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**Private Sector Competitiveness
Enhancement Program**

DOMESTIC RESOURCE COST ANALYSIS OF AZERBAIJAN

SUPPLEMENTARY REPORT

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ACRONYMS

ADDY	Azerbaijan Railway
AZN	Azerbaijani Manat
CIF	Cost, Insurance, and Freight
CIS	Commonwealth of Independent States
CPI	Consumer Price Index
DRC	Domestic Resource Cost
EPC	Effective Protection Coefficient
ERER	Equilibrium Real Exchange Rate
FOB	Free on Board
GDP	Gross Domestic Product
GOAJ	Government of Azerbaijan
ICT	Information Communication Technology
IMPACT	Integrated Model for Policy Analysis Computer Template
IT	Information Technology
MB	Macroeconomic Balance
NFA	Net Foreign Asset
NPC	Nominal Protection Coefficient
NRP	Nominal Rate of Protection
NSP	Net Social Profitability
PSCEP	Private Sector Competitiveness Enhancement Program
PVC	Polyvinyl chloride
REER	Real Effective Exchange Rate
SER	Shadow Exchange Rate
SPS	Sanitary and Phyto-Sanitary
TIRSP	Trade and Investment Reform Support Program
USSR	Union of Soviet Socialist Republics
VAT	Value Added Tax
WTO	World Trade Organization

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SECTION I

Executive Summary

The Domestic Resource Cost (DRC) Analysis of Azerbaijan has assisted USAID's Private Sector Competitiveness Enhancement Program (PSCEP) in the selection of those sub-sectors in which Azerbaijan has a strong comparative advantage, as well as in identifying key economic constraints to be addressed, which inhibit the achievement of this advantage. The study has also aided the Government of Azerbaijan (GOAJ) in the formulation of policies that will promote the most economically efficient allocation of capital and budgetary resources.

The Final DRC Report submitted in April 2009 focused on 30 subsectors of Azerbaijan's economy. The report concentrated to some extent on agriculture and agro-industry, though it also analyzed a number of light manufacturing and services sub-sectors. As the implementation of PSCEP has progressed, however, it has become evident that there is a need for information on other agro-industrial, manufacturing, and service subsectors, especially where these are linked with the activities or regions in which the project is becoming involved. The sub-sectors chosen for this supplementary work include:

- packaging (corrugated cartons, glass bottles and jars, and plastic containers and sheeting);
- refrigerated truck assembly;
- silk cloth;
- tea; and
- software solutions

In addition, the study briefly reviews the petrochemicals and metallurgy industries because of their importance in the economy. Annex A, a separate Special Report on the Petrochemical Industry in Azerbaijan provides more details regarding this industry.

DRC analysis estimates the economic as well as the financial profitability of entire value chains, as well as individual segments within these chains. It also calculates the degree to which the chains are subject to positive or negative protection in relation to world market conditions. The DRC is an indicator of the efficiency with which a country's domestic resources, such as labor and capital, are converted into useful output. The effective protection coefficient (EPC) measures incentives that affect the prices of both outputs and inputs, and is therefore an indicator of protection offered to producers.

In order to acquire the specific data needed to conduct the DRC analysis, PSCEP contracted a local consulting company to carry out 19 surveys of farmers, processors, and manufacturers in the seven sub-sectors listed above. These data were then combined with other information on customs duties, prices, input-output data, etc. in a common format to derive the DRC, EPC, and profit rate indicators.

In almost all the sub-sectors examined here, the DRCs are less than one, showing a comparative advantage. As discussed in more detail in the main body of the text, some of these comparative advantages may be temporary or illusive, e.g., production may be based on aged farms or equipment, whose initial investment has long been depreciated and where additional investments may be required in the future, but are not included in

existing costs. The EPCs tend to be pretty close to one, suggesting that rates of protection are not very high for these subsectors. Thus the high rates of protection that characterize some agricultural and agro-industrial sub-sectors such as poultry and some dairy products, do not appear to be as important for a broader range of manufactured goods.

Because of lack of data, it was not possible to conduct DRC analysis on some of the sectors owned by the state, such as petrochemicals and metallurgy. However, their heavy dependence on subsidized electrical power and raw materials suggests that their DRCs would be fairly high. This does not say that they would not be economically profitable if new investments were to be made incorporating new, more productive technology. But analysis of this hypothesis requires data that were not available for this study.

The study conducted sensitivity analysis on the impact of changes in the exchange rate and interest rates on the DRC indicator. Although changing the exchange rate does increase the DRCs, it does not reverse the findings regarding the products in which Azerbaijan has a comparative advantage. The only product in which Azerbaijan does not have a comparative advantage continues to be plastic containers, which is a comparatively old industry with somewhat outdated technology. The sensitivity analysis measures relative costs but does not measure potential reductions in demand, as a result of economic slowdown in trading partners.

The conclusion of the analysis of sensitivity to the interest rate is similar to that contained in the Final Report. In general, the DRC results are not very sensitive.

Two broad problems emerge from the firms' responses to qualitative questions that were posed during the interviews. Frequently mentioned (and briefly discussed earlier) is the problem of antiquated machinery, as well as the high cost of financing new investment. Companies also complain about the high cost and delay associated with clearing customs for their inputs. In their view, there is an excessive amount of paper work.

With respect to specific sub-sectors, the following emerge as the principal problems:

- Packaging. With the exception of plastic containers, Azerbaijan can produce its own packaging materials efficiently in competition with imports. There is, however, a substantial need for modernization of equipment.
- Refrigerated Trucks. There is a shortage of refrigerated trucks during the busy season, which results in delays, high transport costs, and deteriorated produce. Azerbaijan can assemble the trucks that are needed but there is insufficient demand, due in large measure to financial constraints.
- Silk Cloth. Even though Azerbaijan has to import most of the silk yarn used in its silk scarf and carpet industry, the sub-sector is profitable and has experienced growing exports in recent years. Firms are promoting local production of silk cocoons, though it is not yet clear whether this will substantially reduce their raw material costs.
- Tea. Tea processing is profitable, though much of the raw material is imported. Local production of tea is high cost, and, in some cases at least, is not

profitable to farmers once the full cost of establishing a tea farm is taken into account. There are also serious questions related to the high prices charged by processors for local tea, even if it is of somewhat superior quality, because of the limited size of this market. More study is needed.

- Software Solutions. This is a sub-sector in which Azerbaijan clearly has a comparative advantage owing to the high cost of bringing in expatriate expertise except for very limited tasks. The major problem here is training. There is a need to create specialized training institutions at the industry level.
- Petrochemicals. Azerbaijan has an apparent comparative advantage in petrochemicals, especially if based on low cost ethane from its large natural gas reserves. At present, however, its production of polyethylene does not satisfy the requirements of the local plastic sheeting industry because of quality differences and high price. As a result, Azerbaijan achieves very little vertical integration. Another major problem in the low rating for Azerbaijan's business environment. There is an urgent need to finish the feasibility study of the Sumgait project and to undertake the reforms required to engage foreign direct investment in this project.
- Metallurgy. The metallurgy industry suffers from ineffectiveness of its privatization program and lack of consistency in the treatment of private foreign partners. There is enormous potential, but it is not clear how well this potential can be realized without government subsidies in the provision of raw materials and electrical power.

SECTION II

Introduction

A. Objectives

The USAID Private Sector Competitiveness Enhancement Program (PSCEP) is a US\$6.6 million, three-year project designed to offer Azerbaijan the tools it needs to create jobs, expand sales, increase trade and investment, and promote the competitiveness of a number of sub-sectors in the agricultural, industrial, and services sectors. PSCEP works to enhance competitive value chains through enterprise level support and to develop stakeholder cooperation institutions at the broader sector level.

