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and
Centre for Maritime Policy**

Working Paper No. 9

**SEABORNE TRADE FLOWS IN THE ASIA PACIFIC
PRESENT AND FUTURE TRENDS**

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Summary

In response to a request from Director-General, Navy Strategic Policy and Futures (DGNSPF), under a three-year directed research program agreed between the Royal Australian Navy and the University of Wollongong, Centre for Maritime Policy (CMP). The Centre conducted a study of seaborne trade flows in the Asia Pacific region, both now and to 2020. This research task constituted Part I of Research Task 1, which is to examine the future trends in shipping and seaborne trade in the Asia Pacific region. This research study considered both the recent trends and form of world and regional seaborne trade and the likely trends in future commodity flow in the Asia Pacific.

This Report summarises the findings of that research and presents some conclusions and indicators for future trends.

Research Approach

We sought to identify the recent past and present composition and flow of seaborne trade in the world and in the Asia Pacific, and to identify likely trends in seaborne trade in the region over the next 10-20 years. To help identify trends we examined likely energy demands and commodity requirements for Asia-Pacific Economic Cooperation (APEC) forum members over the period 2000-2020. The study seeks to identify seaborne trade patterns, which can then link with future studies on merchant ship developments, shipping flows and trends in port development and infrastructure.

Key Findings

The principal findings of our research, into present and future seaborne trade flow in the Asia Pacific, are summarised below.

- World seaborne trade comprises approximately 99% by weight and between 71% - 79% by value of total world trade, and totalled 5.23 billion tons in 1999, an increase of 1.3% over 1998. Growth in world seaborne trade in 2000, is expected to be 2%. In 2000, the 21 countries comprising APEC accounted for 64% of world economic activity, 50% of world GNP and 45% of world foreign trade volume.¹ Nine of Australia's top ten trading partners are members of APEC. In 1999, 73% of Australia's exports by value were to APEC and 70% of imports were from APEC members.

- Intra-APEC trade in 1999 accounted for 71.6% of exports and 72.6% of imports of member economies. This predominance of intra-regional trade will likely continue to 2020. Australia conducts approximately 70% of its trade with APEC, with imports coming primarily from the US, ASEAN and Japan, and exports going to Japan and ASEAN.
- In 1999, Asian countries maintained 26.1% and 18.8% of total world export and import trade respectively, by volume. The sustainable demand for imports to the US in 1999 (11.5% growth over 1998) and to a lesser extent, export growth of 3.2%, primarily fuelled the Asian economic recovery and, therefore, level of seaborne trade in the Asia Pacific. The level and degree of fluctuation of domestic demand in the US will be critical to the level of intra-Asian and Asia Pacific seaborne trade over the next 5 years. Asian export growth is linked closely to the export levels of Japan and the five Asian developing countries (Indonesia, Malaysia, Philippines, Thailand and ROK).
- The medium to long-term forecast for seaborne trade flow in the Asia Pacific is uncertain, depending largely on the nature and extent of the slowdown in the US economy and the flow-on effects to Asia, particularly on East Asian import and export growth. Uncertainty surrounds the extent of any economic recovery in Japan, the strength with which the Chinese economy will continue to grow from its low in 1999, and the sustainability of the rapid expansion in the economies of the ROK and Vietnam. To 2005/6, the principal factors shaping regional seaborne trade will be the emergence of new markets, further reduction of trade barriers by 2003 under the ASEAN Free Trade Area (AFTA) regime, and the progress of World Trade Organisation (WTO) negotiations with regional members.
- In relation to the pattern of energy sector seaborne trade in the Asia Pacific, the APEC economies presently account for nearly 59% of world energy consumption, and this is projected to grow by an average of 1.9% per year to 2015.² In particular, the major growth in demand for energy commodities in the region is for nuclear, coal, natural gas and oil. Crude oil demand is principally from the US, followed by Japan, ROK, Taipei and China. The oil for Asian States is predominantly sourced from the Middle East Gulf States. The demand for LNG has grown significantly in Japan, ROK and Taipei,

as gas is increasingly seen as a clean and efficient alternative to coal in the electricity generation industry. Nevertheless, coal continues to supply approximately 50% of the regional electricity demand.

- Crucial to the supply of approximately 80% of crude oil demand from Japan, ROK and Taipei, and over 60% of the LNG demand of North East Asia, are the sea lines of communication (SLOC) through the South China Sea and Indonesian archipelago. The South East Asian SLOCs are also vital to the movement of both import and export trade for Australia, which has over 70% of its trade moving through these SLOCs.
- By 2015, Asia's energy needs will be met either through coal transported intra-regionally, or from oil and gas supplies transported from the Middle East Gulf States, Central Asia and Russia. The US and Canada will source their energy needs primarily from the Atlantic Basin.³ Disruption of these energy supplies, by conflict among energy-producing States, or major terrorist actions, would have serious consequences for the economy of the Asia Pacific, and in particular, that of North East and South East Asia.
- Whilst the majority of seaborne trade in coal, iron ore, wheat and crude oil/petroleum products is shipped by bulk carriers or tankers, the liner trades are far more significant in value terms. Over the next 20 years, container traffic in the Asia Pacific is expected to grow substantially, both in terms of size of vessels and frequency of traffic. In ASEAN alone, container traffic is projected to increase by over 400% by 2020. This will parallel a move away from bulk agricultural and mineral products towards value-added manufactures. Trade flows will increasingly be concentrated at a two-tier level, ie.
 - (a) Mega-vessels calling at mega-hubs serving regions/trade blocs rather than individual countries
 - (b) An elaborate relay/feeder service with the deployment of 1000-2000 TEU (twenty-foot equivalent unit) feeder vessels connecting the mega-hubs to waypoints, minor hubs and feeder ports in individual countries.⁴
- In terms of overall APEC trade flow, in 1999, the majority (73%) of import trade (US\$1937B) was sourced within APEC, and 72% of export trade (US\$1879B) was intra-APEC. The principal exporters to

APEC are the US (17% of market: US\$444B), EU (14.6%: US\$389B), Japan (12%: US\$323B) and ASEAN7 (10%: US\$266B). The principal importers from APEC are US (25%: US\$668B), EU (15%: US\$398B), ASEAN7 (9%: US\$235B) and Japan (7.5%: US\$196B). Thus, we can see the importance of the US economy and the involvement of the EU market, which would be also affected by any significant slowdown in the US economy.⁵

- China's export trade in 1999 was principally with the US (US\$42B), followed by HK (US\$37B), Japan (US\$32B), EU (US\$28B) and ASEAN7 (US\$12B). Only 0.8% (US\$1.5B) of its export market is to the Russian Federation. China's import trade is principally from Japan (US\$33.8B), followed by EU (US\$24B), Taipei (US\$19.5B), the US (US\$19.5B) and ROK (US\$17B). Only 2.5% of its import market is from the Russian Federation (US\$4B).⁶ China is vulnerable in both its export and import trade to any economic slowdown in the US and in Japan. Russia has much to gain from trade liberalisation with China, especially in the energy market, principally in oil and natural gas.
- The strategic importance of seaborne trade in the Asia Pacific, and the necessity to keep open the major shipping routes through the region, dictate that there be current and ongoing analyses of shipping movements, by type, frequency and route, in order to determine changes, patterns of use and emerging difficulties of navigation and free passage under international Law of the Sea provisions. Australia, in conjunction with the US and perhaps Canada and Malaysia, should seek to develop a cooperative research capacity to analyse and collate commercial shipping information available from Lloyd's and others, so as to be able to generate the necessary information best able to inform respective maritime security decisions by regional States. This cooperative research capacity should utilise, and where necessary, further refine, the Strategic Maritime Information System (SMIS) concept demonstrator developed by the RAN in conjunction with DSTO in 1995.⁷

Introduction

On the 11 September 2000, DGNSPF signed, on behalf of the Royal Australian Navy (RAN) a Memorandum of Agreement with the University of Wollongong for the conduct of a three year directed research program on topics within the marine studies domain. Research Task 1 commenced in January 2001 and was to include an analysis of regional shipping and seaborne trade in the Asia Pacific, both now and over the next 20 years. This task was particularly appropriate, given the global significance of this region to the movement of seaborne cargo (over 50% of the world's merchant fleet pass through the Indonesian archipelago or Malacca Strait and on to the South China Sea).

The first two months of research sought to identify sources of current and projected data and analyses of shipping and seaborne trade flows, and developments in ship design, propulsion and employment. This data and analysis was, in some cases, non-existent and in other cases, incomplete or tightly controlled in terms of access, and with significant costs for acquisition. The last detailed analysis of commercial ship and trade flow through the South East Asian Sea Lines of Communication (SLOC) and South China Sea was done using data for 1993, by the economist and naval analyst, Dr. J. Noer, at the Center for Naval Analyses, USA. This was part of a US Navy-directed study utilising specially compiled databases of commercial shipping information.⁸ As far as we are able to determine, there has been no other detailed analyses of commercial shipping data for the Asia Pacific region by either the USN or other regional navies carried out in the intervening period. Despite the fact that detailed shipping data is held by Lloyd's Maritime Database, Lloyd's Shipping Index, Seadata, and other sources both international and national, and regularly compiled for specific Commercial Reports by maritime consultants such as Drewry and Fearnley, who charge in excess of \$1000AUD per report.

