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RESTRUCTURING AND REVITALIZING THE KALININGRAD REGION* (PHASE I-A)

TF/RUS/94/001 and US/RUS/93/134

RUSSIAN FEDERATION

Technical report: Study on pulp and paper**

Prepared for the Kaliningrad Administration
by the United Nations Industrial Development Organization

Based on the work of B. Kyrklund, consultant in pulp and paper, including wood processing, and O. N. Paseka, national consultant

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ABBREVIATIONS

AD	Air-dry (10 percent moisture)
ADt	Air-dry (metric) tons
ADt/a	Air-dry (metric) tons per year
F	Finished (paper)
Ft	Finished (metric) tons
Ft/a	Finished (metric) tons per year
ha	hectare
kg	kilogramme
km	kilometre
km^2	square kilometre
m	metre
m^2	square metre
m^3	cubic metre
t	metric ton
t/a	metric tons per year

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CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. The immediate serious problem of the pulp and paper industry in Kaliningrad is the pollution of the environment, both as regards the lack of effluent treatment and the emission into the air of unacceptable quantities of pollutants, primarily from the steam boilers that use coal and heavy oil as fuel. The emission of pollutants can be reduced to acceptable levels switching to gas as fuel and by making adjustments in the pulp plants. The effluent problem can be solved by implementing the municipal sewage treatment projects that would also serve as effluent treatment plants for the industry.

2. The pulp mills have outdated technology and worn out equipment, which is unlikely to serve for more than a few more years. The paper mills, with one exception, are in a better position, although the mills do not represent the latest in technology of papermaking. The pulp mills will eventually have to face the decision whether to close down or to invest in new production facilities.

3. All raw material for both pulping and papermaking chemicals have to be brought in from outside the region. The main supply of wood is from Lithuania and measures need to be introduced to ensure reliability of supply at reasonable cost.

4. Marketing of pulp does not seem to be a problem. However, partly because marketing of paper is more complex, partly because of in some instances inadequate organization of marketing, there are problems in this regard in the paper mills.

5. The wages and salaries in the industry are at present very low. However, such a situation cannot continue and the mills will have to face escalating costs, partly because introduction of new taxes and duties, partly because an increase in costs in general, especially because of inevitably increasing wages and salaries. This means that the mills will need to become extremely efficient in their operations.

6. A SWOT analysis made in this report identifies the strengths and weaknesses of the sector and suggests strategies for addressing the problems identified and to improve the situation.

Recommendations

1. The plans and projects for constructing municipal sewage treatment plants for the towns of Kaliningrad, Sovjetsk and Neman should be implemented and completed as soon as possible since they will serve as effluent treatment plants for the industry as well.

2. The mills should start implementing existing plans to convert their steam boilers to gas firing and the pulp mills should invest in the short term for cleaning up the air emission of sulphur dioxide from the pulping process.

3. The paper mills should prepare and implement plans on upgrading their technology and restructuring their operations as soon as possible.

4. Measures should be taken to ensure reliability of wood supply at reasonable cost from Lithuania, as suggested in this report and include use of birch pulpwood in addition to spruce.

5. A programme of training in marketing should be undertaken either by the Regional Administration and the companies themselves especially for marketing of paper and paperboard. Such efforts could at least partly take the form of workshops organized for all export oriented industries in the region, organized by the Regional Administration in cooperation with UNIDO.

6. A programme of training and introduction of company-wide management methods to ensure efficiency of operation and high and uniform quality of products should be undertaken, as suggested in this report.

7. The pulp mills should prepare themselves to decide whether they will continue operating in the next century by establishing new production facilities or close down. This also affects their short term investment policies.

8. The problem of lack of long term credit for investment should be addressed by other components of the "Kaliningrad 2000" project.

INTRODUCTION

The report is based on findings of the consultant during his stay in Kaliningrad from 30 May to 28 June, 1995. The original terms of reference of the mission, attached in Appendix 1, emphasized marketing aspects of the industry. However, in the initial discussions with industry representatives it turned out that marketing of the pulp and paper from the region is not a serious problem, with some exceptions. On the other hand, there are severe environmental problems caused by the pulp and paper industry. Other problems relate to wood supply and outdated technology and worn-out equipment, especially for pulping.

As to other wood processing industries, there are a number of small sawmills that mainly use imported wood raw material for the local market and their level of technology is low. Their total log input is 150,000 cubic metres of various mixed species per year. With two exceptions that have an input of 30,000 cubic metres/year, the sawmills are very small. According to the information obtained on arrival, there is very little development potential in that sector.

It was therefore agreed in discussions with the counterpart, Mr. Oleg Paseka, the Team Leader, Mr. Sven Mauléon and the substantive officer from UNIDO, Mr. Rudolf Mueller, that the consultant should concentrate his efforts on addressing problems identified in the pulp and paper sector.

During the stay of the consultant in Kaliningrad, visits were paid to all local pulp and mills and to various organizations of relevance to the activities of that industry. A list of Persons Met is given in Appendix 2.

I. BACKGROUND

A. Objectives

The objectives of the present study were to

1) Identify the opportunities and constraints for the pulp and paper industry in Kaliningrad;
2) Propose strategies to be adopted to strengthen the pulp and paper industry sector;
3) Identify viable investment and development projects based on the above strategies.

B. Scope of Work

To achieve the above objectives, information was collected through questionnaires and interviews with company management in all five pulp and paper mills of the Kaliningrad Region. In addition, the mission interviewed representatives of the Forestry Department and of the Regional Committee for Environment and Natural Resources. Linkages were also established and discussions held with other consultant groups of the present UNIDO project, especially those concerned with development of infrastructure and management.

C. History and Trends

Kaliningrad

The Kaliningrad Region is an enclave of the Russian Federation, located between Lithuania and Poland on the Baltic Sea coast, as shown in Map 1. Its total area is about 15,000 square km, with a population of about one million. The capital, Kaliningrad is near the outlet of the river Pregel and has a population of about 500,000.

The pulp and paper industry of the region was established at the turn of the century and the mills are still on the same locations, restored after World War II and modernized on several occasions, especially in the period 1960-1979. Paper machine rebuilds have also been done subsequently. The importance of the sector in the economy of the region is shown by the fact that in 1994, this industry accounted for 20 percent of the total export in US dollars from the region. One of the companies, Cepruss Ltd, was in 1994 the second largest individual export earner in the region, at 12 percent. The largest was the Gasoil company with 20 percent. The pulp and paper industry is now entirely privatized, so there is no government participation in the ownership of the companies.

A detailed description of the legal infrastructure and its need for development is described in a separate report of the project. However, suffice it in this context to state that the province in the past, since September 1993 with specific privileges for the region given in December 1993, was a free economic zone, where joint ventures were exempt from corporate tax and import and export was free of tax and duties. These privileges were abolished through a Presidential Decree in March, 1995. This was part of measures suggested by the International Monetary Fund (IMF) and concerned several provinces in Russia, not only Kaliningrad.

The re-establishment of at least part of the privileges for the region are now negotiated and proposals are being prepared for consideration by the parliament in Moscow. It is already clear that the import taxes and duties will have to be paid, but that they will be refunded to the industry

to 75 percent. It is generally assumed that the situation as to future privileges of the region will be clarified some time in the autumn, 1995.

Market

The markets of main interest for the region are those of bleached market pulp and woodfree printing and writing papers. An indicative review of the market situation for those grades is given in Appendix 3. It is concluded that the market outlook is good for the European Union, neighbouring countries and for the domestic market in Russia. However, this requires that the high quality standards of the larger export markets can be met. Although low quality products can be sold on those markets as well, the price is very unfavourable, in view of the transport costs. There is always a demand for low quality, low cost paper or paperboard, but the production of such grades should preferably aim at the demand of the local market within the region or in the neighbouring countries of Poland and Lithuania and possibly Belarus.

II. THE PRESENT SITUATION

A. Forest Resources

The total forest land in the Kaliningrad Region is 266,600 ha of protection forest and 7 100 ha of natural parks and reserves. Accordingly, the forest areas cover about 18 percent of the land with the main forest areas situated as shown in Map 1. The emphasis in forest management is on protection of the flora and the habitat for wildlife rather than on production of timber. The forests contain a variety of species as shown in Table 1.

Thus, almost two-thirds of the forests consist of hardwood species with birch as the predominant species. The total standing volume is 40.78 million cubic metres with harvestable mature stands

Table 1

Distribution of Main Species in the Forests of the Kaliningrad Region

Tree Species	Area, 1000 ha	%
Pine (*Pinus silvestris*)	40.0	17.8
Spruce (*Picea excelsa L.*)	41.1	18.3
Birch (*Betula verrucosa.*)	55.7	24.9
Alder (*Alnus spp.*)	34.3	15.4
Oak (*Quercus spp.*)	31.1	13.8
Ash (*Fraxinus spp.*)	10.1	4.6
Aspen (*Populus spp.*)	3.7	1.6
Other	7.9	3.6

accounting for only 3.7 million cubic metres. The average standing volume is 182 cubic metres per ha which in mature stands amounts to 245 cubic metres per ha. The annual total growth is 0.76 million cubic metres with a mean annual increment of 3.8 cubic metre per ha.

The annual cut is 178,800 cubic metres per year to which can be added the present salvage cuts in areas affected by the spruce bark beetle, 140,000 cubic metres. However, this salvage operation will be finished within 1995. It has also seriously depleted the mature spruce stands. It is estimated by the Forestry Department that the potential total harvesting could be increased by about 35 percent, but the volumes of spruce wood would still be insufficient for the needs of the pulp mills in the region. However, with the present cut, about 45,000 cubic metres of birch could be harvested and part of it could be used for the pulp mills, especially in the Sovjetsk and Neman mills, for pulp to be used as part of the furnish in printing and writing papers. Nevertheless, the volumes actually available as pulpwood would need to be ascertained.

In 1992 and 1994, the pulp and paper industry in Kaliningrad purchased its wood as shown in Table 2.

Table 2

Wood Purchases by the Pulp and Paper Industry in Kaliningrad in 1992 and 1994
(1000 m^3)

Main supply areas	1992	1994
Total purchased	948.5	527.0
In neighbouring areas	173.3	
Northern Region of Russia	598.3	
North-Western Region of Russia	9.1	92.5
Central Region of Russia	107.9	
Region of River Volga	11.9	
Western Siberia	4.4	
Eastern Siberia	11.1	
Far East Russia	32.5	
Lithuania		381.6
Byelarus		11.9
Latvia		10.0
Poland		9.0
The Kaliningrad Region		12.0

Although the wood supply situation from within the region is completely inadequate, there are abundant forest resources in Lithuania which can provide wood raw material to the industry. The present annual cut in Lithuanian forests is about 3 million cubic metres and according to some estimates, it could be increased to 6 million cubic metres per year, with appropriate

management[2]. The Lithuanian forests are very similar to those in Kaliningrad in species composition but there are indications that the mean annual increment is as high as 6-7 cubic metres per ha.

Sweden already buys pulpwood, mainly birch, from Lithuania, so there is competition for the resource. Long term agreements could, however, be made with Lithuanian suppliers to ensure continuity of supply. For instance, the pulpwood price could be tied to the international price for sulphite pulp. This would also help to reduce pulpwood prices when the pulp price situation is tight.

B. The Pulp and Paper Industry

General

There are a total of four pulp mills and three paper or paperboard mills in the region. Two of the mills produce only market pulp, mainly for export, at present about 90 percent of their production. The other two are integrated with papermaking and one of them also produces market pulp. One paper mill uses purchased pulp and waste paper as raw material. The location of the mills is shown on Map 1 and reports on individual mills are given in Appendix 4.

One of the companies, Cepruss Ltd, a producer of bleached market pulp, is a joint venture with foreign partners in Austria, Germany, Italy and Switzerland. The other market pulp producer, Darita, is a closed company and it has not been possible to ascertain who its partners and owners are. Both Cepruss and Darita are shareholders in the Sovjetsk Pulp and Paper Mill and Darita is also shareholder in the Neman Pulp and Paper Mill. Almost 61 percent of the shares in the Neman mill are being purchased by Schooner Capital Corporation in Boston, USA. Once that deal is closed, the Neman mill becomes a joint venture as well.

The only mill not to include a pulp plant, Znamensk Paper Mill, is owned by the Grif company in Moscow.

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2 A.Kuliesis: "Forest Yield Tables in Lithuania", Kaunas (1993)

Table 3

Unit Costs of Some Pulping and Papermaking Raw Materials
(First quarter, 1995)

Item	Unit	Price
Spruce pulpwood	US$/m^3	27-29
Bleached sulphate pulp (softwood)	US$/ADt	950
Sulphur	US$/t	25
Chlorine	US$/t	160
Alum	US$/t	150
Heavy fuel oil	US$/t	60-80

Infrastructure

The infrastructure for transport is very good for the existing mills. Thus, there is a good Baltic Sea port and good highways and railways connecting the mills with the capital of the region and also with Lithuania, Belarus, Germany, Poland and Russia (See Map 1).

Raw Materials, Costs and Employment

With the exception of some insignificant quantities of wood, all raw materials come from outside the region. The main part of the wood comes from Lithuania with some supply from Latvia, Belarus, Poland and from other provinces of Russia. The chemicals come mainly from Russia, Lithuania, Belarus and Poland.

