

## 15. INDEPENDENT MARKET RESEARCH REPORT (Cont'd)

Songkhla	border				Petronas	
Cakerwala	Offshore Thai- Malaysia border	Gas field development	2005	Planning	Carigali - Triton	2,280
<b>Total</b>						<b>11,244</b>

Source: The Edge, 14 July 2003

Figure 2-5

## Costs of Ongoing and Future Pipeline Projects in South East Asia

Projects	Location	Distance (km.)	Start	Status	Operator	RM Million
16 offshore projects	Offshore Sarawak	72	2002	In progress	Talisman	152
Helang-Jintan pipeline	Offshore Sarawak	420	2002	In progress	Nippon Oil / Shell	n. a.
Duri-Malacca	Indonesia to Malaysia	200	2002	In progress	Petronas - Pertamina	429
Natuna-Kerteh	Indonesia to Malaysia	280	2003	Confirmed	Petronas - Pertamina	2,291
Arun-Pauh	Indonesia to Malaysia	365	2005	Planning	Petronas - Pertamina	1,577
Natuna-Sabah- Luzon/Palawa n	Indonesia - Malaysia - Philippines	1,540	2008	Planning	-	11,537
Joint Development Authority - Block B	Offshore Thai- Malaysia border	140	2009	Planning	-	376

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Gas Malaysia distribution lines	West Malaysia	200	2004	Planning	Gas Malaysia	49
Joint Development Authority Songkhla	Offshore Thai-Malaysia border	255	2004	Finalising	Petroleum Authority of Thailand - Petronas	2,147
Total						18,558

Source: *The Edge*, 14 July 2003

Marine ships are another end-user of atmospheric corrosion control products. With over 1,100 ships, the merchant marine fleet in Malaysia consists of oil tankers, liquefied natural gas carriers, general cargo ships, passenger ships, container ships, vehicle carriers and others. The main shipping company is Malaysia International Shipping Corporation Berhad (MISC). Being a subsidiary of Petronas, MISC operates a fleet of 127 vessels. The company is a specialist in the carriage of liquefied natural gas, besides being involved in the shipping of crude oil, petroleum products tankers and bulk commodities. The other main shipping companies in Malaysia are Halim Mazmin Berhad, Nepline Berhad, Global Carriers, PDZ Holdings Berhad, Malaysian Merchant Marine Berhad and Wawasan Shipping Sdn Bhd.

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Figure 2-6 present the revenue forecasts for the Malaysian atmospheric corrosion control market from 2000 to 2008.

Figure 2-6

Atmospheric Corrosion Control Market: Revenue Forecasts (Malaysia), 2000-2008

Year	Revenues (RM Million)	Revenue Growth Rate (%)
2000	103.4	-
2001	111.1	7.5
2002	120.0	8.0
2003	130.8	9.0
2004	143.2	9.5
2005	154.8	8.1
2006	168.5	8.8
2007	183.9	9.2
2008	201.2	9.4
Compound Annual Growth Rate (2002-2008):		8.9

Note: All figures are rounded; the base year is 2002.

Source: Frost & Sullivan

The revenue forecasts above include the installation or service component of the contracts. In general, the servicing or service component comprises around 40 percent of the bidding, with the remaining 60 percent accounted by the price of the hardware. This is due to the fact that the installation of the hardware requires specialized skills and technical expertise that the petroleum companies are not able to provide in the first place. Obviously, the perceived degree of difficulty of installing the corrosion protection products and the environment (friendly or harsh) has an impact on the service component cost. Hence, the prices quoted by a company are very project-specific and is intangible.

The market for atmospheric corrosion control products was estimated at around RM120 million in 2002. Over the forecast period, the market is anticipated to increase dramatically, to reach RM201.2 million in 2008, yielding a CAGR of 8.9 percent. There is a trend towards applying corrosion control products when the plant and equipment is first commissioned, instead of applying remedial actions when normal corrosion takes place.

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## Competitive Structure

Figure 2-7 presents the competitive structure of the atmospheric corrosion control market in Malaysia for the year 2002.

Figure 2-7

## Atmospheric Corrosion Control Market: Competitive Structure (Malaysia), 2002

<b>Number of Suppliers:</b>	No direct competitors, both local and foreign, due to Corro-Shield's appointment as a supplier under Petronas' Vendor Development Program (VDP)
<b>Distribution Structure:</b>	Direct to the end-user Through sales office or agents
<b>Key End-User Groups:</b>	Upstream petroleum sector Downstream petroleum sector Shipping
<b>Competitive Factors:</b>	Technical Expertise Appointed vendor under the Vendor Development Program Product Quality Pricing Turnaround Time Support Facilities

Source: Frost & Sullivan

In a capital-intensive industry like petroleum, the service companies must have both the technical expertise and product quality. The turnaround time and support facilities are also critical as production downtime translates into a hit on the bottom line. The prices are negotiated with the client prior to the contract being awarded.