In short, it became obvious that, in order to address the original scope of Research Task 1. It would be necessary to spend most, if not all, of 2001 in lengthy and costly pursuit of data that may or may not be appropriate for the purpose for which the RAN commissioned this research. The analysis of this data would, by its nature, be very time and resource intensive. It was therefore resolved to address the task by sub-dividing it. Research Task 1, would be subdivided into three parts:

- Part I – an analysis of the present nature of seaborne trade flow in the Asia Pacific and an analysis of future trends in this trade over the next 10-20 years.
- Part II – an analysis of the strategic development of hub and feeder ports in the Asia Pacific and the future trend over the next 10-15 years.
- Part III – an analysis of the evolving nature of the shipping industry and shipping patterns and flows in the Asia Pacific, over the next 10-20 years. Factors to include environmental, propulsion and hull design issues and shipping movements by type in the region, concentrating on the key SLOCs.

It was resolved that Part I would be addressed first. It was further resolved that the RAN would review and determine the specific objective(s) of Research Task 1 and the necessary research components in order to attain that objective.⁹ This would then inform the final detail of Parts II and III.

We divided Part I into the following sub-tasks:

- A description of the nature and pattern of world seaborne trade in the period 1995-2000, identifying major issues and trends.
- A description of the nature and pattern of trade in the Asia Pacific region (specifically amongst the 21 members of APEC) in the period 1995-2000, identifying major issues and trends.
- A review of trade flows in the Asia Pacific, including Australian import and export trade, identifying major commodities and trading partners.
- A review of liner trade flows in the Asia Pacific, focussing on trade flow to and from Australia, identifying major issues and trends.
- An analysis of future commodity flows and energy demands for APEC members, for the period 2000-2020.

This report summarises many of the details of seaborne trade flows to and from Australia and both extra and intra-Asia Pacific regional trade. It does not seek to generate or devise new analyses of trade flow patterns, or apply economic modelling to an analysis of economic factors that might impact on the nature and extent of future seaborne

trade in the Asia Pacific. The trade statistics quoted for APEC member economies are for seaborne trade relevant to the whole country, and do not, unless stated otherwise, apply only to a specific coast or region of that country. Trade flow patterns and routes will usually be specific to a particular coast or region of a country, unless stated otherwise.

PART 1

World Seaborne Trade

The nature of global seaborne trade has continued to evolve as a truly internationalised activity. Manufacturer's products may be assembled from elements produced in several countries. Transported to national seaports under multinational control, then loaded aboard a vessel that is owned by a numbered company located, for example, in the Grand Cayman Islands, with shareholders in at least three European countries, and registered in Liberia, although its true country of domicile may well be Greece. The Captain and officers are from Asia and the crew is multinational. The ship has the carrying capacity of a small World War II convoy and the product, just loaded, represents about ten per cent of the total cargo, which may come from a dozen countries and is destined for a variety of markets.¹⁰ This 'globalisation' of seaborne trade raises some complex issues relating to the nature of the strategic concern and the extent and responsibility of international regulation of maritime trade and shipping. The short-term future of seaborne trade in the Asia Pacific may well be shaped by the emergence of new markets. The reduction of trade barriers under the ASEAN Free Trade Area (AFTA) regime by 2003, and the forthcoming World Trade Organisation negotiations.

From 1990-95, world trade grew at a rate of 6.5%. Exports from the developing economies in North East and South East Asia increased by 13% at a time when GDP in Asia increased by 6.1%.¹¹ By 1997, world GDP had slowed to 3.4% and by 1998 it was just 1.8%. In 1998 the Asian GDP was 0.9% although the GDP of China was a healthy 7.8%. The pick-up in world GDP in 1999 to 2.7%, of which Asian GDP increased by 5.1% was fuelled by an expansion of United States output in excess of 4% with an associated import demand that sustained the improvement in Japan's economy and that of Asia as a whole.¹² Global seaborne trade is expected to grow by 2.0% in 2000. The development of international seaborne trade is represented at Table I, for selected years. Main points include:

- World seaborne trade in 1999 reached a record high of 5.23 billion tons and increased by 1.3% over 1998.
- Import expansion of Asia in 1999 offset import contraction in dry cargo in 1998.
- Socialist countries of Asia substantially increased their dry cargo imports in 1999.
- Asian export growth improved as Japan's exports recovered and the five developing Asian economies (Indonesia, Malaysia, Philippines, Thailand, ROK) affected by 1997-98 financial crises, achieved good growth in combined exports of dry cargo in 1999.

World seaborne trade can be summarised by major commodity type and geographical area, as indicated in Table II. The main points to note are:

- Developing Asia (incl. China, India and Indonesia) accounts for approximately 10% of world GDP, 54% of world population, and 18.6% of world energy consumption (of which 40% of the energy is oil).¹³ Their share of energy consumption by fuel is oil (18%), natural gas (7%) and coal (36%).¹⁴
- The US and Japan are the major importers of crude oil and petroleum products, with 23.7% and 16.4% respectively of total world imports.
- There has been a constant increase in volume of intra-regional trade in the Asia Pacific.
- The increase in cargo unloaded is due mainly to expansion of liner cargo from Asia.
- The Developing countries share in total world exports in 1999 remained at 50.5%, and share of imports was 27.8%.
- In 1999, Asia maintained 26.1% of world exports and 18.8% of world imports.
- 37% of world loaded petroleum products were traded in intra-Asian markets, including Japan, in 1999.
- Asia kept a 21.9% share of world dry cargo imports.
- China's trade dominates the socialist grouping in Asia and comprises mainly exports of coal and manufactures, and imports of iron ore.¹⁵

Table 1

Table 2

APEC Trade

The 21 countries comprising the Asia Pacific Economic Cooperation (APEC) forum, and their economic indicators, are listed at *Appendix A*. In 2001, these countries comprised 49% of the total world population, 64% of the world GNP and 45% of world foreign trade.¹⁶ In 1998 the APEC economies made up about 42% of the total volume of world trade. In the case of Australia, nine of our top ten trading partners are members of APEC. Trade within the APEC region grew at an average rate of 11.3% for the period 1992-97.¹⁷ This intra-APEC trade can best be summarised at Table III and IV.¹⁸ The most notable trends in intra-APEC trade at Table III include:

- In 1999, market share of APEC export trade staying within APEC was 71.6%, but ASEAN members only had 8.9%, the majority going to US (25%), China/HK (10%), Japan (7%) and Canada (7%).
- Drop in Japan's import growth from 10% (1992-97) to 0.4% by 1999, and China's import growth from 14.9% to 4.9%, largely as result of 1998 economic contraction.
- Fastest growth in intra-APEC imports over 1994-99 was in Mexico (13.1%), Philippines (10.6%), Canada (7.4%), United States (7%) and Vietnam (6.9%).
- Continued strength of US import demand from APEC (66% of merchandise imports in 2000) is crucial as an engine of trade growth for East Asian economies if they are to resume an overall high import growth rate.

Table III: Intra-APEC Trade - Importers

Largest intra-APEC importers	Value of 1999 Imports in \$US	Average Annual Growth in intra-APEC Imports from 1994-99
United States	\$ 668.0 billion	7.0%
Japan	\$ 196.0 billion	0.4%
Canada	\$ 189.6 billion	7.4%
China (PRC)	\$ 131.4 billion	4.9%
Hong Kong, China	\$ 129.1 billion	1.1%

Source: The APEC Region Trade and Investment 2000, DFAT

Table IV: Intra-APEC Trade – Exporters

Largest intra-APEC exporters	Value of 1999 Exports in \$US	Average Annual Growth in intra-APEC Exports from 1994-99
United States	\$ 445.0 billion	4.9%
Japan	\$ 322.6 billion	- 1.4%
China (PRC)	\$ 242.9 billion	9.1%
Canada	\$ 217.3 billion	6.7%
Mexico	\$ 120.9 billion	16.0%

Source: The APEC Region Trade and Investment 2000, DFAT

The principal points relating to intra-APEC export trade are:

- In 1999, market share of APEC imports from other APEC members was 72.6% but ASEAN7 members only had 10%.
- The US exported to other APEC members some 69% of its merchandise exports in 2000.
- The marked contraction in intra-APEC import growth, from (1992-97) to (1994-99) of: US (11.3 – 4.9%), Japan (6.9 – -1.4%), China (16.8 – 9.1%), Canada (10.9 – 6.7%) and Chinese Taipei (9.4% - 2.1%).
- The prominence of high intra-APEC export growth for the period 1994-99, in the Philippines (19.1%), Mexico (16.0%), Vietnam (13.6%) and China (9.1%).¹⁹

The principal export items of each APEC member are listed at *Appendix B*. When considering the nature and volume of seaborne **energy trade flow** in the Asia Pacific, the following points emerge:

- The APEC economies accounted for 59% of world energy consumption in 1999, and were a net energy importer. The region is a small net exporter of coal; a net exporter of natural gas (due to Russian exports to Western Europe); and a large net importer of oil. The region's largest net importers of energy are the US, Japan and ROK, and the largest net exporters are Russia, Canada, Indonesia, Australia and Mexico.²⁰