The Domestic Resource Cost (DRC) Analysis of Azerbaijan has identified and evaluated 30 sub-sectors that demonstrate potential for increased sales, employment, and either exports or the ability to substitute competitively for imports. Its purpose is to assist PSCEP in the selection of those sub-sectors in which Azerbaijan has a strong comparative advantage, as well as in identifying key economic constraints to be addressed, which inhibit the achievement of this advantage. Beyond PSCEP, the study aims to aid the Government of Azerbaijan (GOAJ) in the formulation of policies that will promote the most economically efficient allocation of capital and budgetary resources.

An important early step in assessing the comparative advantage of the original 30 sub-sectors is the application of DRC methodology. At its core, what the DRC methodology measures is relatively simple: the efficiency by which domestic resources can be used to earn or save foreign exchange.

The Final Report of the Domestic Resource Cost Analysis of Azerbaijan, which presents the results of these 30 sub-sectors, concentrates to some extent on agriculture and agro-industry, though it also analyzes a number of light manufacturing sub-sectors such as carpets, furniture, building finishes, computer assembly, protective clothing, packing materials, and low voltage equipment, as well as catering and truck transportation services. As the implementation of PSCEP has progressed, however, it has become evident that there is a need for information on other agro-industrial, manufacturing, and service subsectors, especially where these are linked with the agricultural and agro-industrial activities and regions in which the project is becoming involved.

One of these is packaging. The earlier study focused only on wooden boxes, which are important for existing exports of fresh fruits and vegetables, but are not fully adapted to the needs of modern commerce, especially those associated with the selling of fresh produce to super markets. This Supplementary Study therefore expands on the earlier one by looking at the manufacture of **corrugated cartons, glass jars and bottles, and plastic containers and sheeting**.

Investigation by PSCEP of cold storage chains revealed the need for more **refrigerated trucks**, especially during the busy season for fruit and vegetable exports to Russia and other countries. This study examines the comparative advantage of assembling these trucks in Azerbaijan. Another sub-sector of potential importance is **silk cloth**, which is currently being produced in Sheki, where the project has a number of other activities. Silk scarves and carpets are a rapidly growing export, though producers complain of inadequate supplies of raw materials. Finally, there is a need to

explore other aspects of information and communications technology, given the importance of this sector for economic development. One such sub-sector is business **software solutions**, which is important for increasing efficiency in other sub-sectors.

Another sub-sector that was added to the list is **tea** production and processing. Many of the existing tea farms and processing equipment are quite old. Tea is therefore imported in bulk and packaged in Azerbaijan for the local market. While it may be possible to process locally grown tea in competition with import, the profitability of this activity over the longer run will require that the full costs of replanting tea farms and refurbishing tea factories are taken into account.

Beyond this, there are several large non-oil industries that are gaining prominence in the Azerbaijan economy but have not yet been studied because of their complexity and because they are not composed principally of small and medium enterprises upon which PSCEP is focused. Two of these are **petrochemicals** and **metallurgy**, principally iron and steel, and aluminum. The GOAJ is making large investments in each of these industries, as well as hoping to entice substantial foreign direct investment. This not only will expand exports of the primary and secondary products of these industries but also will enlarge the possibilities of downstream productive activities that use these products as inputs. The current situation with each of these industries is described briefly in this report. In addition, for the petrochemical industry, a DRC analysis was undertaken for two plastic packaging companies that use locally produced as well as imported polyethylene as a primary input into their production processes.

B. Organization

Section III presents a brief overview of the DRC methodology, which is presented in detail in Section 3 and Appendix A of the Final Report of the Domestic Resource Cost Analysis of Azerbaijan. It also presents the principal quantitative results, as well as the results of sensitivity analysis with respect to variations in the exchange rate and interest rates. This is followed by a discussion of each of the sub-sectors, including major issues, qualitative information from the firm survey, and implications of both the qualitative and quantitative results for PSCEP programming.

The overall conclusions of the analysis and recommendations for policy and programming are presented in Section IV.

Annex A, the Special Report on the Petrochemical Industry in Azerbaijan comprises an examination of this sector within the context of the dynamics of the world petrochemical market. It looks at current production in Azerbaijan and its dependence on energy and raw material subsidies. It analyzes not so much current costs of production, which are high because of outdated technology, but the opportunity to make changes in these costs that will result from the new project that is being developed for implementation at Sumgait.

Methodology, Results, and Analysis

A. Overview of the Methodology

DRC analysis estimates the economic as well as the financial profitability of entire value chains, as well as individual segments within these chains. It also calculates the degree to which the chains are subject to positive or negative protection in relation to world market conditions. The analysis identifies ways in which tariffs, subsidies, and non-tariff barriers to trade affect the prices of outputs and inputs, as well as variations in benefits and costs associated with location of production, location of markets, scale of activity, and other factors.

The DRC is an indicator of the efficiency with which a country's domestic resources, such as labor and capital, are converted into useful output. More precisely, it is the ratio of the true economic cost of these domestic resources to the value added created. This value added is measured in terms of world market prices, which are an indicator of the true economic value of internationally traded resources.

When measured in terms of a common currency that reflects the true economic value of foreign exchange, the DRC is a measure of comparative advantage in a particular sub-sector. If the value of domestic resources used in production is less than the value added created, the DRC ratio is less than one, and the country has a comparative advantage in the sub-sector. If the value of domestic resources used in production is greater than the value added created, the DRC ratio is greater than one, and the country has a comparative disadvantage in the sub-sector.

While the DRC indicator is related to the theory of comparative advantage, nominal and effective protection refer to the structure of incentives involving international trade (import duties, export taxes, quantitative restrictions on imports, etc.). The nominal protection coefficient is the ratio of the domestic price of a product to its world market price. It measures the extent to which trade and other distortions cause domestic prices to differ from world market prices. It may be applied to inputs as well as final products. Effective protection measures incentives that affect the prices of both outputs and inputs, and is therefore a better indicator of protection offered to producers. The effective protection coefficient (EPC) is the ratio of value added in domestic prices to value added in world market prices. If the EPC is greater than one, then domestic production is being protected vis-à-vis foreign competition. If the EPC is less than one, then, domestic production is being discriminated against.

In order to acquire the specific data needed to conduct the DRC analysis, PSCEP contracted a local consulting company to carry out 19 surveys of farmers, processors, and manufacturers in the seven sub-sectors listed above. These data were then combined with other information on customs duties, prices, input-output data, etc. in a common format to derive the various DRC, EPC, and profit rate indicators.

DRC and effective protection analysis involves comparison between domestic prices, generally at the wholesale level, and either export parity prices, where the products are exported, or import parity prices, where the products are produced domestically as substitutes for imports. In the case of export parity prices, the relevant price is the free-on-board (FOB) price of exports at the border, or in some cases at the factory

where the client pays for transportation. Import parity prices are those that apply at the point where both domestically produced products and imported products are consumed. Sometimes this is in Baku and sometimes it is upcountry. In either case, we start with the cost, insurance and freight (CIF) price and add the costs of transportation and handling to arrive at the “import parity price” at the point of common consumption. There we compare the import parity price with the domestic wholesale price to determine the level of protection. In most cases in this Supplementary Study, this information was obtained from the factory manager, who was asked for his or her best estimate of the CIF and wholesale market price of competing imports. The difference between these was then broken down into import duties, costs of handling and transport, and any unexplained transactions costs. In most cases the unexplained costs were either zero or very low.