The raw material prices shown in Table 3 are not necessarily typical, since there is some variation in raw material costs, depending on the source of supply and there is also bias in what rate of exchange should be applied for each individual supply quoted. However, they are by no means much different from those paid in main pulp and paper producing countries. Accordingly, these costs imply that they would not affect the competitiveness of the industry as such in a negative way. However, the costs are expected to increase, especially with the introduction of duties and taxes on imported raw materials.

The integrated pulp and paper mills typically employ 1100 - 1800 workers each and the average wage rate in the industry is about US$ 75 per month. The salary of professional staff is about US$ 150 per month. The number of employees is high but the wages and salaries are extremely low, compared with those of major pulp and paper producing countries. Since the salaries and wages have been unable to keep up with the increase in cost of living, there is no doubt that they must increase rather rapidly in the future. The only non-integrated paper mill, Znamensk, has 350 employees.

Production

All pulp mills employ the sulphite pulping process, one with sodium base (Cepruss), two with ammonium base and one with calcium base (Darita). The only one producing unbleached market pulp is Darita, with a capacity of around 60,000 ADT/a. Cepruss at present has a capacity of about 75,000 ADT/a of bleached market pulp. The Sovjetsk mill has reduced its capacity from 130,000 ADT/a to 60,000 ADT/a because of worn-out equipment and the Neman mill has a capacity of 70,000 ADT/a, all of which is used for paper production in their own plant.

The pulp mills are all equipped for production of ethanol, fodder yeast and lignosulphonates from the pulping waste liquor. However, Sovjetsk and Neman do not produce lignosulphonates at present, since they use an ammonium based pulping process. The production of these pulping by-products reduce the organic substance in the waste liquor, but the processes also contribute in their own way to pollutants in the effluent.

Paper production consists primarily of printing and writing papers and wallpaper base paper with a capacity of 25,000 Ft/a in Sovjetsk, 50,000 Ft/a in Neman and about 25,000 Ft/a in Znamensk, although this capacity is not used at present because the price of imported purchased pulp is almost the same as the price of finished paper. Neman also has two paper machines for manufacture of about 25,000 Ft/a of greaseproof paper, but the production in 1994 was only 700 tons, due to low demand.

Pulp screening rejects and corrugated board waste are used for manufacture of corrugating medium and test liner, 500 Ft/a in Sovjetsk and 10,000 Ft/a in Neman (corrugating medium only). Znamensk has capacity to produce 8,000 Ft/a of low grade packaging board from mixed waste paper.

Sovjetsk also has a wallpaper printing plant, a paper conversion plant and a corrugated box plant. In addition, they produce wallpaper printing rolls for export.

Marketing

All mills except the Neman mill have marketing organizations. In the case of Neman, they prefer to "sell" to clients that come to them, rather than doing actual marketing and do not see any reason for changing this. However, with the new ownership structure and almost 61 percent of the shares owned by an American company that is expected to invest US$ 25 million into the plant, this situation might change. Znamensk's marketing organization is likely to be rather simple, in view of its small capacity - maximum 8,000 Ft/a of low quality board and 25,000 Ft/a of printing and writing papers. The mill is in any case now closed because of lack of working

capital. It is considering investment in restructuring and in that context some assistance in preparation of a marketing and business plan is likely to be needed.

Most of the printing and writing paper is sold to Russia or to countries of the former Soviet Union. Pulp is sold almost exclusively on the export market and the pulp mills have foreign partners and agencies that handle marketing in Austria, Germany, India, Ireland, Italy, Switzerland and the UK. At present there is a boom on the pulp market due to under-capacity and the pulp mills sell the pulp usually one month before it is produced.

Production in the sector was very low in 1994, when pulping capacity was utilized to about 50 percent and some papermaking capacity utilization dropped to an all-time low of about 25 percent. The reason for this was not lack of demand, but very low prices, which made the production uneconomic. Another reason was shortage of pulpwood at prices which could be accepted at the low prices for pulp. Since the papermaking in the region is largely linked to pulp production, this also affected the output of paper.

All the companies emphasized that they have no problem with marketing, which apparently has been quite well organized in most cases, but that problems of high costs arise in low product price situations, when production must be reduced, close to the break-even point, to minimize losses. As far as production and marketing of pulp is concerned, this is most probably correct. At least in some cases, however, it seems that the concern in papermaking is mainly with minimizing costs of purchased raw materials, rather than directing efforts towards sufficient planning of marketing and determination of the most profitable product mix.

Technology and condition of the mills

All the mills were established around 1900, with modifications and improvements introduced on several occasions during the period 1945 - 1980. The result is that the pulp mills are seriously outdated in technology and badly worn out and in constant need of repair. The paper machines and papermaking equipment in general are in reasonably good condition and also represent a more acceptable level of technology. The paper machines are on the whole old, but they have been rebuilt several times to adapt to more modern requirements. The converting plants on the other hand are quite modern and well equipped.

Bleaching is carried out in up to seven stages. The initial stages seem to be predominantly with a combination of treatment with chlorine and chlorine dioxide, with extraction, followed by bleaching with hypochlorite in up to three stages. The pulp is acidified with sulphur dioxide after

the last bleaching stage. The dominance of chlorine and hypochlorite as bleaching chemicals has a serious effect on the effluent load of organic halogen compounds (AOX).

There is complete lack of effluent treatment in the mills, apart from the use of the waste liquor from pulping for production of by products. Washing the unbleached pulp in the digesters and in open tanks also causes emission of sulphur dioxide, further aggravating the effects of the use of coal and sulphur-containing heavy fuel oil in the steam plants.

Three of the four pulp mills produce sufficient steam to generate all the electrical power they need and to be able to sell surplus to the national power grid. Darita has sufficient capacity for this on their turbo-generator, but their steam producing capacity is insufficient.

Some general information on the mills is given in Table 4 and production data for 1992-1994 are presented in Table 5. They also show the extent of difficulties faced by the industry, due to past market problems, lack of working capital and a high rate of inflation..

Table 4

General information on the pulp and paper mills in Kaliningrad

Mill	Year of establishment	Production in 1994 1000 t	% of capacity	Total area 1000 m^2	No. Employees
"Darita"	1885			N.A.	1136
- Total pulp		32.0	40.0		
- Market pulp		24.0	30.0		
"Cepruss"	1907			N.A.	1612
- Total pulp		51.7	57.4		
- Market pulp		45.6	60.0		
"Sovjetsk"	1898			N.A.	1774
- Total pulp		21.2	16.1		
- Market pulp		7.4	10.4		
- Paper		13.8	40.3		
- Paperboard		1.1	N.A.		
"Neman"	1912			105.8	1500
- Total pulp		80.0	39.2		
- Paper		20.5	52.0		
- Paperboard		2.4	33.3		
"Znamensk"	1923			16.1	350
- Paper		1.4	7.6		
- Paperboard		2.1	25.9		

Table 5

Production and Markets of the Pulp and Paper Mills in Kaliningrad in 1992 - 1994

Product and market	Unit	Production 1992	1993	1994
Unbleached market pulp				
- Total	t	N.A.	N.A.	24,000
- Export	t	N.A.	N.A.	21,000
- Percent export	%	N.A.	N.A.	90.0
Bleached market pulp				
- Total	t	88,146	72,544	53,000
- Export	t	.61,660	71,105	50,316
- Percent export	%	70.0	98.0	90.0
Paper				
- Total	t	82,968	54,649	39,560
- Export	t	10,681	18,190	14,899
- Percent export	%	12.9	33.2	37.7
Paperboard				
- Total	t	10,591	6,530	4,491
- Export	t	-	1,570	778
- Percent export	%	0.0	24.0	17.3

Research and Development

In view of the technology available in the mills, there is little scope for technical research and development except on the company level.

Environment

Russia has very strict limits on pollution. In the Kaliningrad region, the responsibility for compliance with these limits and monitoring of the performance of the industry rests with the Kaliningrad Regional Committee on Protection of the Environment and Natural Resources. The pulp and paper industry is unable to comply with the requirements of the limits and therefore pay high fines, based on the extent to which the limits are exceeded. There is also the 1995 Helsinki agreement on the Baltic Sea (HELCOM 1995) which established certain limits on effluent load. The present effluent load from the mills and the national and HELCOM 1995 limits are given in Table 6. As to emission of air pollutants, the Committee monitors the concentration in the surrounding air, not the emission from the mills. The pulp and paper mills have high stacks and

the emission from them is probably largely drifting farther away and contributing to acid rain elsewhere. Even so, the smell in the surrounding areas is noticeable. The estimated annual emission from the mills is given in Table 7 It should be noted that contrary to the others, the Neman and Znamensk mills use only heavy fuel oil in their boilers, which explains the lower emission of particulates. The predominant wind direction is from the south or from the south-west.

Table 6

Effluent Load of the Pulp and Paper Mills and National and Baltic Sea Treaty Requirements

Item	Unit	Cepruss	Darita	Sovjetsk	Neman	Znamensk	National Limits	HELCOM Limits
Water consumption	m^3/t	380	140	400	275	65		
Suspended solids	kg/t	15.3	9.1	66	36	17	8.1	
BOD	kg/t	95	42	188	85	2	1.15	5
COD	kg/t	750	190	NA	821	29	11.7	155
AOX	kg/t	6.6	-	NA	1.3*)	-	-	3

*) In view of the bleaching process, this value seems too low.

Table 7

Estimated Annual Emission from the Pulp and Paper Mills, t/a

Mill	Total suspended particulates	Carbon monoxide	Sulphur dioxide	Nitrogen oxide
Cepruss	1246	1091	2784	147
Darita	NA	NA	NA	NA
Sovjetsk*)	5960	NA	25670	1150
Neman	481	1609	2670	394
Znamensk	1047	NA	145	25

*) This is estimated on the assumption that the steam plants that account for most of the emission, would be operated at full capacity throughout the year. This is unlikely, since the plant also is a remote heating central for the town of Sovjetsk. It should also be noted that the estimates for the other mills were probably determined for 1994, when the capacity utilization was lower than now.

None of the mills have effluent treatment. The Sovjetsk and Neman mills discharge their untreated effluent into the slow-flowing Neman river along the border with Lithuania and further out into the Baltic Sea, about 100 km downstream. The Cepruss, Darita and Znamensk mills all discharge their effluent into the Pregel river (Znamensk via its tributary Lava) and then into

the Kaliningrad Bay. The effluent from Cepruss alone adds approximately 25 percent to the concentration of suspended solids in the river immediately after the discharge point, 80 percent to the BOD and almost 50 percent to the sulphate content. It should be noted that at that time the Darita mill was closed down. Since then it has started operation again and discharging their effluent upstream from Cepruss. The pollution of the river is accordingly worse now, especially since both mills are now operating at full rated capacity. Another serious feature of this is that the fresh water intake of the City of Kaliningrad is about 1 km upstream from the Darita mill. When the wind blows from the south-west, it presses water from the Kaliningrad Bay into the river, reversing the flow from the Darita plant towards the water intake. This has in the past caused problems with the supply of potable water to the city. At the peak of the summer the river at Kaliningrad City is dead and emits unpleasant smells.

Price/Cost Competitiveness

Its can be assumed that the positive demand trends for pulp and paper will continue for the next few years which means that the prices will be fully acceptable. As to the cost of raw materials it is likely that they will increase somewhat, partly because of customs tariffs and taxes and partly because of cost increases in the neighbouring countries from which the raw materials are delivered. Nevertheless, it is probable that the wood cost will remain stable in real terms since the prices in that case will be governed largely by international prices in the Baltic area. A rapid growth in salaries and wages in the region is extremely likely to eradicate the present competitive advantage of low wage rates and salaries in the industry.

Table 8

A Comparison of Break-Even Points for a Hypothetical Bleached Market Pulp Mill of 60,000 ADT/a in Kaliningrad, Using Price/Cost Forecasts for 1996 - 2000
(See Appendix 5 for details)

Mill Net Price, US$/ADT	Break-Even Capacity Utilization	
	1996,%	2000,%
750 (assumed maximum average)	5	18
500 (assumed minimum average)	17	99

The results of an attempt to forecast the price/cost situation over the period 1996-2000 made in Appendix 5 of this report are shown in Table 8. Accordingly, the break-even point in 1996 would be 5 percent at the maximum average pulp price and increase to 17 percent at the minimum average price. However, with increased costs, the corresponding break-even points in year 2000 would jump to 17 and 99 percent, respectively. Regardless of how accurate the forecast may

or may not be, it is obvious that the industry will not be able to have the benefit of low wage rates over the next years. As a result, the efficiency of utilization of all resources, human or physical, must be raised to the maximum.

Management and Organizational Culture

There is no doubt that in the technical sense the management is fully capable of operating the mills. This is probably true also as regards other types of functional management. What is seems to be lacking is strict cost control, efficiency, reduction of waste and close teamwork in the production as a whole. The marketing of paper and paperboard also needs to be improved and linked to planning of both marketing and production in a corporate context. This will be extremely important in the future, if the mills are to continue operating, since the cost situation is expected to be increasingly tight over the next few years.

