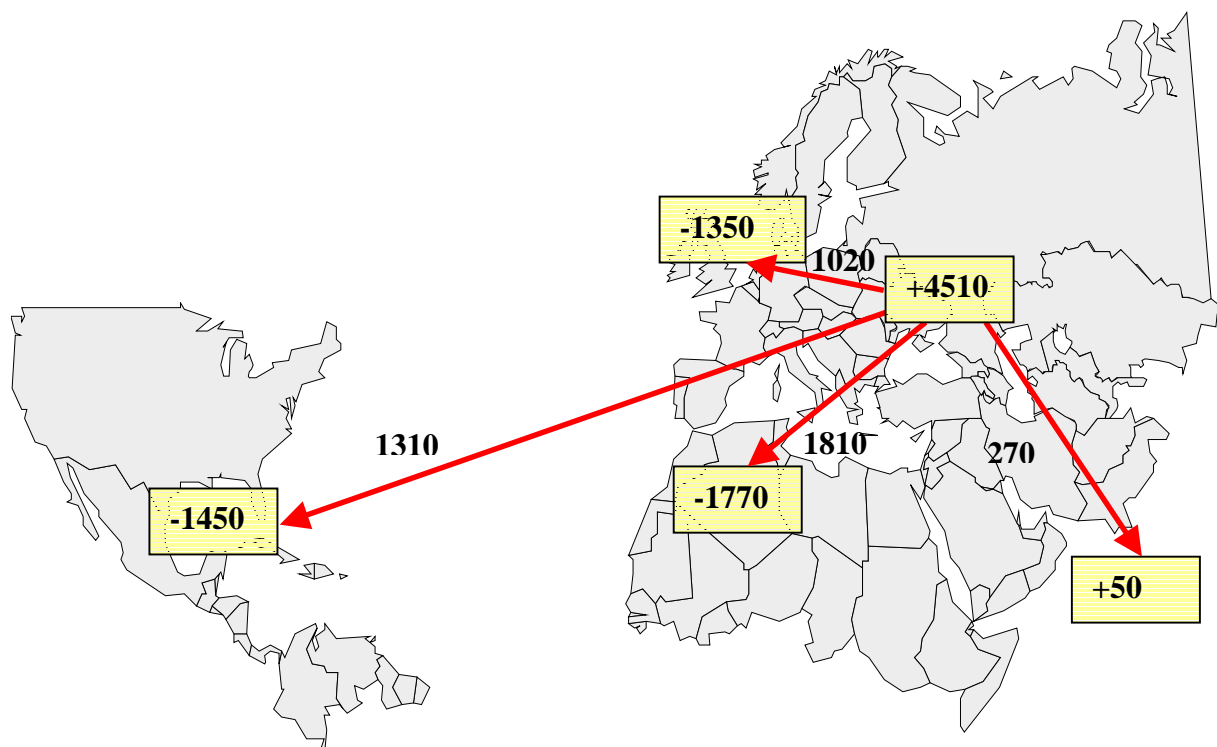
- Asia including Alaska (“East of Suez”) ;
- Mediterranean and Africa ;
- North-West Europe ;
- the Americas excluding Alaska ;
- and FSU (Russia and Ukraine).

Before looking into the developments in each region, Figure 5 illustrates the net balances in 2001 (all numbers are kt ammonia).

The Americas had net import demand of 1.45 million tonnes, of which 1.3 million tonnes was supplied by FSU ; North-West Europe a net deficit of 1.35 million tonnes, of which 1 million tonnes was supplied by FSU ; and Mediterranean/Africa had a net import demand of 1.8 million tonnes, of which everything was supplied by FSU. Asia had a small net surplus, but because of some exports out of the region, both from Arab Gulf and Indonesia, Asia also imported ammonia from FSU, but less than 0.3 million tonnes. FSU exports cover around 30% of world exports, so there are of course important trade patterns within each region.

Figure 5: Global trade balances 2001 (kt ammonia)

