

# Panama Bunker Market Study

Prepared for the  
Panama Canal Authority

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## PANAMA BUNKER MARKET STUDY

### Present and Projected Supply/Demand for Bunkering Services in Areas Adjacent to the Panama Canal's Ends.

#### **Introduction**

The **objective** of this study is to determine present and projected supply and demand of bunkering services in area adjacent to the Panama Canal's ends due to the expansion of the waterway, and the cost/benefit to the Republic of Panama as a result of the potential growth of this activity.

This study is divided into 5 main parts, which cover the following issues:

1. **Current Market assessment:** Analysis of bunker suppliers & service providers in Panama, and in the region, bunker sales volumes, delivery infrastructure, bunker quality and price structure. This section also includes an overview/analysis of competitors/bunkering alternatives to Panama Canal bunker operations today and in the future.
2. **Forecast of future Canal bunker market potential: Analysis and forecasts for 3 case scenarios: best, worst and most probable case for the existing and for the expanded Canal. Included in these forecasts are forecasts on the following:**
  - Number of vessels serviced by size
  - Number of vessels serviced by type

The study includes a volume and revenue forecast of overall bunkering activity, and an analysis of trade routes of vessels serviced. The study will also evaluate demand for new bunker suppliers for this activity and a break-even analysis for this activity.

3. **Cost/benefit analysis to the Rep. of Panama** basis results from 2.) above in this study, we will look at the contribution which bunkering activity will make to the Panamanian economy, due to the expanded Canal after 2010. Included here will be contribution to GDP, Panama's balance of payments, capital inflows to the Panamanian economy, incremental employment opportunities, etc., etc.
4. **Environmental impact:** Assessment of expected environmental impact from ship bunkering, including oil spills from bunker handling, possible generation of fumes and/or odors, risk from ship-to-ship bunkering, etc.
5. **Appendix:** we have extensively used the appendix for detailed information on actors and competitors in this market.

Sources for this study are mentioned after each section, and to complete this task we have used a wide variety of information, including telephone discussions with relevant industry people.

## ***Panama Bunker Market Assessment***

### **Bunkering in Panama Today**

The traffic through the Panama Canal is the backbone of the Panama Bunkering industry. From our discussions with the major bunker suppliers in the industry, only about one of every five (20%) of all vessels transiting the Canal lift bunkers in Panama – given Panama’s strategic location for many shipping trades, there should be room for further growth. Bunker sales for year 2000 totaled some 11 million barrels for the “área del Canal de Panamá”, down from 13 million barrels in 1999.

The Panama Canal is going through a period of change, and the Panama Canal is striving to maintain a pivotal role in the world shipping industry. A billion dollar modernization program, which will raise capacity to 16,000 transits per year from the present 13-14,000, is now coming to an end. The modernization program include increasing the draft of the Canal to allow the passage of larger post-Panamax vessels, and widening the Canal in some of the bottleneck areas such as the Gaillard Cut to accommodate two lanes.

On 7th March 2002, Panama’s President Mireya Moscoso and the Brazilian President Fernando Henrique Cardoso together launched the Canal’s latest channel deepening project by setting off a fragmentation blast that symbolised the beginning of a seven-year, one-metre channel-deepening programme that is the first major improvement project scheduled by the Panama Canal in this century.

The project’s goal is to increase Gatun Lake’s water storage capacity by 45% and to augment the Canal’s watershed output by 300 million gallons of water a day. According to the ACP, deepening the channel will benefit Canal customers by enabling more efficient draft administration and reducing the impact of water shortages on shipping.

With more Canal transits, the potential market for bunkering activities in Panama may also increase.

In 2001, Panama hosted the Bunkering in the Americas convention. During this convention, senior government ministers and administrators from the Panama Canal Authority (ACP) emphasized just how vital bunkering was to Panama’s economy.

Mr. Alberto Alemán Zubieta, Administrator of the ACP, predicted that these developments would trigger an increase in the volume of bunker fuel sales in Panama, from their current level of about two million metric tonnes (mt) a year.

Representatives from suppliers operating in Panama, such as Alireza Mobil Terminals SA (AMTSA), Fuel and Marine Marketing (FAMM) and Isthmian Petroleum & Supply Services also offered an optimistic outlook on bunkering growth in Panama, although Alonso Young of MOBCO commented that the full potential of Panama’s location for bunkering had not yet been realised due to relatively high import and tariff fees.

In a speech at the Bunkering in the Americas convention, the second Vice-President of the Republic of Panama, Dominador Kaiser Bazán, said that one of Panama’s goals are to become a major oil and downstream product redistribution center. He also said that the Panama Canal is a natural bunkering market as well as a trans-shipment axis complemented by the fact that the country is the narrowest isthmus between the

Atlantic and Pacific oceans to pipe oil from Atlantic South America to the Far East.

To promote the bunkering business, Panama enacted legislation in 1992 to liberalize the petroleum market and to establish Petroleum Free Zones. This legislation created the required incentives to install storage capacity for petroleum and its by-products. Therefore, since 1992, Panama has pursued a well-defined policy to promote itself as an international processing, distribution and redistribution center for petroleum and its by-products. Within the petroleum free zones in Panama, national and foreign companies may perform multiple operations in a special tax regime under high standards and technical specifications. These operations are vast, ranging from imports, storage, refining, and pipeline oil and by-products to bunkering ports, dry docks and other installations. Operating from petroleum free zones means that crude oil and petroleum by-products shall enter and leave these areas without having to pay taxes, provided that sales are destined to the international market. Income tax rate in Panama is fairly low, at 8.3%, which makes Panama an attractive investment choice.

ChevronTexaco, ExxonMobil, and Shell are amongst over 25 companies operating in Panama's Petroleum Free Zones today and the results from operating Panamas petroleum free zone the last nine years seems to be good.

After two years of negotiations, ChevronTexaco and the Panamanian government agreed to cancel the contract to operate the refinery 10 years ahead of the original expiration date in order to convert the refinery into a petroleum duty-free zone. The Panamanian government and Refinería Panamá, an affiliate of US oil giant ChevronTexaco, have now signed an agreement allowing the company to become a duty-free zone for importing and marketing fuels effective Jan. 1, 2003. Panama's Ministry of Commerce and Industries said the parties also agreed to cancel the oil-refining contract 10 years prior to its expiration date of 2012.

### **Panama Bunker Sales Volumes**

There are very few statistics regarding Panama bunker sales. However, we have statistics over “Ventas Totales de Combustibles Marinos, Área del Canal de Panamá” from “Dirección General de Hidrocarburos” indicating that Panama's bunker market was over 13 million barrels (some 2 mmt) in 1999. Year 2000 figures show a slowdown in bunker sales to around 11 million barrels, a drop of some 16%. These figures are, however, considerably lower than the levels achieved in 1996, when over 18.4 mill. barrels of bunker were sold in Panama. Talking to Industry sources, we get the feeling that the official statistics are a bit on the low side, but no industry player could provide more detailed data. There is a slight overweight of suppliers and sales volumes on the Pacific side. Bunker sales are mainly heavy fuel oil (HFO). There are no official statistics on this, but through discussions with suppliers in Panama, we believe HFO (mainly IFO 180 to 380) represent some 80% of total sales in volume. The rest is mainly marine diesel oil (MDO). Lubrication oil sales volumes are not included in this figure, and not included in this report.

### ***Panama's Current Bunker Infrastructure***

Panama has several port facilities with bunker storage infrastructure, as well as a 131 km crude oil pipeline, capable of pumping 800,000 barrels per day (b/d) and storing 2.5 million barrels of oil at each terminal on the Atlantic and the Pacific. Panama's free zones have a storage capacity of 14 million barrels.

Panama's bunkering market provides a wide range of services, including a flexible and efficient system whereby marine fuels can be delivered by pipeline, road tankers or barges, while lubricants can be supplied in bulk, drum or can. This ensures that vessels can be served without delay at either end of the Canal, around the clock, 365 days a year. Most of the bunker suppliers do not have their own barges, and instead use the local barge operators.

### **Storage Facilities**

Storage facilities already in operation include those operated by Atlantic Pacific SA (APSA) and AMTSA.

APSA has concessions from the Maritime Authority of Panama (AMP) to operate bunker terminals at both Cristobal and Balboa. The Mount Hope tank farm on the Atlantic side of the Canal has approximately 1.6 million barrels of storage, while the Balboa terminal has capacity for 1.8 million barrels. All types of petroleum products are stored at these facilities. However, petroleum suppliers must first get access to storage and then sign a throughput agreement with APSA. APSA also has a petroleum storage concession at the Gatun tank farm on the Atlantic side. The Gatun facility has about 1.1 million barrels of storage and is used primarily by petroleum traders.

AMTSA, a joint venture that was set up in 1996 between Haji Abdullah Alireza and Co. of Saudi Arabia and Mobil (back in the days before the company merged with fellow major Exxon), operated the former U.S. military Rodman terminal (now known as Vasco Nuñez De Balboa) at Arraijan, outside Panama City. Alireza Mobile is no longer in Panama.

The facility has 1.1 million barrels of underground petroleum storage about three miles from the Rodman piers. The storage is connected to the piers by five underground pipelines. The facility stores fuel oil, diesel, cutter stock and JP5. In the past, the facility also handled gasoline and JP8. The facility offers both term and spot arrangements. The facility's storage customers include most of the major bunker suppliers.

Petroterminal de Panamá (PTP) operates a trans-Isthmian crude terminal located near the border with Costa Rica.