Accordingly, the organizational culture or the attitude of management to change becomes very important. A survey was therefore carried out among managers, using a questionnaire for

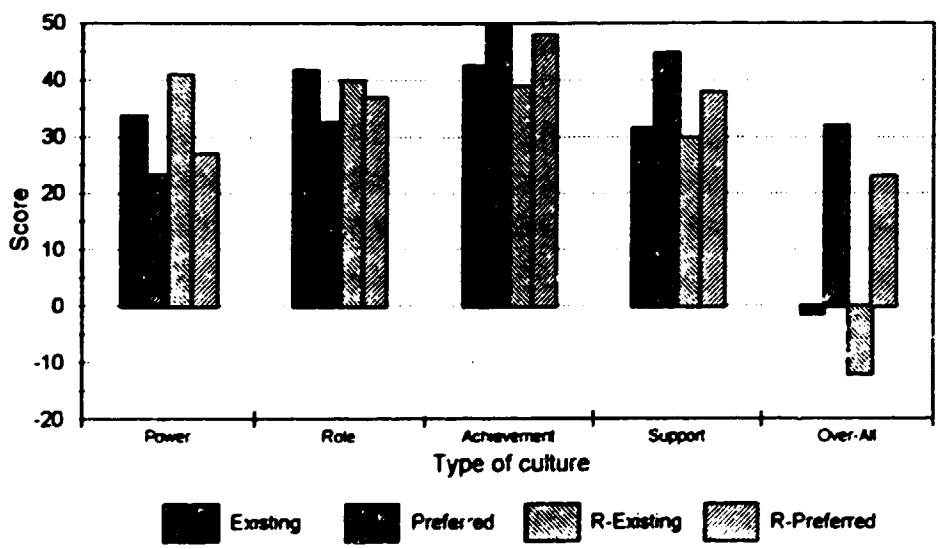

Figure 1. - Evaluation of organizational culture among managers in the pulp and paper mills in Kaliningrad (Existing and Preferred) based on five interviews, compared with 109 middle-level managers in the USA (R-Existing and R-Preferred).

evaluation of organizational culture[3]. The participants in the test were asked to rank statements in the order which best represented two sets - the actual conditions in the company ("Existing") and those which the participants would prefer that did ("Preferred"). The results are summarized in Figure 1, which shows clearly that there is a wish for a less authoritarian and bureaucratic ("Power" and "Role") culture and that more emphasis should be given instead to "Achievement" and "Support". In fact, the results tally quite well with those obtained in the much larger reference sample of 109 managers in the USA ("R-Existing" and "R-Preferred"). It shows that the management has the right attitude for implementation of a programme of result oriented management with strong involvement of teams to improve cost, production and marketing efficiency. Such schemes should be introduced as soon as possible and involve both salaried and hourly paid staff. A starting point could be to carry out the same survey within the company at medium levels on a larger sample.

III. SWOT ANALYSIS AND AMBITIONS

A. SWOT Analysis

The strengths and weaknesses of the pulp and paper sector in Kaliningrad are listed in Table 9. The weaknesses by far outnumber the strengths and it is very much in doubt whether these industries would be established as greenfield enterprises in the region today. The situation in 1900 was, of course entirely different. However, the industries are' there', and although there is little scope for over-all expansion of the capacity, this also offers opportunities.

The opportunities and threats are shown in Table 10. Although there is competition from Scandinavia for the wood supply, competition on the market with high quality products and an increasingly tight cost situation in the future, the opportunities are no doubt stronger than the threats - if the industry meets the challenge.

B. A Vision of Future Possibilities and Ambitions

Figure 2 illustrates how the strengths and opportunities can be developed by addressing the factors that lie behind the weaknesses and threats. Of course, it is impossible to remove all weaknesses and threats, but their effect can be diminished. For instance, without building completely new pulp mills, the problem of obsoleteness of technology and equipment cannot be

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[3] R. Harrison, H. Stokes: Diagnosing Organizational Culture. Pfeiffer & Company, Amsterdam (1992)

overcome entirely, but their impact can be reduced. The location of the Kaliningrad region in relation to Russia cannot be changed, but perhaps other markets can be developed or the

Table 9

Strengths and Weaknesses of the Pulp and Paper Industry in Kaliningrad

Strengths	Weaknesses
Good infrastructure for sea and land transport	Remote and isolated in relation to Russia
Existing know-how in pulping and papermaking	Obsolete pulping technology and equipment
Management attitudes in favour of change in organizational culture	Inadequate process control in papermaking
	Low efficiency
	No raw material resources for pulping or papermaking
	Extremely inadequate pollution abatement measures
	Problems with obtaining long-term credit

Table 10

Opportunities and Threats for the Pulp and Paper Industry in Kaliningrad

Opportunities	Threats
Good position for export to Germany and neighbouring countries	Competition from Scandinavia for wood supply
Growing export, domestic and regional markets for pulp and paper	Competition with high quality products from large producers
Existing production facilities	Costs of chemicals likely to increase
Low labour cost	Labour cost advantage likely to diminish

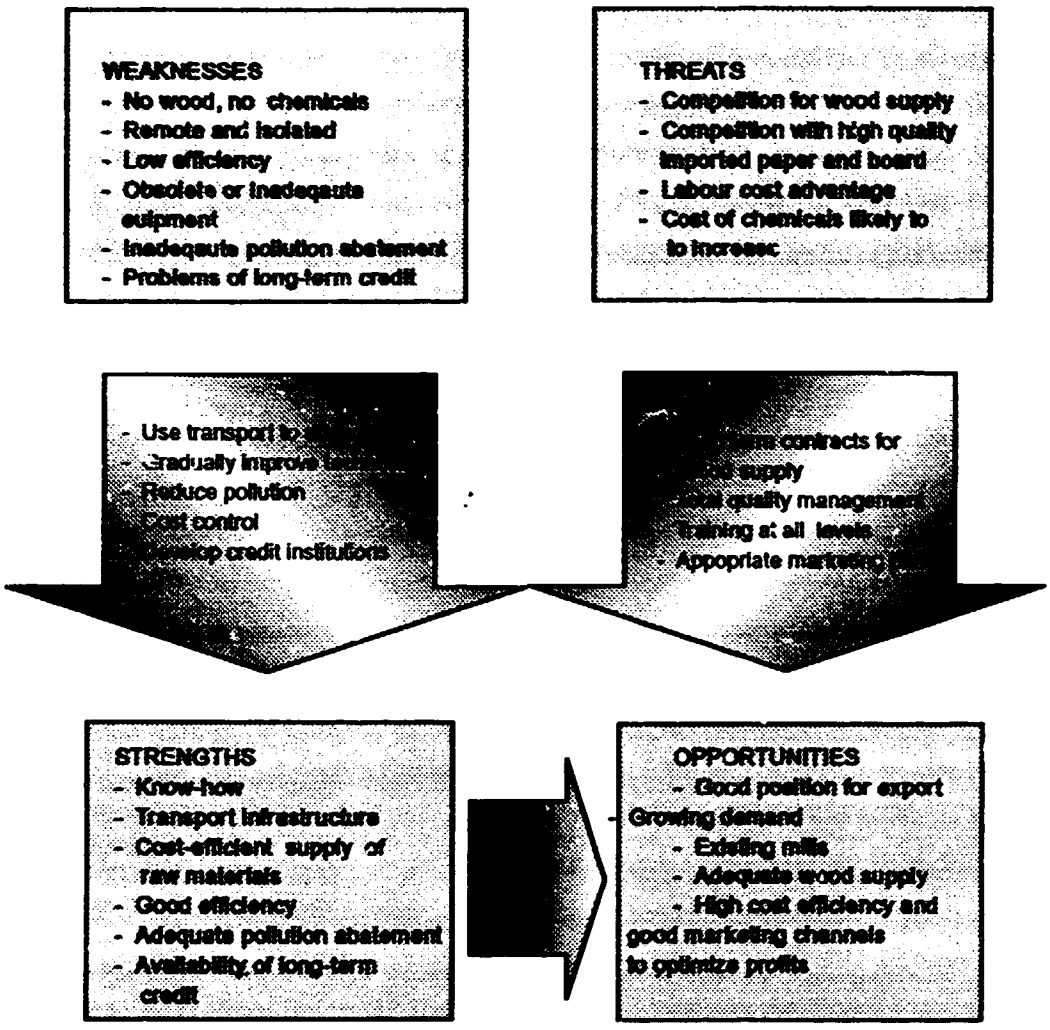

Figure 2. - Weaknesses and threats of the pulp and paper industry in Kaliningrad and how their impact can be reduced and the strengths and opportunities improved.

products be made competitive on the Russian market in spite of transport distances. In fact, the Russian market should largely be looked upon as an export market.

The large arrows in Figure 2 also give an indication of what needs to be done in order to improve the situation. Some of the measures can be implemented in the short term - say, within a few years - others require more time. Most of the measures are on a company level, but the effluent treatment requires regional efforts for development of infrastructure and development of credit

institutions must most likely be part of a regional/national effort for improvement of the institutional infrastructure.

IV. STRATEGIES AND DEVELOPMENT AREAS

A. General

The strategies or actions required to address the threats facing the pulp and paper industry in Kaliningrad and its weaknesses were already implied in the preceding section of this report. They can be divided into seven groups or development areas, that is

- strategies to address reliability of wood supply
- strategies to address environmental problems
- strategies to address the problems of outdated technology and worn out equipment
- strategies to address high transport costs for products
- strategies to address marketing deficiencies
- strategies to address low operating efficiency
- strategies to address lack of long term credit

B. Reliability of Wood Supply

The closest source of pulpwood is no doubt Lithuania that has very good potential for export of pulpwood. This has also been discovered by the Scandinavian industry, which accordingly is likely to compete for that supply with the industry in Kaliningrad. On the other hand, the supply to Scandinavia is, for the industry there, merely a question of marginal quantities, although substantial in each shipment. The cost of transport is also higher for the Scandinavians than for the industry in Kaliningrad.

A formula used by Scandinavian pulp mills is to make long term agreements of supply, especially as regards prices. In these agreements the price is not fixed but fluctuates with the international price of pulp. The prices of pulp are reviewed every quarter and the wood prices adjusted accordingly. This gives reliable supply at reasonable prices.

Another possibility is to widen the scope of raw material supply. At present the pulp mills in the region only use spruce and there is no reason to change that for market pulp. However, in integrated operations, like in Neman and to some extent in Sovjetsk, birch pulpwood could be

used for a pulp very suitable for printing and writing papers. In fact, it might even improve the quality of these papers, with respect to formation.

C. Environmental problems

The environmental problems have to be dealt with as two separate issues. Firstly, there is the complete lack of effluent treatment in the mills and, secondly, the severe air pollution. Plans already exist at varying stages of implementation for expansion or establishment of municipal treatment plants for sewage in Kaliningrad city, Sovjetsk and in Neman. These plants will have sufficient capacity to effectively handle the effluent from the pulp and paper industry in those locations. For instance, the plant for Kaliningrad city has been under construction for about 20 years and is now reportedly finished to about 85 percent. It is of utmost importance that these plans are implemented as soon as possible. The cost of their implementation will be dealt with in another report, on infrastructure, and reference is therefore made to that report for details on these projects.

The Znamensk mill, which has no pulp production and is situated in a small town will need to make arrangements for effluent treatment in their plans for restructuring. The mill also uses oil of high sulphur content for its boilers and it will need to install some equipment for purification of the flue gases, to remove particulates and sulphur dioxide.

The integrated pulp and paper mills will need to reduce considerably their emission of particulates and sulphur dioxide. The main part of the emission comes from the boilers, fired with coal and oil in the case of Cepruss, Darita and Sovjetsk and with oil in the case of Neman. These mills already have investment projects which include conversion to using gas as fuel in the boilers. To this must be added a program for trapping sulphur dioxide from the pulping plant through use of closed blow tanks, ventilation hoods and scrubbers. It should be possible with these measures to reduce the emission to acceptable limits. Modification of the bleaching process away from chlorine and hypochlorite would also cut down on the load of organic halogens in the effluent.

D. Outdated Technology and Worn Out Equipment

The problem of outdated technology and worn out equipment is a major strategic issue for the mills in the region. The Znamensk mill is already considering various options for restructuring and purchase of new equipment with an estimated project cost of US$ 35 million. Cepruss is considering a modernization project for about US$ 50 million and Darita investments of US$ 5 million. Sovjetsk and Neman also have their plans.

The key issue in this context is, for how long is the mill going to operate in the future? There is obviously no point in making large investments if the mill is going to be closed down in 5-6 years from now. The problem is most serious in the pulp mills. The paper mills, with the exception of Znamensk, are in a much better condition and have good prospects of continuing, with some modernization of the equipment and controls. In their case it is worth considering a modernization/restructuring programme which would involve some paper machine rebuilds, modification of stock preparation, adding new equipment, computerized controls, etc.

The pulp mills on the other hand will in a few years face the choice between closing down or building a new mill. Although some improvements can be made to keep the mill running and generating cash in the short term, it is no doubt impossible to go on maintaining and repairing them much longer. Any larger investment over the next few years will need to take into account the choice which will have to be made early in the next century.