Source: IFA



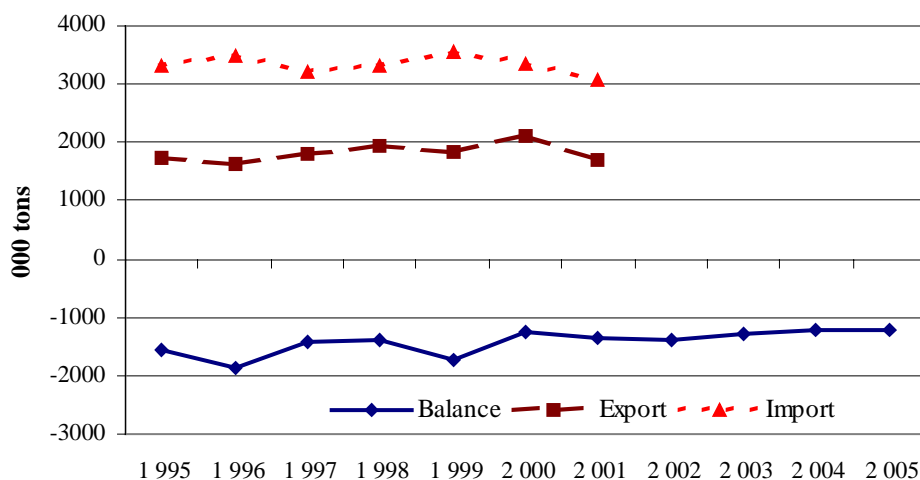
NORTH-WEST EUROPE

The major part of the ammonia trade in North-West Europe is intra-trade. Over the last few years, exports from producers in this region have fluctuated around 2 million tonnes a year, practically all of it to importers also located in North-West Europe. The net import demand used to be in the range of 1.5 to 2 million tonnes a year. Since 1999, following the closure of several ammonia importing fertilizer plants, net import demand has been reduced by roughly 0.5 million tonnes.

Further closures of nitrogen capacity can be expected in North-West Europe, but it might not necessarily affect the ammonia balance. It is hard to predict whether plants with ammonia surplus, plants with ammonia deficit, or fairly balanced plants will close. The ammonia balance is also affected by cash margins for ammonia producers. Recently, when oil prices (and therefore natural gas prices) have been high and ammonia prices have been low, utilization rates have been reduced and import demand has increased somewhat.

The forecast in Figure 6 assumes a slight decrease in net import, based on continued reduction in import demand, without a similar reduction in export supply.

Figure 6: North-West European ammonia balance



Source: IFA, Hydro

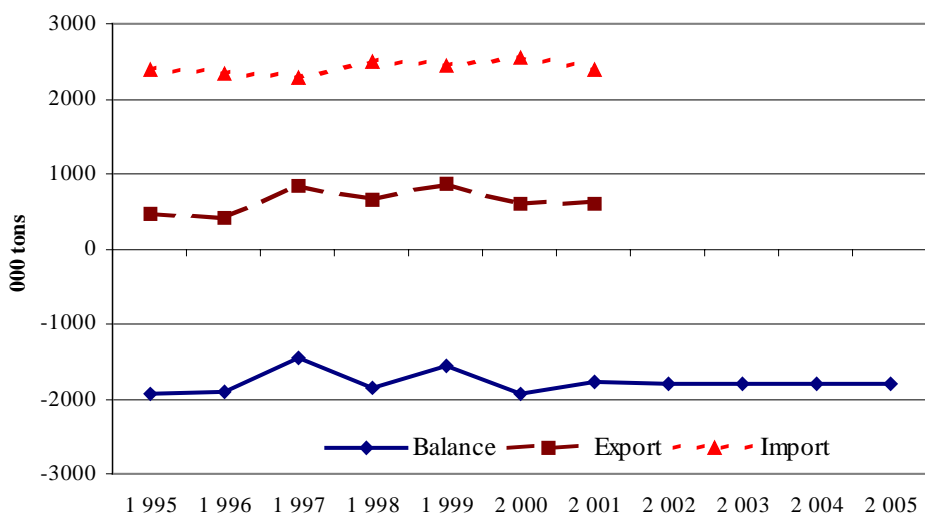
MEDITERRANEAN/AFRICA

Imports to this region have been fairly stable at around 2.5 million tonnes a year. Since 1999, a reduction in import demand to Spain and Italy has been compensated by an increase in Greece and Morocco. Net import demand has fluctuated more, between 1.5 and 2 million tonnes, due to unstable export volumes from the exporters in the region, mainly Algeria.

Going forward, further import reductions in Southern Europe are possible, following additional closure of downstream operations. This could be compensated by increased imports into Africa, particularly for increased DAP production. Turkish, and also Greek, imports look to be mainly dependent on the price ratio between ammonia and finished fertilizer. It is hard to estimate the level of exports from Algeria, but full utilization of the plants seems unrealistic.

Summing up, no major shift in the ammonia balance is expected for Mediterranean/Africa. If the exporters in North Africa achieve higher utilization rates, a reduced net import demand will result.