- From 1980-98, APEC energy consumption increased 35%; oil increased 16%, natural gas 37%, coal 48%, nuclear 198%.
- In 1999, APEC accounted for 57% of world natural gas consumption, 66% of coal consumption (principally US and China with 49% of world total), 56% of nuclear power production and consumption and 58% of world oil consumption.²¹
- In 1999, the US was the largest net oil importer in APEC (427.6 million tonnes), followed by Japan (214.9), South Korea, Chinese Taipei, China (36.6), Singapore and Thailand. Russia, Mexico, Canada and Indonesia are all significant net oil exporters. The US crude market continues to be fed by the Atlantic trade from the Arab-Gulf region, with excess Atlantic basin crude exported to Asia as backhaul cargo. Fuel oil demand in several Asia Pacific countries, including China and Japan, actually contracted during the economic slump of 1997-98, while in the Pacific basin the dependence on Middle East crude oil has continued to increase.²²
- In 1999, APEC was a significant net natural gas exporter, due largely to Russian exports to Europe. Canada exported large volumes of gas within APEC (to the US). Japan imported large volumes of natural gas in the form of LNG, mainly from South East Asia (Indonesia, Brunei, Malaysia). Brunei and Malaysia accounted for 25% of world LNG production in 1998.²³ Demand growth for LPG in Southeast Asia has been rapid, with regional LPG consumption of 6 million tons in 1990, 12.5 million tons in 1995, and an estimate of 16 million tons in 2000.
- The traditional LNG markets, Japan, Korea and Chinese Taipei, have more than doubled in the last decade due to increased generation requirements and growing city-gas demand.²⁴
- In 1999, APEC coal exports were principally from Australia, US, Indonesia and China.²⁵ Coal continues to supply approximately 50% of the electricity generation demand.²⁶

We can summarise APEC Export Trade estimates for 2000, by major commodity (not including petroleum), at Table V.

Table 5

The Table indicates that:

- For coal and coke, the major exporters are Australia, New Zealand and the US (in 1999, South Africa displaced the US as the second largest coal exporter in the world). Main importers are Japan, NIEs (mainly Korea) and Europe.
- For iron ore, the major exporters are Australia, New Zealand and the emerging exports of Latin America. The main importers are China, Japan, North America (US/Canada). The Asia Pacific region accounted for 43% approximately of world consumption in 1999.²⁷
- The major exporters of grain are the US, Canada and Latin America. Imports are mainly distributed between Japan, the NIEs and the Middle East.²⁸

In relation to the Crude Oil trade, the pattern of export and import trade has been changing over the period 1996-99. The US has diversified its supply source from the Middle East to now include Latin America. Asian economies, including Japan, rely heavily on imports from the Middle East. The seaborne crude oil trade is expected to grow at approximately 2% over the period 1999–2001, with the predominant flow from the Middle East to Asia.²⁹

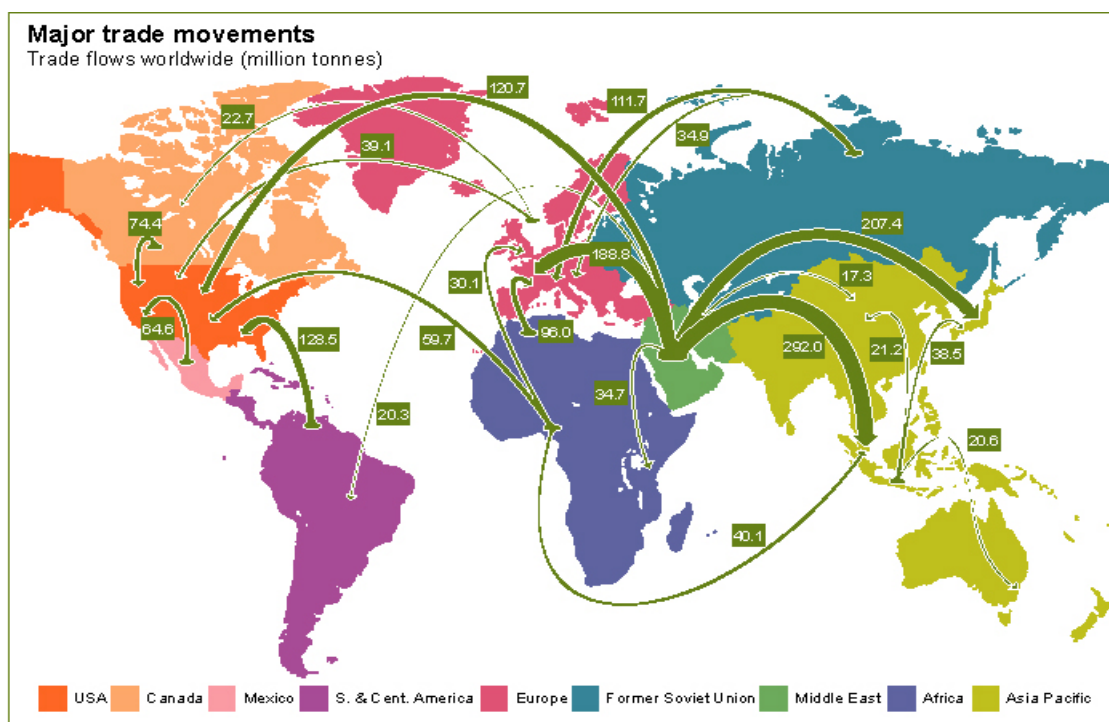
For Petroleum Products, approximately 50% of the demand of China, ROK, Singapore and Chinese Taipei come from intra-regional trade, with the remainder coming from Japan, US and the Middle East. US demand is increasingly being met by supplies from Latin America and Europe, as well as from the Middle East.³⁰

Major Oil and Gas Trade Flows 1999

Figures 1 and 2 show the major energy trade flows in Oil and Gas respectively, for 1999. Oil includes crude oil and petroleum products. *Appendices C and D* show oil and gas trade data for 1999.

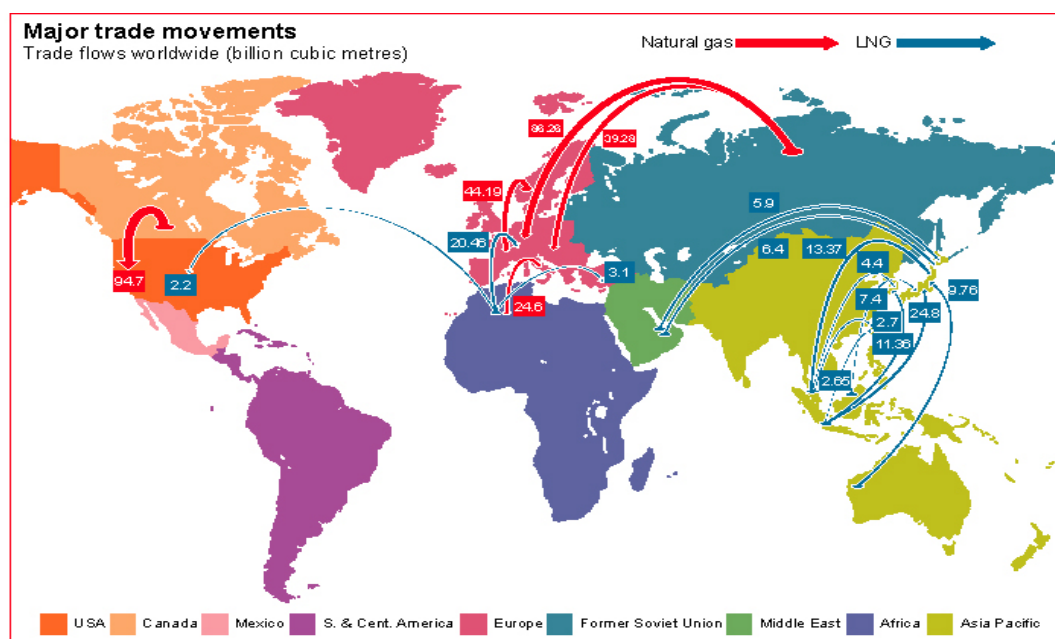
In the Asia Pacific region, the principal movements are from the Middle East to Japan (207.4 million tonnes) and the Asia Pacific, excluding US and South America (292.0 million tonnes). In addition, other significant petroleum movements are from the Asia Pacific to Australasia (20.6 million tonnes), China (21.2 million tonnes) and Japan (38.5 million tonnes).³¹

Figure 1: Major Oil Trade Flow 1999



Source: BP Amoco Statistical Review of World Energy 2000.

Figure 2: Major Gas Trade Flow 1999.



Source: BP Amoco Statistical Review of World Energy 2000

Principal trade movements of Liquefied Natural Gas (LNG) in the Asia Pacific in 1999 include supplies to Japan from Brunei (7.40 billion cubic metres), Australia (9.76 billion cubic metres), Malaysia (13.37 billion cubic metres) and Indonesia (24.80 billion cubic metres). Indonesia was the worlds largest exporter of LNG, with 38.81 billion cubic metres, followed by Algeria with 25.76 million cubic metres and then Malaysia with 20.55 billion cubic metres.³² This trade principally flows through the South China Sea.