Looking at it from the point of view of regional development rather than in the context of individual companies, the obvious strategy for the pulp mills would be to close all pulp mills and build one new one, with a capacity of, say, 250,000 ADt/a of bleached pulp. This would allow getting the benefit of economies of scale in the establishment and operation of the new mill. It would still be a fairly small mill, for international standards, when mills have grown to the output of 700,000 ADt/a.

An alternative is looking for a good second hand mill of a size equivalent to the ones in the region. This would also involve changing the process to sulphate pulping, possibly with an oxygen delignification stage added. Such an approach would allow at least perhaps two mills to continue with pulping. There is a limit to how many second hand pulp mills could be found.

In any case, if the pulp production is to continue on some sites in the region, the companies concerned need to take this into account in any investment programme to be implemented in the near future. Investment in a new bleaching plant, for instance, needs to be suitable for the future new mill and its process as well. Thus, although the mills will continue to operate for a few more years, any improvement in them in the short term will need to be for continuation of cash flow generation only. Major investments must be made only in the context of a longer term plan for establishment of a new pulping plant, whether in only one company or in several. These are questions which only the companies themselves can answer.

The negative prospects for pulp production in some mills in the region may raise the question whether it is worth the while or even financially feasible to invest at all in the existing pulp mills.

The hypothetical pulp mill case of Appendix 5 may serve the purpose of a financial evaluation of the possibility of implementing an investment programme in the short term, mainly for environmental reasons. There is no doubt that such a programme is a must if the mills are going to continue operation at all. Assuming the cost increases over 1996-2000 already referred to and a mill net price of US$ 650/ADt, the internal rate of return (IRR) on an investment of US$ 12 million over the period 1996-8, based on the cash flow projection in Appendix 5, is about 30 percent. The sensitivity of the IRR with respect to the mill net price of pulp is shown in Figure 3.

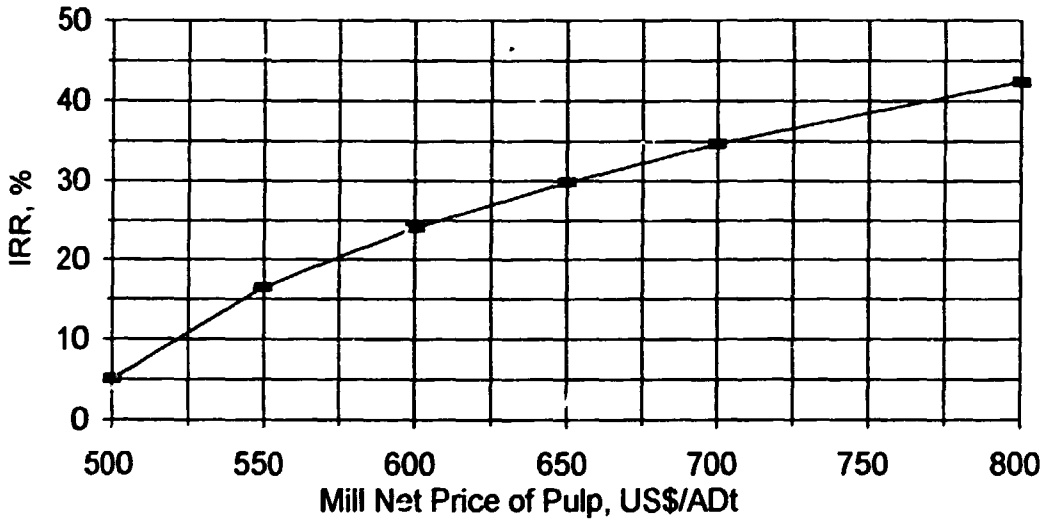

Figure 3. - Sensitivity of internal rate of return on an investment of US$ 12 million over three years in 1996-2000 to variations in average pulp price for a hypothetical bleached pulp mill of 60,000 ADt/a, with cost increases as shown in Appendix 5.

Thus, if the average pulp price would drop to US$ 550, the IRR would drop to about 17 percent. On the other hand, with an average pulp price of U$ 800, the IRR would be as high as 42 percent.

It is clear that the IRR is not really a return on the capital invested as such, but it shows that a mill can afford it and still make a good profit before taxes and debt services. It also emphasizes that such investments should be seen as a precondition for continued operation even in the short term. The size of the actual investment in switching to gas fired boilers and cleaning up the air emission will vary between companies, but it will still be a necessary outlay, like the costs of keeping the equipment running.

E. High Transport Costs for Products

Moscow is about 1,200 km away from Kaliningrad, and there are at least two border crossing before any paper gets to the market in the capital. On the other hand, Berlin is only about 600 km away and the market in Germany is by far greater than the Russian one. For instance, in 1991 the consumption of printing and writing papers (including wood-containing and woodfree) was 5.8 million tons, whereas in the area of the former USSR, it was 1.4 million tons[4]. In addition there are Poland, Lithuania and Belarus within reasonable distance. By concentrating the marketing efforts on these countries and considering Russia outside the region as an optional export market, the remoteness from the Russian capital becomes less important. However, it should by no means be ignored as a market especially when import duties of the European Union prohibit export of some grades to that region.

F. Marketing deficiencies

The marketing in the pulp mills seems to be well organized. Partly because pulp marketing is simpler than paper marketing and partly to a 'selling' approach to marketing, the situation is less satisfactory in the paper mills, at least in some cases. The reason for this is likely to be to some extent the stress on production targets in the past. The emphasis is on cutting of costs in production rather than supplying the right products at the right prices to the right markets.

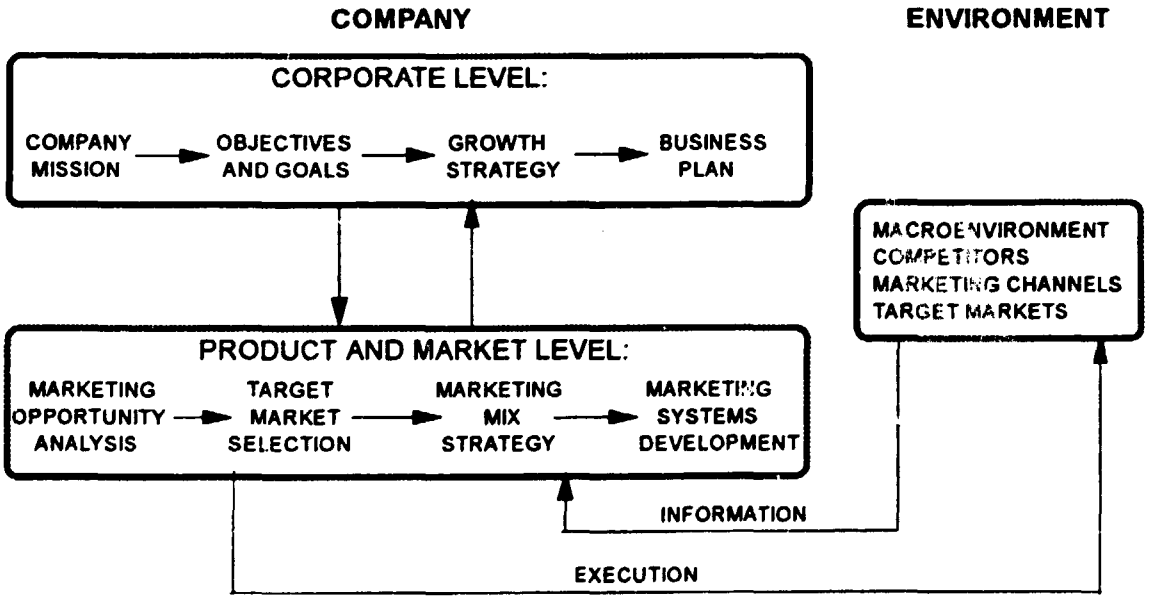

Figure 4. - Marketing and production as part of the corporate strategy and its interaction with the company environment.

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[4] FAO: "Pulp and Paper Towards 2010", Rome (1994)

What is needed is a training programme that establishes the marketing and production efforts as part of and interacting with the development of corporate strategies and the company environment, similar in structure to corporate planning, as shown in Figure 4. The Economic Commission for Europe (ECE) and the Food and Agriculture Organization of the United Nations (FAO) are jointly organizing a training course in marketing of forest products in the autumn this year, and apparently they could accept three participants from Kaliningrad. The course is free, with daily allowance and travel costs paid to the participants[5].

Three participants at a short workshop is obviously not enough and it needs to be complemented with other training and workshops for a larger number of people. How this should be organized depends very much on the companies themselves. However, the most cost effective way of doing it would be to have marketing workshops organized for the industry in the region as a whole, not only the pulp and paper industry. The possibilities of the Regional Administration organizing a series such workshops could be explored. The companies could also, in addition, at a later stage call in a consultant to discuss and advise on the organization of the marketing in each company separately.

G. Low Operating Efficiency

It is clear that the cost of production will escalate over the next few years, especially because of expected increases in labour costs and salaries, as already mentioned in this report. The companies must therefore prepare themselves to cope with this through introduction of management methods that aim at ensuring company-wide efforts for control of costs and quality. This involves team work and approaches such as total quality management and "Do it right the first time", in addition to cost control management as such.

To achieve this, it should be explored whether UNIDO could provide a consultant for about four man-months to help organize such management systems over a period of one year, with several visits and working with all the pulp and paper mills in the region. The alternative is that each of the companies themselves call upon a consultant for this.

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[5] For further information contact Mr.Leo Lintu, Senior Forestry Officer, FAO, Via delle Terme di Caracalla, Rome, Italy. Telephone +39-6-52251, fax +39-6-5225-5618

H. Lack of Long Term Credit

The development of credit institutions and credit facilities is part of the institutional infrastructure that needs to be created. It will be dealt with in a separate report on infrastructure development and its importance is only highlighted in this context.

V. PROJECT CONCEPT

Based upon the strategies and development areas presented in Section IV some projects can be formulated. Some of them address actions in the short term and they can be formulated as concrete proposals. Others are more for the long term, beyond year 2000.

The long term projects for all the mills, each one on its own or in cooperation, relates to the decision on the continued operation of the companies as pulp producers and investment in new facilities and closing of the old ones. This is something the companies will have to consider over the next few years in order to formulate their own individual or joint investment projects.

For the short term, projects can be formulated that relate to investment in environmental protection and improvement of the production facilities, in the latter case especially for production of paper and paperboard. Such projects are already considered or partly implemented by the Kaliningrad Regional Committee on the Environment and Natural Resources as well as by the companies themselves. However, this is hampered by lack of financial resources.

A second type of projects for the short term are development assistance or training projects that relate to improved marketing and higher cost efficiency in production. Here, the question arises whether the companies should undertake these activities individually on their own or if some assistance could be provided to them as a group or as part of a larger group, by the Kaliningrad Administration or by international organizations such as UNIDO.

The project proposals in the following section will deal exclusively with short-term projects.

VI. CONCRETE PROJECT PROPOSALS

A. Investment Projects

1. Establishment/expansion of municipal sewage treatment plants in the towns of Kaliningrad, Sovjetsk and Neman. These plants would also treat the effluent from the local pulp and paper mills. The cost and time-frame of each of these will be estimated in the context of development of infrastructure in a separate report (Construction).

2. Conversion of the steam boilers of the pulp and paper industry from coal and/or oil as fuel to gas firing in order to reduce the emission of pollutants from these plants. In addition, modifications in the pulp plants to reduce emission of sulphur dioxide. These projects require for each mill an estimated investment of US$ 5 - 25 million over the next 1-3 years, depending on the mill and to what extent improvements are made in the process. The total is likely to be about US$ 50 million. The companies are looking for financing through equity or loan participation for their present plans, some of which are under implementation.

3. Improvement and restructuring of the production facilities, especially in the paper mills but also in at least one pulp mill (Cepruss). The estimated investment over the next 2-4 years is US$ 10 - 35 million each, depending on the mill and their plans. The total is likely to amount to about US$ 90 million. The companies are looking for financing for such projects.

B. Development Assistance and Training Projects

1. Training in marketing and organization of marketing, through workshops for the industry as a whole in Kaliningrad and through company specific consultancies. The cost of this depends on how the assistance is organized. Possible steps are:

   - The ECE/FAO workshop for three participants in Tallinn this year
   - Organization by the Regional Administration of a joint workshop on marketing for all sectors of industry, together with UNIDO
   - Company specific training programmes for marketing staff

The companies have expressed interest in such activities and willingness to implement company specific training programmes in marketing at their expense. In the case of a joint workshop for all the industry, they could send up to 12 participants.

2. Introduction of management methods to improve the effectiveness of all activities in the pulp and paper mills and ensuring high quality of output. This involves a team approach to management (total quality management - see Appendix 6), with company-wide participation and identification and elimination of so-called quality costs which may be as high as 25 percent of the turnover[6]. A possible approach would be:

- Organization by the Regional Administration of an introductory workshop for all industries in the region, together with UNIDO, to present the case for total quality management.
- A series of seminars for the pulp and paper industry, financed by the companies, with company specific support for one week by consultants after each seminar for stepwise implementation of a company-wide management programme, with five seminars over a period of six months..