Figure 7: Mediterranean/Africa ammonia balance

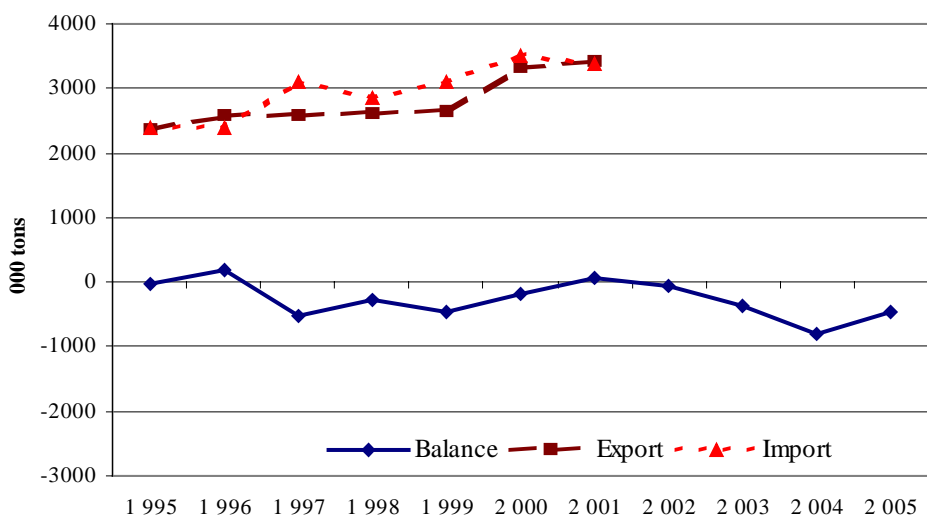


Source: IFA, Hydro

ASIA

The ammonia trade in Asia has increased substantially since 1995. In 2001, imports were approximately 1 million tonnes (40%) higher than in 1995. The increase in Indian imports follows increased DAP production. Imports have also increased into South Korea and Taiwan, mainly for non-fertilizer purposes. In addition, Thailand has increased its ammonia imports compared to 1995, but it has been stable over the last three years.

Figure 8: Asia ammonia balance



Source: IFA, Hydro

The increase in import demand has been covered by increased exports from producers in the region. Indonesia has increased exports substantially, as several new ammonia plants have been built. Malaysia increased its exports after the new ammonia export-oriented plant came on-stream. Compared to 1995, Alaska is also selling more ammonia in Asia. Exports from the Arab Gulf have been stable, as nitrogen expansions there have focused on urea. As in 1995, Asia is currently in balance on ammonia.

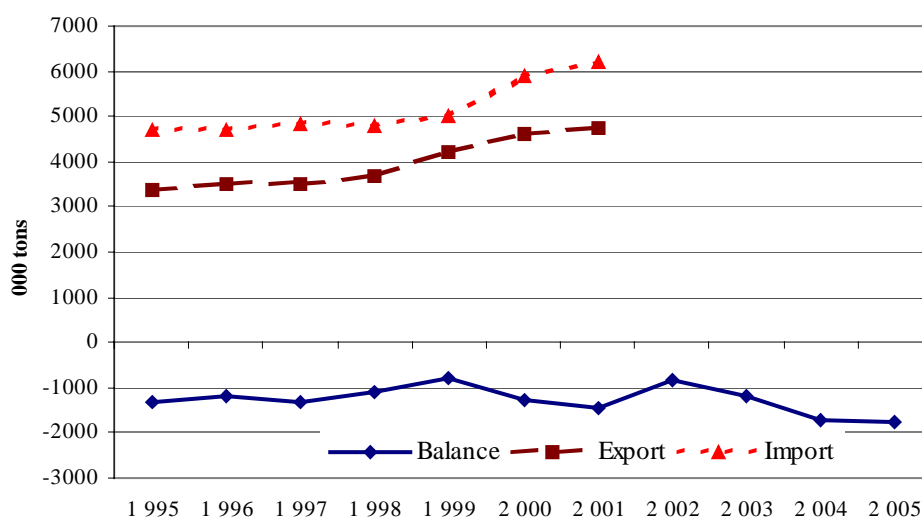
The ammonia trade is expected to continue to grow in Asia, based on an increase in import demand. India, by far the largest importer, is a question mark. Ammonia imports by the Indian DAP industry are based on heavy subsidies, but, at least in the medium term, it is likely that DAP production will continue at least at today's level. China is building import terminals, and will become a net ammonia importer. Import is expected in Zhangjiang, serving DAP/NPK production, and in the Shanghai area, serving the petrochemical industry.

Japan and South Korea have announced closure of nitrogen capacity, probably leading to increased import demand. Despite one more ammonia plant coming on-stream in Indonesia next year, net import demand in the region is expected to increase towards 2004. After 2004, import demand will probably continue to increase, but it will be covered by new capacity in the region, for instance from the new projects in Australia, Oman, Saudi-Arabia and Egypt. The region might even become a net exporter, shipping ammonia to West Coast Americas and the Mediterranean.