Lastly, in order to encourage the development of Bumiputera entrepreneurs, Petronas has established the Vendor Development Program (VDP). The major conditions for a company to be appointed as a vendor under the VDP are as follows:

- At least 70 percent of the company's equity is to be held by Bumiputeras
- The management must be of Bumiputera majority
- The owner and operator must hold 51 percent of the company's equity
- Registered as a private limited company under the Companies Act, 1965

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- Must have a minimum paid-up capital of RM100, 000

In this context, Corro-Shield is the only Malaysian (and Bumiputera) company that has been awarded to supply and install atmospheric corrosion control products under the Vendor Development Program by Petronas. The vendor status is also extended to the other PSC contractors of Petronas like Shell and ExxonMobil. Hence, Corro-Shield has a monopoly in the installation of atmospheric corrosion products in the petroleum industry in Malaysia.

## Pricing Trends

### Price in Relation to Raw Material Cost

Many of the raw materials used in the manufacturing of atmospheric corrosion control products utilize plastics and synthetic rubber, with the precursor raw material being mostly petroleum. Even the corrosion control compounds are made from a blend of petroleum waxes, oils and inhibitors. As synthetic rubber is not produced in Malaysia, it has to be imported. Hence, the price of corrosion protective products is inherently linked to the global movement in the price of petroleum.

### Price in Relation to Technical Support

As the cost of skilled labor is rising in Malaysia, that has an impact on the cost of installation and after sales service. Skilled labor refers to both engineers and technicians. The acquisitions of contracts to supply corrosion control products come with a commitment to provide a relatively high level of technical support to the client. This is exacerbated by the stringent safety requirements imposed by the petroleum companies. However, companies based in Malaysia have an advantage as they do not have to supply expatriate engineers, which are normally needed by the foreign-based companies.

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Market Trends

Figure 2-8 presents the market share for atmospheric corrosion control suppliers in 2002.

Figure 2-8

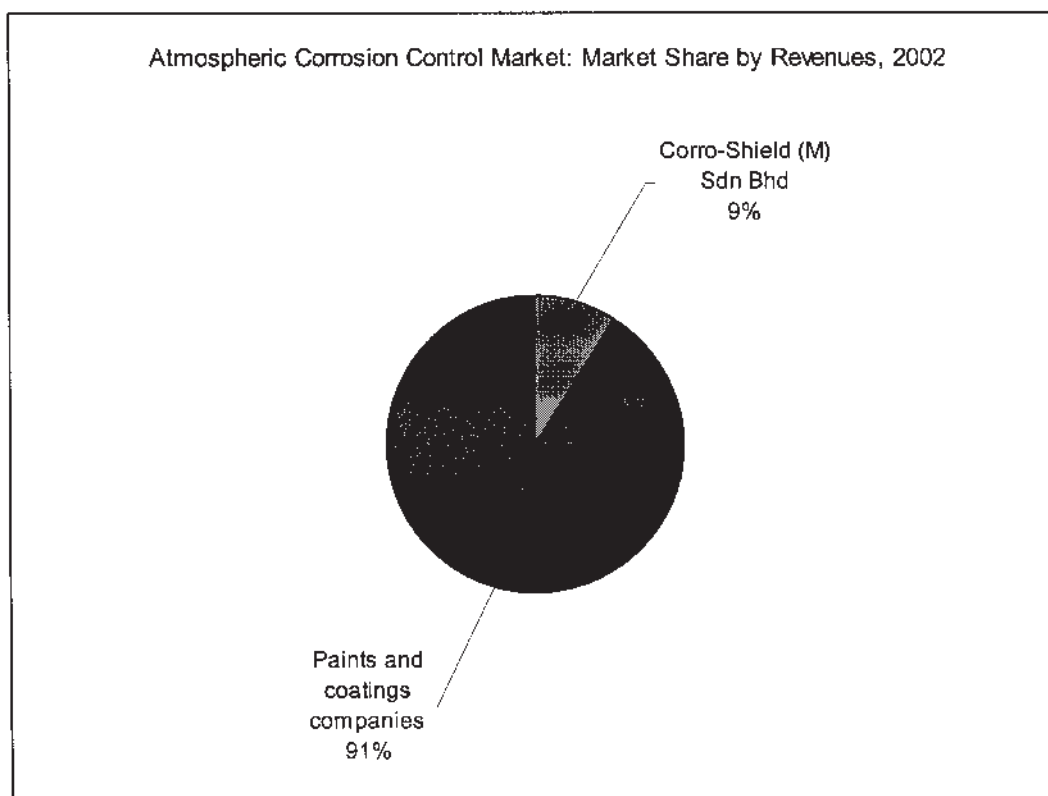
Corrosion Protective Market: Company Market Share by Revenues (Malaysia), 2002

Company	2002 (%)
Corro-Shield (M) Sdn Bhd	9.0
Paints and coatings companies	91.0
<b>TOTAL</b>	<b>100.0</b>

Note: All figures are rounded; the base year is 2002.