Table VI: Intra-ASEAN7 Exports 1997-98 (US\$ million)

Country	1997	1998	Change (in value)	Change (%)
Brunei	496.42	220.83	-275.59	-55.5
Darussalam				
Indonesia	8,850.95	9,346.72	495.77	5.6
Malaysia	23,248.72	21,611.41	-1,637.31	-7.0
Philippines	3,436.17	3,821.03	384.86	11.2
Singapore	35,793.85	27,676.83	-8,117.02	-22.7
Thailand	13,525.72	8,314.67	-5,211.05	-38.5
Vietnam	1,832.89	2,373.40	540.51	29.5
Total	87,184.7	73,364.9	-13,819.8	15.9

Source: Vitasa, H.R. and Soeprpto, N. Maritime Sector Developments in ASEAN 1999, pp. 2.

ASEAN7 Trade Flow

We can get a more detailed picture of patterns of trade flow in Asia by looking specifically at the ASEAN7 grouping. This group includes Brunei, Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam. The level of intra-ASEAN7 Export trade over the period 1997-98, is shown at Table VI.

The financial and economic crisis in Asia over 1997/98 is evident in the sharp contraction in intra-regional trade. Intra-ASEAN7 exports declined by 15.9%, from US\$87.2 billion in 1997 to US\$73.4 billion in 1998. Member countries such as Singapore, Thailand and Malaysia showed marked drops in value of export trade for the period.³³

ASEAN7 trade with various countries for the period 1998-99 is shown at Table VII.

Table VII: ASEAN Trade 1998-99 (US \$ million)

Countries	Exports			Imports		
	1998	1999	Change (%) 1994-99	1998	1999	Change (%) 1994-99
US	69,390	71,477	6.4	46,124	46,480	1.5
Japan	38,774	44,390	0.7	51,325	54,997	-7.7
EU	56,911	51,907	7.1	36,142	32,983	-5.9
Australia	8,580	9,050	13.8	5,991	6,382	-3.8
Canada	2,650	2,536	2.9	1,729	1,797	-2.2
New Zealand	863	1,044	5.4	890	946	-1.9
ROK	8,687	11,965	4.2	13,670	14,825	1.2
China	10,676	11,543	9.8	12,273	13,261	10.2
Russian Fed	575	452	-14.4	561	1,361	12.2
Total APEC	244,620	266,734	4.1	219,033	230,504	-0.7
Rest of the World	31,243	36,337	7.6	24,601	30,981	-0.8
TOTAL	332,774	354,977	4.9	279,776	294,469	-1.4

Source: The APEC Region Trade and Investment 2000, DFAT

Table VII indicates the following trends in ASEAN trade flow:

- ASEAN exports to its members comprised 21.5% of the export market in 1999, and exports to APEC members comprised 75.1% of the market.
- Despite the economic slowdown in 1997-98, export growth to Australia, China, ROK, Mexico, Chinese Taipei and the US has remained strong.
- The principal export trade flow from ASEAN is to its own members (21.5%), followed by the US (20.1%), EU (14.6%) and Japan (12.5%).
- The most significant gains in export growth from ASEAN in 1994-99 were to the Philippines, Mexico, Australia and Chinese Taipei.
- ASEAN member imports come predominantly from ASEAN members (22.8%), then Japan (18.7%), US (15.8%) and the EU (11.2%).
- Growth in ASEAN7 import market share has come principally from Philippines, Mexico, Vietnam and China.

- The major decline in import trade to ASEAN7 has been seen from Japan (-7.7%) and Chile (-10.3%) over the period 1994-99.³⁴

Principal Trade Flow Routes in Asia Pacific

The principal international seaborne trade flows in the Asia Pacific are through the southern Straits of the Indonesian Archipelago, the South China Sea and the Philippine Archipelago. More than half of the world's annual merchant fleet tonnage (approximately 40,000 ships³⁵) passes through the Straits of Malacca, Sunda and Lombok each year, with the majority continuing into the South China Sea.³⁶ Large merchant vessels have three principal options:

- ***Malacca Strait*** The shortest route for all but the largest vessels sailing from the Middle East and Europe to North Asia and on to the west coast of North America.
- ***Sunda Strait*** The most direct route for vessels sailing from southern waters to North Asia.
- ***Lombok and Makassar Straits*** An important route for North-South traffic from southern waters and Australia to South East Asia and North Asia through the Philippine Sea.

The major trade flows in South East, North East and East Asia are shown at ***Appendix E*** (Major Liquid bulk trade flow 1993), ***Appendix F*** (Major Dry bulk trade flow 1993), ***Appendix G*** (Major Manufactured goods 1993) and ***Appendix H*** (Cellular container flow 1993).³⁷ These diagrams, although dated in terms of raw data flows, nevertheless show clearly the economic importance of the Malacca and Singapore Straits, the Indonesian archipelagic sea-lanes and South China Sea for North-South and East-West movement of trade. The major points are:

- Oil flows through Strait of Malacca are three times greater than through Suez Canal/Sumed Pipeline, and fifteen times greater than through the Panama Canal;
- Ship tonnage in the South China Sea is dominated by raw materials to East Asia;
- Tonnage via Malacca and Spratly Islands is dominated by liquid bulk (crude oil, LNG) and dry bulk (coal, iron ore);

- Nearly 66% of tonnage through Strait of Malacca, and 50% of volume passing the Spratly Islands is crude oil from the Persian Gulf;
- In 1997, oil flow through Strait of Malacca was 9.5 Million barrels per day, and projected to be 19-20 Million barrels by 2020;
- 80% of crude oil supplies to Japan, ROK and Taipei flow through the South China Sea from the Gulf, Africa and South East Asia (Indonesia, Malaysia);
- 66% of ROK energy imports and 60% of Japan and Taipei's energy imports are shipped through the South China Sea.³⁸
- Shipments of LNG through the South China Sea to North East Asia constituted 66% of the world's LNG trade in 1998. Japan is the world's largest consumer of LNG and shipments to Japan made up 75% of LNG trade through the South China Sea in 1998. Shipments to ROK and Taipei make up the remaining LNG trade through the Sea.³⁹

The percentage of respective countries seaborne trade flowing through these important sea lines of communication (SLOC) is shown at Table VIII and IX.

The Tables indicate that a significant percentage of the world's seaborne trade flows through the key SLOCs (15% in 1993). For Japan, over 40% of imports and exports flow through the SLOCs, hence their strategic importance in the absence of any viable alternatives such as land-bridges and alternate routes. The NIEs, with about a quarter of export and import trade flowing through the SLOCs, are less dependent but would nevertheless suffer any effects of closure. Australia (and New Zealand) have a key strategic interest in the Indonesian archipelagic sea-lanes and the Makassar Strait, which carry a significant percentage of both import (approx 42%) and export (approx 52.5%) trade, especially export trade to Japan and the NIEs. China's position is perhaps understated, given the emerging heavy reliance of China on oil imports and the significant percentage of intra-APEC trade to and from China. Nevertheless, a significant percentage (over 80%) of China's trade flows by other routes. The United States has even less trade through these routes (3.3% of exports, 4.5% of imports). The major trade links for the US with Asia are by means of the East-West flows from North Asia to the west coast of the United States. It should be remembered that the US trades more

goods across the Pacific than across the Atlantic. The US therefore has less of a direct economic interest in the SLOCs of South East Asia, but a significant strategic interest, given the trading links to the region they service, and the importance of the SLOCs to regional security and stability.⁴⁰

Table VIII: Seaborne Exports flowing through South East Asian SLOCs, 1993.

Economies	Tonnes (millions)	Value (US\$ Billions)	Percentage of export trade
Japan	33.6	153	42.4
NIEs ^a	24.7	78	25.7
Australia	133.6	17	39.5
China	8.9	20	21.8
Europe	40.8	107	6.8
South East Asia	171.2	114	55.4
United States	11.1	15	3.3
World	830.0	568	15.1

a. Newly Industrialised Economies (ROK, Chinese Taipei, Hong Kong)

Source: Chokepoints: Maritime Economic Concerns in Southeast Asia NDU.

If we consider export and import flow through the South East Asian SLOCs as a percentage of Gross Domestic Product (GDP), we find that the NIEs, with export and import flow approximately 10-11% of GDP, are the most dependent on the SLOCs. Export and imports combined for NIEs were over 21% of GDP in 1993. Next is Australia with over 12% of GDP, followed by Japan with 10% of GDP.⁴¹

Australian Seaborne Trade

Transport by sea is the major mode of transport for Australia's export and import trade. In 1997-98, 79% of the \$87.7 billion merchandise export trade, and 71% of the \$90.7 billion merchandise import trade, moved by sea.⁴² Australia's seaborne trade grew by 5.5% in 1997/98 to 478.8 million tonnes. Annual growth in the general cargo trade was 4.6% in 1997/98, which was a drop from the figure of 7.6% in 1996/97. Exports grew by 5.7% in 1997/98 to 427.1 million tonnes.⁴³ In 2000, Australian export trade grew by 25% to a total value of \$143 billion.⁴⁴ Australia's sea freight can be summarised at Table X.