Below is an overview of the different storage suppliers, and it's users:

Source: Ministerio de Comercio e Industrias, Dirección General de Hidrocarburos

Users	ALIREZA	DAC OGDEN	PETROPORT	APSA GATÚN	REFFAN	AMP-APSA		PTP	
						BALBOA	CRISTÓBAL	C. AZUL	C. GRANDE
FUEL AND MARINE MARKETING ANTILLES LTD. (FAMM)	X					X	X		
PETRÓLEOS GENERALES, S.A.	X								
GLENCORE LTD.	X			X		X	X	X	
RIO ENERGY PANAMA, S.A.	X			X		X	X		
MARINE OIL SERVICES DE PANAMÁ, S.A.	X								
PETRO-MARINE SERVICES INC.	X								
ESSO STANDARD OIL, S.A.	X					X	X	X	X
TRITON ENERGY OF PANAMÁ CORP.	X								
PETRÓLEOS DELTA, S.A.		X							
THE SHELL COMPANY (W/I) LIMITED		X				X	X		
TEXACO PANAMÁ, S.A.		X							
ESSO STANDARD OIL, S.A.		X							
CORE LABORATORIES PANAMÁ, S.A.			X					X	
PANAMA TERMINAL FUEL SUPPLIERS, S.A.				X				X	
CEPSA PANAMÁ, S.A.				X		X	X		
ISTHMIAN PETROLEUM SUPPLY & SERVICES, S.A.	X			X			X		
D. DUCLIAS CONSULTOR, S.A.				X		X	X		
MARINE DIESEL AND FUEL SERVICES, S.A.				X		X	X		
COASTAL ENERGY OF PANAMÁ, INC.						X	X		
ESSO MARINE SUPPLY COMPANY LTD.	X					X	X		
PETROLEUM & TRANSPORT SERVICES, S.A.							X		
CHEVRON MARINE AND SERVICES						X	X		
ENVIRONMENTAL PROTECCIÓN SERVICES						X	X		
SAYBOLT DE PANAMÁ, S.A.						X	X		
ENRON CAPITAL & TRADE GLOBAL RESOURCES CORP.									X

NOTA: (X) = Con permiso usuario

**Contractors:**

ALIREZA MOBIL TERMINALS, S.A.  
 DIRECCIÓN DE AERONÁUTICA CIVIL - OGDEN AVIATION SERVICES, S.A.  
 PETROPORT, S.A.  
 ATLANTIC PACIFIC, S.A.  
 REFINERÍA PANAMÁ, S.A.  
 AUTORIDAD MARÍTIMA DE PANAMÁ - ATLANTIC PACIFIC, S.A.  
 PETROTERMINAL DE PANAMÁ, S.A.

Below is an overview of Panamas ‘Zonas Libres De Petróleo’ fuel storage capacities and operators:

**ZONAS LIBRES DE PETROLEO**

Contractor	Administrator	Port/Terminal	Draft	Principal Product	Storage Capacity (Barrels)
AERONAUTICA CIVIL	OGDEN AVIATION SERVICES	TERRESTRE	-	JetFuels	16,190
AUTORIDAD MARITIMA DE PANAMA	ATLANTIC PACIFIC, S.A.	CRISTOBAL BALBOA	37-40'	Marine Fuels	1,589,000
			31-40'		1,761,000
PETROTERMINALES DE PANAMA	PETROTERMINALES DE PANAMA	CHARCO AZUL CHIRIQUE GRANDE	70'	Crude & Derivatives	2,912,000
			49'		2,887,000
PETROPORT, S.A.	PETROPORT, S.A.	CRISTOBAL	37-40'	LPG	34,286
REFINERIA PANAMA, S.A.	REFINERIA PANAMA, S.A.	BAHIA LAS MINAS	39'	Crude & Derivatives	4,263,000
ATLANTIC PACIFIC, S.A.	ATLANTIC PACIFIC, S.A.	CRISTOBAL	37-40'	Marine Fuels	1,207,000
ALIREZA MOBIL TERMINAL, S.A.	ALIREZA MOBIL TERMINAL, S.A.	ROADMAN 1	33,5-38'	Marine Fuels	975,000
		ROADMAN 2	30-33,5'	Fuels	
		OLEODUCTO	-	Marine Fuels	
		(ARRAJAN-HOWARD)		JetFuels	
Total Panama Storage Capacity					15,644,476

Source: Ministerio de Comercio e Industrias, Dirección General de Hidrocarburos

The overviews above are dated October 18, 2001. It has not been possible to get any more updated information from either the “ministerio” or the industry, but we understand that Enron have pulled out and so have Coastal from the Panama Market. In addition, due to oil company mergers, Chevron and Texaco are now one company and the same goes for Exxon and Mobile.

### New Taboguilla Terminal

In addition to all the new construction work on the Canal itself, Panama is also set to see the opening of a new fuel storage terminal this year, which could bring significant benefits for the local bunker industry.

Located at the Pacific end of the Canal on Taboguilla Island, near Balboa, Decal-Panama is building a new terminal with 1.1 million barrels of storage space for diesel and bunker fuel. It opened for service in early 2003 and has 12 oil tanks for marine

diesel and bunker fuel and this could be put to good use by the local bunker suppliers, as well as fuel oil traders moving cargoes between the Americas.

### **Panama Bunker Suppliers**

In our research for this study, we have used an estimated figure of 11 million barrels in total bunker sales per year in Panama for year 2000 (base year).

After the refinery closure, the Panama bunker market is organised with large-scale bunker fuel oil importers. After Enron disappeared, Glencore and Trafigura seems to be the major independent bunker importers, taking typically cargoes of some 20-30.000 mt of bunkers from Ecuador. These volumes are then resold to the local suppliers and storage operators.

Five suppliers dominate Panama's bunker market, in total capturing about 98% of the market, measured in volume:

<u>Company</u>	<u>Oil major supplier</u>	<u>Market share 2001</u>
1. FAMM (Fuel & Marine Marketing)	TexacoChevron	53%
2. Coastal Energy	El Paso/Coastal Refining	20%
3. ExxonMobil	ExxonMobil	15%
4. Tramp/Isthmian Petroleum	Independent	6%
5. <u>CEPSA (Cia. Española de Petróleo)</u>	CEPSA	<u>4%</u>
“The Big Five”:		98%

Source: Interviews with industry players, amongst others FAMM, ExxonMobile, Tramp/Isthmian and DNV. Figure for 2001 market share. In 2002, the big five have lost some of their market share. Coastal have had limited activity in this market in 2002. “The Big Five” was therefore reduced to “The Big Four” in 2002.

**Fuel and Marine Marketing Antilles Ltd. (FAMM)**: the bunkering arm of recently merged Chevron and Texaco is widely acknowledged as the leading supplier in the Panama bunker market with over 50% market dominance. FAMM is a world-wide bunker operator and is represented in the Americas by offices in Ecuador, Peru, U.S. Gulf, and San Francisco. FAMM also has offices in Europe, Asia, Africa and the Middle East.

Earlier, ChevronTexaco had one barge on standby in Cristobal, two in Balboa and a very large barge, which is used to transport product between the two ports. They recently sold their barge fleet, and now prefer to chartered in barges instead.

Until recently, Texaco also had its own refinery in Panama (the 60,000 barrels per day REFSPAN plant at Bahia Las Minas near Colon, which closed in 2002). FAMM still uses the 4.7 million barrel storage capacity at the Bahia Las Minas facility, of which 1.4 million barrels is for crude oil storage and 2.9 million barrels for refined products.

FAMM has a pipeline link to APSA's Cristobal terminal, from which it can supply to receiving vessels and also provide product for other suppliers.

**Coastal Energy:** Was bought up by El Paso, but current position is a bit unclear due to the financial difficulties at El Paso, their parent company, losing their investment grade credit rating. We understand they have closed down their office.

Coastal in Panama have/had significant storage tank capacity for bunkers, while chartering barges from Compañía Marítima de Panamá, part of the Boluda Group. It used to be among the biggest cargo importers in Panama.

Coastal Corporation did derive much of its bunker fuel from its 170,000 barrels per day San Nicolas refinery in Aruba, although it also draws on other sources, including its refinery in Corpus Christi, Texas.

**ExxonMobil Marine Fuels:** Marine Oil Trading SA (MOBCO), now ExxonMobil Marine Fuels (EMMF) is a well-established player in the Panama bunker market and its wholly-owned subsidiary, Petroleum and Transport Services (PTS), has been supplying fuel by truck for more than four years. EMMF supplies through Rodman and other terminal facilities. As of early 2001, EMMF has been handling enquiries for Panama through its Coral Gables offices in Florida. EMMF has a lot of storage space in Panama (see storage facilities).

MOBCO has been present in Panama for a long time. MOBCO and EMMF are now back as a major force due to their joint venture with the Arabian Alireza group. Alireza won the concession for the Rodman terminal opposite Balboa in 1996, and it is now known as the Alireza Mobil Terminal Services Inc. ExxonMobil has announced a plan to invest \$25 million in conjunction with Alireza over a ten year period in a bid to become a major force in the Panama bunker market.

**Isthmian Petroleum Supply and Services SA** Isthmian is the longest and best established independent in Panama. Isthmian has had a close working relationship with the global bunkering group Tramp Oil and Marine Ltd. The two companies set up a joint venture supply operation in Panama in 2000 and in August 2001, Tramp announced that it had acquired 50% of the share capital in Isthmian. In March 2002, Tramp said that it had sold about 350,000 mt of bunker fuel in its first full year of operation, and it was looking to increase this to 500,000 mt in 2002. The company said that it was also looking at the shipping side of things, in order to bring a better standard of barge into Panama.

Isthmian currently spot charters barges. In early 2002, they were in negotiations over the possible charter of a 4,000 mt double-hulled barge. The company said, if it proceeded with the deal, the barge could be in operation by May 2002. It would be the second double-hulled bunker barge in Panama, and would have considerably more capacity than the Panamanian Glory.

**Compañía Española de Petróleos S.A. (CEPSA)**, a Spanish oil company set up a new bunkering operation in Panama in 1999. CEPSA Panamá S.A. supplies fuel oil and distillates by barge and ex-pipe at both ends of the Canal, using imported product stored at its own facilities.