Source: Frost & Sullivan

Chart 2.2



Source: Frost & Sullivan

The market size for atmospheric corrosion products was mainly computed based on the number of oil and gas platforms and onshore installations. Of the total market size of around

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RM120 million for corrosion control products in 2002, Corro-Shield had a market share of approximately 9 percent. The rest of the market is accounted by the various paints and coatings companies, which are not direct competitors to Corro-Shield's range of products. This is due to the fact that paints and coatings are normally used when there is a budget constraint on the part of the clients. They are basically available off-the-shelves and are viewed as commodities in the market. Some of the more prominent companies supplying paints and coatings to the petroleum industry include:

- Jotun (M) Sdn Bhd
- Nippon Paint (M) Sdn Bhd
- Sime Leigh Sdn Bhd
- International Coatings Sdn Bhd
- Corrocoat Corrosion Services Sdn Bhd
- Chugoku Paints (M) Sdn Bhd
- Dimet (M) Sdn Bhd
- Hempel (M) Sdn Bhd
- DNT (M) Sdn Bhd

### Substitute Products

There are many corrosion control methods available and they include protective coatings, corrosion-resistant metals and alloys, corrosion inhibitors, polymers and anodic and cathodic protection. Protective coatings comprise galvanizing and metallizing. Stainless steel, nickel-based alloys and titanium alloys are also used for corrosion control purposes. In general, paints and coatings are the nearest substitute or alternative for corrosion control purposes. The selection of a particular technique of corrosion control is dependent on a number of factors, like the intended service, application, planned service life and cost.

➤ Nuts and bolts protection:

Alternative products include painting, fluorocarbon coatings and plastic caps. Given the sharp edges and poor accessibility of a nuts and bolts system, it is extremely difficult to get a uniform thickness of paint. Subsequently, this aspect resulted in pinholes. Fluorocarbon coatings refer to the usage of many layers of protective fluorocarbon polymer films. However,

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they are susceptible to either mechanical damage or rough handling, which are impossible to avoid in the marine and plant environment. The threads are also vulnerable, as the nuts have to be put back after the coating is in place. Plastic caps have limited advantages as they required minimum exposed stud lengths and are also easily removed by high pressure water jetting.

➤ Flange protection:

Alternative products are caulking, tapes and flooding. The usage of tapes does not prevent galvanic corrosion from taking place. In addition, the tapes have a limited life span and hence, require routine maintenance. Lastly, the system of flooding the flange voids with waxes or inhibitors is aesthetically unpleasant.

➤ Pipe support systems:

Neoprene pads are commonly used. However, this results in a tight crevice being formed. Subsequently, through capillary action, the crevice attracts and retains moisture. It is exacerbated by the fact that the original coating specifications are not intended to perform in a submerged environment, resulting in premature coating failure and aggravated corrosion. The same situation applies to the standard pipe rack supports as they are difficult to access and experience similar defects.

➤ Pipe protection and leak containment systems:

Current repair methods include the usage of clamps for localized repairs and specialized connectors with sleeves for extensive repairs. It is also possible to encircle the defective area with close fit metallic sleeves, which are welded together. As it has to be seal welded, it could cause weld-induced damage or material property changes on the pipe to be repaired. In underwater conditions, this may require specialist habitats to carry out hyperbaric welding. However, this is costly and may pose additional dangers associated with welding on live pipelines and is currently not practiced by the major petroleum operators in the region. Another method is to cut and replace the particular section of the pipe. Nevertheless, such connectors are expensive and take substantial man-hours to design, manufacture and assemble the required section.

➤ Riser clamp protection:

Similarly, neoprene pads are used. As they are placed between the clamps, moisture is trapped in the process. This forces the coatings, which were designed for splash zone conditions, to work in submerged conditions, resulting in premature coating failure. The progressive failure of coating can compromise the structural integrity of risers.



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➤ Protective insulation system

Alternative products are calcium silicate, rock wool and glass wool. However, these products suffer from very high water absorption rates resulting in a loss of their insulation properties.

➤ Permanent sleeve repair

An alternative is to cut and replace, which is not cost-effective because of production of downtime. The client has an obligation to produce certain quantities of petroleum per day and downtime is not a favorable option.

➤ Marine growth removal and prevention

The alternative is to conduct blasting, on an annual basis, so as to remove the marine growth. The blasting is normally carried out by divers and involves the deployment of both diving vessels and compression chambers. As it is weather-dependent, it is both risky and is extremely expensive.