As with the original 30 sub-sectors, PSCEP used the 2006 input-output table developed by the State Statistical Commission to develop a set of coefficients breaking the value of inputs down into their tax or subsidy components, as well as the relative importance in total costs of labor, capital, and traded inputs.

B. Results of DRC Analysis

The results of the DRC analysis are presented in Table 1.

Table 1: Results of DRC Analysis					
Product	Source	Destination	DRC Range	EPC Range	Profit as % of Revenue
Corrugated Carton	Gusar, Baku	Baku, Guba, Gusar, Khachmaz	0.430 – 0.432	1.253 - 1.429	6% - 31%
Glass Bottles and Jars	Baku	Baku, regions	0.247 - 0.509	1.160 – 1.322	21% - 23%
Plastic Containers and Sheeting	Baku	Baku, regions, Kazakhstan, Georgia	0.444 - 1.662	1.194 – 1.509	-30% - 22%
Silk	Sheki	Baku, Regions, Russia	0.241 - 0.442	0.992 – 0.993	42% - 48%
Tea	Astara	Lankaran, Baku	0.915	1.421	11%
Refrigerated Truck Assembly	Baku, Ganja	Baku	0.214 – 0.462	1.168 – 1.221	10% - 20%
Computer Solutions	Baku	Baku	0.382 – 0.545	0.970 – 0.982	11% - 23%

In almost all instances, the DRCs are less than one, showing a comparative advantage. This is substantiated by the relatively high profit rates for these subsectors. One reason for the relatively low DRCs and high profit rates is that, for a number of firms, the DRC analysis does not include the cost of capital because plant and equipment are so old that they have long ago been completely written off. This is the case, for example, of refrigerated trucks. Accordingly, the low DRCs for this sub-sector may be deceptive because eventually the plant and equipment will have to be renewed, even though for the moment, despite its age, the capital stock is sufficiently productive to allow a profit to be made. Where capital costs are included because investments are more recent, the DRCs tend to be considerably higher. This is the case, for example, with tea. Table 1 reports the results for a tea factory in which the cost of processing

equipment is included even though the equipment is fairly old. The result is a DRC that is marginal.¹

In other instances, the DRC analyses are based on fairly extreme assumptions because there are no good international comparators. An example is software solutions. Local firms in this industry substitute for imported skills, not products. But the cost of bringing an expatriate to do what local software engineers are already doing is very high. Only if the skills required are not available locally would this likely happen. But then one could not make direct comparisons between the two services. This is frequently the problem with conducting DRC analysis on services rather than goods, but it can exist for differentiated goods as well.

The EPCs tend to be pretty close to one, suggesting that rates of protection are not very high for these subsectors. Information provided by firms on the CIF and wholesale prices of competing imports were generally not far out of line with what would be expected given the tariff rates on imports. Thus the high rates of protection that characterize some agricultural and agro-industrial sub-sectors such as poultry and some dairy products in the Final Report, do not appear to be as important for a broader range of manufactured goods.

Because of lack of data, it was not possible to conduct DRC analysis on some of the sectors owned by the state, such as petrochemicals and metallurgy. However, their heavy dependence on subsidized electrical power and raw materials suggests that their DRCs would be fairly high. This does not say that they would not be economically profitable if new, more productive investments were to be made. But analysis of this hypothesis requires data that were not available for this study.

Analyses were conducted on three firms producing plastic containers and sheeting that use some raw materials from the petrochemical industry. Two of the firms produce plastic film for packaging; the other produces a range of plastic containers. The first two are quite profitable; the third is not profitable – either economically (DRC>1) or financially (Profit Rate < 0). The summary statistics in Table 1 do not, in this case, do justice to the heterogeneity of the industry.

The study conducted sensitivity analysis on the impact of changes in the exchange rate and interest rates on the DRC indicator. The exchange rate was assumed to be depreciated by 50% in favor of Azerbaijan's competitors, e.g., from 30 RR/AZN to 45 RR/AZN for Russia, and alternative interest rates of 2.5% and 15% were introduced in addition to the base rate of 7%. These are the same alternative exchange and interest rates that were used in the Final Report for the other 30 sub-sectors. The results are presented in Table 2.

Although changing the exchange rate does increase the DRCs, it does not reverse the findings regarding the products in which Azerbaijan has a comparative advantage. The only product in which Azerbaijan does not have a comparative advantage continues to be plastic containers, which is a comparatively old industry with somewhat outdated technology.

The conclusion of the analysis of sensitivity to the interest rate is similar to that contained in the Final Report. In general, the results are not very sensitive. In some

¹ This result may not be very predictive of the profitability of processing local tea because most of this factory's production involves the packaging of imported tea.

cases, there is no change at all – where the capital stock is very old and already fully depreciated.

Table 2: Results of Sensitivity Analysis

Product	DRC under Depreciation by Competitors		DRC under Alternative Interest Rates		
	0%	50%	2.5%	7%	15%
Corrugated Carton	0.430 - 0.432	0.646 - 0.648	0.397 - 0.423	0.430 - 0.432	0.447 - 0.507
Glass Bottles and Jars	0.247 - 0.509	0.370 - 0.763	0.236-0.508	0.247-0.509	0.269-0.510
Plastic Containers and Sheeting	0.444 - 1.662	0.666 - 2.493	0.415 - 1.505	0.444 - 1.662	0.507 - 1.978
Silk	0.241 - 0.442	0.361 - 0.663	0.224 - 0.432	0.241 - 0.442	0.275 - 0.462
Tea	0.915	1.273	0.765	0.915	1.236
Refrigerated Truck Assembly	0.214 – 0.462	0.321 - 0.694	0.214 - 0.462	0.214 - 0.462	0.214 - 0.462
Computer Solutions	0.382 – 0.511	0.573 – 0.766	0.380 – 0.499	0.382 – 0.511	0.387 – 0.532

C. Sub-Sector Issues and Results

This sub-section examines some of the issues and results for the different sub-sectors. First, however, we list some of the cross-cutting issues that firms raised during the survey.

- There was frequent mention of the problem of antiquated machinery, as well as the high cost of financing new investments. It is difficult to attract equity capital. Even working capital is a problem, with the result that raw materials are not always available when needed. This is a problem that cuts across a number of the sub-sectors. It parallels the findings highlighted in the Final Report.
- Companies complain about the high cost and delay associated with clearing customs for their inputs. In their view, there is an excessive amount of paper work. Some respondents complain about harassment from police as well. This finding is similar to that obtained from other studies. On the other hand, there is no evidence from these seven sub-sectors of some of the excessive monopoly profits that were evident for poultry, dairy, and some other sub-sectors, as reported in the Final Report.

C1. Packaging

Azerbaijan has a strong comparative advantage in exporting fresh and processed fruits and vegetables, as well as a few manufactured goods, to rapidly growing markets (at least until recently) in Russia and other CIS countries because of its soils and climate, abundant labor supply; proximity to these markets; common language and culture; and existing stock of capital, even though much of this capital is old and outmoded. But this advantage could be threatened in coming years. Much of the produce exported by Azerbaijan is sold in open markets and small shops, where the wholesalers and traders are often Azerbaijanis. But these markets are declining in importance all over the world as supermarkets, with direct links to producers, gain in importance. Even the Russian market is becoming more sophisticated, with packaging, quality, and presentation increasing in importance. Furthermore, the heavy dependence of Azerbaijan's exports on a single market, that of Russia, is risky. Finally, with

competition in the Russian market increasing, and the growth that is likely to occur in Eastern Europe and other areas, there is much to be gained by diversifying to the European Union and other markets.