**The Shell Company W.I. Ltd.:** Shell Panama was once an active player in the fuel oil market, but for many years has concentrated on marine gasoil (mgo) and marine

lubricants. Shell has its own storage facilities at both Balboa and Cristobal and opened its own lubricant plant in Panama City about ten years ago.

Bunker fuel is still sold “on request”, but recent volumes have been limited. Ambitions are there to expand in this segment. Shell has a large set-up in the U.S., and has operations in over 130 countries, making it an operator of global proportions. Shell is a strong potential competitor to FAMM and other companies in Panama in the future.

All major suppliers in Panama – with the exception of Isthmian Petroleum – are well known in the international bunker market, while Isthmian, the largest among the independent bunker suppliers, is a local Panamanian player.

Besides of “The Big Five”, other companies share a modest 2% of the bunker market in Panama, i.e. some 220,000 barrels per year. It seems, however, that this market share is rising as several new players have entered this market in recent years.

The smaller companies with capabilities to arrange bunker supplies are:

1. General Petroleum Inc. – Supplier and Trader (Representing GP resources)  
Active in the distillates/gasoil and lube oil business. Have recently put a lube oil barge into operation.
2. Shipping and Trading Ent., Corp. -
3. Petroleum and Transport Services SA - supplier (wholly owned by ExxonMobil people. Have supplied bunkers for 3 years. Recently launched its own barge delivery service using the 2,000 mt tanker, Panamanian Glory. The Panamanian Glory is currently the only double-bottomed bunker barge operating in Panama.)
4. Petrolera Nacional SA - mainly inland services (gas stations, etc.)
5. Triton Energy of Panama Corp.- supplier (One representative, mainly in the Gasoil + diesel trade supplying fishing vessels)
6. Triton Marine Fuels Ltd. – trader and supplier
7. Universal Oil Ltd. Bunker – supplier and trader (related to the Barge operator Compañía Marítima de Panamá)
8. Universal Oil Union SA - Trader (related to Universal Oil Ltd.)
9. Fernie Oil Services (Not in the IFO or MDO bunker market)
10. Peninsula Petroleum – trader
11. Panama Canal Oil and Bunker Services - supplier
12. Rio Energy Panama SA – trader - mainly in the gasoil business with a fairly good market share

Peninsula Petroleum (PP), which is associated with the Gibraltar-based Gibunco group and with CEPSA (Gibraltar), is another company which has reached out from its Spanish/Gibraltar base to enter the Panama bunker market, as is the case for CEPSA and Universal Oil Ltd. PP's core activity is as a physical bunker supplier in Gibraltar. In Gibraltar, PP has its own barges, product and shipping agency services. The company has since expanded into nearby Ceuta, Las Palmas and Tenerife. The latest addition to Peninsula's supply operations is the Panama Canal, where the company started supplying on a small scale in 2002. In addition to PP's supply

capacity, the Gibunco Group offers barging facilities and ship agency services via the Gibunco shipping Agency in Gibraltar.

Panama Canal Oil and Bunker Services was set up in March 2002. They aim to broker bunker deliveries and services in Panama and other ports, and may become involved in trading in the future.

El Barú Petroleum Company S.A. is a new bunker supplier that has just recently started offering supply of marine gasoil (MGO) for fishing fleets, tugs, oceanographic vessels and merchant vessels in the Panama ports of Charco Azul and Puerto Armuelles, located on the Pacific coast, near the border with Costa Rica. El Barú Petroleum operates as a bunker supplier only, but it also has a sister company named QuinnOil which provide broking and trading services in the Panama Canal area. Delivery is ex pipe only based on low wharfage cost, according to Mr. Quinn. The company uses the ex-pipe delivery facilities owned by Petroterminales de Panama (PTP). El Barú also rents storage tanks for its gasoil from PTP. Additionally, El Barú has a strategic alliance with the Boluda Group, bringing to the port two tugs for marine operations. The new company will also be able to offer marine lubricants.

Several of the above companies only supply MDO or lube oil. Several of them act more as agents and therefore, only do bunker supplies on request, and then talk to one of the “big five” operators.

Interestingly, several of the major bunker operators in the U.S. Gulf region are not active in the Panama bunker market. These include the following:

**BP:** no operations in Panama, but have operations in the Caribbean and are a large player in the U.S. Gulf market, for both bunker fuel and lube oil. Strong in Trinidad. BP have a J/V refinery with PetroTrin. Market leader in Houston and New Orleans

**Enron:** Used to be a big player in the Panamanian bunker market, but shut down their operations due to their parent company’s financial difficulties.

**Chemoil:** one of the largest bunker operators in the U.S., supplying some 6 mmt of bunker, or 20% of the North American market and 4% of total world bunker market, but have no local presence in Panama. They are working on establishing themselves in South America and could be a player in Panama in the future. We understand they are now talking to local suppliers and barge operators.

**Deltaven:** PDVSA’s bunkering division. Have “monopoly” in Venezuela and are a major bunker seller in the region, both in Venezuela and in the U.S. Gulf due to the location of PDVSA’s refineries. PDVSA is a major source for bunker to the Panama market, together with Ecuador and the U.S. Gulf.

Venezuela's state-owned oil company, PDVSA, sent in early 2002 a delegation to Panama to explore the possibility of building a petroleum product storage facility and an oil pipeline in Panama. Venezuela has been restricted with regard to the business it does in Panama due to exclusive provisions in the government's contract with Refinería Panamá, a subsidiary of U.S.-based ChevronTexaco. Those restrictions have evaporated since ChevronTexaco cancelled its contract with the Panamanian government, and shut down the refinery.

BP and Chemoil used to be present in Panama, but withdrew from the market in the first half of the 1990s. Fearnleys would not be surprised to see some of the above-mentioned companies entering the Panama bunker market in the near future.

**Directory of Some Bunkers Suppliers, Traders and Brokers in Panama<sup>1</sup>****Atlantic Pacific SA (APSA) -Terminal Operator**

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<sup>1</sup> This information is mainly taken from [www.bunkernews.com](http://www.bunkernews.com)'s country profiles

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### **Location of Current Panama Bunker Facilities**

This is also described in the Environmental impact analysis. Panama has a good bunker supply system and bunkers are available in most ports of some size. There are bunkering facilities/capacity in the following ports/areas:

<b>Port</b>	<b>Delivery Methods</b>
Balboa/Panama City	Barge, Truck or Pipeline
Colon	Truck and Barge
Cristobal	Barge, Truck or Pipeline
Aguadulce	Truck
Coco Solo	Truck
Las Minas	Pipeline, Barges, Truck
Manzanillo	Truck and Barge
Vacamonte	Truck

The bunker suppliers/terminals are located in a similar manner as the sales volumes, i.e. with a slight overweight of suppliers on the Pacific side. A major area for bunkering activity at the Atlantic end is the Manzanillo International Terminal. Bunkers are also available at the Evergreen terminal. At Balboa, bunkers are more frequently delivered by barge to ships awaiting transit in the port basin.

The principal way of lifting bunkers at the Panama Canal is by barge, with around 90% of fuel deliveries being effected in this way. Both the Cristobal and Balboa port areas have ex-pipe facilities, which can be used to bunker a ship directly, but the pipelines are generally used to load the barges. As is the case in several other ports, ex-pipe facilities are most widely used and cost efficient for tankers working cargo at the terminals. Barges can bunker a ship at anchorage while waiting for Canal transit, and this is the preferred method as it saves time and is most cost efficient. Barges also service ships alongside berth at the terminals.

For small quantities, the most convenient and cost efficient method is probably to use tank trucks, which are also available at either end of the Canal.

More ships are going through the Canal from the Atlantic side to the Pacific side – 53% and 47% respectively – and from an operational perspective it could be advantageous to use waiting time before transiting for bunkering. Hence, looking at the transit figures only, one would believe that more ships would bunker on the Atlantic side than on the Pacific side, but bunker volume figures show the opposite. There are several reasons for the Pacific region being used for bunkering more than the Atlantic.

- Vessels arriving at the Canal, may not have time or may not wish to risk the loss of a transit slot by starting to bunker prior to transiting the Canal
- Several vessels are loaded to the Panama Canal maximum when entering the Canal's locks and therefore, in order to maximise earnings on cargo, wait until they have passed through the Canal before bunkering. This is a typical phenomenon in the grain trade from the U.S. Gulf to the Far East, where bunkers are often taken onboard on the Pacific side to prepare for the relatively long voyage to Japan/China. By doing this, the vessel can take more cargo onboard.
- Traditionally, the general level of competition for bunker business is much tougher on the Atlantic side (with Venezuela, Aruba and U.S. Gulf) than on the Pacific side (mainly Ecuador and California)

With the development of the new Taboguilla terminal outside Balboa, the balance of bunker sales may now go further in Balboa's favour. The terminal will have a capacity of about 154,000 mt, a T-shaped pier, and will be able to accommodate ships up to 70,000 dwt on a 24-hours basis.

However, in the course of some of the discussions we have had with Panama Canal users in the making of this report, it has been mentioned that it is often easier to get bunkers on the Pacific side than the Atlantic side, – often a good reason why ships “have to” bunker on the Pacific side. It seems that the delivery reliability is slightly higher on the Pacific side.

### **Barges in the Panama Bunker Market**

The fleet of barges operating in Balboa and Cristobal is a mixed bunch. There are both dumb barges, self-propelled barges, bunker tankers and supply vessels in operation. Some of them have in-line blending facilities, but it is common practice that products are blended to specification onto the barges from the tankage facilities. Capacity varies, but with sizes from 2,000 mt to 6,000 mt, there is barging capacity for every need and for every ship size in today's market.