The cost of international lecturers/consultants for the latter is estimated very preliminarily at about US$ 100,000, including travel, food and lodging and honorarium for four consultants. To this should be added local expenses for organization, simultaneous interpretation, audiovisual equipment rentals and venue.

The companies have in principle shown interest in this and willingness to invest in such a programme which they feel is important for the survival of the sector. However, the actual implementation would for some companies depend on the cost. They could send up to 12 participants to a workshop for all the industry in the region.

3. Advisory services for strategic planning of the future of the industry, especially the pulping sector but also for strategies of development of the papermaking sector. These would need to be financed separately by each of the companies, to avoid conflicts of interest. However, a workshop in strategic planning, organized by the Regional Administration together with UNIDO for all industries, would serve as an incitement for these activities.

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6 A survey made in 1985 in the United Kingdom recorded that quality costs may in general amount to 10-20 percent of the turnover. A reduction by one third can usually be achieved within three years, with introduction of total quality management. At a turnover of US$ 60 million, this saving amounts to US$ 2 - 4 million annually.

APPENDIX 1

PERSONS MET

Institutions:	
Mr. Georgaij L. Uljashev	First Vice-Chairman, Kaliningrad Regional Committee for Protection of Environmental and National Resources
Mr. Nicolai A. Volchuga	Head of Kaliningrad Forestry Department
Industry:	
Mr. Boris A. Ovchinnikov	President, Cepruss Pulp Mill
Mr. Valeri N. Baibakov	Vice President for Fiscal and Economic Management, Cepruss Pulp Mill
Mr. Ivan M. Vasiliev	Vice President for Production Management, Cepruss Pulp Mill
Mr. Vladimir V. Baigdanov	Executive Director, Darita Pulp Mill
Mr. Peter A. Yershov	Main Advisor, Darita Pulp Mill
Mr. Rafail Sukhovolsky	First Deputy Director, Darita Pulp Mill
Mr. Nicolai Krevtsov	General Manager, Neman Pulp and Paper Mill
Mr. Nicolai N. Scuba	Head, Technical Department. Sovjetsk Pulp and Paper Mill
Mr. Anatolii I. Pronin	Chief Engineer, Sovjetsk Pulp and Paper Mill
Mr. Victor I Grachev	Managing Director, Znamensk Paper Mill
Mr. Juri V. Buchnev	Chief Engineer, Znamensk Paper Mill
Counterpart	
Mr. Alexey Y. Ignat'ev	Chief of Department, Kaliningrad Regional Administration, Free Economic Zone "Yantar" Development Committee
Mr. Oleg Paseka	Deputy Director, Kaliningrad Industrial Production Planning Organization
UNIDO	
Mr. Rudolf H. Mueller	Senior Industrial Development Officer, Institutional Support and Private Sector Development Branch, HEDIISP Vienna, Austria

National and International Consultants of US/RUS/93/134

Mr. Sven Mauleon	Team Leader
Mr. Jakub Swieciscki	Consulant, Investment Promotion
Mr. Alexander Barinov	National Consultant, Regional Development
Mr. Roy Liff	Consultant, Regional Development
Ms. Angelina Dolgaya	National Consultant, Light Industry
Mr. Yriy Zverev	National Consultant, Military Conversion
Mr. Christer Ekman	Consultant, Military Conversion
Mr. Lev Gik	National Consultant, Machine Building
Mr. B. Bossak	National Consultant, Machine Building
Mr. Igor Pritykin	National Consultant, Shipbuilding
Mr. Slavomir Dobsky	Consultant, Shipbuilding
Mr. Alexander Alexeyev	National Consultant, Infrastructure
Mr. Rainer Folster	Consultant, Infrastructure
Mr. Valentin Korneevetz	National Consultant, Food Industry
Ms. Olga Kadiinikova	National Consultant, Construction Industry
Mr. Bo Björk	Consultant, Construction Industry

APPENDIX 2

THE MARKET FOR PULP AND PAPER

General

The world consumption of pulp and paper has been forecast[7] to grow at an annual rate of 3.2 percent in the period 1991 to 2010 from a total of about 243 million tons in 1991 to 443 million tons. However, the present capacity, with the addition of projects currently under construction, is very likely sufficient for the next five years. Although there are countries where the consumption of paper and paperboard could increase relatively rapidly, there is little scope for expansion in the near future of the capacity in a global context. Under such conditions, the world market outlook for established capacity is expected to continue to be quite good for the next few years.

The demand for paper in Western Europe increased steadily during the 1980s and the supply and demand continued to be in balance with capacity. Prices have risen to high levels. For instance, in the first quarter of 1995, the price of bleached softwood sulphate pulp was US$ 825/ADt (Ex Rotterdam). As of June, the price increased to US$ 925/ADt. Woodfree uncoated printing and writing paper is currently selling for DM 1750-1900 per ton.

Pulp

The growth of world capacity in pulp production is shown in Table A3:1, with a forecast for 1998[8]. Thus, the total capacity has grown from 151 million tons in 1980 to 195 million tons in 1992. The growth is expected to slow down considerably, so that in 1998, the total capacity would be 208 million tons - an increase of only 13 million tons. The increase between 1992 and 1998 is expected to be mainly in grades such as thermomechanical and bleached sulphate and soda pulps. Capacity in the other grades is likely to be more or less constant, whereas capacity in unbleached sulphite pulp will be reduced - by about 60 percent. Bleached sulphite pulp capacity is expected to remain constant.

The trend in fibrous raw material usage will be towards increased utilization of coniferous (long fibre) raw materials. Thus the proportion of hardwood pulp is expected to decrease from 45 percent in 1992 to about 30 percent in 1988.

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7 FAO: "Pulp and Paper Towards 2010", Rome (1994)

8 FAO:"Pulp and Paper Capacity Survey", Rome (1981 and 1994)

Table A3:1

Trends and Composition[9] in World Pulp Capacity, Million Tons[10]
(Source: FAO)

Type of Pulp	1980	1992	1998
Total pulp	151	195	208
Total wood pulp	139	174	185
- Mechanical	28	21	20
- Thermomechanical[11]	5	23	26
- Semi-chemical	10	9	9
- Unbleached sulphite pulp	7	3	2
- Bleached sulphite pulp	5	6	6
- Unbleached sulphate pulp	36	39	40
- Bleached sulphate and soda pulp	45	72	80
Other fibre pulp	12	21	23

In the EEC countries, excluding Austria Finland and Sweden, the total pulping capacity is not expected to grow significantly during the period 1993 to 1998, whereas the total for the Nordic countries will grow from 24.6 million ADt to 27.0 million ADt in the same period. The main growth in the Nordic countries is in thermomechanical pulp (1.0 million ADt) and in bleached sulphate pulp (1.6 million ADt), while the capacity will be the same or decrease in other grades. Nevertheless, the capacity in market pulp in the Nordic countries will grow at a much lower rate.

The consumption of bleached pulp (sulphate and sulphite) in the European Union grew steadily from 1985 to 1992, but showed a drop in 1993, as shown in Figure A3:1[12]. Data are not available for the USSR except from 1990 to 1993, during which time the consumption of bleached pulp dropped. However there is no doubt that it will increase again in the near future.

Similarly, as shown in Figure A3:2, the import of bleached pulp to the European Union has increased steadily, following the demand, with a levelling off in 1992-93. The import to the area of the former USSR has remained fairly stable with some reduction in recent years.

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9 Subtotals may not add up due to incomplete reporting

10 Metric units are used throughout this report

11 Includes chemi-thermomechanical pulp, CTMP

12 FAO: "Yearbook of Forest Products" (1994)

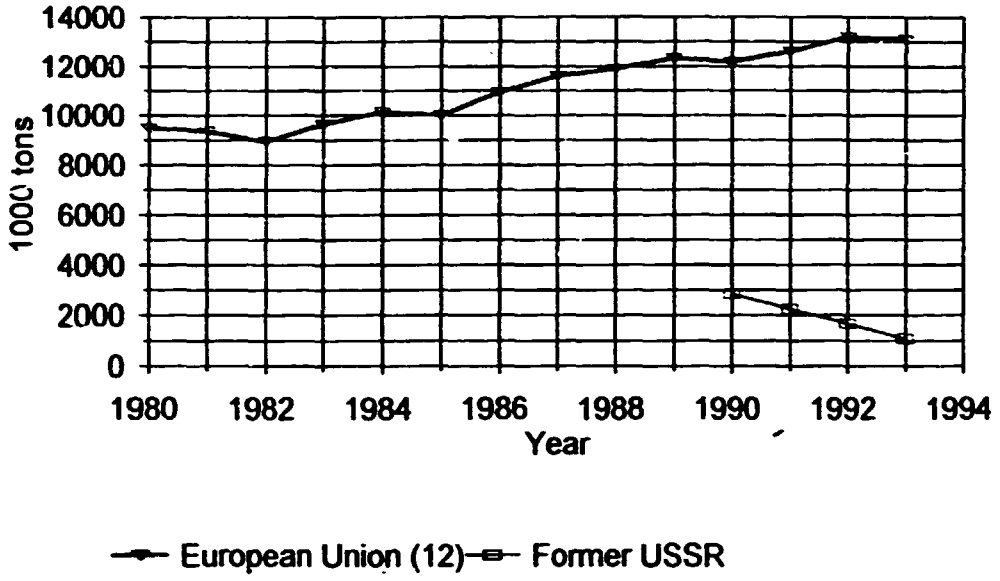

Figure A3:1. Total apparent consumption of bleached pulp in the European Union (12 countries) and in the area of the former USSR, 1980-1993 (FAO).

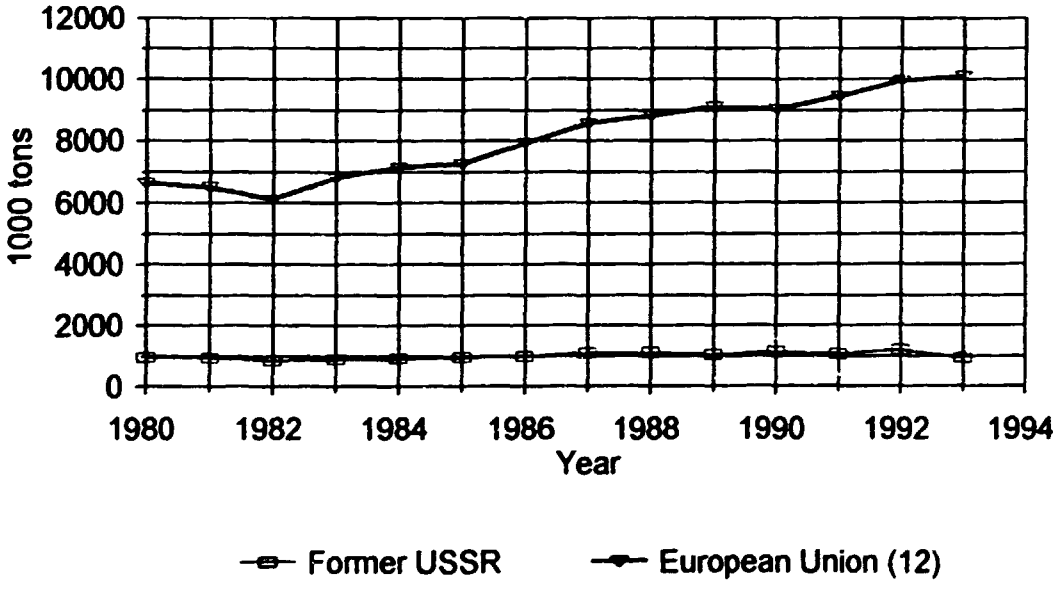

Figure A3:2. Import of bleached pulp to the European Union (12 countries) and to the area of the former USSR, 1980-1994 (FAO).

There is no doubt that the current trend will continue for the next few years and beyond. The outlook for pulp on the export market and in the area of the former USSR is accordingly good. Although the total import of bleached pulp to Poland is only about 60,000 ADt, with growth potential, the Kaliningrad region is in a good position to compete on that market, which accordingly is of some importance.

Paper

The grade of paper of primary interest for the Kaliningrad region is woodfree printing and writing papers. The world capacity in this group was in 1993 45.4 million tons and it is expected to increase to 50.7 million tons by 1998. The total capacity of printing and writing papers, including wood-containing grades but excluding newsprint in the corresponding years are 87.5 and 97.5 million tons, respectively. Thus, the growth in capacity in woodfree and wood-containing printing and writing papers will be about the same.

In 1991, the total consumption of printing and writing papers in Western Europe was 21.0 million tons and according to FAO estimates it will grow to 47.0 million tons in 2010. In the area of the former USSR, the corresponding data are 1.4 and 4.5 million tons, respectively.