## Technology Trends

As with any industrial product, technologies are constantly evolving, due to better results obtained in basic research, applied research and technology development. This also extends into the atmospheric corrosion control products. Improvements in the understanding and knowledge of both materials science and metallurgy over a period of time would also lead to the discovery and development of corrosion control products. Companies involved in this field are constantly striving to come up with better products.

## Distribution Channels

Corro-Shield participates in the petroleum industry in both Malaysia and Indonesia by dealing directly with the national petroleum companies, that is, Petronas and Pertamina, respectively. In other words, it is involved in a direct marketing channel. In Brunei, Corro-Shield is represented by an agent. It is a one-level intermediary channel. The agent, through its contacts, experience, knowledge, specialization and scale of operation, offers the company more than it can usually achieve on its own.

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### Ease of Entry and Exit

There is a high barrier to entry, principally in terms of proprietary product technology. The design characteristics are kept proprietary through patents that typically last around 15 years in Malaysia. Also, a company must be appointed by Petronas under the Vendor Development Program in order to venture into the petroleum industry. In addition, the corrosion protective market is unique in the sense that there is a very high ratio of fixed costs to variable costs. Fixed costs include warehousing facilities, rentals, research and development costs, salaries and plant and machinery. On the other hand, the variable costs include offshore allowances, cost of material inputs and transportation charges for product installation. The sunk costs may be unrecoverable if a market participant decides to leave the market. There is no main exit barrier in the corrosion protective industry.

### Capital Intensity

Effective August 1995, the Malaysian government has defined a capital-intensive industry by using a benchmark of RM55, 000. This is computed based on the capital investment per employee ratio. Using this definition, Corro-Shield's manufacturing operation in Malaysia is considered a capital-intensive industry, as it exceeds this figure.

### Environmental Issues

In environmental issues, both the Environmental Quality Act, 1974 and the Exclusive Economic Zone Act, 1984 apply to the offshore petroleum industry. The Department of Environment (DOE) comes into play if the petroleum activities are within the territorial waters of Malaysia. If activities take place beyond the territorial waters, that is, the economic exclusive zone (EEZ), then both Petronas and the Ministry of Domestic Trade and Consumer affairs have regulatory control over the environmental aspects of offshore operations. The territorial waters are defined as situated within 12 nautical miles from the coast. The maritime zone adjacent to the territorial water may not extend beyond 200 nautical miles from the baselines from which the breadth of the territorial waters is measured, under the framework of the United Nations Convention on the Law of the Sea, which entered into force in 1994. Besides these national environmental regulations, international agreements do apply, as well as voluntary measures in the form of codes of practice.

### Trade Restrictions, Political and Economic Factors

Both Malaysia and Brunei had been enjoying political stability over the past few decades. However, since the Asian financial crisis struck in mid-1997, Indonesia has been beset by a

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host of political and economic difficulties. Given ASEAN's proposal for a Trans-ASEAN Gas Pipeline through 2010, there are no major setbacks for Corro-Shield foreseen during the forecast period, in terms of the regional market potential. The 4,200-kilometer pipeline is projected to cost around RM26.6 billion with seven systems connecting the gas fields of Vietnam, the Philippines, Sumatra, Kalimantan, Malaysia and Thailand. The development of a regional gas transmission backbone is expected to encourage the development of stranded, uneconomic gas fields whose small size do not currently justify the production and utilization of natural gas by the end-users.

### SWOT Analysis

#### Strengths:

- VDP status.
- A range of atmospheric corrosion control products to suit a variety of end-user needs.
- Patented products.
- Management staff with experience in the petroleum industry.
- Ability to provide timely services due to its presence in the region, as opposed to other companies based in Europe and the United States.
- Corroborative work with Petronas Research and Scientific Services Sdn Bhd.

#### Weaknesses:

- A relatively small capital base.
- Need to tie-up with foreign partners or appoint agents to venture into other regions.

#### Opportunities

- The enormous petroleum industry, which provides huge opportunities for the company's range of products.
- The petroleum industry in Malaysia is poised for further expansion as the government recognizes it as another engine of growth to replace the sluggish manufacturing sector.

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**Threats:**

- Should Corro-Shield venture into the other neighboring countries, it faces strong competition from more established companies who are based there. Some of the more prominent companies for sleeve repairs in these countries include PII International, Mexssub International, Hydratight Sweeney Limited and Oil States Hydrotech. In the field of caps, they are Radolid and Sapseal.
- Petroleum is a commodity, and hence subjected to wide fluctuations in prices. A sharp drop in the price of petroleum would cause the petroleum multinationals to curtail their capital expenditure.

**Diversification into New Products**

As part of its diversification process, the group of companies under Perisai Petroleum Teknologi Berhad is moving into the distribution of new products used in the petroleum industry.