Most of the suppliers charter in barges to sell bunkers directly to the ships waiting offshore. There are only a few major commercial barge operators in Panama, dominated by CMP (Compañía Marítima de Panamá, former PAMAR Inc), Tramp Oil/Isthmian Petroleum, PTS (Petroleum & Transport Services) and EPS

(Environmental Protection Services is thought to have one barge at Cristobal and two at Balboa).

The Compañía Marítima de Panamá S.A have a Spanish parent, the Boluda Group. Boluda's bunker-related companies in Spain include Ciresa, which runs all the bunker barges operating in the Canary Islands, and supplier Petrolífera Ducar S.A.

Compañía Marítima de Panamá S.A., which has close links with the supplier Universal Oil Ltd, (In 2002, the same person was both the general manager of Universal Oil and the assistant general manager and commercial manager of Compañía Marítima de Panamá S.A.) operates one of the biggest barge fleets in Panama, with nine owned or chartered vessels, as well as tugs, supply vessels and a floating crane.

### **Barge Costs**

In Panama, the official commercial barge fee is usd 2,500 for volumes up to 3,000 barrels and an additional usd 0.37 for every barrel above that. (We understand barge rates have recently moved up to minimum usd 3,350 for 1-500 mt, then usd 1.6 per mt)

Pipeline pumping fees: a minimum of usd 750, the fee is 50 cents per barrel plus 5 cents per barrel in anti-pollution fee. This 55-cent pumping and anti-pollution fee is always applicable, even when lifting by barge. The truck, minimum fee is \$150.

For reference, BP Marine<sup>2</sup> post the following prices for barge use:

- Trinidad: Pointe a Pierre: usd 8 per mt, min. USD 2000
- All other Trinidad ports: usd 12 per mt min. USD 3000
- Houston: usd 3,90 per mt, min. usd 4215 + wharf fee 0.18 usd per mt
- New York: usd 4.175 flat (up to 565 mt, rate increases with size), + usd 250 for containment boom

And in Ecuador, the following prices are used for barge services:

Port of supply / Minimum volume in mt / barging Lump sum in us \$

- Guayaquil (Pto Maritimo) / 350 mt / \$3.600
- Guayaquil ( Rio Guayas) / 400 mt / \$4.200
- La Libertad / 350 mt / \$3.300
- Puerto Bolivar / 400 mt / \$4.200
- Manta / 400 mt / \$4.200
- Esmeraldas / 1,000 mt / \$12,500

Based on a 500 mt/3,200 barrels bunker lot, barge costs end at:

- usd 2,574 + 1,760 = usd 4,334 in Panama
- usd 4,000 in Trinidad's Pointe a Pierre
- usd 2,040 in Houston
- usd 4,425 in New York

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<sup>2</sup> From Bpmarine's web site [www.bpmarine.com](http://www.bpmarine.com)

- usd 3,600-4,200 in Ecuador

Barge costs in Panama are regarded as competitive, as shown above. The cost difference versus Houston is, however, significant.

Bunker barges in Panama are generally available on a 'first-come-first-served' basis, irrespective of how many weeks in advance the nomination took place. With several customers awaiting bunkers, a barge will not sit around and wait for the 'right' ship in tight barging schedules.

Pulling the strings behind the scenes, and thus preventing anarchy and queue jumping, are ship agents. Perhaps more so in Panama than in many other places, the ship agents play a key role in the bunkering arrangements. It is their task to liaise with all parties involved in bunkering. They try to organize the most convenient transaction time by keeping in touch with ships and pilots, suppliers and barge operators.

### Sources of Supply, Cost of Supply and Profit Margins in Panama

#### Sources of Supply

In 2002, Texaco, now ChevronTexaco, closed the only refinery in Panama, at Las Minas near Cristobal. The refinery was, however, not able to cover bunker demand in Panama and imports – for exports have always played a role in the Panama bunker market.

There are various bunker sources for the Panama bunker market. There are no official statistics on this, and the various players have different views as to which is the most common source, but most bunkers are assumed to come from the U.S. Gulf, followed by Venezuela and Ecuador, see figure below.

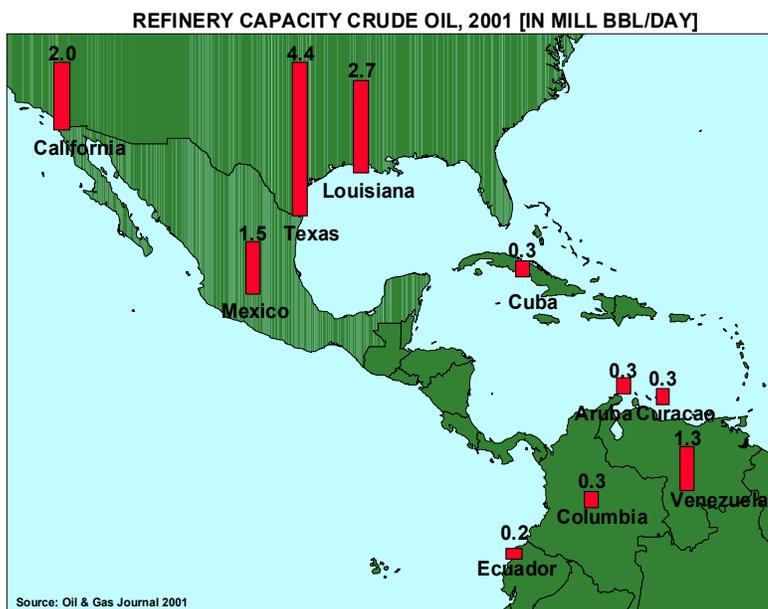


Figure 3-2 Panama's Bunker Source Options

Bunker volumes have, on occasion, also been sourced from relatively distant suppliers, such as Japan and Europe, due to arbitrage opportunities and low freight markets/shipping costs.

Several companies are involved in supplying Panama with bunkers. We understand the oil trading company Glencore is active on the Pacific coast sourcing bunker fuel from Ecuador. Deltaven (PDVSA company) are active from Venezuela, and Trafigura, also an oil trading company, are active in the U.S. Gulf/Caribbean area. Whenever a fuel cargo comes in it is often divided up between the various suppliers. This makes good economic sense and they share the costs and benefits of incoming cargoes, securing economies of scale. However a cargo can also be brought in exclusively for one of the major operators. FAMM, for instance, have done this on several occasions. Typical import lots are 220,000 – 320,000 barrels (32-47,000mt). This lot volume may increase in the Pacific after the opening of the new terminal with more storage capacity added to that region.

### Cost of Sourcing Bunker to the Panama Canal

To estimate the competitiveness of the different sources, we have calculated the transportation cost from the different sources. We used the following T/C rates and ship cargo volumes:

1. 30.000 tonnes 12.500 usd/day
2. 40.000 tonnes 14.000 usd/day
3. 65.000 tonnes 16.250 usd/day

Source	30,000 USD/MT	40,000 USD/MT	65,000 USD/MT
ARUBA	\$4.99	\$4.52	\$4.07
GUAYAQUIL	\$5.14	\$4.69	\$4.19
VENEZUELA	\$5.29	\$4.81	\$4.43
HOUSTON	\$6.45	\$5.74	\$4.98
NORFOLK/PHIL.	\$7.12	\$6.37	\$5.52
NEW YORK	\$7.23	\$6.41	\$5.59
LOS ANGELES	\$9.08	\$7.98	\$6.89
SANTOS	\$11.73	\$10.34	\$8.46
ROTTERDAM	\$11.86	\$10.61	\$8.73
TOKYO BAY	\$17.22	\$14.70	\$11.82
SINGAPORE	\$21.79	\$18.44	\$14.60

The results are shown in the table below, in usd per metric ton:

With an average price delta from the U.S. Gulf to Panama of some 10-12 usd per mt, it seems like there are only a few suppliers that, on average, can deliver competitive bunkers on the basis of imports of 30.000 and 40.000 mt. Basis a Panamax cargo (65.000 mt), the list does not increase much, but bunkers could then also be sourced from several areas in the U.S.

If we use the table above and compare it with the average bunker price for 2001 and 2002 in the table below, sourcing bunkers from the U.S. seems like the “on average” preferred/cheapest option since Houston HFO IFO380 bunker prices are very competitive compared to Aruba, Venezuela and other regional sources, and transport costs from Houston to Panama are one of the lowest in the table above, only 1.46

usd/mt above Aruba for a 30,000 mt cargo. The same goes for MDO, where the differences are even bigger.

Location	HFO IFO 380	MDO
Rotterdam	126	189
Houston	129	215
Santos	132	277
New York	133	283
Los Angeles	135	246
Venezuela	135	295
Fujairah	136	233
Panama	137	270
Philadelphia	138	287
Singapore	141	208
Aruba	142	286
Guayaquil	145	363
Tokyo	165	279

The result from the above data, indicate that, on average, HFO could be bought at 129 usd/mt in Houston, transported at some 5.0-6.5 usd/mt to Panama, giving a delivered cost in Panama at some 134-135.5 usd/mt and this seems like the on average, most competitive way to source fuel oil. However, from talking to Industry players, we also understand Venezuela have a solid market share of bunkers sold to Panama.

### **Profit Margin in the Panama Bunker Market**

The average resale price in Panama was some 137 usd per mt, giving a profit margin of some 1.5-3.0 usd per mt. There are, however, volume discounts when buying bunkers in 30-40.000 mt lots, instead of the 500-2000 mt volumes upon which the posted prices above are based. After talking to several bunker brokers, we have estimated this discount level to be some 9-10% or some 11-12 usd/mt on average, basis bunker prices in the 120 usd/mt range, increasing the profit margin to about 12.5-15 usd/mt.