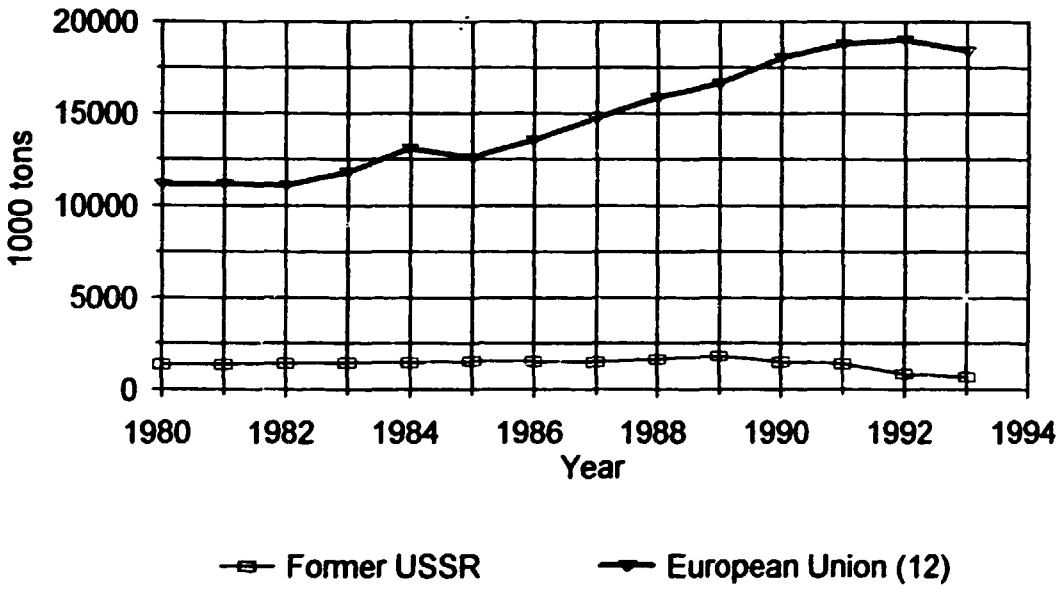

Figure A3:3. Consumption of printing and writing paper in the European Union (12 countries) and in the area of the former USSR in 1980-1993 (FAO).

The total consumption of printing and writing paper in the European Union (12 countries) and the area of the former USSR in the period 1980-1993 is shown in Figure A3:3. Thus, in the European Union, the consumption grew steadily between 1985 and 1990, levelled off in 1991 and 1992 and dropped somewhat in 1993. However, the current market situation shows that the consumption has again gained momentum in those countries. Although the consumption in the area of the former USSR shows a downward trend in recent years, there is no doubt that it will start growing again, beyond the 1990 level, as indicated in the FAO forecast above.

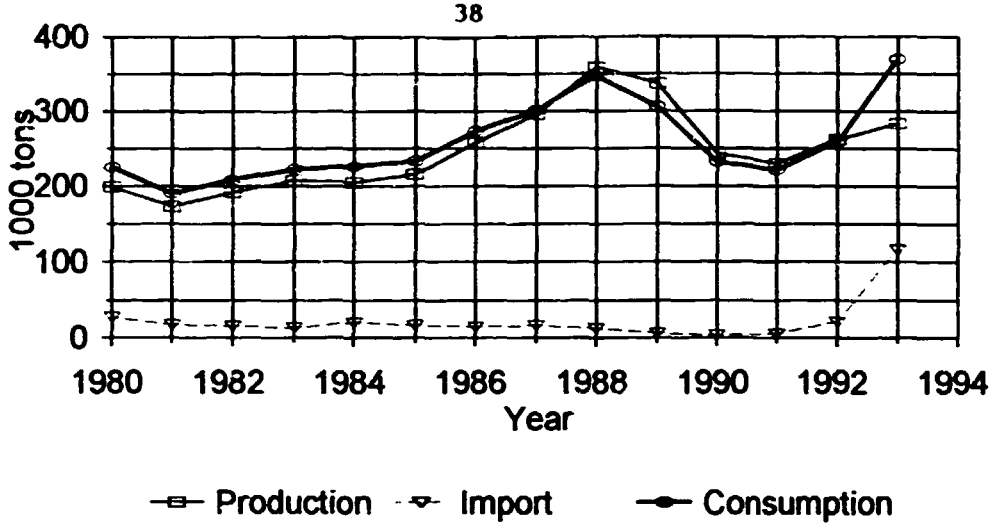

Figure A3:4. Production, import and apparent consumption of printing and writing papers in Poland 1980-1993 (FAO).

Figure A3:4 shows the remarkable recovery made in Poland in terms of consumption of printing and writing papers. The rapid growth is likely to continue for some time and the FAO forecast is 837,000 tons in 2010. Poland should therefore be considered an important potential future market for the paper production in Kaliningrad.

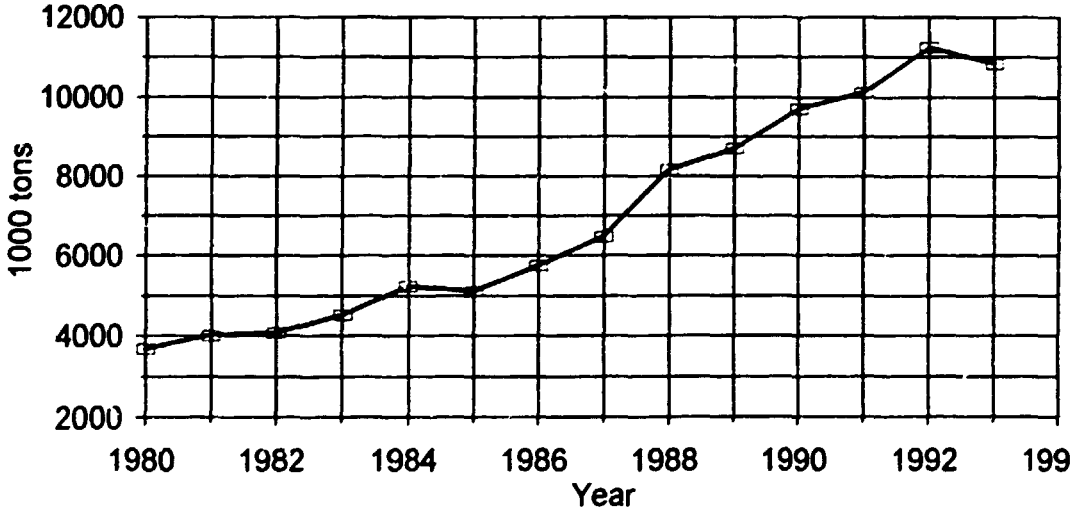

Figure A3:5. Import of printing and writing papers to the European Union in 1980-1993 (FAO).

As shown in Figure A3:5, there is continuing growth in import of printing and writing papers to the European Union and the potential for marketing that grade of paper in those countries is also good. The trend follows very closely that of consumption.

Conclusions

From the above, it can be concluded that the market outlook for bleached chemical market pulp and woodfree printing and writing papers is very good in the European Union and in neighbouring countries as well as on the domestic market. However, it is also obvious that there will be fierce competition on those markets from highly cost efficient producers, especially during recessions and periods of temporary over-capacity.

Review of Individual Pulp and Paper Mills

CEPRUSS PULP MILL

General Information

CEPRUSS is located on the outskirts of the city of Kaliningrad, next to a port area. It is a joint shareholder company which was established in 1993 to succeed the Kaliningrad Pulp an Paper Mill No 2, privatized in 1991. The equity capital of the company is US$ 6 million, with the following distribution of shares:

- Management (32 persons) 18%
- Other employees 51%
- Foreign partners 31%

The foreign partners are companies in Austria (Wilfried Heinzle AG), Germany (Dr. Zeeliger & Co.), Ireland (Eldon Corporation Ltd), Italy (SICOM) and Switzerland (IMAG, AG). The foreign partners are also marketing channels to the EEC and other export market areas.

New partners are also being sought for financing of a project which mainly aims at revising the bleach plant to Totally Chlorine Free bleaching (TCF) and conversion of the boilers to gas firing for environmental reasons.

The company employs about 1600 persons at the pulp mill complex, including about 1400 workers. In addition, there are about 250 employees in subsidiary companies for whole-sale and retail trade in consumer goods, brokerage, insurance and construction.

Process and Production Capacity

The mill was first built in 1908 and was later modified in the 'sixties and 'seventies.

The process used for pulping now is a STORA type acid sulphite processes with sodium as base. The pulp is bleached by a a C-E-D-E-H-H-H bleaching sequence to an ISO brightness of 88. The waste liquor from cooking of the spruce wood chips is used for manufacture of ethanol, fodder yeast and lignosulphonates.

The capacity of production was in January 1995:

Product	Unit	Capacity
Unbleached pulp	1,000 ADt/a	90
Bleached market pulp	1,000 ADt/a	76
Ethanol	1,000 litres/a	3,800
Fodder yeast	t/a	2,820
Lignosulphonates (50% solids)	t/a	150

The mill also has capacity for production of about 1,500 tons per year of tissue paper for napkins but apparently the present production capacity for this is not utilized. Some screening rejects are used for manufacture of board, probably for corrugating medium, or sold for manufacture of packaging materials.

Marketing

The company has its own marketing organization that also carries out market studies. In addition, it is in charge of shipping of the products. The foreign partners also provide marketing channels

for the mill output of pulp to the EU and other countries, in addition to which some foreign agents are used. According to the mill management, there has been no problem of placing the production of pulp on the market. Thus, in 1993 the 62,000 ADt of pulp exported was distributed as follows:

Country	Percent
Italy	34.8
Great Britain	15.7
Czech. Republic	11.6
Germany	8.3
Poland	7.2
Austria	6.5
Others	16.0
Total	100.0

The same year all ethanol (2,500,000 litres) and fodder yeast (1,110 t) produced was sold within Russia and other countries of the former Soviet Union, with 62 percent and 43 percent, respectively, sold within Russia. Of the lignosulphonates (about 55,000 t), only 2.5 percent were sold within Russia.

The problems of the mill are not lack of success in marketing of the pulp, but its operation is affected by pulp price fluctuations. Thus, in 1994, the utilization of pulping and bleaching capacity was as low as 60 percent. The low price on the market and the high costs of production made the operation uneconomic and a reduction in production was made to avoid losses. Since the production of fodder yeast, ethanol and lignosulphonates depend on the availability of waste liquor from the pulping operation, the output and sale of these products were reduced accordingly.

Raw Materials

All of the wood raw material is purchased from outside the region. Thus, in 1994, a total of almost 137,300 m^3 of wood was supplied from the following sources:

Country/Region	Percent
Komi (Russia)	16
Belarus	9
Lithuania	39
Russia	30
Poland	6

Similarly, the chemical raw materials and fuels were also supplied from outside the region:

Chemical	Country/Region
Sulphur	Odenburg
Calcium oxide	St. Petersburg
Caustic soda	Poland, Lithuania
Chlorine	Poland
Coal	Kuzbass
Heavy fuel oil	Lithuania

Energy

The mill is fully self-sufficient in electrical energy which is produced in extracting turbines from high-pressure steam. The boilers are at present using coal and heavy oil as fuel, but one gas fired boiler is under installation. There are plans for converting all boilers for gas firing.

Environment

The coal and oil fired boilers have scrubbers for fly ash and sulphur dioxide removal and emission of pollutants into the air is reduced by application of scrubbers. the main sources of air pollution are

- the pulping and bleaching plants
- the ethanol and yeast plants
- the boilers.

The total annual air emission from the mill is as follows:

Item	Emission, t/a	Remarks
Total suspended particulates (TSP)	1,246	
Sulphur dioxide	2,784	
Carbon dioxide	1,091	
Nitrogen oxides	147	
Other pollutants	225	Includes 0.46 t/a of chlorine and 0.016 t/a of chlorine dioxide
Total	5,493	

Thus, the TSP load corresponds to 16 kg/ADt of bleached pulp and the sulphur dioxide load is 37 kg/ADt of bleached pulp. The sulphur dioxide emission alone is already about 8 tons per day and partly due to the fact that the digesters are emptied into open chests, rather than into a blow tank with collection of gases. It seems that an improvement will be made to this in the planned investment programme for the mill.

Conversion of the boilers from coal and oil firing to gas firing is expected to reduce the emission from the boiler stack considerably, and the emission from the process is expected to be reduced through improvements the digester blow system and in the brown stock washing plant. The use of chlorine in the bleaching process will be eliminated through the project for conversion to TCF bleaching.

The daily volume of discharged effluent is 92,800 m^3/day, without any treatment, apart form the reduction in pollutants which occurs in the production of ethanol, yeast and lignosulphonates. However, these processes also contribute tc the effluent load in their own way. The effluent is discharged at three points along the Pregel river. The effluent adds approximately 25 percent to the concentration of suspended solids in the river immediately after the discharge point, 80 percent to the BOD and almost 50 percent to the sulphate content. The river is accordingly badly polluted by the mill effluent.

There are plans for expansion of the capacity of the municipal sewage treatment system and it is assumed that the CEPRUSS mill would be able to empty all its effluent to that system for treatment, after the planned modifications of the mill. There would accordingly be an improved quality of the effluent and a reduction of its quantity as well as improved subsequent treatment of it, as outlined in the following:

Item	Unit	Present Load	Planned Load	
			Before Treatment	After Treatment
Water consumption	m^3/ADt	380	160	160
Suspended solids	kg/ADt	15.3	8.4	
BOD	kg/ADt	95	35	5
COD	kg/ADt	750	130	20
N, total	kg/ADt	3.4	1.5	
P	kg/ADt	0.15	0.1	
AOX	kg/ADt	6.6	0.5	

If the plans of both the mill and the municipal sewage treatment plant are implemented. There would accordingly be a significant improvement in the effluent load on the river. Nevertheless, the load values would still be too high to meet the regional requirements, although the values for BOD and COD would meet the recommended levels of HELCOM RID-2 of 01.01.1995.