The bulk of Australia's exports and imports by weight, consisting of coal, iron ore, wheat, petroleum and fertiliser, are shipped by bulk

carriers or tankers. The liner trades (ro-ro, containers) are far more significant in value terms, especially for the import trade, because liners tend to carry higher value cargoes. In 1997-98, liner vessels carried 4% by volume and 48% by value of seaborne exports, and 23% by volume and 74% by value of seaborne imports. Remaining seaborne trade is commodities shipped by bulk carriers and tankers.⁴⁵

Table IX: Seaborne Imports flowing through South East Asian SLOCs, 1993.

Economy	Tonnes	Value (US\$ Billions)	Percentage of import value
Japan	385.0	102	42.0
NIEs	199.8	85	28.3
Australia	10.2	24	52.8
China	23.0	11	10.3
Europe	41.7	162	10.5
Southeast Asia	139.4	118	52.5
United States	9.5	27	4.5
World	830.0	568	15.2

Source: Chokepoints: Maritime Economic Concerns in Southeast Asia, NDU.

Table X: Australian sea freight 1997-98

Imports	Australian Exports		Australian Imports	
	\$ billion	% of total by sea	\$ billion	% of total by sea
By value				
Total carried by sea	69.6	-	64.1	-
Bulk shipping	36.1	52	16.8	26
Liner shipping	33.5	48	47.3	74
By weight	Million tonnes	% of total by sea	Million tonnes	% of total by sea
Total carried by sea	427.1	-	51.7	-
Bulk shipping	408.8	95.7	39.6	77
Liner shipping	18.2	4.3	12.1	23

Source: International Liner Shipping August 1999.

The major trading partners for Australia can be summarised at Table XI.

The main points from Table XI are:

- In terms of both Export and Import trade, APEC is the most significant trading group for Australia, with 73% of exports to APEC and 70% of imports from APEC in 1999. In the case of Imports, the European Union is also significant. A healthy US economy and demand for our exports (30% growth in goods in 2000) supports a healthy export demand from East Asia. Goods exports to East Asia in 2000 grew at 34%, with growth in exports to China, ROK, and Singapore all over 40%.⁴⁶
- Within APEC, the major Australian export countries are Japan, ASEAN7, US. Exports to the USA have shown the greatest growth; over the period 1994-99 exports have grown by 12.2%. Other export partners for Australia are NZ and the ROK.
- Within APEC, the major Australian import countries are from the US, ASEAN7, Japan. The greatest trend in import growth over 1994-99 has been from ASEAN7 (15.9%), ROK (14.7%) and China (10.6%). China is currently Australia's fifth largest trading partner and accounts for over \$10 Billion of bilateral trade annually.
- By value, Australia's principal seaborne exports to APEC in 1999 were coal, crude petroleum, aluminium, iron ore, bovine meat and manufactures. In 2000, exports of manufactures grew by 20% and were larger than exports of fuels and minerals and rural products.⁴⁷ Importantly, in 2000 the Middle East became the largest market for Australian exports of motor vehicles, and goods exports to the Middle East grew at 38%.⁴⁸
- By value, Australia's principal seaborne imports from APEC in 1999 were passenger motor vehicles, crude petroleum, aircraft and parts and other elaborately transformed manufactures.⁴⁹

Major Australian Liner Trade Routes

We can derive some specific cargo flow information relating to regional seaborne trade routes from Australia by looking just at Cargo Flows on the major Liner trade routes, over the period 1997-98.⁵⁰ Australia's major trade routes run North-South, with major trade partners being East Asia (China, HK, Philippines, Taipei), Europe, Japan, North Asia (ROK, Nth Korea, Russia), South East Asia (Indonesia, Malaysia, Singapore, Thailand and Vietnam). The East-West routes lie mainly from trans-

shipment at Singapore, where cargo then goes to Europe or to North America. Approximately 30% of trade cargo destined for or originating in South East Asia is transhipped.⁵¹

Table XI: Australia's Principal Export and Import Trading Partners 1999.

Country	Exports To		Imports From	
	Value (US\$ million)	Market Share (%)	Value (US\$ million)	Market Share (%)
Singapore	2,633	4.7	2,683	4.1
ASEAN 7	7,223	12.9	9,176	14.0
China	2,639	4.7	4,266	6.5
Japan	10,777	19.2	8,798	13.4
ROK	4,052	7.2	2,519	3.8
NZ	4,306	7.7	2,650	4.0
Taipei	2,686	4.8	1,928	2.9
USA	5,429	9.7	13,726	21.0
Total				
APEC	40,863	72.9	45,933	70.1
EU	6,996	12.5	14,917	22.8
Others	8,200	14.6	4,645	7.1

Source: The APEC Region Trade and Investment 2000, DFAT

Table XII summarises the major liner cargo flows in 1997-98 to and from Australia and the Asia Pacific.

Table XII: Australian Liner Cargo on major trade routes, 1997-98 (million tonnes).

Trade route	Exports	Imports	Ratio of exports to imports
Japan and North Asia	4.18	1.19	3.5
South East Asia	3.58	1.82	2.0
East Asia	3.55	1.59	2.2
Europe	1.62	2.96	0.6
North America	1.30	2.12	0.6
New Zealand	1.23	1.30	1.0
Total	18.23	12.08	1.5

Source: International Liner Shipping Submission, August 1999

Table XII indicates the imbalance in trade, with the total weight of liner exports in 1997-98 almost 50% higher than imports. Since 1994-95, the weight of exports has exceeded the weight of imports on the Japan and North Asia, New Zealand, South East Asia and East Asia trade routes. The opposite is true for the Europe and North America routes.

Australian exports to Europe, whilst only 9% by weight of total exports, represent 15% by value. This is because exports to Europe tend to be of higher unit value than exports on average.⁵²

In 1998, approximately 30% of south-bound Europe – Australia liner trade was transhipped through Asian ports. Of this 30%, about 59% is transhipped through South East Asia. Transshipment of the north-bound trade is primarily through Singapore and represents about 10% of total trade. In 1997-98, about 48% of transhipped export trade from Australia to Europe went via South East Asia. This compares with 10% in 1989-90.⁵³

In 1997-98, approximately 7% by weight and 11% by value of Australia's liner exports went to North America. The total value was \$3.6 billion. Meat products make up the single largest liner export, followed by agricultural and mineral products, iron and steel. Major imports include chemicals, wood products, machinery, paper, and transport equipment.⁵⁴ In 1999, approximately 10% of containers to and from Australia/New Zealand to the US west coast were transhipped.⁵⁵

Future APEC Trade Flows

World economic growth in 2000 was 4.6%, the strongest growth in more than a decade. This was fuelled by growth of 5% in the US, solid growth in Europe and continued slower growth in East Asian economies, especially China. Whilst there was a slowing of growth in the second half of 2000, and weaker growth of only 3.25% is expected in 2001, the overall world growth is forecast to pick up from 2001 onwards to about 4% in 2002, underpinned by a resurgent US economy and stronger growth in the East Asian economies.⁵⁶

Whilst Table XIII estimates and forecasts are based on a continuing strong US and Chinese economy and moderate growth in East and South-East Asia, the key uncertainty is the economic prospects for the US, which accounts for 25% of the world economy.⁵⁷ A sharper than expected slowdown in the US economy combined with international oil prices averaging significantly higher than US\$28-29 a barrel for 2001-2002 could weaken the overall economic expansion rate for Asia, and for Canada and Mexico, who supply more than 80% of their exports to the US. Japan, China, ROK, Malaysia and Thailand supply between 20-30% of their exports to the US and would therefore, also be significantly affected by the economic slowdown.⁵⁸ Importantly for Australia, its

major export destination, Japan (20% of exports), is expected to have a prolonged slow economic recovery, exacerbated by any US slowdown. Economic growth is projected to average 1.8% a year to 2006.