With a profit margin in the Panama bunker industry for HFO of approximately 12.5-15 usd per mt, or about 10% margin (basis average bunker sales price of usd 137 per mt), before administrative costs, taxes, barge fees, storage fees, capital costs, metering losses, etc. there is not much room for mistakes. From the chapter about barges in Panama (page 15), barges cost for a 500 mt lot would average about usd 8.7 per mt, reducing the industry margin to a slim usd 3.8-6.3 per mt or 3-5%, to cover administrative costs, capital cost (which depends on each company's cost of capital and grace period given on bunker sales payments), taxes, waiting time, etc.

The bunker industry's profit margin can, of course, be substantially improved as a result of good timing in cargo purchases, followed by a volatile upward market, but any margin in this business can also be totally destroyed if bunker prices move in the wrong direction after a purchase is made.

About 90% of all fuel sold to end users (ships) in Panama is delivered by barges. The barges are a mixed group with varying types and sizes – dumb barges, self-propelled barges, bunker tankers with sizes from 2,000 to 6,000 dwt.

With an average intake of some 400-600 mt (typical bunker sales vary between 200 and 1,200 mt), the actual bunkering of ships in Panama takes an average 3-5 hours with an StS operation (ship-to-ship), which is quick.

We have, in this report, not performed a local efficiency study of bunker operations in Panama, but some shipping companies with whom we have spoken, give bunker operations in Panama (the barge delivery process, etc.) only a “fair” rating.

### ***Bunker Quality and Fuel Specifics***

All fuel oil grades are available in Panama: from 30 to 380 cst, including IFO 180 and 380. In the distillates sector, MGO is more dominant than MDO, as there is not a lot of MDO in storage. There is generally only one type of MDO and one type of MGO available. The Atlantic side has pipelines and facilities for diesel, but there as well it is mostly MGO that is on offer. Terminals store IFO 180 and 380, and the product is, as a rule, blended to other specifications onto barges.

IFO's are generally widely available in Panama, and shortages are rare. Over the past six years, suppliers have run dry perhaps 12 times in total, and then for a period of maximum 2-3 days before replenishment arrived. This is because the suppliers rely heavily on imported fuel cargoes.

Analysis of a few hundred fuel quality tests performed by DNVPS in Panama (Det Norske Veritas Petroleum Services, a company owned by DNV, and the world's biggest fuel quality testing company), gave the following results:

- The quality of bunkers in Panama is consistent and of average, good quality
- ...and the bunker quality is higher than in neighbouring countries
- Problem: Vanadium in fuel sourced from Venezuela
- Over-specification on bunker orders from suppliers is common practice to get best quality

Panama's future as a major supplier of marine bunkers depends entirely on its ability to deliver high-quality bunkers, and quality must never be compromised. Bunker quality is measured through a number of different parameters, the most important are:

- Kinematics viscosity
- Density
- Pour point
- Flash point
- Catalytic fines, e.g. silicon and aluminium

Of the parameters above, some are relevant for the handling of the bunkers (the 3 first), and some are relevant for the combustion process (2 last).

Evidently, the quality of the bunkers is dependent on the crude oil used by the refinery. Different shipping companies have different requirements for bunker fuel, but the ISO 8217 gives the minimum standard.

Generally bunkers delivered in the Panama region are of average/above-average quality and therefore there is no apparent need to improve quality. Test results from 2002 show that none of the parameters score better/worse than others and thus one would have to improve virtually all values to increase quality. Also, every ship owner with whom we have talked mentioned Panama as a bunker station with “good quality – no problems there!”.

A guide to bunker quality is in the appendix.

*Note on U.S. Bunker Quality: Almost all U.S. refineries have thermal cracking, catalytic cracking and in many cases hydro-cracking capabilities. This reduces the*

*light end fractions in the bunker fuel from such refineries and the quality of such fuels becomes lower, reducing ignition and combustion properties<sup>3</sup>*

### **Bunker Market Price Structure**

Naturally, the bunker price largely follows price developments in the crude oil market. Nevertheless, industry pundits claim the bunker market is more complicated still:

- Bunker pricing is highly volatile
- Bunker quality is important, but may vary from source to source
- Bunker operations are a low margin/highly competitive industry
- Market manipulation is part of the bunker business
- Average inventory of bunkers is (in the U.S.) some 15 days; inventory in the Panamanian market is probably about 20 days

With the only refinery in Panama closed, all bunker volumes must be imported.

Rotterdam is, on average, the cheapest place to buy bunkers in the world (see appendix on Rotterdam for details on this market) and trades from Rotterdam/ARA region/NW Europe, through the Canal, will most likely bunker up in NW Europe/Rotterdam area, if possible. Bunker prices may, however, be significantly higher other places in Europe, Gibraltar for instance (see appendix).

The Panama Canal is a free competition market with a fluid price structure. There are no specific price regulators in force. Prices can thus fluctuate within the same day, and local supply and demand is seen as a major force in which way prices move.

The bunker prices in Panama are higher than in the U.S. Gulf, which is the clear price leader in the region. Comparing the average bunker prices in Panama with competing bunker ports for the last 2 years shows that Panama bunkers are on average about 6% more expensive than in Houston. The price difference is, however, rather limited to other local competitors such as Venezuela, New York and Los Angeles and Panama bunker prices are, in fact, lower than Philadelphia, Aruba, Tokyo and Ecuador (Guayaquil). Prices for MDO show a similar picture, but here price differences as compared to Houston are higher in percentage terms. This has to do with the smaller volumes and higher sourcing costs for Panama

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<sup>3</sup> *Viswa Lab., Dr Vis*

Location	HFO IFO 380	MDO	% above Houston	
Rotterdam	126	189	-2.3 %	-12.1 %
Houston	129	215	0.0 %	0.0 %
Santos	132	277	2.3 %	114.7 %
New York	133	283	3.1 %	119.4 %
Los Angeles	135	246	4.7 %	90.7 %
Venezuela	135	295	4.7 %	128.7 %
Fujairah	136	233	5.4 %	80.6 %
Panama	137	270	6.2 %	109.3 %
Philadelphia	138	287	7.0 %	122.5 %
Singapore	141	208	9.3 %	61.2 %
Aruba	142	286	10.1 %	121.7 %
Guayaquil	145	363	12.4 %	181.4 %
Tokyo	165	279	27.9 %	116.3 %

Bunker volumes vary typically between 200 and 1500 mt. For MGO, volumes are typically up to 200 mt. After discussing with local market players in Panama, we understand that an “average” HFO bunker lot is around 500-600 mt.

For an “average” vessel (bunkering of about 500 mt), this corresponds to about usd 4,000 per bunkering. Knowing that fuel costs often add up to 30% of a bulk vessel’s operating costs, a 6% price differential represents a significant amount of money. However, using a vessel earning usd 24,000 per day, which may not be a high figure for a modern advanced containership or a tanker in a good market, the usd 4,000 represents 4 hours’ earnings for this vessel. Therefore, if the vessel has to deviate/spend more than 4 hours to bunker somewhere else than in Panama, it may not be worth it.

## References

Information used in this market assessment section is mainly provided through telephone discussions with people from the following organizations in the industry:

- DNV, Oslo
- DNVPS, Panama
- ExxonMobil, London
- ChevronTexaco, UK
- Fernie Oil Panama
- Isthmian Petroleum Supply and Services SA
- FAMM, Oslo and Panama
- Shell, Oslo and Panama
- Norwegian Oil Trading, Oslo
- VPS (Veritas Petroleum Services), Oslo
- Star Shipping, Bergen
- BP Marine International Fuel Sales, Oslo
- Bergen Bunker Brokers, Bergen
- Barwil, Panama...plus various other bunker suppliers and agents in Panama
- Norse Bunker AS, Oslo

Other references, incl. articles, web pages, documents etc. are collected from:

- Chemoil, US
- Bunkerworld.com
- OceanConnect.com
- Information from Ministerio de Comercio e Industrias –
- Petroecuador.com.ec

- Deltaven
- Fairplay
- Lloyds List
- Bunker News, monthly magazine
- bpsmarine.com
- Norwegian Oil Trading

### ***Bunkering Alternatives Before and After Transiting the Canal***

The Major trade routes through the Canal in fiscal year 2002 in million PC/UMS Net Tons and in % of total, were:

East Coast US - Asia	73	31%
East Coast US – WC South America	20	9%
Round the World – Trade	24	10%
Europe – WC South America	19	9%
Europe – Asia	20	9%
Europe – WC US/Canada	9	4%
East Coast US – WC Central America	8	3%
South America Intercostals	8	3%

From the list above, we see that the bunker markets in the U.S. East Coast, South/Central America and Europe will be major competitors for bunker services in the Panama. In addition, most vessels will pass several bunkering stations in the Caribbean on their way to the Canal. It is a long way from Europe to the Canal, and it may, therefore, be convenient to bunker in Panama, especially if the trade continues to Asia.

For Round the World Services, we would think that they call U.S. ports before or after transiting the Canal. At least US Gulf and East coast have very competitive Bunker markets and one would think that such vessels would bunker there.

There are, however, differences in how bunkering operations are done, depending on vessel type. In bulk shipping, keeping transport and operating costs down is vital to maintain competitiveness. Therefore, tankers and dry bulk carriers will always seek cheap bunkering alternatives on their voyages. However, due to draft limitations and the need to load the vessel to its maximum capacity, bunker volumes may be kept at a minimum to cater to the concept of more cargo volume (revenue earning volume).

Cruise vessels, liners, Ro-Ro carriers, etc are more service focused in their industry and keeping route tables and performing reliable services/deliveries are important factors in their trades. Such vessels will, in general not be so eager to deviate for bunkering purposes or to seek alternative ports for low cost fuel oil. Generally speaking, such ship types would be more eager to bunker where it is most convenient for them to do so. This could be, for instance, during waiting periods before transiting the Canal, but then, they must be sure that bunkering will not cause them to miss their scheduled slot for Canal transit.