Technology and Condition of the Mill

The technology applied in the mill is somewhat outdated, both as regards process and equipment. Several modifications have been made over the years and mainly about 30 and 20 years ago.

Especially the environmental features of the technology are disturbing. The mill management is aware of this however, and an investment project for major modification of the mill is in the pipeline. The total investment for this has been estimated at about US$ 47 million, with 77 percent loan financing. The planned modifications are:

- Boiler No. 6
- Converting boilers to gas firing
- Turbogenerator No. 3
- Digester No.3
- Blow tanks after cooking
- Improved brown stock washing and screening
- New bleach plant with Totally Chlorine Free bleaching based on oxygen and peroxide
- New screening and cleaning plant for bleached pulp
- Warehouse for bleaching chemicals
- Expansion of pulp drying plant

These modifications will be introduced gradually without closing the mill operation.

DARITA PULP AND PAPER MILL

General Information

The Darita Pulp and Paper Mill is a closed company that was established in 1993. In late 1994, it started its production facilities in Kaliningrad, taking over the former Kaliningrad No. 1 Pulp and Paper Mill, established early this century.

The company has an ongoing US$ 5 million investment programme for improvement of the production facilities and the steam plant.

Process and Production Capacity

The mill uses an acid sulphite process to produce long-fibre pulp from spruce and ethanol, fodder yeast and lignosulphonates are produced from the pulping waste liquor. In addition there is a paper plant which has been closed down as economically unviable. The ethanol plant had also been closed down.

The present capacities and estimated annual productions[13] are as follows:

Product	Unit	Capacity	Annual Production
Unbleached pulp	ADT/a	60,000	58,000
Paper	Ft/a	26,000	0
Paperboard	Ft/a	8,000	0
Ethanol	Litres/a	2,780,000	0
Fodder yeast	t/a	2,200	1,600
Lignosulphonates	t/a	10,000	10,000
Carbon dioxide	t/a	-	240

Marketing

About 10 percent of the unbleached pulp produced is sold on the domestic market or to Belarus. The remainder is exported to Austria, Germany, India, Italy and the UK. Some of the export is sold through the company's foreign partners in Austria and Germany. There are no problems of marketing. In fact, as a rule, the pulp is sold one month before it has been produced.

Raw Materials

All raw materials are form outside the region of Kaliningrad. Thus, they are supplied from Lithuania, Latvia, Belarus and from other regions of Russia.

Energy

The steam boilers are at present using coal and oil but will be converted to gas firing. With that modification the efficiency of the boilers will also be improved so that there will be sufficient

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13 The mill has been in operation less than a year

steam to operate the existing two turbo-generators to provide enough electrical power for the total requirement of the mill.

Environment

The mill has no treatment of its effluent, which is discharged into the river Pregel, about 1 km downstream from the municipal water intake of Kaliningrad city. The effluent load of the mill is

Water consumption	140	m^3/ADT
Total suspended solids	9.1	kg/ADt
BOD	42	kg/ADt
COD	190	kg/ADt

No data on air emission are available for this mill.

Technology and Condition of the Mill

The technology of the mill is outdated and according to the mill management, worn out to about 60 percent. The present investment programme aims at upgrading the pulp mill and, as already mentioned, converting of the boilers to using gas as fuel.

The mill is in a bad shape and its environmental performance at the edge of the city of Kaliningrad may in the end prohibit continuation of the operation in its present form. This seems to be understood by the mill management that apparently is looking into other fields of activities to be undertaken on the same site.

NEMAN PULP AN PAPER MILL

General Information

The mill is situated on two sites in the town of Neman and along the river Neman. The first site includes the head office, the pulp mill, yeast production and two machines for greaseproof paper manufacture. Corrugating medium is also produced on that site on one machine from pulp screening rejects. The second site includes three paper machines for manufacture of wood-free printing and writing paper, wallpaper base, paper for playing cards, etc.

The company employs about 1180 persons, including 1080 workers. It is a shareholder company with the following distribution of shares:

-	Employees	17%
-	Suppliers and clients of the company	22%
-	Sold on stock market	61%

Apparently an American company has bought up all the stock market shares for US$ 3 million and is expected to invest an additional US$ 25 million into the company. Details of the deal are being negotiated at the time of writing this report.

Process and Production Capacity

The mill has capacity for production of 70,000 ADT of bleached ammonium sulphite pulp, all of which is used by the mill itself for paper and paperboard production, together with waste paper (corrugated board clippings). The bleaching sequence is C-E-H-H. Fodder yeast is also produced from the pulping waste liquor. The capacity of yeast production is about 4,400 tons per year.

The mill has six paper machines with the capacity for the production of the various grades as follows:

-	Greaseproof paper	25,000 Ft/a
-	Corrugating medium, wrapping paper, etc.	10,000 Ft/a
-	Printing and writing papers, wallpaper base, etc.	50,000 Ft/a

Marketing

The company does not make any specific efforts to sell its production. It has long term relationships with its clients and they are expected to come and buy the products when they need them. The company finds this fully satisfactory and does not intend to change its approach to marketing, or, rather, selling.

On the other hand the main concern for the company at present is the low demand for greaseproof paper, the sale of which has dwindled from 20,000 Ft/a to almost nothing. In 1994, the sale of this grade was only 700 tons.

The management reports that, because of problems of poor availability of wood raw material at reasonable cost from neighbouring countries and regions, the production was very low in 1993 and 1994. Wood could be made available from more distant regions of Russia, but the transport costs would have been prohibitive. Most likely low prices for the products in 1993-1994 also contributed to the low utilization of capacity, like in the case of CEPRUSS.

Since 1993, 25-30 percent of the paper production has been exported.

Raw Materials

All raw materials are purchased from outside the region of Kaliningrad, with the exception of a small volume (12,000 m^3 or 6%) of the wood requirement. This was purchased from a distance of about 30 km from the mill. The remainder of the wood, 200,000 m^3, was purchased from Lithuania, from a distance of 200 km from the mill for a price of 29-30 US$/$m^3$.

Sulphur is also obtained from Lithuania, whereas chlorine and other pulping, bleaching and papermaking chemicals are purchased from Belarus and from other regions of Russia.

Energy

The mill uses fuel oil only for firing its steam boilers and has no plans for switching over to gas. It produces its own requirement of electrical energy.

Environment

The mill does not use coal for steam generation and accordingly the emission of particulate matter from the boilers is not as severe as in the other pulp and paper mills in the region. The annual emission from the plant as a whole is as follows:

Item	Emission, t/year
Total emission	5,175
Total suspended particulate (TSP)	481
Sulphur dioxide	2,670
Carbon dioxide	1,609
Nitrogen oxides	394
Other	21

The mill does not treat its effluent in any way, apart from using the pulping waste liquor for yeast production, where most of the ammonia present is removed. Otherwise the effluents from the plant are discharged directly into the river Neman. The effluent load with respect to various pollutants is the following:

Item	Unit	Effluent Load
Water consumption		
- Pulp mill	m^3/ADT	275
- Paper mill	m^3/Ft	100
Suspended solids	kg/Ft	36
BOD5	kg/Ft	85
COD	kg/Ft	821
AOX	kg/ADt	1.3*)
pH	-	6.7

*) In view of the bleaching process used and the target brightness, this value seems too low.

The pollution load is accordingly considerable. It should also be noted that the Neman river is the border between Russia (Kaliningrad) and Lithuania and it flows into the Baltic Sea about 100 km downstream.

Technology and Condition of the Mill

The pulping and bleaching processes are considered outdated in major pulp producing countries, although they are to some extent still applied in Central and Southern Europe. The papermaking equipment is more up-to-date, although not of the latest technology.

The mill gives in general, especially the papermaking departments, seem well laid out and there is a certain tidiness in the operation.

SOVJETSK PULP AND PAPER MILL

General Information

The Sovjetsk pulp and paper mill is situated in the town or Sovjetsk along the river Neman. It employs 1800 workers and the operation includes, in addition to market pulp and paper and paperboard, also a converting plant for production of corrugated board and boxes and for printing wallpaper. The plant also produces wallpaper printing rolls for export.

It is a public shareholder company that in 1991 had an equity capital of 63 million rubles. At present the distribution of shares is as follows:

- Employees	23%
- Darita Pulp and Paper Mill	30%
- Pension Fund and Cepruss Pulp Mill	37%

The mill was established 1986, but has been modified several times since then. For instance, the only original part of the oldest paper machine is its frame. All moving parts have been replaced. There is an ongoing investment programme which involves expansion of the corrugating board box production from about 5,000 Ft/a to about 60,000 Ft/a, using imported raw material.

Process and Production Capacity

The pulping process employed today is ammonium sulphite. Trial runs have been made with sodium as base and it is likely that the mill will switch over to that process. The pulping capacity was previously 130,000 ADT/a, but has been reduced to 60,000 ADT/a, and the pulp drying capacity has been reduced accordingly. The bleaching process employed is C/D-E-H-H-H, with a target brightness of 87-88 ISO. The present production is about 40,000 ADT/a, with about half of it sold on the market. The remainder is used for paper production within the mill.

From the pulping waste liquor the mill produces about 100,000 litres of ethanol per month and 115 t per month of fodder yeast. Although the mill has evaporating capacity for production of lignosulphonates, this is not used at the moment, because the ammonia based pulping process. Once the mill converts to sodium as base, the production of lignosulphonates may be taken up again.

The paper mill produces offset paper and wallpaper base from the bleached pulp. The total paper production is 25,000 Ft/a, about 70 percent of which is offset paper. Screening rejects from pulping are used for manufacture of about 5,000 Ft/a of corrugating medium and testliner board, which are converted to boxes in the plant. The boxes are partly sold on the domestic and foreign market, partly used for packing of wallpaper produced in the mill.

The wallpaper base paper is used in the printing shop for manufacture of wallpaper. In addition, about 100 wallpaper printing rolls are manufactured per month for export.

The paper converting plant on site produces exercise books, notepads, art paper and typing/photocopy paper.

Finally, the mill operates partly as a remote heating central in the winter for the town of Sovjetsk. Apparently it does not get any income from this.

Marketing

The company has its own marketing organization. Oversupply on the market in recent years resulted in low prices of pulp and paper, whereas it did not affect the cost of raw materials. Accordingly, the production was reduced to minimize losses, in accordance with availability of raw materials that could be purchased at lower costs.

At present the marketing is fully satisfactory and the market is good with high prices. The company gets a higher price for its products in Kaliningrad than in other parts of Russia.

Raw Materials

The wood raw material for pulping is spruce, purchased mainly from Latvia, Lithuania and from within the Kaliningrad region.

Energy

The mill uses coal and heavy fuel oil for steam generation and also supplies heating to the town during the winter. It is accordingly more than self-sufficient in steam and power and the excess electrical power is sold to the national grid.

Environment

The fuel used for steam generation and heating creates serious problems of emission into the air. It is the main source of emission of particulate matter accounting for 94 percent. It accounts for 99 percent of the emission of nitrogen oxides and for 79 percent of the emission of sulphur dioxide. The following table gives the breakdown for the emission by department:

Department	Total solid particulates	H_2S	NO_x	SO_2
Steam Plant, g/sec	188.23	-	38.26	682.64
Pulping Plant, g/sec	11.81	-	0.40	178.69
Other, g/sec	-	-	-	0.51
Total, g/sec	200.04	-	38.66	861.184
At 345 days/year, t/a[14]	5,960	-	1,150	2560

The emission of sulphur dioxide from the mill is strikingly high. If the emission from the steam plant could be eliminated, there would be a reduction to 5,340 t/a, which is still above the norm for allowable sulphur dioxide emission. However, as mentioned in the footnote below, there is considerable exaggeration in the above annual estimate.

[14] The assumption that the steam plant would be operating at full capacity throughout the year is, of course, not correct, since it is also used as a remote heating central for the town of Sovjetsk. Nevertheless, even in the unlikely event that the whole steam plant would be closed down for six months a year, the emission would still be extremely high. The estimates for annual emission only serve to make that point.

The effluent load of the mill is as follows:

Item	Unit	Load
Water consumption	m^3/t	397
Suspended solids	kg/t	66
BOD	kg/t	188
pH	-	7.0

The mill does not treat its effluent. Dilute effluents are discharged directly into the river and more concentrated ones, like from the yeast production are discharged into a small pond dug in German times before discharge to the river, which flows into the Baltic about 100 km downstream.

Technology and Condition of the Mill

The pulp mill is of very outdated technology and some of the equipment is no longer in working order. For this reason the capacity of pulping has been reduced. The paper machines are in better condition and have apparently been rebuilt several times, although not to the most recent technology. Nevertheless, the quality of paper produced is fully acceptable and the paper mill operation is in general tidy and reasonably well laid out.

The converting operations, such as box manufacture, wallpaper printing, and wallpaper printing roll manufacture are of good to high technical standard and also well laid out and tidy.