THE AMERICAS

Since 1998, ammonia imports have increased by more than 1 million tonnes. This can partly be explained by an increased ammonia demand in South America, but a large share of the increase is substitution of domestic production in USA. High energy costs have forced closures, and demand for imported material has increased. In 2001, offshore imports to USA increased even more, as Canadian exports to USA were curtailed. As in Asia, the increased trade is covered by exporters in the region, through new plants in Trinidad and Venezuela. Net imports have varied in a fairly narrow band of 1.2 to 1.5 million tonnes a year, 1999 being an exception.

Figure 9: Americas ammonia balance



Source: IFA, Hydro

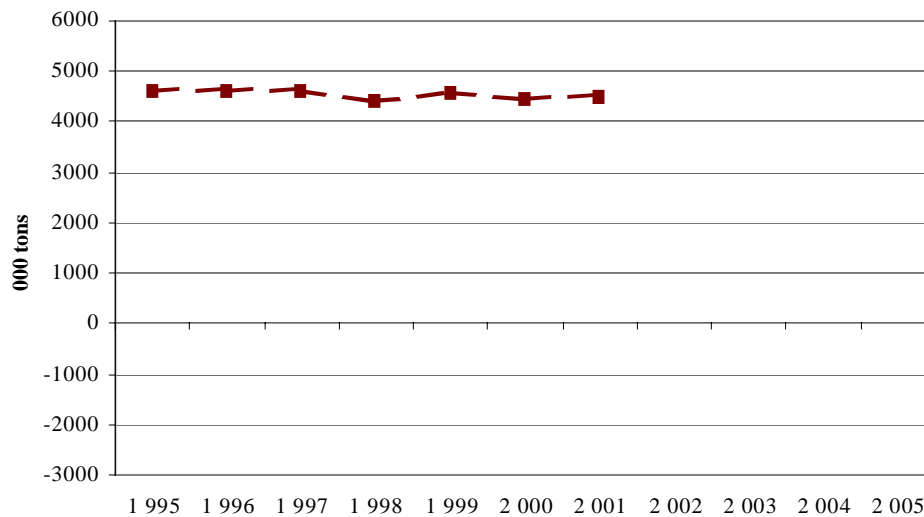
In 2002, the net import requirement in the Americas is considerably less. USA will import less from offshore sources, following increased utilization rates, both in USA and in Canada. The new CNC plant in Trinidad adds to the supply within the region.

For the next couple of years, no additional supply is expected from within the region. Net import demand will then mainly depend on whether US gas prices allow full utilization of the domestic industry. The forecast in Figure 9 assumes additional closures in North America as a result of both high gas prices and the need for investments in the aging industry. Given the projected tightening ammonia supply/demand balance towards 2004, this development may be postponed. If ammonia prices improve, less import demand is expected to the Americas. Whether closure of North American nitrogen capacity will mainly increase ammonia imports, or whether it will rather turn to increased imports of urea and UAN, is a question mark. Beyond the next couple of years, more capacity will be built in Trinidad, and maybe also in Venezuela, reducing the Americas' net import demand.

FSU (RUSSIA/UKRAINE)

Russia/Ukraine exports ammonia to all of the regions discussed earlier, and their combined total volumes have been remarkably stable, at close to 4.5 million tonnes a year. Exports from other FSU countries are small, and not considered here.

Figure 10: FSU ammonia export



Source: IFA, Hydro

In 2002, exports will be lower, due to low ammonia prices and reduced import demand in North America. Particularly in the first quarter this year, exports were curtailed due to low prices. Export out of Ventspils was only 162kt first half this year, compared to 570kt same period last year. FSU exporters are more price sensitive than they were a couple of years back.

For logistical reasons, it is not easy to increase exports from the Black Sea. Togliatti is looking at building a new export terminal in the Black Sea, but it will in any case not be in operation for a few years. Some of the smaller and least efficient exporters will probably reduce ammonia export in the future. Increased domestic consumption is not expected to reduce export availability substantially.

So all in all, a fairly constant export level is likely also for the medium term future, assuming ammonia prices above production costs. Production costs will gradually increase, as domestic gas prices are slowly increasing.

CONCLUDING REMARKS

Ammonia trade will increase, as more production will take place in gas rich countries for export to areas where energy is costly. The main trade patterns are not expected to change dramatically. Trade will increase mainly in Asia, but there are several ammonia projects under development in the region, so the net import demand will not increase. Quite the opposite, Asia might become a net exporter of ammonia. The ammonia balance in the Americas is dependent on gas prices. More ammonia capacity will be built, particularly in Trinidad. Whether it will replace FSU export or US domestic production, is a question of who has the highest production cost.

All the new ammonia projects scheduled to come on-stream sometime within the 2005 to 2007 period will put a severe downward pressure on utilization rates and prices. Energy costs and existing capacity's actual production capability will again play an important role.