To do this, Azerbaijan will have to improve and modernize its conditioning, packing, and processing of exports. This may involve increased use of brand names.² It will necessarily involve improvements in storage, packaging, labeling, and transport. The packaging industry will play a vital role if it can be modernized along with this growing need. The alternative will be for producers and exporters to import packaging materials from other countries.

The quantitative analysis shows that Azerbaijan can produce its own packaging materials efficiently in competition with imports. The only exception to this is production of some plastic containers, but success with plastic packaging in general suggests that with some assistance and modernization, this industry can contribute substantially to modernization of the export marketing chain.

Manufacturers of plastic sheet and other goods using products of the petrochemical industry, such as polyethylene, as inputs say that they prefer to import most of their raw materials rather than buy them locally from the petrochemical industry. One of the reasons is quality. Another appears to be price. This suggests a lack of competitiveness of the local petrochemical industry at the present time.

C2. Refrigerated Trucks

An important objective in modernizing trade and transportation is to strengthen the cold chain by upgrading the fleet of refrigerated trucks. This is especially vital for fragile fresh produce, such as cherries, which need to be refrigerated during transportation if quality is to be assured. It also is important for other crops, such as early potatoes for which the timing of arrival at the market is critical to obtaining the best prices. In addition, transportation by refrigerated truck facilitates crossing the border, which the refrigerated trucking companies have worked out with customs and other authorities in a manner similar to the railroad.

At present there are too few refrigerated trucks available in Azerbaijan. This is evidenced by the high tariffs that are charged, especially during the busy season, when rates to Moscow for Azerbaijani trucks may be as high as \$7,500 to \$8000 compared with rates as low as \$500 to \$1,000 for backhaul on Russian trucks during the slack season. Furthermore, during the busy season, refrigerated trucks may not be available at any price. This can result in substantial losses.

The DRC analysis of truck transportation contained in the Final Report indicates that truck operation and ownership are profitable. This should be as true for refrigerated transport as for that which is not refrigerated, especially given the transport rates that prevail during the busy season. The major constraint is lack of availability of finance.

Importation of refrigerated trucks can be quite expensive, partly because the duty rate of 5 % is greater than the duty rate on imported parts, which is only 0.01%, and partly

² This is not always the case. For example, production and export of fruit juice and tomato paste concentrate with aseptic packaging and no brand names is more profitable than is the production and export of fruit juice and tomato paste jars and packages with brand names. See the Final Report for details.

because this rate is assessed not only on the chassis, engine, compressor, and other parts contained in the assembled vehicle but also on the body of the truck. The suggestion has been made that the cost of refrigerated trucks could be reduced by importing the parts and assembling them in Azerbaijan, including the addition of the truck body, which could be fabricated from local materials. Local truck assembly firms claim that they could assemble refrigerated trucks if there was sufficient demand.

The DRC analysis shows that local truck assembly is profitable. There is a need to renew some of the capital stock, but adding on the cost of capital recovery should not significantly reduce that profitability.

Refrigerated truck manufacturers are particularly concerned by the small size of the domestic market. This constraint would be eased if something could be done to lessen the financial constraint. There is also a need for information about international standards.

C3. Silk

Silk materials and carpets have been made in Azerbaijan for many years. Much of this production is exported to Russia, Iran, Turkey, Turkmenistan, and the European Union. Although some raw silk is made in Azerbaijan, most of the raw material is imported from Iran and Uzbekistan. Yet at least two silk factories either are promoting or are interested in promoting local production by bringing mulberry planting material and silk worms from abroad and distributing them to farmers. This will build on Azerbaijan's comparative advantage in design and culturally related products.

At present, production of silk scarves and carpets appears from the analysis to be profitable, both economically and financially, even though most of the raw materials are imported. These raw materials consist primarily of silk thread and dyes, not cocoons – even though the companies are trying to introduce mulberry trees for production of cocoons in the future. Evidence of profitability comes not only from the DRC analysis but also from the fact that the firms are exporting to Russia, Iran, Turkey, and Turkmenistan, and sales are rising at a rapid rate. For, example, one firm claims that its sales in 2008 were 70% greater than those in 2007. Whether Azerbaijan's silk industry would be profitable if the raw material were purchased locally is unknown since virtually all of it is currently imported.

C4. Tea

Over 1,500 smallholder farmers and 4000 seasonal workers are employed in the tea sub-sector. The area planted and the production of tea have increased over the past five years by 10% and 50%, respectively. However, the Azerbaijani tea industry has not been able to capitalize on this advantage.

Tea bushes in Azerbaijan are reportedly over 60 to 70 years old. Although many are in fairly good vegetative health, despite having received no fertilizer or other inputs for a considerable number of years, the trees are at the limit of their productive life and need to be replanted. This will involve a substantial capital investment, including waiting five years after planting for maximum yields.

Azerbaijan produces “orthodox tea”, which refers to a method of producing tea by which the leaves are partially withered and then allowed to ferment to produce black tea as opposed to green tea, which is not fermented. The tea produced in Azerbaijan is

reputed to be of better quality than that which is imported, and thus it is sold at a higher price. This assures relatively favourable profits for the processors, though they report problems in obtaining sufficient tea of high quality from farmers. One of the reasons may be that farmers are not covering all costs once the cost of establishing the trees is taken into account. There is a need for technical assistance in producing tea and for grading equipment to assure that only high quality tea is delivered to the processors. At present, the tea is largely ungraded, which may be why the purchase price to farmers is low. Furthermore, there appears to be a very limited market for higher priced tea even if it is of superior quality. It is clear that costs must be reduced if local tea is going to make any substantial inroads vis-à-vis imported tea.

The major problem in the tea industry, in addition to the pricing structure, is inadequate capital invested in irrigation systems, processing equipment, and infrastructure in the factories and fields, coupled with the high cost of finance. But the DRC for tea is only marginal even when the existing equipment is amortized over a relatively long period. Unless there were substantial improvements in productivity, charging the full cost of capital recovery for substantially larger investments would likely result in DRCs that are considerably higher. It is unclear how effective would be PSCEP's investment in this sub-sector relative to others. The GTZ invested substantial resources in creating a tea association in Lankaran and supported the tea industry for some time. Despite these efforts, the sustainability of the association is questionable.

C5. Software Solutions

The Final Report has already looked at computer assembly, the results of which depend very much on management and the degree of export orientation. But ICT is a very dynamic sector, which is growing rapidly and proving to be critically important in supporting overall economic development. PSCEP plans to be actively involved with this sector over the next few years. It is desirable, therefore, to examine another sub-sector within ICT.

One of the most promising of these sub-sectors is software solutions. This is the application of software to the requirements of specific firms and industries. It involves translation and customization of off-the-shelf software in order to apply it to the complex management needs of corporate resources in the financial sector, government, and large trading companies. The issue at hand is the extent to which it is profitable to use local firms for this purpose compared with importing the technical skills that are required.

The DRC analysis suggests that this is true, at least in cases where the skills of expatriate and local experts are roughly equivalent. This is not surprising given the high cost of expatriate expertise. Where the skills are not equivalent, we would expect expatriates to be called upon, but only for very brief periods to solve critical problems. No attempt is made in this case to undertake DRC analysis since the foreign and local services provided are not comparable.

Software solutions companies complain particularly about the need for more training. New employees lack the skills required by the industry. Most training is undertaken on-the-job within firms, since training by firms for the general labor market is very expensive.