**BioSolve**

A sister company of Corro-Shield, Whizz Water Sdn Bhd, is venturing into the distribution of BioSolve. As a water-based bio-remediation surfactant, it is non-hazardous, non-flammable and biodegradable and is specially engineered as a clean-up and mitigating agent on hydrocarbon and hydrocarbon-based products. It solubilizes, emulsifies and separates the hydrocarbons into small micro-emulsions, ultimately, changing them into a water-based solution. These actions render the volatile hydrocarbons into non-flammable substances and at the same time, stimulate the bio-remediation of the hydrocarbons by increasing the end-chain reaction created by the micro-emulsions. Subsequently, the broken-down hydrocarbons become an easily assimilated food source for bacteria. Hence, BioSolve is a unique, versatile and environmentally-friendly product utilized in fuel and oil spill clean-up and remediation, fire fighting, vapor suppression and general cleaning and degreasing applications. As a patented product, BioSolve is also approved by the Department of Environment, Malaysia.

**Heat Exchanger**

Another sister company of Corro-Shield, Romilly (M) Sdn Bhd is a specialist contractor for inspection and maintenance of heat exchangers and is the only company in Malaysia providing both inspection and maintenance under one roof. It's existing principal activities are maintenance, cleaning, repairs and inspection of plant process facilities such as heat exchangers, boilers, process vessels, storage tanks and condensers for oil & gas and petro-

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chemical industries. It also restores, repairs and carries out retubing of boilers, heat exchangers and condensers and mechanical repairs, fabrication and installation works for piping, structures and lifting equipment and offers chemical cleaning and associated services.

Romilly (M) Sdn Bhd has recently been given an agency by CTI Industries Inc., a US based company, which developed a revolutionary way of restoring the tubes of damaged heat exchangers and condensers. The restoration and repair of heat exchanger and condenser tubes involves thin-walled expandable metallic sleeves. This technology is proven to be technically accepted and cost-effective with the potential cost savings as high as 70 percent, compared to re-tubing. It has been used extensively in the petrochemical, power, marine and petroleum industries across more than 30 countries.

This tube restoration technology essentially comprises the insertion of thin-walled and galvanically-compatible metallic sleeve onto corroded, leaked or weakened portion of the tube, which normally occurs at a distance of between 150 mm. and 300 mm. from the inlet end of the tube sheet. The inserted sleeve will then be expanded hydraulically or mechanically using specially designed tools to achieve intimate metal to metal contact between the sleeve and tube material. If it is used to internally-line the entire length of the tube, the method of sleeve expansion will be hydraulic only. The presence of the expanded sleeve saves the tube from being permanently plugged or decommissioned, besides restoring the affected tube to its original strength.

The main advantage of a full length tube lining is that the tube material can be upgraded to a better material and there is no requirement for an entire tube replacement. It is also technically superior as compared to other sleeving methods using non-expandable materials such as plastics or ceramic ferrules.

## Overview of the Petroleum Industry in Brunei

The first offshore discovery in Brunei was made in 1963, although onshore production started in 1929. The petroleum industry plays a major role in Brunei's economy. The industry generated between 75 percent and 90 percent of the government's revenues. There are seven offshore fields and two onshore fields. In 2002, hydrocarbon output accounted for slightly more than 50 percent of the GDP and close to 90 percent of the export revenues. The country's proven reserves of crude oil and natural gas were estimated to be around 1.35 billion barrels and 391 billion cubic meters, respectively in 2002. In the same year, the output of crude oil and condensate averaged about 197,300 barrels per day, while natural gas output averaged 30 million cubic meters per day. About 90 percent of the crude oil production and almost all the natural gas output, in the form of liquefied natural gas, were exported. The remaining 10 percent was delivered to domestic power plants for electricity generation. Brunei is South East Asia's fourth largest crude oil producer, after Indonesia, Vietnam and Malaysia. At the

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current rate of extraction, the crude oil and gas reserves are expected to last about 15 years and 30 years, respectively.

Brunei Shell Petroleum Company is the major producer, pumping petroleum from 8 offshore fields and 2 onshore fields. This comprises 200 structures and 4 production complexes. The Brunei government and Royal Dutch Shell are equal shareholders in Brunei Shell Petroleum Company. Natural gas is also produced by EPA, a subsidiary of TOTAL Fina Elf S. A. (formerly known as Elf Aquitaine) and Shell New Zealand (formerly known as Fletcher Challenge Energy of New Zealand).

With declining reserves, Brunei made legal claims to its Economic Exclusive Zone. In this context, the activities would take in ultra-deep waters, some 1.5 to 2.5 kilometers deep. The deepwater acreage was opened in 2002. The move into deep sea activities presents both risks and opportunities. It also comes with a huge cost, in the order of between \$3 billion and \$4 billion to develop a commercial discovery. However, the acreage is viewed as the best piece of deep water in South East Asia.