ZNAMENSK PAPER MILL

General Information

The mill was established in 1898 and the oldest machine, used for making board from waste paper, is still original although re-built on several occasions. It is a public shareholder company, with all shares in Russian hands. The main and controlling shareholder is the company Grif in Moscow.

The company is one of the main employers in the town of Znamensk. However, it is not in operation because of lack of working capital and it is seeking partners and financing for a restructuring investment programme of about US$ 35 million. An American company, the International Group of Schooner Capital Corporation in Boston, has shown some interest.

The facilities are located on two sites in the town of Znamensk and a third site is available for construction of new facilities.

Process and Production Capacity

The mill has two machines, one for a cheap grade of paperboard and one for printing and writing papers. There is also a supercalender for the latter grades. The capacity of the board machine is about 8,000 Ft/a and that of the paper machine is 25,000 Ft/a. The printing and writing paper is produced from purchased pulp. However, the mill has found it difficult to obtain pulp at prices which are acceptable to them. Thus, last year some wood-free magazine paper was produced from pulp purchased at a low price from Archangels and sold in Moscow - a total transport distance from raw material to market of almost 4,000 km.

Marketing

The company has a marketing organization. However, the mill is badly equipped to produce higher quality paper and board. The only grade which is up to international standards is wallpaper base paper. As to the quality of the board, there is a certain demand, primarily in the furniture industry, for cheap packaging board. Accordingly, the company was able to sell this product on the export market, starting in 1993 with about 1,600 Ft which dropped in 1994 to about 700 Ft. The domestic sales of the same grade went down from 3,900 Ft in 1993 to 1,400 Ft in 1994. The exported board went to Bulgaria, Finland, Latvia and Lithuania.

The company feels that its competitiveness is low, but improving, since the over-all production of low-quality paper and board is going down on the market.

Raw Materials

The pulp was traditionally obtained from the Cepruss and Sovjetsk mills in Kaliningrad, but because of high prices, the company has been unable to buy this anymore from within the region. Instead, the pulp has been purchased at lower price from Archangels, Bratsk, Kotlass und Utsk-Ilimsk.

Energy

The mill is using oil for firing its steam boilers. Electricity is purchased at a price of about US$ 65/MWh, including a monthly fee for demand.

Environment

The oil used for firing the boilers is high in sulphur and the mill has no effluent treatment and discharges its effluent into the river Lava, a tributary of the river Pregel. The annual emission of pollutants from the mill is as follows:

Total particulates	1047	t/year
Nitrogen oxides	25	t/year
Sulphur dioxide	145	t/year

The effluent load of the mill is

Water consumption	67	m^3/Ft
Total suspended solids	17	kg/Ft
BOD	1.7	kg/Ft
COD	29	kg/Ft

Technology and Condition of the Mill

Technically the mill is outdated and any further rebuild of the old board machine, running at 30 m/minute is unlikely to be worth it. The printing and writing paper machine can still be modified for new products or improved for the same grade. In that case, the supercalender installed in the mill could come to use.

ESTIMATED ESCALATION OF COSTS AND PERFORMANCE OF A HYPOTHETICAL BLEACHED PULP MILL OF 60,000 TONS

Escalation of Costs

It is assumed that the pulpwood prices will remain constant in real terms over the period 1996-2000 due to international pricing. However, during the same period, other variable costs, such as chemicals purchased from neighbouring countries are likely to escalate by 10 percent per year, due to cost increases in those countries. Similarly, it is assumed that the wages and salaries in Kaliningrad will increase 20 per annually, since they are unacceptably low at present. Import duties and taxes would be repaid to 75 percent.

Based on these assumptions the manufacturing costs for a hypothetical bleached pulp mill of 60,000 ADT/a in the region, operating at 85 percent capacity utilization would increase from 1996 to 2000 as shown in Table A5:1.

Table A5:1

Estimated Probable Cost Increases in a 60,000 ADT/a Bleached Pulp Mill, 1996-2000
(85% Capacity Utilization)
Costs in 1000 US$/a, in real terms

Year	1996	1997	1998	1999	2000
Variable costs:					
- Wood	7600	7600	7600	7600	7600
- Fuel	6100	6700	7400	8100	8900
- Chemicals	2200	2400	2700	3000	3300
- Contingencies	1800	1900	2000	2100	2200
Total Variable	17700	18600	19700	20800	22000
Total Fixed	1600	1900	2300	2800	3400
Total annual cost	19300	20500	22000	23600	25400

Assuming a conservative maximum average mill net pulp price in real terms of US$ 750/ADT and a corresponding minimum price of US$ 550/ADT, the break-even analysis for 1996 gives the graph shown in Figure A5:1. Thus, the break-even point at the maximum price is as low as about 5 percent of capacity utilization. At the minimum price it increases to about 18 percent. No depreciation of equipment has been taken into account, since it is assumed that all mill production equipment and buildings have been written off.

However, taking the assumed cost level in the year 2000 as in Figure A5:2, there is a marked increase in the capacity utilization required to break even. At the maximum price level, it is still quite low - only about 18 percent, but at the minimum price it is as high as practically 100 percent. Regardless of the accuracy of the assumptions made, this shows that the requirements on cost control and efficiency of operation will increase substantially over the next few years.

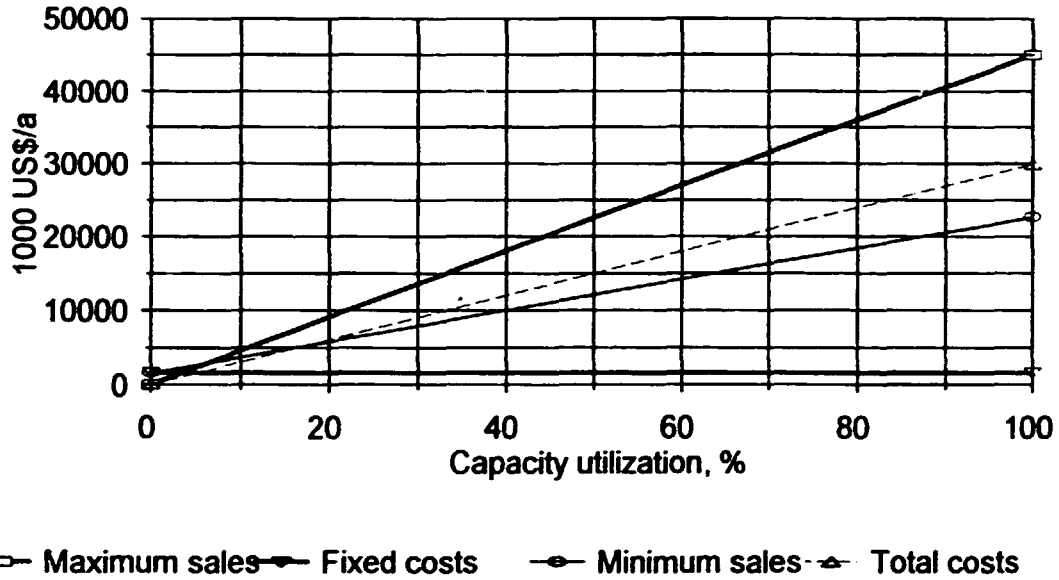

Figure A5:1. - Break-even graph for the price/cost situation assumed in 1996 for a 60,000 ADT/a bleached sulphite pulp mill in Kaliningrad.

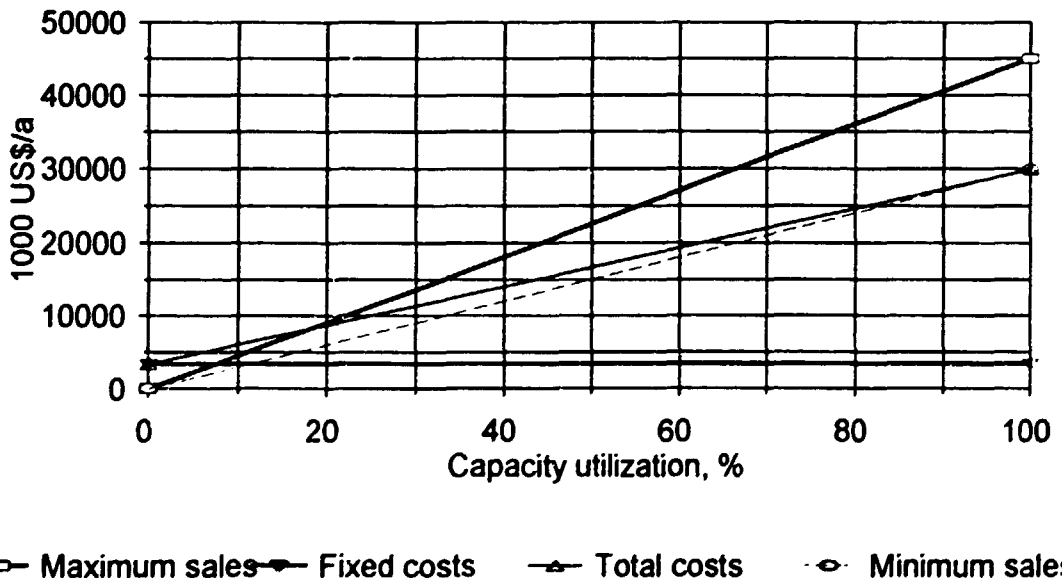

Figure A5:2. - Break-even graph for the price/cost situation assumed in the year 2000 for a 60,000 ADt/a bleached sulphite pulp mill in Kaliningrad.

Cash Flow and Internal Rate of Return

A cash flow estimate for an investment of US$ 12 million over the period 1996-8, for measures of environmental protection, such as conversion of the boilers from coal and oil to gas and some improvement in air emission inside the pulp mill is shown in Table A5:2. The estimate also assumes a US$ 200,000 annual outlay for maintaining the mill in operation, for purchase of spare parts, repairs, etc. The average pulp price is assumed to be US$ 650/ADT. The internal rate of return on investment in air emission control under the assumptions made is almost 30 percent.

Table A5:2

Cash Flow Estimate for a 60,000 ADT/a Sulphite Pulp Mill Investing US$ 12 million in Air Pollution Control
In 1000 US$/a, in real terms

Year	1996	1997	1998	1999	2000
Mill net sales income (US$ 650/ADT)	33150	33150	33150	33150	33150
Manufacturing costs:					
- Variable	17700	18600	19700	20800	22000
- Fixed	1600	1900	2300	2800	3400
Net cash from sales	13850	12650	11150	9550	7750
Investment, spare parts, etc.	4200	4200	4200	200	200
Net cash before debt service and tax	9650	8450	6950	9350	7550
Internal rate of return, %	29.9				

APPENDIX 5

TOTAL QUALITY MANAGEMENT
WHAT IT IS

Total quality management (TQM) is not just about product quality, it is about every activity carried out by every employee in a business.

It focuses on the customers - not only the external ones, the customers of the business, but also the internal customers within the company itself. Each transaction in a large business is the result of a number of internal supplier/customer relationships. The sales team concludes the sale, it specifies the characteristics required of the product to the production team. The delivery team arranges for its delivery and the finance team prepares the invoice for the transaction. Each team relies on inputs from their colleagues to enable them to complete their process right the first time. It is only by satisfying the internal requirements for each of these processes that they can meet the requirements of the external customer.

The objective of a quality improvement programme (QIP) is to develop an approach that ensures that the company produces goods and services that meet customer requirements at minimum cost. It can only be achieved by eliminating the costs associated with not getting things right the first time. These are the quality costs. Most of these are incurred on failure and appraisal activities or costs of non-conformance (CONC). "Do the right thing right, the first time".

Consider a company with a turnover of US$ 10 million and total costs of US$ 9.2 million. That leaves a profit of US$ 0.8 million. Assume that their CONC is 20 percent or US$ 2.0 million. Now, consider the options available for the company to increase its profit by 100 percent to US$ 1.6 million.

One way is to increase the volume of production and sales, to increase the revenue. To do this, it may have to double its sales revenue. This is very unlikely to be possible, especially in a competitive market or a recession.

The other way is to cut costs. Yet to increase profit by US$ 0.8 million, they would need to cut all costs by almost 10 percent or make even larger cuts in selected activities.

A third way is to reduce the cost of non-conformance and try to make savings there. To save US$ 0.8 million they would need to reduce CONC by 40 percent. Although not an easy task, it seems more possible to achieve than doubling the sales revenue.

CONC can consist of bad debt, waste, downgraded product, late deliveries, inventory, breakdowns, unclear specifications, problems of steam or power supply, insufficient process control, excessive debtor days, lost opportunities, etc. down to minute details, the cost of doing the wrong things. The key feature of TQM is that failures are not accepted as a normal occurrence. The root causes are identified and eliminated by prevention activities.

Tools used in QIP are external and internal customer surveys, functional analysis, quality cost analysis, benchmarking, corrective action systems, quality management systems, statistical process control, communication, education and training, etc.

By organizing the business so that it is really customer oriented, the opportunities for improving efficiency are tremendous. However, it requires a change in the basic philosophy of everyone in the company, especially management. TQM requires management to recognize the contributions which every employee can make and to harness the skills and enthusiasm of everyone in the business. To achieve this, the individuals must have the skills, tools and authority to investigate problems and introduce improvements. Teamwork has been the key for successful business in the early nineties and it will continue to be that for year 2000 and beyond.