C6. Petrochemicals

The petrochemical industry has been established in Azerbaijan for many years. Almost all the plants were built during the Soviet period. As a result, much of the technology is outmoded. Furthermore, rather than being supplied principally by the Azerbaijani oil and gas industry, the sub-sector is still dependent on supplies that must be transported long distances from elsewhere in the former Soviet Union. As shown in annex A, the Special Report on the Petrochemical Industry in Azerbaijan, the long-term potential for petrochemicals lies in a shift to ethane derived from natural gas as the most important feedstock in place of naphtha obtained from refining petroleum. The development of Azerbaijan's natural gas potential, especially at Shah Deniz, has been delayed, however, along with the investment required for conversion to this alternative source of raw materials.

Most of the petrochemical sector falls under the state-owned holding company **Azerkimya**. By far the most important products of this industry are the primary petrochemicals ethylene, polyethylene, propylene, and sodium hydroxide. Most of these are exported in raw form rather than being converted into secondary and finished products in Azerbaijan.

The petrochemical industry has been heavily subsidized via low tariff rates on electricity and low prices on its raw materials. Following the government's decision in 2005 to end indirect financing and the purchase of feedstock on privileged terms, Azerkimya came under considerable financial pressure. The result was a cessation of production in 2007 until an agreement was reached with concessions on the government's part.

Azerbaijan would appear to have a comparative advantage in petrochemicals because of its access to reserves of petroleum and especially of natural gas, which is becoming increasingly important as the source of ethane – a basic feedstock that is both lower in cost and more productive than naphtha. Exploiting this potential, however, will depend on Azerbaijan attracting foreign direct investment in a very large new petrochemical project at Sumgait. This new complex, which is planned to consist of 19 plants with modern technologies, could make Azerbaijan the largest petrochemical producer in the region.

In September 2008, the Azerkimya signed a memorandum of understanding and confidentiality agreement with a number of leading international petrochemical companies to undertake the investments required by this project. A feasibility study was to be submitted to the GOAJ in January 2009. Only then would the project be approved. No information is currently available to PSCEP regarding the progress of this study. Furthermore, Azerbaijan remains in last place in Business Monitoring International's Petrochemicals Business Environment Rankings for Central and Eastern Europe. This is likely to deter investors until the full details of the planned petrochemical complex are revealed.

C7. Metallurgy

The territory of the Azerbaijan Republic falls in the Mediterranean Sea zone of Euro-Asia and includes the Great and Small Caucasus geologic systems as well as the Kur lowland which separates them. Approximately 340 ore and non-ore deposits have been

identified in Azerbaijan and about 100 of these are currently being developed. Here we concentrate on Azerbaijan's two most important metals: iron and steel, and aluminum.

C7.1. Iron and Steel

The raw material basis for ferrous metallurgy consists of large deposits of high quality iron ore, bentonite clay, dolomite and flux limestone. All of the magnetite ores are concentrated in the Dashkesan ore region. On the basis of these deposits, the Azerbaijan Ore Purifying Factory was processing 1.8 million tons of raw ore annually during the mid 1990s. At that rate, the resources of these fields were capable of supplying this factory for the next 80-90 years.

Data on production of iron and steel are difficult to interpret since no figures are available on overall tonnage, just on tonnage of a few specific products. However, ferrous metallurgy appears at one point to have been quite developed. In Sumgait, for example, there was a plant producing steel tubes that was designed in World War II to construct pipe for the oil and gas industry. Pipes from Sumgait used to be exported to 20 countries outside the Soviet Union. How profitable this was is hard to establish because of lack of effective cost accounting.

What is clear is that the metallurgy of Azerbaijan has a strong relationship with satisfaction of the needs of the oil industry. The leading enterprises of this sector are the tube-rolling mill in Sumgait, and the Baku electric steel mill that produces cast steel, fittings, and rolls.

It is also clear that the iron and steel industry is vulnerable to slumps in demand. For example, all three of Azerbaijan's largest steel and metal producers suspended their activities or were prepared to do so in late 2008 as a result of a steep decline in orders and a falling off of prices by 20% to 50%.

C7.2. Aluminum

As of the mid-1990s, the production of aluminum in Azerbaijan was based on the large alunite ore fields which were being mined in the Dashkesan Zeylik region. The Ganja Aluminum Factory was operating at this time on the basis of 130.2 million tons of reserves. Three million tons of alunite were being mined annually which means that the supply would have served the factory 40 more years. In addition, bauxite was imported via Poti in Georgia for processing in Ganja.

At the plant in Ganja, the alunite and bauxite were converted to alumina, with about 500 thousand tons being produced annually. The alumina was then transported to Sumgait near Baku and converted into aluminum, though production was quite limited, with only 100 thousand tons being processed, or 20% of Ganja's capacity. The remainder was exported from the Ganja plant. Azerbaijan also has five companies of non-ferrous metallurgy which process aluminum casts, rolled metal, construction materials, and household commodities.

One potential reason why Azerbaijan might have a comparative advantage in the production of alumina is that this uses a great deal of electrical power, and Azerbaijan is capable of producing a lot of this power because of the richness of its oil and gas reserves and its hydroelectric power potential. However, electrical power has for years been furnished at subsidized rates, and it is impossible, in the absence of a detailed

cost analysis, to know what the profitability would be if electrical power were furnished at its true opportunity cost.

C7.3. Privatization

The metallurgy sector is dominated by two large state-owned enterprises. Dashkesan Filizsaflashdirma, JSC (DFS) is an iron ore mining and concentration enterprise with proven reserves of nearly 270 million tons of iron ore. It is the largest exporter in Azerbaijan outside of the oil sector. Azeraluminium, JSC operates 60,000 tons per annum aluminum smelter in Sumgait and 450,000 tons per annum alumina refinery in the city of Ganja.

Privatization in Azerbaijan has been implemented step-by-step since 1995, when the government approved the first state privatization program for 1995-1998. According to this program, state-owned enterprises were to be transformed into joint stock companies (JSC) after which they could be privatized. Within the program, all citizens of Azerbaijan received a voucher recording their involvement in the privatization. Although the vouchers were put into circulation for three years, their time limits were extended several times. The program also stipulated the procedure for the transforming of enterprises into JSCs and the participation of foreign investors in these privatizations.

Although nearly 35,000 small enterprises were privatized and 1520 JSCs were created from the state-owned enterprises under the program, a number of problems emerged, of which several were centered on the metallurgy subsector. There was a tendency for shares of these companies to become concentrated in the hands of a few powerful people, which resulted in the cessation of some of the JSC's activities and the selling off of their assets. In February 2006, for example, the government terminated the 25-year management agreement signed in 2000 with the Dutch-based Fondel Metal, for managing the state-owned aluminum producer's, Azerbaijan Aluminum's (Azeral)'s, Sumgait smelter and the Ganja aluminum plant. The government also refused to extend British Targol's investment program for two or three years to fulfill its contractual obligation at its pipe-rolling factory. In addition, the largest shareholder and head of the steel company Bakuelectrostamp was forced to sell a controlling package of shares.

C7.4. New Projects

On March 2008, a number of agreements were signed leading to investment in an Integrated Steel Project and an Aluminum Smelter. The Integrated Steel Project at Dashkesan will combine the whole chain from the processing of iron ore to final product, with a capacity of one million tons of steel billets per year. The steel produced will permit in-country production of high quality steel pipes for the oil industry as well as construction materials, re-bars, and other metal products.

The construction of the Aluminum Smelter at Ganja will increase Azerbaijan's aluminum production capacity from 100 000 tons to 160 000 tons and will enhance the country's aluminum export possibilities. Application of modern technologies will allow more efficient utilization of raw materials and energy resources, which will help to overcome the problem of losing access to state subsidies on electrical power and raw materials in a manner similar to that experienced by the petrochemical industry. Special attention will also be paid to protection of the environment.