The Table below shows the average bunker price in 2001 and 2002 for most of the major bunker hubs in the world:

Location	HFO IFO 380	MDO
Rotterdam	126	189
Houston	129	215
Santos	132	277
New York	133	283
Los Angeles	135	246
Venezuela	135	295
Venezuela	135	295
Fujairah	136	233
Panama	137	270
Philadelphia	138	287
Singapore	141	208
Aruba	142	286
Guayaquil	145	363
Tokyo	165	279

The U.S. Gulf /Houston area is one of the most competitive bunker market in the world and can, on average, provide very low bunker prices. Hence, it would be logical for shipowners to try to bunker there, if they can.

Asia is a major destination for several trades above. Bunker prices, especially in Korea/Japan/China, are regarded as high and owners tend to avoid bunkering in that region. The exception is vessels, which, after sailing to Asia, continue to the Singapore area, where bunker prices are more competitive and competition/service is high. For such trades, vessels may opt to bunker in Asia.

The Rotterdam area in Europe has some of the most competitive prices in the world for fuel oil bunkering, only challenged by the Middle East Gulf, especially on MDO. Vessels leaving Europe will, therefore, most likely be fully bunkered. In recent times, the bunker market has changed somewhat as Ecuador and Venezuela have altered their pricing policies. The table below shows average prices in the last 6 months of 2002.

Location	HFO IFO 380
Rotterdam	149
Houston	152
Santos	152
Los Angeles	156
New York	157
Fujairah	157
Panama	160
Guayaquil	160
Venezuela	161
Philadelphia	162
Aruba	162
Singapore	165
Tokyo	185

The table shows that Guayaquil in particular has increased its competitiveness versus Panama. In very recent times, also prices in California have changed due to tax increases. We, therefore, expect their competitiveness to weaken in the future.

### **Description of Competitors to the Panama Canal's Bunker Market**

Several major trades involve West Coast South America and the U.S.A. Some Panama Canal trades also have Europe and the Far East as ports of call. We do not,

however, regard Asia as a competitor due to the high prices there. The most competition is expected from the following countries/regions, ranked by competitiveness:

1. U.S. Gulf
2. U.S. East Coast
3. Venezuela
4. Caribbean
5. Ecuador
6. U.S. West Coast

The U.S. Gulf has the lowest prices and is also a natural bunkering area since many vessels also load/discharge there. The U.S. East Coast also has quite competitive prices, but increasingly relies on imports from, amongst others, Venezuela. Panama should, therefore, be able to compete with the U.S. East Coast in the future.

Venezuela is primarily an oil exporting country and most of the country's traffic is in tankers, which naturally tend to bunker there as well. However, we do not see Venezuela as a bunkers only destination due to its location.

In the Caribbean, there are several bunkering possibilities, and several of them focus on bunker sales only. Trinidad, Aruba, Bahamas/Freeport are the most competitive and are all competing more or less in the same market as Panama. What they all have in common is fairly large export refineries, tuned to the U.S. market for high end products.

Ecuador is very close to Panama, but we do not foresee any large-scale bunkers only operation there, except for vessels trading to South America. This due to the deviation any vessel must take after leaving Panama only for bunkering purposes. To justify such a deviation, the price difference between Panama and Ecuador must be considerably more than last 3 years historical difference indicates.

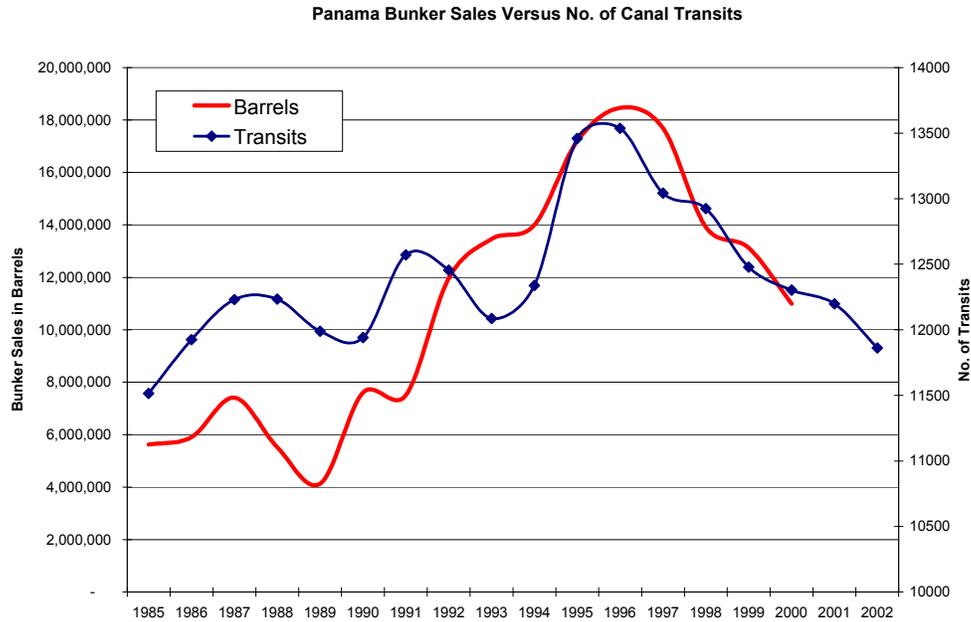
As of 01.01.2003, an 8.5% sales tax was added to bunker fuel sales in California. This may reduce California's competitiveness vis-à-vis Panama and increase the chances of vessels selecting Panama for bunkering instead of ports such as Los Angeles, San Diego and San Francisco. Container vessels requiring significant bunker volumes often call at these ports before/after transiting the Canal, so Fearnleys see some potential volume sales for Panama here. However, companies like Chemoil are lobbying hard to get tax exemption for bunker sales.

For detailed descriptions of each country/region, see the appendix.

### ***Panama Bunker Sales Development***

Although there are limited official statistics available, it is estimated that the annual bunker market in Panama was around 11 million barrels in 2000, down from levels above 18 million barrels in 1996.

The graph below is based on "Dirección General de Hidrocarburos" data for "Ventas Totales de Combustibles Marinos Área del Canal de Panamá" and is in millions of barrels. The volume includes both HFO (mainly IFO 380 and IFO180) and MDO. For illustration purposes, we have also included total ocean-going commercial traffic through the Canal, in numbers of transits



Source: Ministerio de Comercio e Industrias, Dirección General de Hidrocarburos and ACP.

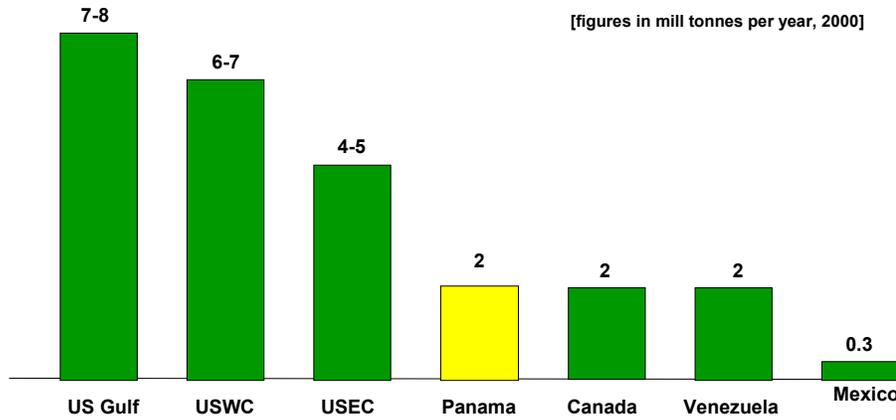
As we can see from the graph, bunker sales were on top in 1996, which also was a historic top for number of transits. Not very surprisingly, there seems to be a clear correlation between the number of transits and bunker sales volumes. The disturbing picture is that transits are falling in both fiscal year 2001 and 2002, indicating falling bunker sales in 2001-2002 as well, but we do not have any official volume sales figures for 2001 and 2002 yet.

The reasons for the slump in bunker sales can, to a certain degree, be explained by the general downturn in global trade, a shift in bunker pricing policies in Ecuador and increased competition from Venezuela, the U.S. Gulf, and the U.S. East Coast. But from speaking to the industry, we feel that the main factor is the fall in ocean-going commercial shipping through the Canal.

Further, it is reckoned that unfavourable pricing of bunkers in Panama has played a role in the situation. For example, because of production problems in Venezuela in April and Nov/Dec 2002, production was very low, and bunker prices in Panama rocketed, causing customers to prefer to bunker their ships elsewhere. The closure of Panama's refinery may also play a significant part in this situation.

### Panama Bunker Sales versus the Competition

Panama's annual 2 mmt bunker market corresponds to about 1.5% of the world bunker market, which is estimated to be about 140-150 mmt per year (figure 3-1).



**Figure 3-1 Panama's Bunker Market Compared with Neighbouring Countries**

With more than 60,000 vessel calls, the U.S.A. is one of the largest bunker markets in the world and is estimated to account for close to 20% of the market.

According to the bunker suppliers in Panama (FAMM) only 20% of the 14,700 (2001) vessels transiting the Canal lift bunkers in Panama. There should be room for growth, but due to Houston's competitive pricing regime, Fearnleys foresee the greatest potential in other vessels than the bulk shipping segment, typically liner and ro-ro trade transiting the Canal. The growth in container/liner trade is higher than bulk shipping and hence, increased sales volumes should be expected in the future.

**Price, quality and delivery** are all essential to success in the bunker industry. The latter, a good delivery system, is dependent on the reliability of the bunker delivery, availability, and location.

In this respect, vessel waiting time could be further exploited to develop the Panama bunker market. Through our discussions with users of the Panama Canal, vessel owners expressed the need for a *guarantee* to get bunkers onboard while waiting for transit. Evidently, if the vessel loses its transit time because it has to wait for the bunkering operation to be completed, money is lost (extra time). Similarly, if a specific bunker type is not available on the arriving side, and the ship owner needs to bunker on the other side, there is lost money too (extra time).