Recognizing the declining petroleum reserves, during the past three years, Brunei Shell Petroleum Company have began investing in two major projects to maintain production levels and to extend production for another 30 years to 40 years, partly through enhanced oil recovery (EOC). A decision was made on the development of the new Egret Field in 2001, which has a projected cost of \$79 million. Phase 1 of the gas development project involves project management, engineering, procurement and fabrication. It covers the construction of a new drilling platform, a 25-kilometer long pipeline, and modification to the existing complex facilities. The second phase of the offshore Ampa-Fairley Rationalization Project was also launched in the same year. It costs \$347 million and is expected to rejuvenate the Western Field infrastructure. This covers a new onshore compression plant (OCP), offshore modifications and the laying of offshore pipelines.

The Brunei Petrochemical Industry Master Plan was completed in 2001 and it identified a number of potential areas for development over the next few decades. The Brunei government had sought expressions of interests for large-scale petrochemical projects, from both foreign and local companies in 2002. In this context, it had also set aside two sites for the use of such downstream industries and planned to bring the proposed facilities on-stream by 2007. Foreign investors would be allowed to own 100 percent equity interest in these projects, and mostly likely be granted pioneer status for a five-year period, for investing between \$278,600 and \$1.4 million; and an eight-year tax relief for investing more than \$1.4 million. The proposed site is the 1,000 square kilometer Pulau Muara Besar which is located just across the Muara deepwater port. It is to be used for the development of integrated petrochemical projects. However, in the interim period, the 230-hectare Sungai Liang site is available, complete with existing gas pipelines to the nearby Lumut LNG plant, as well as the onshore gas processing plant. This is the sole LNG plant in Brunei and it produced around 9.2 billion cubic meters of LNG in 2002.



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To tender for work with the Brunei Shell Petroleum Company, a vendor could either register itself with the company, or appointing a local agent or partner who is already registered with the company in the first place. Brunei Shell Petroleum Company encourages the development of technological capabilities of the indigenous Bruneian companies by encouraging joint ventures with foreign companies. There are two main categories for business developments and they are as follows:

- 100 percent Bumiputera – work is only open to contractors and companies which are 100 percent owned by indigenous Bruneians.
- open to all - work is open to all companies for registration. However, if there are sufficient Bruneian companies registered in the specific category of work, then international companies may not be registered.

A new development in the country's petroleum industry in 2002 was the implementation of the production sharing contract (PSC) as a new model of agreement for the exploration and production of petroleum. This replaced the old concession model. Brunei's Oil and Gas Authority (BOGA), the state's regulatory body was dissolved when a new national petroleum company was established in 2002, also known as Brunei National Petroleum Company or PetroleumBRUNEL.

A subsidiary of Brunei Shell Petroleum Company is the Brunei Shell Tanker Sdn Bhd. Owning seven tankers, the company is involved with the shipping of liquefied natural gas to major markets overseas. This presents another market for atmospheric corrosion control products.

Brunei Shell Petroleum Company spends an average of \$10 million on atmospheric corrosion control per annum. Approximately 50 percent of the costs are channeled into offshore structures, while the remaining into onshore installations. However, the figure spent on atmospheric corrosion control products varies from year to year as it is very project specific and is also a function of the urgency of the remedial actions needed. Brunei Shell Petroleum Company awarded a \$700,000 contract to Corro-Shield, through its local agent, Joffren Omar, to carry out corrosion control prevention and maintenance (34 metres below water), which does not involve the suspension of production. This was implemented in 2003.

## Overview of the Petroleum Industry in Indonesia

Indonesia had crude oil and natural gas reserves of approximately 5 billion barrels and 2.6 trillion cubic meters, respectively, in 2002. The country's crude oil, natural gas liquid and condensate production experienced a fourth consecutive year of decline in 2002, to an average of around 1.25 million barrels per day. This was attributed mainly to ageing fields. Exports of crude oil also declined in tandem, which was recorded at 271.8 million barrels in 2002, due to both lower output and higher domestic demand. Natural gas production was recorded at 86.1

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million cubic meters per day in 2002. Indonesia was the biggest exporter of liquefied natural gas in the world in 2002, exporting up to 26.2 million tons.

Foreign companies participate in the petroleum industry through the production sharing contract (PSC) model. This system only applies for a green field area, where exploration has never been carried out. In addition to this model, Indonesia also has a variety of other contractual agreements that are designed for areas that have previously been explored or been worked, like the technical assistance contract (TAC), enhanced oil recovery (EOR) and joint operating agreements (JOA)

The state gas corporation - PT Perusahaan Gas Negara (PGN) is responsible for a series of gas pipeline projects. It plans to install in phases, an integrated gas transmission pipeline network, also known as the integrated transmission system to link the main gas fields in South Sumatra, Natuna and offshore East Java. Upon completion of the system, Indonesia is expected to have 3,800 kilometers of pipelines linking Batam, Central Sumatra, South Sumatra and Java.