SECTION IV

Conclusions and Recommendations

The analysis suggests that Azerbaijan has a fairly strong comparative advantage in the production of a number of manufactured and service inputs, as was the case with numerous sub-sectors analyzed earlier in the Final Report. These include corrugated cartons, glass bottles and jars, plastic sheet packaging, refrigerated truck assembly, and software solutions. There is a major need for improved access to finance because in most cases, the buildings and equipment used in these sub-sectors are quite old and technologically out-of-date. PSCEP will be working on this, but the range of these efforts needs to be extended to some of the sub-sectors that feed into the agricultural and agro-industrial sectors, which are the principal focus of attention.

Azerbaijan appears to have a comparative advantage in the production and export of silk scarves and carpets. Whether this also applies to local production and processing of silk cocoons remains to be seen, since it was not possible to gather data at this level for the Supplementary Study. Further study is needed.

The software solutions sub-sector needs to try some innovative approaches to solving its human resources problems. Fortunately, PSCEP will be working in this sector, including support for innovation centers. One possibility might be to develop a public-private partnership at the industry level. This is an area where there are substantial positive externalities to the broader economy of improving the human resource base. Thus there is a strong case for some government support, as highlighted in the Booz Allen report to the Ministry of Communications and Technology of 2006/2007. At the same time, most of the immediate benefits of training accrue to the software solutions industry – at least up to the point where the annualized return to training equals the cost of importing these skills. This suggests the desirability of exploring the establishment of a training institute at the industry level.

The situation regarding tea is uncertain. Although the one tea factory for which there are adequate data appears to be operating profitably, this is achieved by selling local tea at a premium over the price of imported tea. It is unsure whether sales of local tea can be expanded without lowering the price. Furthermore, the profitability of growing tea locally needs to be verified. The one tea farm for which there are data on establishment as well as operating costs has total costs well in excess of revenue at the prices currently being received. Given the old age of most tea trees, substantial investments must be made in replanting, improved irrigation, and better farm and processing machinery. Whether the industry can support these costs is an open question. Further study is needed.

When it comes to the huge investments anticipated in petrochemicals and metallurgy, we are unable to make any judgments based on the limited information that was available for this study. It is clear that there are major barriers to private sector investment based on the high cost of doing business and the failure of the privatization program to achieve very much regarding the large state-owned enterprises that dominate these industries. Details need to be worked out regarding the financing and management of private sector investment in petrochemicals and metallurgy before

much is likely to be accomplished. Given the current investment climate, this may take some time.

Special Report on the Petrochemical Industry in Azerbaijan

1 Introduction

This Special Report looks in some detail at the petrochemical industry in Azerbaijan. It begins with a discussion of the global petrochemical industry, including its characteristics and market trends. It then looks at the current situation in Azerbaijan and what is likely to be its comparative advantage over the longer term. The constraints to achieving this advantage are examined, especially the barriers to business investment. Finally, the report examines briefly the new project at Sumgait.

2 Global Petrochemical Industry

The petrochemical industry is one of the most rapidly growing sub-sectors on the world market. Although originally centered in the industrial countries, it is increasingly being displaced towards raw material supplies in the Middle East and markets in Asia.

2.1 Characteristics of the Petrochemical Industry

Petrochemicals are chemical products made from raw materials of petroleum or other hydrocarbon origin. Although some of the chemical compounds that originate from petroleum may also be derived from coal and natural gas, petroleum is the major source. Petrochemicals include purified fossil fuels such as methane, propane, butane, gasoline, kerosene, diesel fuel, aviation fuel, or fuel oil. They also include many agricultural chemicals such as pesticides, herbicides and fertilizers, as well as other items such as plastics, asphalt, synthetic rubber, and synthetic fibers. Frequently, however, the term petrochemical is reserved for the products comprising one of two major categories. The primary petrochemical industry produces basic chemicals, such as ethylene, from oil or gas. The secondary industries convert these basic petrochemicals into materials that may be directly used by consumers or other industries.

Petrochemical technology employs high pressures and temperatures, requiring sophisticated engineering and equipment in order to use energy efficiently. Most modern technology has been developed at great expense in laboratories run by multinational firms.

The pricing of oil and gas is critical to the international competitiveness of the industry. In today's world, the petrochemicals sector is struggling to keep up with rising costs of electricity and raw materials and with government regulations and bottlenecks facing the industry. The issues have become more acute recently because of fluctuations in the prices of oil and natural gas.

To cope with this challenge, many players are choosing either to consolidate or to divest some less profitable activities. With mergers and acquisitions shaping the face of the industry and the focus of the global petrochemical industry shifting increasingly

towards areas of most rapidly growing demand, the prominence of China, India, Thailand, and other Asian countries is growing on the global petrochemical scene.

2.2 Global Market Overview

2.2.1 Ethylene

The largest petrochemical industries are still to be found in the US and Western Europe, though the major growth in new production capacity is in the Middle East and Asia. There is a substantial inter-regional trade in petrochemicals of all kinds. Of the primary petrochemicals, world production of ethylene is around 132 million tons per year, of polypropylene 48 million tons, and of aromatic raw materials 70 million tons.

At present, naphtha comprises about 54 percent of the feedstock for the world's petrochemical steam crackers,³ with ethane providing another 28 percent. Ethane is increasing in relative importance, largely because of its availability from gas fields in the Persian Gulf and the fact that it costs just over one third the cost of naphtha and cracking margins are higher, lowering the cost of raw materials. This gives petrochemical companies in Iran and the Arabian Peninsula an important cost advantage, especially as the price of naphtha has tended to rise with the price of crude oil.

With the global economic slowdown and the expansion of capacity to produce ethylene in the Middle East, there is likely to be a short-term glut on world markets. Middle East producers are heavily reliant on exports, particularly to Asia, where the demand for imports of primary petrochemical products has until recently been growing rapidly with the expansion of downstream production and little capacity to produce these products themselves. Despite this short-term glut, over the longer term, countries able to produce ethylene from natural gas are likely to dominate those reliant upon naphtha produced from petroleum.

2.2.2 Polypropylene (PP)

Demand for PP has been growing over the past decade at about 7.5% per year. This polymer is attractive as it can be used in a wide range of products and yet is priced lower than other thermoplastics. In recent years, global PP prices have been pushed up by demand growth outstripping capacity additions and the effect of high oil prices on propylene feedstock. Rising PP prices are catching up with PE prices, leading to a slackening in the pace of this growth. Nevertheless, PP consumption is set to exceed 50 million tons in 2010 and could reach 80 million tons by 2016, making it the world's most important polyolefin. Demand growth will continue despite the global economic slowdown due to a broadening of applications, particularly in the packaging, construction, and automotive industries. The Asia-Pacific region has become the world's largest PP market due to rapid industrialization in China and India, which are driving PP net demand as their growth in demand exceeds their growth in capacity.

The global landscape is set to radically shift over the next five years as demand and supply move eastwards. PP producers in the Middle East and Asia will firm up their positions on the global market, exporting their surpluses to the detriment of Western

³ A steam cracker is a petrochemical plant that turns naphtha and light hydrocarbons into ethylene, propylene, and other chemical raw materials. These chemicals can be transported, via pipeline and other methods, to chemical and polymer facilities and converted into olefin-based products.

European and North American producers, which are unlikely to put significant new capacity online in coming years as they come under attack from cheap imports and struggle to maintain their competitiveness on export markets. The stagnation in production and slower demand growth in Europe and North America also stand in stark contrast to the surging Chinese market, which will become increasingly self-sufficient. The whole of Asia will represent just under half the additional capacity expected to come on stream between 2008 and 2012, while the Middle East will add a further 23 percent, largely due to developments in Saudi Arabia.