If ship owners have the guarantee that bunkering operations could be completed during their waiting time, more vessels would probably bunker in Panama. However, most owners are not afraid to not get bunker in Panama, but may instead of using the idle time, use valuable time after passing the Canal to bunker.

## PANAMA BUNKER MARKET FORECAST

Bunker sales volumes depend on several items, but price, quality and service/efficient delivery are the main requisites for increasing sales, in addition to increased ship traffic. Based on this, the following SWOT (strength, weaknesses, opportunities and threats) analysis is done for the Panama bunker market.

**Strength:** Location, and nobody can take this advantage from Panama. Large vessel traffic flows with idle waiting time. Panama is also a highly competitive market (although a few dominating players, there are many companies offering their services) with fairly competitive prices (compared to its competitors in the region). Good infrastructure. Acceptable bunker quality. Free trade zones with limited tax on sales and revenues.

**Weakness:** All products are imported, and mainly imported from Panama's competitors in this market. There is, of course, a cost disadvantage due to Panama's 100% import dependence and bunker quality dependent on imported quality. Main Canal trades call at ports with very competitive markets such as the U.S., Europe and Venezuela. It may be tough to compete with these markets on price.

**Opportunities:** We expect vessel traffic growth, especially liner/container traffic, in the years to come. This is trade that focuses on utilizing idle time due to a fairly tight schedule and very hectic activity at destinations. Taxation of bunker sales in California may increase sales potential in Panama.

U.S. oil markets may slowly become more import oriented/ import dependent. In addition, refineries in the U.S. become more and more attuned to producing high end products, increasing import demand for bunker fuels. In addition to traffic increase, utilizing vessel idle time before passing the Canal is Panama's clearest opportunity to increase bunker sales.

**Threats:** Increased competition from Venezuela and Ecuador due to new pricing policies. More competition from the Caribbean Islands. Higher prices or increased taxation and/or environmental costs compared to Panama's competitors. With the current level of new entrants into the market, bunker quality may be reduced to increase profit margins/competitiveness now, but may have negative effects in the long run.

Today, bunker quality is acceptable in Panama and we have assumed that this will continue also into the future, when we have done our forecasts.

Service is quite good and efficient, but we have assumed that more competition will improve both quality and reliability in the bunker market. We would like to stress that reliability is important and vessel must be 100% sure that bunker is available in Panama and that it will be delivered timely. This is important since we believe one of Panama's most competitive advantage is that vessels can utilize the waiting time before entering the Panama Canal. In addition, after exiting the Panama Canal on the Pacific side, vessels may select to bunker before a long voyage to the East, where

prices are generally higher. Also, after exiting the Canal, vessels may select to bunker due to draft limitations in the Canal, or for cargo capacity reasons.

Example:

A vessel loads in Houston for discharge in Chile, routing via Panama. The vessel has a total dwt capacity of 10,000 mt (this figure is the maximum the vessel can load (cargo + bunker). By loading only enough bunkers in Houston to reach the Pacific side of the Panama Canal, the vessel is able to obtain higher revenues produced by virtue of the fact that it does not utilize dwt capacity for bunkers, but instead uses this capacity for revenue-generating cargo. When reaching the Pacific side, the vessel will bunker just enough fuel to reach Chile.

Forecasting Panama bunker prices compared to those of competitors is difficult, but we have assumed the following:

1. Bunker market competition in Panama will increase with an increased number of both small and large companies entering the market
2. Increased competition will be seen from both Venezuela and Ecuador in the future, but this will also reduce sourcing costs for Panama bunker sales, increasing Panama's competitiveness compared to U.S. markets (due to more import requirements as U.S. refineries produce less and less fuel oil).
3. In total, we foresee Panama bunker supplies to be priced relatively equal to current price regimes in the region, but with a slight improvement compared to the U.S.A.
4. Average vessel size will increase and hence also average bunker volumes per vessel, however a Panamax will still be a Panamax.
5. The physical limitations in trade through the Canal are taken into consideration, and our forecasts end up near 40 vessel transits per day in 2025 for both cases.

Our vessel traffic assumptions and number of transits per vessel type, to establish this forecast, are in the appendix. Below is the summary table for the unexpanded Canal case, expressed in number of transits/port calls:

Year	1998	1999	2000	2001	2002	2005	2010	2015	2020	2025
TOTAL	13749	13045	12303	12198	11862	12540	13430	14149	14741	15354
Transits per day	37.67	35.74	33.71	33.42	32.50	33.84	36.24	38.16	39.74	41.38

Total traffic do not include vessels that call in Panama but which do not transit the Canal. Average yearly traffic growth in number of vessels from 2000 – 2025 is expected to be 0.75%. This may not seem like a high figure, but one must take into consideration that vessels also get larger and larger and there are limitations to the Canals maximum capacity.

Below is the forecast for an expanded Canal. The difference in number of ships is not very significant between the two forecasts. An expanded Canal may attract more trade, but due to the fact that a large post Panamax containership may replace 2 smaller container vessels (the same goes for dry bulk and tanker vessels) the resulting number of transits does not increase very much over the forecasted period. However, larger vessels consume more bunker oil.

Year	1998	1999	2000	2001	2002	2005	2010	2015	2020	2025
TOTAL	13749	13045	12303	12198	11862	12564	13464	14265	14968	15769
Transits per day	37.67	35.74	33.71	33.42	32.50	33.91	36.89	39.08	41.01	43.20

An increase in vessel traffic is an important element in the forecast since it is the most fundamental element of bunker sales today. However, analyzing vessel traffic increases by vessel type is very important as we see more potential in increased bunker sales from container vessels than if it is only tanker vessel traffic that grows. Another important element in the forecast is, of course, the percentage of vessels that bunker in Panama. We have established a reference level of about 20% on average, but tried to adjust this figure depending on vessel type, increasing it for container and ro-ro/liner vessels and reducing it for tankers and gas carriers.

The detailed results are in the appendix, but below is a summary table of bunker sales in metric tonnes (mt) for an unexpanded and an expanded Canal:

Unexpanded, basis by vessel type:

Year/mt	2005	2010	2015	2020	2025
Best	1,997,216	2,357,719	2,702,997	3,048,660	3,455,394
Base Case	1,866,092	2,107,603	2,317,300	2,515,800	2,794,310
Worst	1,692,469	1,881,400	1,977,657	2,151,900	2,333,784

Expanded, basis by vessel type:

Year/mt	2005	2010	2015	2020	2025
Best	1,998,771	2,361,045	2,881,878	3,274,676	3,760,138
Base Case	1,867,505	2,110,375	2,493,521	2,735,422	3,089,387
Worst	1,691,022	1,880,684	2,180,561	2,396,279	2,654,494

Main assumptions, inputs and forecasts for bunker sales by vessel size are in the appendix.

Base Case/Reference Case: Business as usual. In this scenario, we have assumed that the bunker price differentials and quality issues are as they are today and that in general, 20% of the vessels transiting the Canal, also bunker there. Regional competition is assumed to be more or less as it is today.

Best Case: U.S. competitiveness weakens as it becomes more and more dependent on bunker imports. A high freight rate scenario, with limited/no economy for vessels to do any deviation for cheaper bunker suppliers. High growth in liner/container trade and Canal traffic in general, increasing trade and idle time.

Worst case: Stronger competition from Venezuela, Ecuador and the Caribbean. Low freight rate scenario. Lower growth in liner/container trade and lower Canal traffic in general.

In our forecast for bunker sales, increased vessel traffic is the most important element for increased bunker sales. Our assumptions on trade growth per vessel type and segment is in the appendix.

As we can see from the forecasts above, the volumes in 2025 will be in the region of 2.3 to 3.5 mmt for an unexpanded and 2.7 to 3.8 mmt for an expanded Canal. The

difference is about 450,000 mt. The difference is built up gradually from 2010. With today's bunker sales of about 11 million barrels/ 1.7 mmt, the increase reflects approximately 2% annual growth over the forecasted period for base case unexpanded and 2.4% annual growth for base case expanded Canal.

. Forecasting bunker sales per route is difficult and involves a lot of parameters that might change the picture totally. Each main route is serviced by different ship types carrying different cargo types, which may increase or decrease in the future. In addition, ships used on each route may change, bunker opportunities on each route may vary between ship types, etc.

To overcome these issues in our forecast of bunker sales per route, we had to establish some basic fundamentals. We have made forecasts of 12 principal routes (the principal routes which the ACP provide statistics for on and listed as their major routes on the web site).

We have used 5 years history to look at trade development per route. The trade development per route has been quite stable, with exception of the round the world route, which have been quite volatile and the largest route (East Coast USA – Asia), which have increased from mid 60's to above 70 million PC/UMS net tons over the last 5 years.

We have compared bunker sales and Panama Canal traffic statistics. This showed that bunker sales have fallen from about 80.000 barrels per million PC/UMS net tons in 1996 and 1997 to 60.000 barrels in 1998 and 1999 to only 50.000 barrels per million PC/UMS net tons in 2000. For the bunker sales forecast by route, we have firstly established forecast in every principal trade route measured in PC/UMS net ton. After forecasting trade development per route, we have forecasted average bunker sales per PC/UMS net ton. We have then adjusted each principal routes bunker sales potential with expected deviation from an average bunker sale on each particular route. (Earlier in this study, we have looked at the major principal routes and commented the competition for bunker sales and bunkering alternatives for the principal routes.) 100% means that the route has average bunker sales per PC/UMS net ton. 110% means that this route will probably sell 10% more than average bunker sales per PC/UMS net ton and vice versa. The bunker sales per route are then adjusted to reflect the results from the other bunker sales forecasts. This is done by adjusting bunker sales for "all other routes". The result from our forecast on most likely case, expanded canal as shown below. The other forecasts by route are in the appendix.