While the national petroleum company, Pertamina, produces some crude oil (2.5 percent of the national total output), the vast majority are produced by the foreign multinational corporations under the PSC model. The government sets the tendering guidelines and also makes the final decision on large purchases of most equipment and services. In this context, all purchases by either Pertamina or the foreign MNCs must be firstly made through a local limited liability company, except for materials or equipment that are demonstrated to be available more cheaply overseas or are not available locally. They are usually procured by a tendering process.

The capacity utilization of the 9 refineries (eight plants are state-run) stood at 94 percent, out of the installed capacity of over 1.06 million barrels per day in 2002. The largest share of natural gas production is processed into liquefied natural gas and liquefied petroleum gas, followed by its generation for electricity production and conversion into polymers by the petrochemical plants. There are 13 liquefied petroleum gas and 2 liquefied natural gas plants in the downstream sector, besides 3 petrochemical plants.

In spite of its huge petroleum reserves due to its geological factor endowments, the global petroleum industry views Indonesia as being beset by almost insurmountable problems. They include issues of regulatory enforcement, interpretation, administration and duplication; taxation; labor regulation; political stability; native land claims; and forced socio-economic contributions outside the regular taxes.

Indonesia is the largest archipelago in the world, consisting of more than 17,000 islands. The country's sea area is 7.9 million square kilometers, including the exclusive economic zone, or about 4 times its land area. Hence, Indonesia is heavily dependent on maritime transport for both international and domestic trade. Pertamina also has its own shipping subsidiary,



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consisting of 31 ships to carry petroleum products. However, Indonesian waters suffer the dubious reputation of being unsafe, in light of the highest number of piracy incidents reported by the International Maritime Bureau. Hence, it affects the passage of vessels through Indonesian waters, and ultimately, docking at Indonesian ports that have the potential to generate the demand for corrosion control products, through maintenance and repair.

It is estimated that Indonesia's petroleum industry spends around \$10 million per annum on atmospheric corrosion control. It is also subjected to budget constraints and is a function of the urgency of the remedial actions needed on the part of the petroleum corporations. Corro-Shield markets its products directly to the end-users in the Indonesian market.

# 3

## Research Methodology

Frost & Sullivan has refined its research methodology over many years of experience, having researched a wide diversity of markets in many different life cycles—from embryonic to mature. Frost & Sullivan's reference publication, *Industrial Market Engineering* (Publication 5168-80), explains the research methodology in great depth.

Frost & Sullivan's Market Engineering system:

- Focuses on challenges, problems, and needs of industry participants
- Is based on primary market research, not secondary or previously published research
- Is based on detailed, comprehensive "bottom-up" data collection techniques
- Is based on measurements

### Market Engineering Forecasting Methodology

#### Overview

One of the most common questions Frost & Sullivan receives from its clients is, "What is your forecasting methodology and how can I assess its level of credibility and accuracy?" This section on Frost & Sullivan's proprietary Market Engineering forecasting methodology has been added to answer this question.

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This methodology integrates several forecasting techniques with the Market Engineering measurement-based system. It relies on the expertise of the analyst team in integrating the critical market elements investigated during the research phase of the project. These elements include:

- Expert-opinion forecasting methodology
- Delphi forecasting methodology
- Integration of market drivers and restraints
- Integration with the market challenges
- Integration of the Market Engineering measurement trends
- Integration of econometric variables
- Integration of customer demographics

The Market Engineering forecasting methodology is a seven-step system that maximizes the credibility and accuracy of the forecasts. The steps in this process are discussed in the following:

#### Market Engineering Research Process Completed

The Market Engineering research process provides the navigational measurements of current market position and trends, which become the basis of the forecast.

#### Measurements and Challenges Analyzed over Time

Measurements and challenges are analyzed over time to provide more insight into their potential impact on market size and development.

#### Identification of Market Drivers and Restraints

At this stage, the analyst specifies the factors that will drive the market forward in terms of revenues and determines the elements that will inhibit growth.

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**15. INDEPENDENT MARKET RESEARCH REPORT (Cont'd)**

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**Expert-Opinion Integration with Analyst Team**

The interview process includes a variety of industry experts: competitors and key customers. These expert opinions on the direction of the market are integrated with the data and analysis already created.

**Forecasts Calculated**

At this stage, analysts collect all the market data needed to create the initial forecast scenarios. Each scenario is tested to determine the most probable outcome for the market size. For example, the forecasts are matched to the leading economic indicators and drivers for each specific industry.

**Delphi Technique Integration When Needed**

If data and forecast scenarios conflict, it becomes necessary to again discuss the market forecasts with the industry experts interviewed in the research process.