There are, however, significant risks facing PP producers. A stronger than expected slowdown in Chinese economic growth could lead to a glut in supply, driving down prices and forcing less competitive operations out of business. Margins will also be put under pressure by sustained high oil prices, which will keep the price of propylene at high levels. A combination of over-capacity and rising costs of raw materials could lead to the reduction of PP capacity in developed markets. A significant constraint facing the industry is the tightening of the propylene market as production of the monomer outstrips refinery output. Cuts in refinery capacity during the global economic downturn could intensify this constraint. As a result, some PP producers are reconsidering plans to build plants dedicated to propylene production. Furthermore, while feedstock prices are set to rise, Chinese and Middle Eastern producers are managing to bring down prices of end products, leading to pressures on margins, particularly for producers in the developed world. The only way they can stay afloat is to corner niche markets with innovative products requiring greater technical sophistication than currently offered by plants in emerging markets.

3 Current Situation in Azerbaijan⁴

Azerbaijan has 25 petrochemical plants, all built during the Soviet era. The petrochemical sector is concentrated physically in the area around Sumgait, close to Baku. There are also plants in Baku and in Neftchala, south of Baku. All the plants are based on Soviet technology, apart from a polyethylene unit. The sector depends heavily on feedstock imported from elsewhere in the former Soviet Union.

The state-owned petrochemical holding company Azerkimya's main polyolefin production facility is located at Sumgait. It operates the Sumgait cracker, which has an ethylene production capacity of about 250,000 tons per annum and a propylene capacity of 135,000 tons per annum. This facility supplies feedstock to a polyethylene unit with a rated capacity of 165,000 tons per annum. Only about 30-40% of this capacity is being used.

Prior to independence in 1991, there were 35 petrochemical enterprises in Azerbaijan, accounting for 7% of the country's total industrial output and producing 58 different types of chemicals. These included 9 % of the Soviet Union's sulphanol, as well as 250,000 tons per annum of caustic soda, 1.2 million tons per annum of super phosphate fertilizer, and numerous other products. With the collapse of the Soviet Union, many of these production lines were shut. By early 1993, most existing plants were operating at less than 50% of capacity. In the ensuing years, production continued to decline. By the late 1990s, a number of remaining plants had closed for environmental reasons. Today, the country produces only eight or nine chemical

⁴ This section draws heavily on Business Monitor International Ltd, "Azerbaijan Petrochemicals Report Q1 2009".

products. This is despite the fact that Azerbaijan has considerable petroleum and natural gas reserves, which could form the basis of a thriving petrochemicals industry.

Of the petrochemicals products being manufactured in the country, a few are secondary, but most are primary products, which are sent abroad for further processing within the petrochemical industry.⁵ This is demonstrated by the data presented in Table A1, which shows the evolution of production in Azerbaijan from 1999 to 2007.

Table A1: Production of Petrochemical Products, 1999-2007 ('000 tons)

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Primary Products									
Hydrate of sodium (liquid)	20.8	25.3	21.8	20.5	21.6	24.7	26.4	33.2	19.9
Propylene	16.4	18.5	15.9	22.9	26.7	33.1	29.2	38.5	26.6
Ethylene	30.0	40.1	31.9	46.4	50.5	61.6	54.7	72.6	2.4
Polyethylene	23.2	32.3	27.2	40.5	47.2	59.0	53.0	70.4	47.2
Secondary Products									
Nitrogen (mn cubic meters)	8.6	12.0	14.0	13.4	9.6	8.2	9.9	---	---
Paintwork products	2.0	1.6	1.8	1.9	1.7	1.5	3.5	1.7	1.7
Hydrochloric acid	4.4	4.5	4.9	6.2	7.9	6.6	8.1	---	---
Polymers film	2.7	1.4	2.5	2.6	1.3	0.9	1.5	---	---
Isopropyl alcohol	12.0	8.0	6.5	17.3	18.8	22.9	20.7	24.2	16.6
Synthetic detergents	---	2.4	---	---	5.3	5.8	6.0	3.6	5.9
Doors and sash pulley	---	---	0.9	---	---	1.0	1.5	0.9	1.1
Polymeric dyes	---	1.4	---	---	1.3	0.9	1.5	0.9	0.8

Source: BMI, Azerbaijan Petrochemicals Report Q1 2009, p. 14

Table A2 shows the evolution of Azerbaijan's principle petrochemical exports and imports from 2003 to 2007. This suggests substantial trade in both directions, with primary products dominating exports and secondary products making up a larger share of imports. Year-to-year variations have been sizeable, but there are few discernable trends.

Table A2: Principal Exports and Imports of Petrochemical Products, 2003-2007 ('000 metric tons)

	2003	2004	2005	2006	2007
Exports					
Sodium hydroxide	3.3	3.0	7.6	8.8	4.6
Polymers of ethylene, primary form	39.4	53.3	47.2	63.7	30.2
Petroleum resins and polyterpenes	58.7	63.1	61.9	88.3	60.5
Acyclic alcohols and their halogenates	18.9	21.9	18.6	27.1	15.2
Imports					
Sodium hydroxide	---	25.7	69.9	54.6	34.2
Polymers of ethylene, primary form	5.6	8.4	7.2	8.6	13.0
Polymers of propylene, primary form	9.5	9.4	6.1	13.5	15.5
Polymers of vinyl chloride, primary form	9.4	13.1	13.9	16.8	17.1
Detergents	11.8	13.5	15.1	19.0	23.8
Nitric fertilizers	45.4	67.1	77.3	81.7	65.0
Insecticides, herbicides, disinfectants and similar products	0.5	0.8	0.7	1.3	1.1

When Azerbaijan was a part of the Soviet Union, processing plants were often situated at a considerable distance from raw material sources, partly because not much

⁵ For example, the industry began to export ethylene in 2002.

attention was paid to transportation costs. After the transition, however, realistic transportation costs were imposed on importing countries, leading to substantial increases in the cost of energy and raw materials for the petrochemical industry. Although Azerbaijan had the capability of producing some of these raw materials, it continued to import these from elsewhere in the former Soviet Union. At first, Azerkimya was protected from these cost increases because of government support in the form of subsidized electricity and price controls on chemical products. However, following the government's decision in 2005 to end indirect financing and the purchase of feedstock on privileged terms, Azerkimya came under considerable financial pressure. The result was a cessation of production in 2007, until an agreement was reached with concessions on the government's part.

Azerkimya is assigned the short-term task of co-coordinating relations with Russia for raw materials and payment. It is also responsible for the longer-term goals of co-coordinating new capacities, improving the industry's product range and image, and reducing dependence on Russia. In addition, it has responsibility for improving the environmental performance of the chemical industry, particularly in petrochemicals.

In 2004, the government announced plans to convert Azerkimya into a joint stock company for its ethylene and propylene operations, its organic synthesis plant, its rubber synthesis plant, and its surface activity compounds plant. The restructuring program was aimed to attract foreign investment to its core operations and new projects. There was to be a proviso that the state would retain a 15% stake. The plans have yet to be implemented.

4 Longer Term Perspective – SWOT Analysis

Azerbaijan's chemical output grew by 35% year-on-year in 2008, while the production of rubber and plastics fell by 5%, though there was strong growth in production of some finished plastic products, such as plastic bags, pipes, windows, and doors. The overall growth in primary and secondary petrochemicals in 2008 marks a turnaround from 2007, when Azerkimya's output was affected by a rise in electricity and raw material costs, which the company struggled to finance without state subsidies.