Table XIII: Key World Macroeconomic Assumptions

Economic Growth^b	1999	2000	2001	2002	2003	2004	2005	2006
OECD	3%	3.9%	2.3%	3.0%	2.9%	2.8%	2.8%	2.9%
US	4.2	5.0	1.8	3.2	3.0	3.0	3.0	3.0
Japan	0.8	1.5	1.2	1.5	1.7	1.8	1.8	2.0
ROK	10.7	9.2	5.0	5.5	5.5	5.0	5.0	5.0
NZ	3.9	4.2	3.0	3.0	3.0	3.0	3.0	3.0
Australia	5.4	4.4	3.5	3.5	3.5	3.5	3.5	3.5
Non OECD	5.8	6.8	6.2	6.4	6.2	6.2	6.0	6.0
Asia	3.1	5.7	4.3	4.7	5.0	5.1	5.3	5.3
SE Asia ^c	7.1	8.0	7.8	7.8	7.5	7.5	7.0	7.0
China ^d	5.4	6.3	5.0	5.5	5.5	5.5	5.0	5.0
Taipei	0.1	3.5	3.5	3.7	3.7	3.7	3.7	3.7
Latin America	3.3	4.6	3.4	3.9	3.8	3.8	3.7	3.7
World ^e								
Inflation ^b								
US	2.2	3.4	2.7	2.5	2.5	2.5	2.5	2.5

Source: Australian Commodities: Forecasts and Issues. 2001

b. change from previous period

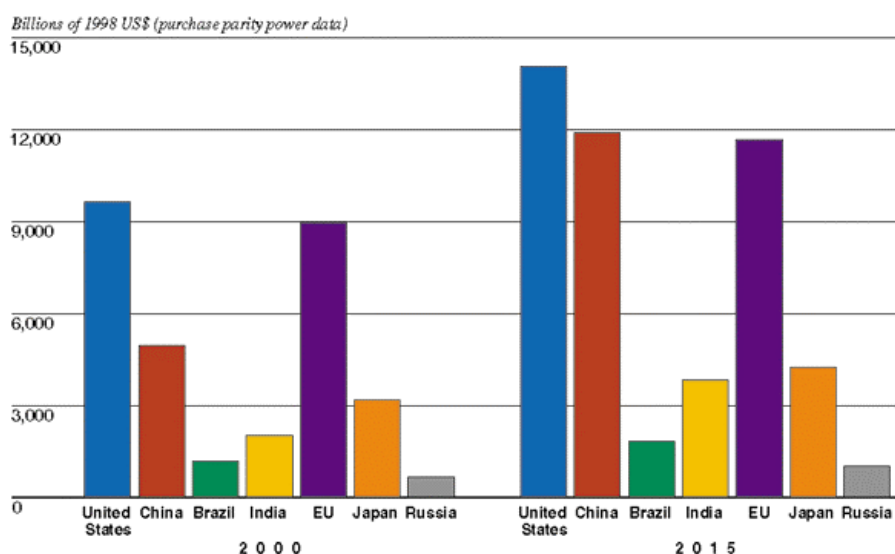
c. Indonesia, Malaysia, Philippines, Singapore, Thailand

d. Excludes HK

e. Weighted using 1999 purchasing power parity valuation of country GDP by IMF

Economic growth in China is expected to remain strong, with moderating export performance as a result of the US slowdown. The US and Japan are destinations for close to 40% of China's exports.

The following Table summarises GDP trends by Countries for 2000 and 2015.

GDP by Major Countries and the EU: 2000 and 2015


Source: CIA's Long-Term Growth Model.

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It shows that emerging Asia will be the fastest growing region, led by China and India, whose economies already comprise one-sixth of global GDP. Japan's relative importance in the global economy will decrease. The model is predicated on a strong growth forecast for the US.⁵⁹

The following Table summarises economic growth forecasts in South East Asia for 2000-2006, based on the factors discussed above.

Table XIV: Economic Growth Forecast for SE Asia

Country	2000	2001	2002-2006
Thailand	4.5%	4.0%	4.9%
Indonesia	4.5%	4.0%	4.9%
Malaysia	8.7%	5.0%	5.7%
Philippines	3.9%	2.6%	4.2%
Singapore	10.0%	6.0%	5.7%

Source: Australian Commodities: Forecasts and Issues. Outlook 2001

For South East Asia as a whole, economic growth is forecast to average 4.3% in 2001, strengthening to 4.7% in 2002. This compares with growth of 5.7% in 2000. The risks to the economic health of Asia and South East Asia in particular, hence to import and export demand in the region, include external disturbances such as a marked US economic slowdown, the slow pace of economic restructuring in Thailand and

Indonesia, and continuing political uncertainty and social instability in the region.⁶⁰

Table XV: International Trade Forecast ASEAN7 (US\$ Million)

	Intra-ASEAN	ASEAN Exports	Imports to ASEAN	Total
1997	148,871 (21.3%)	258,251 (37.0%)	291,520 (41.7%)	698,642
2004	245,614 (24.8%)	353,979 (35.8%)	390,102 (39.4%)	989,695
2010	431,924 (27.6%)	538,926 (34.4%)	594,172 (38.0%)	1,565,022
2020	969,197 (32.3%)	964,311 (32.2%)	1,063,186 (35.5%)	2,996,694

Source: ASEAN Transport Cooperation Framework Plan, July 1999

Assuming that ASEAN7 economic integration proceeds smoothly, with progressive reduction in tariff barriers, improvement in transport corridors and effective rules and regulations governing transit transport and international trade in place, the overall regional trade forecast is as shown at Table XV.

Table XV demonstrates a trend over the next 20 years for the percentage of overall international trade comprising extra-ASEAN imports and exports to decline, and for the percentage contribution of intra-ASEAN trade to increase, to be on a par in value with ASEAN Exports by 2020 (percentage of international trade with ASEAN shown in parentheses). Container trade in ASEAN is expected to increase to 2020, when total container growth is expected to be 2.4 – 4.9 times higher than in 1997. More direct shipping movements will occur as more routes become economically viable, and hence the transshipment load on Singapore will ease. Of note here is the continuing research (by 14 countries) into the feasibility of a major shipping route through the Arctic, connecting Europe, the Middle East and Asia, which would be approximately half the distance of the Suez route. Even though research has been continuing since 1993, it is difficult to forecast whether such an Arctic route will become economically feasible in our forecast period to 2020.⁶¹

The greatest growth in container traffic is expected in Myanmar, Cambodia and Vietnam.⁶² Overall, ASEAN container trade traffic is

projected to increase to 128,900 TEUs by 2020, an increase of 400% over 1997 figures.⁶³ This projected growth will drive a remodelling of container port development in the region. It will also drive the development of larger capacity container ships and general cargo shipping.

Overall, the key seaborne trade trends for the Asia Pacific over the next 10-20 years include the following:

- Strong growth in import demand amongst regional countries with strong GDP, in particular, China, India and Taiwan.
- Slower growth in Australian exports to Japan reflecting slower economic growth. The nature of Japanese import demand will change away from resource-intensive industrial products to more technology-intensive, information and services industries. This will see a reduction in seaborne trade in resource-based exports to Japan.
- Substantial import demand in both the US and European markets. The US economy will continue to act as an engine of trade growth for East Asian economies.
- Continued trade focus for Australia in the Asia Pacific region, but increasing efficiencies in trade through electronic commerce may well open up other markets.
- Composition of seaborne trade will move away from bulk agricultural and mineral products towards value-added manufactures, however this trend may be slower in our region compared to more developed economies.⁶⁴
- Energy fuels and mineral exports will continue to grow over the next 10 years, but reductions in key energy exports such as coal will be inevitable in the long term (20 years plus) due to adoption of environmental regimes and protocols. Coal is projected to comprise only 19% of total world energy consumption in 2020, down from 22% in 1999. Also, Australia will face increasing competition for supply of coal to the region from China and Indonesia. China (the world's largest coal consumer) and India will account for 92% of the world's forecast growth in coal use over 1999-2020.⁶⁵ Japan will continue to be the world's leading importer of coal, with 24% of

world import trade in 2020. Coal imports by China, Malaysia, Philippines and Thailand will grow substantially to 2020.⁶⁶

- Oil consumption in East Asia is expected to increase by 3% pa, with over half of this coming from China (by 2020, China forecast to import 60% of its oil requirement⁶⁷). By 2020, oil consumption in East Asia is forecast to be 20 Million barrels per day, or a 66% increase over 2000 consumption. Most of this oil will be sourced from the Persian Gulf.
- Natural gas consumption in East Asia is expected to increase 7% pa to 2020, with over half this increase from China (by 2020, China forecast to import at least 30% of its natural gas requirement⁶⁸). Consumption in 2020 would be 4 times 2000 levels.⁶⁹
- Increasing competition for Australian supplies of natural gas to the Asia Pacific will come from Indonesia, Malaysia and the Middle East, and any Asian Pipeline Grid.⁷⁰

The detailed forecasts for World Oil, Gas and Coal consumption by region (1990-2020) and Oil and Gas trade movements are at *Appendices I-K*.

Australian Commodities Trade Outlook to 2005/6

Agricultural Products

There will be a general growth in demand for animal feed and food products as the global economy grows. This should result in increased export of cattle to the US and Asia. Farm exports are forecast to reach a real value of \$28 billion pa by 2006. Crop export value will rise but livestock exports will remain stable.⁷¹

Grains

The US dominates over 20% of the world wheat trade. The major exporting countries will remain the US, EU, Canada, Australia and Argentina. Demand for grains will be strongest amongst the developing countries, including Asia and South America. Feed grain demand will be strongest in China and South East Asia, where there will be growing consumption of meat and dairy products. The population growth in Asia and some Latin American countries will remain strong, hence demand for cereals, meat and processed foods will grow from the traditional exporters, the US, Argentina, Australia, Canada and the EU. Japan is

expected to remain a significant importer of feed grain, accounting for between 20-30% of world trade in corn and other grains. India is likely to become more dependent on imports of course grains as its meat consumption increases and livestock sector expands.⁷²

Meat

Australia's export markets are the US and Japan. The US accounts for 39% of beef exports in 2000, and Japan 36%. Other importers are ROK (8%), Canada (3%), Chinese Taipei (3%) and South East Asia (4%). Export volume to the US is projected to increase from 343 kt in 2000-01, to 369kt in 2002-03, then reduce to 350kt by 2005-06. In Japan, the level of exports is expected to decrease with a slowing Japanese economy and decreasing domestic demand for beef combined with cheaper imports. In the ROK, with liberalisation of the beef market and increased market access, beef imports from Australia are forecast to increase from 74kt in 2000-01 to 97 kt in 2005-06. Live cattle exports to Indonesia make up the largest sector of our live exports, with approximately one third of the total live trade in 2000 going to Indonesia. The Philippines accounts for 25% and Egypt is the third largest cattle market for Australia. Live cattle exports are projected to grow by 20% over the period to 2005-06. Overall, the meat export market is expected to grow from \$3.5Billion in 2000-01, to \$3.9 Billion in 2002-03, then reduce to \$3.3 Billion by 2005-06.⁷³

Minerals and Energy

Exports of Australian minerals and energy resources are expected to grow over the period, supported by strong growth in world GDP and industrial production. The continuing strong Asian demand in this sector is predicated on a reasonable economic growth rate for the US economy. Asia's share of world consumption of minerals and energy resources has, on average, grown by 60-70% over the period 1980-2000. Asian consumption as a percentage of world consumption of minerals is approximately 30-39%, whilst steel consumption is now 39%, coal 36% and oil 25.7%.⁷⁴ These figures are expected to increase over the period due to economic expansion in Asia of 4-7%.