**Quality Control Within Research Department**

Once the forecasts are integrated into the market section, they are checked by other team members in the industry research group (IRG) and the research director. The forecasts are also checked for mathematical accuracy and internal consistency by the Final Review Preparation Department and the Editing Department.

**Strategic Significance of the Market Engineering Forecast**

The Market Engineering forecast can have a significant impact on the business in several areas. Therefore, it should be integrated into business planning, strategy development, and decision-making.

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**15. INDEPENDENT MARKET RESEARCH REPORT (Cont'd)**

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## Judging Credibility and Accuracy of Market Engineering Forecasts

Frost & Sullivan forecasts integrate the key elements that typically have an impact on market growth and size. No one can consistently make accurate forecasts, but market research has a proven track record in making accurate projections of market trends and growth rates.

The key test of credibility is whether the analyst team integrated all the critical elements of the market into the forecast. If all the elements that create a credible forecast are included in the analysis, then the forecast has strong credibility.

The accuracy of a forecast to within a 10 percent range over a three-year period is not vitally important. What is important is that the overall trend be forecast correctly, because the overall trend drives the appropriate strategy and subsequent decisions. The Market Engineering forecasting methodology has consistently proved to be an accurate and reliable forecasting tool, particularly for high technology and industrial markets.

All the currencies reported are in the US dollar. For the Malaysian market, the currencies specified are in Ringgit Malaysia (RM).

Over the past 40 years, Frost & Sullivan has had an impressive track record in forecasting emerging markets, new technologies, and shifts in existing markets. Unexpected events have always significantly changed the marketplace, but these do not occur often, and they typically merely delay the development of the market rather than destroy it.

Frost & Sullivan always advise clients that its forecasts should not be the exclusive basis for decision making at their companies. It should be one more source of input and a support tool for their work in investigating the market and creating a winning strategy.

In the final analysis, decision-making is based on the general trend of the forecast, not its absolute accuracy.

It is important to accurately determine the range of the forecast, because that will have the greatest impact on the investment or strategy decision. Typically the decisions revolve around questions such as:

- Should the company enter the market?
- Should the company increase or decrease its investment?
- Should the company improve its performance in the market?

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**15. INDEPENDENT MARKET RESEARCH REPORT *(Cont'd)***

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These decisions do not require accuracy within a few percentage points. They require accuracy in the determination of the general trend category. All business decisions carry some risk. Market Engineering increases the probability that the decisions will be correct, but it does not eliminate all risks.

## 16. DIRECTORS' REPORT

**PERISAI PETROLEUM TEKNOLOGI BHD** 632811-X  
LOT NO: 9, JALAN P10/15  
KAW. PERINDUSTRIAN MIEL,  
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43650 BANDAR BARU BANGI,  
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**PERISAI**  
PetroleumTeknologi

### Registered Office

Suite 2, 1<sup>st</sup> Floor, Wisma Leopad  
No.5 Jalan Tun Sambanthan  
50470 Kuala Lumpur

11 JUN 2004

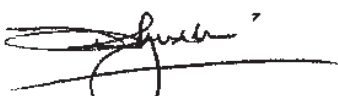
The Shareholders  
Perisai Petroleum Teknologi Bhd

Dear Sir / Madam,

On behalf of the Board of Directors of Perisai Petroleum Teknologi Bhd ("the Company"), I report after due and careful enquiry that during the period from 31 December 2003 (being the date to which the last audited accounts of the Company and its subsidiary companies have been made) to 11 June 2004 (being a date not earlier than 14 days before the issue of this Prospectus):

- a. the business of the Company and its subsidiary companies has, in the opinion of the Board of Directors of the Company, been satisfactorily maintained;
- b. in the opinion of the Board of Directors of the Company, no circumstances have arisen since the last audited accounts of the Company and its subsidiary companies which have adversely affected the trading or the value of the assets of the Company or of its subsidiary companies ;
- c. the current assets of the Company and its subsidiary companies appear in the books at values which are believed to be realisable in the ordinary course of business;
- d. no contingent liabilities have arisen by reason of any guarantees or indemnities given by the Company and its subsidiary companies ;
- e. since the last audited accounts of the Company and its subsidiary companies, there has been no default or any known event that could give rise to a default situation, in respect of payments of either interest and/or principal sums in relation to any borrowings in which we are aware of; and
- f. since the last audited accounts of the Company and its subsidiary companies, save as disclosed in the Accountants' Report and the proforma consolidated balance sheet of the Company as at 31 December 2003 enclosed in this Prospectus, there have been no changes to the published reserves or any unusual factors affecting the profits of the Company and its subsidiary companies.

Yours faithfully,  
For and on behalf of the Board of Directors  
Perisai Petroleum Teknologi Bhd



Tengku Daud Shaifuddin bin Tengku Zainudin  
Executive Director