The government appears determined to press ahead with the development of the petrochemical industry, utilizing the country's considerable petroleum and natural gas resources. This is line with the Azerbaijan's apparent comparative advantage. However, Azerbaijan will need to address major infrastructural, institutional, and policy constraints if it is to become a significant petrochemicals producer, as suggested in the following SWOT analysis.

SWOT Analysis

Strengths: <ul style="list-style-type: none"> • Low-cost labor resources in relation to Central and Eastern Europe • Rich natural resources of oil, natural gas, and mineral reserves as well as large areas of farmland • Favorable location • High rates of economic growth increasing the potential for major expansion in the petrochemicals sector 	Weaknesses: <ul style="list-style-type: none"> • Outdated technologies and polluting assets • Petrochemical companies operating well below capacity • Lack of maintenance of petrochemical plants • Lowest ranking on BMI's Petrochemical Business Environment Index for Central and Eastern Europe
Opportunities: <ul style="list-style-type: none"> • Profit from the oil and gas sector could be used to initiate petrochemicals activities • Variety of projects in the pipeline, including reconstruction of the Sumgait cracker and establishment of a polypropylene (PP) plant • With an advantage in ethylene, PE, and plastics production, the industry has huge potential for exports • Feasibility study is underway for a US\$500-600mn petrochemicals facility, with apparent FDI interest 	Threats: <ul style="list-style-type: none"> • Competition in ethane production from other Middle Eastern countries • Competition in PP production from China and Asian production • Environmental concerns on the part of FDI

5 Constraints on Expanding Production

Azerbaijan's petrochemical production falls far short of its potential. One reason is lack of investment, lack of maintenance, and the predominance of old and environmentally damaging technology. There is a large gap between petrochemical ambitions and the currently available feedstock. The industry is excessively dependent on state subsidies.

One reason for the lack of investment is the absence of foreign participation in the sector, which remains dominated by the state-owned holding company Azerkimya. Lack of foreign direct investment (FDI) is at least partly related to the fact that Azerbaijan remains in last place among Business Monitor International's Petrochemical Business Environment Rankings for Central and Eastern Europe. This ranking measures scores for current cracker capacity in ethylene and polymer production as well as five-year growth projections for this capacity. Azerbaijan's sole current cracker facility has a capacity of 270,000 tons per annum, but production remains far short of this capacity. Part of the reason has been the rise that occurred in electricity costs and the imposition of price controls following 2005, though these problems have been alleviated by the government's willingness to provide incentives until the financial difficulties have been resolved.

Azerbaijan also falls short in this ranking because of corruption, poor contract enforcement, lack of transparency, and excessive bureaucracy. In addition, there have been delays in the implementation of the giant Shah Deniz gas project, which will

eventually be needed to reduce Azerbaijan's dependence on Russian supplies and allow it to substitute less costly and more efficient ethane in place of naphtha.

6 New Project at Sumgait

A Memorandum of Mutual Understanding and a Memorandum of Confidentiality were recently signed with Exxon, Mobile, Bazel, KBR, Technip, Imeos Thysenn Krupp and Unde to construct a modern petrochemical complex in Sumgait (Project S). Implementation will enable Azerkimya to reinforce its position in world markets and to cover internal demand within the country.

The new complex, which will consist of 19 plants with modern technologies, will make Azerbaijan the largest petrochemical product producer in the region and the first in the CIS. The complex will annually produce 700,000 tons of high and low pressure polyethylene, 130,000 tons of polypropylene, and 40,000 tons of benzol and other petrochemical products. The production of these products will enable the country to cover its demand for construction materials, plastic tubes, paints and varnishes, and synthetic rubber.

Special equipment is expected to be installed in the complex to clean gas through separation means, as well as to produce ammoniac and carbamide, including production of different olefine, polycofine, and petrochemical products. Under the State program to provide the Azerbaijani population with greater food security in 2008-2015, the project envisages construction of a plant in 2008-2010 to produce 800,000 tons per annum of nitrogen fertilizer. This plant will cover the country's nitrogen fertilizer needs as well as permit exports to foreign countries. Nexant is developing a feasibility study under Azerkimya for this purpose.

7 Conclusion

Azerbaijan has an apparent comparative advantage in petrochemicals, especially if based on low cost ethane from its large natural gas reserves. At present, however, its actual production is far below capacity and there is little vertical integration. Even its production of polyethylene does not satisfy the requirements of the local plastic sheeting industry because of quality differences and high price.

The new project at Sumgait may solve all this, but it is very ambitious. Planning is still at an early stage. Any decision to go ahead awaits the results of the feasibility study that was to be completed in January 2009. Financing in the current economic climate may prove difficult. Production of oil and natural gas has not increased as rapidly as projected, partly because of low prices for petroleum products and partly because of technical problems. In addition, Azerbaijan remains in last place in BMI's Petrochemicals Business Environment Rankings for Central and Eastern Europe – with a score of 30.5, 10.4 points behind Bulgaria. This has deterred foreign investors despite Azerbaijan's considerable energy reserves and rising gas output. However, all this may change once the details of the Sumgait project are revealed and arrangements are agreed upon by the partners.

Annex A - Appendix: Details Regarding the Petrochemical Industry

Information regarding the petrochemical industry in Azerbaijan is difficult to obtain. The industry is dominated by a state-owned holding company, Azerkimya, from which specific information on production and prices could not be obtained, but the following is picture of the products that could be produced at Azerkimya's various plants.

Organic Synthesis Factory (ОргСинтез)

Currently the following processing lines exist at the factory: Liquid lime; chlorine; propylene oxide; propylene glycol; polyether pitch grade 3603, 3003, 5003, 702, 1002, and AZ-3; polymer MLSP-R; synthetic black oil fuel, nitrogen and oxygen, heavy naphtha, polyethylene based consumer goods. Polyether pitch grade 3603, 3003, 5003, 702, 1002, and AZ-3 are used for sediments from crude oil. Nitrogen and oxygen are mainly used for in the oil and gas industry for leak testing and other purposes. Propylene oxide is exported to Iran.

Surface-active Substances Factory (Завод Поверхностно Активных веществ)

Currently the factory is capable of producing: caustic soda dry and solid, inhibited hydrochloric acid, technical grade synthetic hydrochloric acid, liquid chlorine, sulfuric acid, synthetic hydrochloric acid, technical grade dichloromethane, carboxyl ethyl cellulose, calcium chloride, sodium carbonate, whiteners, and polyethylene based consumer goods. Chlorine is used mainly by Azer SU for drinkable water and by the Ministry of Health for medical purposes. The main consumer of caustic soda is the Ganja Aluminum Factory. Sulfuric acid and hydrochloric acids are mainly used internally by Azerkimya facilities (mainly for water softening in thermo power plants).

Synthetic Rubber Factory (Завод Синтетического Каучука (Завод «СинтезКаучук»))

The factory is capable of producing butadiene 1.3, a fraction of butylenes-isobutylene, which is used as fuel- LPG (Liquid Pressurized Gas); and isopropyl alcohol, which is used for medical purposes and as fuel in aviation.

Ethylene Propylene Factory (Завод Этилен Полиэтилен)

This factory can produce heavy pyrolyzed resin (E-6), liquid pyrolyzed resin, and propylene. Exports of petroleum resins and polyterpenes are shown below. In addition, the factory produces consumer goods such as polyethylene coating, plastic bags, and pipes of different sizes for the local market

	2003	2004	2005	2006	2007
Product Exports	'000 tons	'000 tons	'000 tons	'000 tons	'000 tons
Petroleum Resins and Polyterpene	58.7	63.1	62.0	88.3	60.5