Demand for fuel for electricity generation is expected to increase in Asia, leading to increasing demand for thermal coal, liquefied natural gas, and uranium. The increasing concentration of global steel production in the Asian region (from 27% in 2000 to 30% in 2006) will

result in an increasing share of world consumption of traded steel-making raw materials.⁷⁵

China is a large exporter and importer of minerals and energy commodities. It has imported steel in quantities ranging from 5% to 36% of total consumption. Energy and mineral consumption in the ROK, Chinese Taipei, Singapore and HK is now raised to levels consistent with many developed countries. Minerals and energy consumption in Thailand, Malaysia, Indonesia and China will continue to rise rapidly over the period. An unknown factor in determining future patterns of energy usage and location of energy intensive production, is the form and extent of any 'Greenhouse Gas Emissions' regime adopted by the region and by major trading partners in APEC, following from the 1997 Kyoto Protocol.⁷⁶

Energy demand in East Asia is forecast to increase at an average of 4% pa between 2000 and 2010, to reach 2.1 Billion tonnes of oil equivalent. China is expected to account for more than 50% of East Asian demand. Fossil fuels will account for around 94% of total energy consumption in East Asia. Coal will remain the region's most important primary fuel, declining to 47% of regional energy demand in 2010 and 44% in 2020. Over 80% of the increase in the regions coal consumption is expected to occur in China, where coal's market share of energy sources will remain strong due to limited access to alternative sources of energy and abundant coal reserves. This coal will remain the dominant fuel for power generation, at approximately 55% of the regional total. Electricity generation in the region is expected to increase at 5% pa over the period to 2010, and by 2020, coal will comprise 31% of the energy share in power generation.⁷⁷ Australia, as the world's largest coal exporter, will continue to meet the bulk of steam coal demand in Asia as well as increasing its share of coking coal in places such as Japan. Australia's share of world coal trade is projected to reach 37% in 2020. Australia should continue as the major coal exporter to Asia, meeting approximately 50% of the region's coal import demand in 2020.⁷⁸

Oil will be the second largest primary energy source, driven by continued strong demand for transport fuels in the region. Gas demand is projected to increase more rapidly than other fossil fuels, at an annual rate of 5.4%. This will be due to an increasing use in power generation.⁷⁹

The increases in East Asia's energy demands will be met by exporters including Australia, tempered by increases in Asia's energy production. China, Indonesia and Malaysia will remain the largest energy producers in the region, and important suppliers of coal, oil and gas. Those economies with limited indigenous energy resources, such as ROK and Taipei, will continue to be concerned with energy security.

Overall, Asia will continue to provide the engine for growth in Australia's mineral and energy sector. This is dependent on strong and sustained economic growth forecast over the period. The main importers of minerals will be Japan, ROK, Taipei, Singapore and HK, whilst the exporters will be China, Malaysia, Indonesia and Thailand.⁸⁰

Oil and Gas

OPEC oil producers will remain the dominant influence in the world oil trade over the period, with 75% of the world's reserves of crude oil and 40% of production capacity. The largest producers will remain Saudi Arabia, Iraq, Kuwait, United Arab Emirates, Iran and Venezuela. Together they hold 70% of world oil reserves but currently only account for 30% of production. World oil consumption is only expected to grow at 1.6% pa to 2006, reflecting the gradually moderating rates of oil consumption in the US, Canada, western Europe and the Asia Pacific.⁸¹ The US Energy Information Administration forecast puts world oil demand growth at 2.3% pa over the period to 2020.⁸² Developing countries, including most of Asia, are projected to account for 65% of the world's increase in oil use over this period, (with most being Persian Gulf oil), with an increase in imports to 2020 of 62%.⁸³ However, as a function of GDP, oil consumption will decline slightly in Asia as increasing economic prosperity leads to more energy-efficient and less energy-intensive uses. The fact that growth in oil consumption in Asia has almost matched economic growth rate is due to the close relationship between oil use and transportation services. In the past 10 years, China's share of world oil consumption has doubled to around 7% in 2000. China, the largest oil consumer in Asia, is forecast to show oil consumption growth of 4.3% pa to 2020, making it one of the strongest areas of consumption in the Asia Pacific.⁸⁴ Almost all of this oil will come from Persian Gulf producers. The ROK will increase oil consumption by 2.3% for the period and Japan (the second largest oil consumer in the world) 0.3%. The rest of Asia is projected to show an annual growth in consumption of 3.5% to 2020, with the three largest oil

consumers being Indonesia, Taipei and Thailand.⁸⁵ Interestingly, Australia is projected to have a much higher growth rate in oil consumption than Japan, at 1.5%, due mainly to the expansion of the transportation sector.

Optimistic forecasts of oil reserves in the South China Sea (in particular the Spratly Islands and Paracel Islands) put potential resources as high as 105 Billion barrels of oil, and a total for the South China Sea at 213 Billion barrels. These Chinese estimates imply potential production levels for the Spratly Islands of 1.4-1.9 million barrels per day, comparable to 1999 oil production for the entire South China Sea region. Non Chinese estimates put potential reserves in the South China Sea at 28 Billion barrels. Peak production for the Spratly Islands would probably be 137,000 – 183,000 barrels per day, comparable to the current production levels in Brunei or Vietnam.⁸⁶

The flow of Arab-Gulf oil around the Cape is anticipated to remain constant to 2005, eroding marginally by 2010 as a consequence of the expanding Atlantic basin exports. The continuation of flow from the Arab-Gulf countries largely hinges on the preservation of demand from the US crude market, with excess Atlantic basin crude exported to Asia as backhaul cargoes on Very Large Crude Carriers (VLCCs). By 2010, the US may only be sourcing approximately 5% of its consumption from the Gulf States, with most of its requirement being met from Atlantic Basin reserves.⁸⁷ The Pacific basin will continue to increase its dependence on Middle East crude to 2005-06.⁸⁸ By 2015, 75% of Persian Gulf oil will be to Asia.⁸⁹

Natural gas will be the fastest growing primary energy source over the next 10-20 years, as it is perceived to be a clean and efficient fuel for generation of electric power, in comparison to coal and oil.⁹⁰ The main area of growing demand for LNG will be South East Asia, whilst for LPG it will be China and South East Asia. East Asian demand is projected to grow at 7% pa to 2020. Almost half this increase is coming from China.⁹¹ This is being driven by increased city-gas demand, deregulation of the gas and electricity industries, the emergence of India as a major consumer of South East Asian LNG with six import projects now driving supply, and the approval by the Chinese government for LNG imports to Guangdong and possibly for imports to northern China to follow.⁹² Malaysia is the regions principal natural gas producer. For

Australia (Asia's third largest producer of natural gas), the volume of LNG exports is projected to rise sharply in 2004-05 as additional production capacity of some 12 million tonnes comes on line before 2005-06. Growth in exports will be primarily to India, Chinese Taipei, ROK, and China. Competition will come from expanded production capacity of up to 50% by Qatar, Oman and Abu Dhabi, who export to the Asia Pacific, and from Indonesia as the world's largest exporter of LNG.⁹³ The development of proposed gas field projects in and adjacent to the Timor Gap Zone of Cooperation will impact on the future delivery of dry gas to the mainland by pipeline. Regardless of whether the gas comes from E. Timor or PNG, Australia will be importing significant quantities of natural gas over the next 5 years.⁹⁴ Natural gas deposits in the South China Sea may become quite significant. In Japan, natural gas use in power generation will be influenced increasingly by moves to decrease its share in power generation and increase both nuclear and coal shares.⁹⁵

Future trends in gas delivery in the Asia Pacific will depend on the following developments:

- The re-emerging interest in the economic viability of gas to liquid (GTL) production utilising technologies such as the Syntroleum proposal for Timor Sea gas, with oil prices above US\$20 a barrel, which will strengthen future demand for natural gas.
- The replacement of LNG seaborne transport of gas with pipelines. Subsea pipelines can now be laid at depths of 2000 metres, and pipeline costs have fallen further than LNG plant costs.⁹⁶ Recent discussion in APEC has involved the concept of an Asian Gas Grid (AGG), with a projected cost of \$8 Billion. This would link the Natuna gas field to Shanghai and tie in existing gas networks in Malaysia, Indonesia and Thailand, and possibly Vietnam. In North East Asia, discussions have taken place regarding the use of Russia's natural gas reserves (the largest in the world) to supply Japan through a subsea pipeline from Sakhalin Island, and a pipeline from Siberia to northern China. International pipelines under construction include from the Thailand-Malaysia Joint Development Area, and another from Indonesia's Natuna gas field to Singapore.⁹⁷

- The increasing inter-connection of gas pipelines networks between the US, Canada and Mexico, to supply their respective increasing gas demands.⁹⁸

Coal

World consumption of coal is forecast to grow at a moderate rate of 1.5% pa to 2020, with growth mainly restricted to the developing countries and the newly industrialised economies. Coal is projected to decline from 22% in 1999 to 19% in 2020 as a share of world energy consumption, with natural gas increasingly taking up a major share. Coal will remain Asia's most important primary fuel, accounting for 47% of regional energy demand in 2010,⁹⁹ and declining to 44% in 2020. Asian consumption is projected to grow at 4.5% pa over the period. Countries such as India and China are expected to increase coal use substantially over the period. More than 80% of the increase in regional coal consumption is expected to occur in China. China may well increase import demand to 55-60 million tonnes by 2008, representing 12% of current seaborne hard coal trade or almost 20% of seaborne steaming coal trade.¹⁰⁰ By 2020, China is expected to account for 40% of world coal use.¹⁰¹ Outside China and India, the next largest coal users are Japan, ROK, Taipei and Indonesia. Japan is the third largest coal user in Asia and fifth largest in the world. Australia is the world's largest coal exporter, with over half its production exported, principally to Japan, but also to Taipei.

The world metallurgical coal trade is underpinned by growing demand in the ROK, Chinese Taipei and India. The Asian region (excluding Japan) is expected to take up to 24% of world trade by 2006, and Japan is expected to remain the largest importer of metallurgical coal over the period, taking up to 30% of world trade. Trade exports of metallurgical coal will reduce from Canada and the US and exports will increase from Australia, China and Indonesia.¹⁰² Australia is projected to have approximately 50% of the world metallurgical coal export market.

Regional consumption of thermal coal, which is used primarily in power generation, is expected to increase by 2.5% pa to 2006. The major importers of thermal coal from Australia are Japan, ROK and Chinese Taipei. Consumption is expected to grow at approximately 5% pa to 2006. In Japan, where electricity consumption is expected to grow at 2% pa for the period, thermal coal consumption is forecast to increase by

2.7% pa over the period. Australian exports of thermal coal are projected to reach 105.7 million tonnes in 2006, or 28% of world export market.¹⁰³

In the longer term, from 2010 onwards, we could see a decline by up to 5.8% in hard coal consumption amongst developed economies in APEC, as a result of increased competition in the energy market and climate change policies put in place in a post-Kyoto Protocol regime environment. Coal is expected to be replaced in the power generation sector by less emission intensive fuels, especially natural gas. In China, the world's largest producer and consumer of coal, consumption has reduced by 9% in the last three years. With an increasing domestic stockpile of coal, China may increase its coal exports to the region substantially over the next 20 years, leading to significant pressure on Australian exports and increasing the demand for investment in China to develop the transport and port infrastructure for such trade.¹⁰⁴

Iron Ore and Steel

Over the next 5 years, Asia is expected to account for most of the projected growth in world steel consumption and production, estimated to be 7% over the period to 2005-06. The four major Asian producers of steel (China, Japan, ROK, Taipei) will produce about 35% of the world total. China will account for over 60% of Asian steel production and remain the world's largest steel producer and second largest consumer. Japan's steel production is forecast to remain stable to 2006, with a reduction in exports to Asia. Steel imports to China are expected to increase over the period to 2006. There is also forecast to be strong growth in exports of steel from the ROK and Taipei over the period to 2006, although significant infrastructure projects such as the Taipei – Kaohsiung high speed rail project (cost approximately US\$13.5 Billion) should help increase domestic demand.¹⁰⁵

Over the period 2000-01 there was a substantial decline in Australian steel exports to Asia and North America due to decreased demand. This trend is projected to reverse over the period 2001-06, with an increase in value of steel exports of over 23% to \$1.4 Billion.¹⁰⁶

The seaborne iron ore trade is forecast to rise by 30 Million tonnes to 495 Million tonnes by 2006. Virtually all the projected rise is expected to come from Australia and Brazil, who together account for over 65% of the world's iron ore exports. China's iron ore imports are projected to

increase by 10 Million tonnes to 84 Million tonnes by 2006. Imports of iron ore to Taipei are projected to increase by 30% to 19.2 Million tonnes in 2006, with the majority of this demand being satisfied by Australia.¹⁰⁷

Australian iron ore exports are forecast to decline to Japan but increase to China, ROK and Taipei. Exports are projected to increase by 12% to 181 Million tonnes by 2005-06.¹⁰⁸

Nuclear Fuel

Nuclear power is projected to represent a growing share of Asia Pacific electricity generation in the period to 2020. Nevertheless, worldwide, nuclear power consumption is expected to decline in the long term as older reactors in OECD countries and Russia are retired and replaced with alternative generation methods. South Korea depends on nuclear power for at least 40% of its electricity consumption.¹⁰⁹ In the developing world, the greatest expansion of nuclear generation capacity is expected in China, followed by ROK and India. Whilst nuclear power generation plant construction is progressing in the Asia Pacific, in Belgium, Germany, Netherlands, Sweden and Switzerland there is commitment to progressively shutting down their nuclear power industries.¹¹⁰ This might be expected to generate a need for the shipment of nuclear waste and spent reactor rods to reprocessing plants in Japan and elsewhere in the Asia Pacific. Specific trends in nuclear power generation capacity over the forecast period include:

- Developing countries in Asia including China, India, Pakistan, ROK and Taipei are expected to increase their nuclear capacity to 2020, resulting in the region more than doubling its capacity by 2020.
- By 2020, developing Asia is projected to account for 17% of world's nuclear power capacity, up from 6% in 1999.
- China is projected to have 6% of its electricity requirement coming from nuclear power in 2020, up from 2% in 1999.
- ROK has the largest nuclear power industry in Asia and nuclear generation of electricity is expected to remain at 40%.
- Taipei is the second largest producer of nuclear electricity in Asia and is expected to have three additional plants on line by 2010, although it

has signalled a move to LNG and away from nuclear power for electricity generation.

- The US has no plans to build additional reactors and is forecast to reduce its reliance on nuclear power generation from 20% of total electricity generation in 1999 to less than 12% in 2020. Canada also is not building any new reactors and its nuclear power share of electricity generation is expected to drop from 14% to 13% in 2020
- India is projected to have 6% of its electricity requirement met by nuclear power by 2020.¹¹¹
- Japan presently has 33% of its electricity generation from nuclear power and this is projected to increase to 38% by 2020.¹¹²

The growth in nuclear power activity in Asia combined with reductions in online nuclear power generation in Europe and North America suggest that an increasing commodity being shipped through the region will be spent nuclear fuel rods for reprocessing (from Japan to Europe) and nuclear fuel in the form of MOX (mixture of uranium and plutonium) from Europe to Japan. Japan uses this type of fuel in its nuclear program and reactors in Europe have used it for some time. The shipment of this specialised fuel is via MOX carriers, specially designed ships for carrying nuclear fuel. The transport of this fuel is from Europe to Japan through the Asia Pacific area. This 'trade' commenced in 1992. States involved in the shipments are France, US, UK and Japan. Routes taken by these ships include sailing around the Cape of Good Hope, south of Australia, through the Tasman Sea and up through South East Asia to Japan. Other routes include westward around Cape Horn and through the Pacific, and through the Caribbean and Panama Canal and across the Pacific to Japan. This seaborne trade is expected to involve at least 2 trips per year and may involve more if spent nuclear fuel is sent to sites in Australia or elsewhere for storage and/or reprocessing.¹¹³ The future transport of spent nuclear fuel rods might also involve the Republic of Korea and Chinese Taipei, who want to ship spent nuclear fuel from their reactors to Europe (France) for reprocessing into plutonium and then returned to them by sea.¹¹⁴

Appendices

- A. APEC Economic Indicators.
- B. Table A: Principal Export Items of each APEC Member.
- C. Table of Oil Imports and exports 1999.
- D. Trade movements 1999 – LNG.
- E. Major liquid bulk trade flows interregional maritime trade – 1993.
- F. Major dry bulk trade flows interregional maritime trade – 1993.
- G. Major manufactured goods trade flows interregional maritime trade – 1993.
- H. Shipping routes cellular (container) vessels.
- I. World Oil Consumption by Region, Reference Case, 1990-2020.
- J. World Natural Gas Consumption by Region, Reference Case, 1990-2020.
- K. World Coal Consumption by Region, Reference Case, 1990-2020.

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