From	To	2005	2010	2015	2020	2025
East Coast US	Asia	3,961,511	4,513,338	5,318,051	5,872,437	6,667,044
East Coast US	WC South America	1,085,346	1,236,531	1,457,000	1,608,887	1,826,587
Round the world		1,302,415	1,447,928	1,706,089	1,847,361	2,076,849
Europe	West Coast South America	1,031,078	1,180,457	1,418,471	1,581,727	1,778,216
Europe	Asia	1,085,346	1,218,506	1,435,762	1,554,650	1,756,376
Europe	West Coast U.S./Canada	488,406	542,973	639,783	692,761	778,818
East Coast US	West Coast Central America	434,138	497,035	597,251	659,512	741,439
South America Intercoastal		434,138	482,643	568,696	615,787	692,283
West Indies	West Coast Central America	162,802	189,134	230,624	258,426	293,394
US Intercoastal		325,604	369,150	434,968	482,666	542,625
East Coast US/Canada	Oceania	271,336	307,625	362,473	402,222	454,413
EC South America	West Coast U.S./Canada	217,069	246,100	289,979	321,777	361,750
Other Routes		1,346,345	1,486,020	1,748,739	1,882,030	2,111,222
<b>Total Bunker Sales</b>	barrels	<b>12,145,534</b>	<b>13,717,439</b>	<b>16,207,886</b>	<b>17,780,243</b>	<b>20,081,017</b>
<b>Total Bunker Sales</b>	million tonnes	<b>1.869</b>	<b>2.110</b>	<b>2.494</b>	<b>2.735</b>	<b>3.089</b>
<b>Bunker sales per PCUMS</b>		<b>50,163</b>	<b>51,009</b>	<b>54,974</b>	<b>54,447</b>	<b>55,987</b>

## POTENTIAL NEW BUNKER FACILITY REQUIREMENTS

As mentioned earlier, about 11-14 million barrels (1.7-2.2 mmt) of bunker fuel has been sold during the last 4-5 years in the Panama region. In 1996, Panama bunker sales reached an all time high, ending at 18.5 million barrels/close to 3 million tonnes. Since then, another terminal has been developed with a storage capacity of about 1.1 million barrels/ 172,000 mt. This is an increase of some 7-8% of Panamas storage capacity, but probably more in terms of bunker sales capacity. It is, therefore, expected that current bunker facilities should be capable of handling up to 3 mmt per year.

Our forecast shows a bunker market in the region of 2.8 mmt for existing Canal and 3.1 mmt for an expanded Canal in 2025 as a base case. The demand for new bunkering facilities is, therefore, limited during the forecasted period. However, in our “best case” scenario, bunker sales volumes climb to 3.6 mmt. We have, therefore, based our analysis below on an additional requirement for bunker facilities capable of handling 500,000 mt per year.

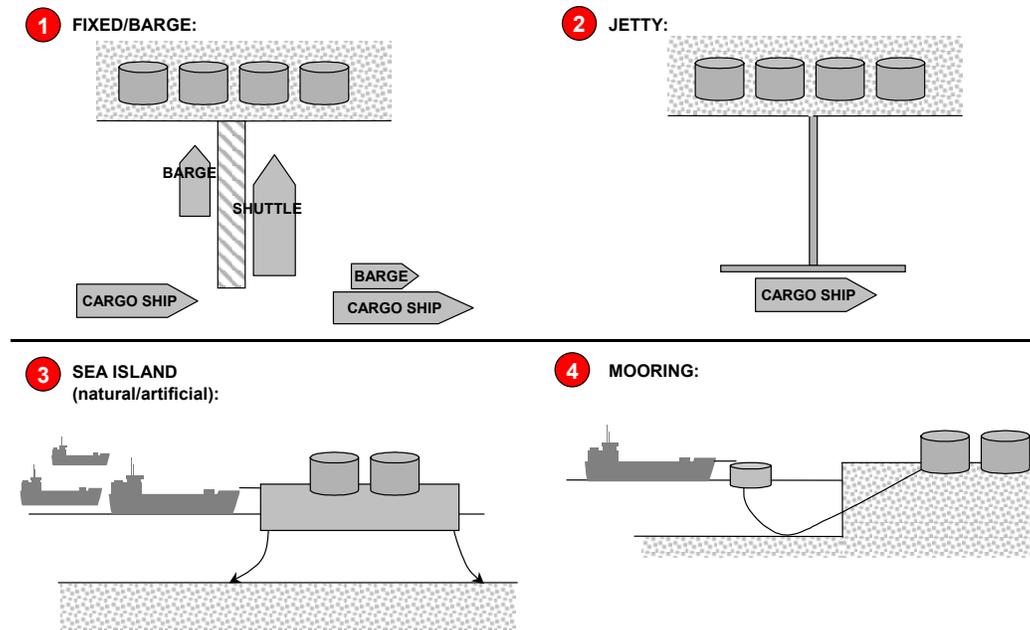
In the discussions below, we have assessed requirements for a bunker facility able to handle an additional 500,000 mt per year. To cope with these (possible) increasing volumes, two opportunities exist:

1. To supply bunker fuel through existing facilities.
2. To develop and build a new facility.

Indeed, a detailed feasibility study, and an independent assessment of the existing bunker facilities included, is needed prior to making a decision regarding building new vs. expanding existing facilities. In this study, we have addressed option 2 above, where four different concepts have been outlined:

1. Fixed/barge
2. Jetty
3. Sea island
4. Mooring

The concepts are schematically presented in Figure 4-1. The Fixed Pier/Barge alternative is the concept that throughout history has been used in Panama, but the Jetty alternative has advantages with respect to operational/building simplicity and distance from ports and populated areas. Requirements for these two alternatives – Fixed/Barge and Jetty – are described below.



**Figure 4-1 Bunker facility concepts**

### 1. The Fixed/Barge Alternative

Each cargo ship typically requires 600-1,000 mt of bunker. If the Panama Canal should increase its annual bunker volumes by 500,000 mt a year, this would imply 5-900 fillings per year, or, on average, 2 fillings per day. The ship-to-ship bunker transfer time is 3-5 hours. If we include sailing time from one ship to another and time required visiting the port and loading the barge, two barges are then needed to service this increase in traffic. The required size of the barges should be about 2-5,000 mt, enabling them to supply 3-6 ships between each loading call.

A 2-400 meter long pier is required (depending on depth conditions). The barges and the shuttle tankers may load simultaneously on each side of the pier. A 60-80,000 dwt tanker is the most likely supply alternative for the bunker facility, with about 6-8 visits per year. Required total tank capacity is then minimum 60,000 tonnes, and the required number of tanks is then 5-6, each tank with an average size of 12,000 mt.

We have discussed cost estimates with construction companies in the field. For professional reasons, they virtually refuse to give any cost estimates for the building of a bunker pier construction without further site- and capacity-specific information. However, they do reckon that the tank facilities (5-6 tanks, each about 12,000 mt) will amount to usd 6-9 million. Piping arrangements will be in the same cost range, and the pier construction will probably amount to usd 10-50 million. Again, lack of site-specific information is reflected in the wide range in the cost estimate. In total, the building costs of the land arrangements could amount to usd 20-50 million.

### 2. The Jetty Alternative

The Jetty alternative does not require any barges for bunkering, as the transiting ships have to visit the pier prior to/after the Canal crossing. This concept implies less operational costs, but the building costs are reckoned to be in the same range as for the Fixed/Barge alternative, i.e. usd 20-50 mill including piping and tanks. The pier has a different design, and the distance to land can be made quite long (500-1000

metres if needed). The quay needed for ship approaches may be long enough to handle two ships at the time (on the average two bunker supplies per day) to give the required flexibility. On the negative side (Jetty alternative), however, the need for the ships to visit the pier to bunker implies time lost for ships and less possibility to exploit Canal transit waiting time.

### **3. The Sea Island Alternative**

A sea island is a floating storage, which makes jetty construction unnecessary. A floating storage facility may have production systems onboard, or it may be placed ashore with an associated pipeline system.

### **4. The Mooring Alternative**

This consists of a moored buoy offshore, which gets bunker oil from an onshore tank or from a tank placed on the sea bottom. The vessel moors to the buoy and bunkers are transferred through a system of hoses. This setup is most commonly used for transfers of crude oil in larger quantities, but could also be used for transfer of bunkers. The buoy could easily be placed close to sea-lanes, but one would have to have piping to shore or tanks that need filling from a bunker vessel. The mooring alternative is presently mostly used for transferring large volumes of crude oil to tankers.

Alternative 1 and 2, fixed facilities/barges and jetties, are the predominant concepts being used today. Nevertheless, during the course of our study, we have talked to three different building companies with experience from the bunker market, and the “sea island” and “mooring” alternatives were mentioned as interesting options, and we were further encouraged to include them in a further study. Today, very few sea island/mooring alternatives have been built, but the technology is being developed and building cost may be lower than alternative 1 and 2.

Alternative 1 and 2 end up around usd 20-50 million each. Using a 12% return on investment over 15 years, the new facility needs a yearly income of some usd 2.6-6.6 million. Based on net extra sales of 500,000 mt bunkers from this new facility, usd 5.2-13.2 per mt bunker sold is needed to break even for this investment. There are also operating cost, which must be added to evaluate this investment.

## **Conclusions - New Bunker Facility**

We recommend that a detailed feasibility analysis is carried out to determine what kind of bunker facilities is most appropriate for Panama. This is not a back-of-the-envelope exercise and before a conclusion can be taken as to the preferred facility concept (fixed/barge, jetty, sea island, mooring, other), local investigations and details analysis are needed.

Building costs for the Fixed/Barge alternative with ship-to-ship bunkering is probably of the same order of magnitude as for the Jetty alternative, and is roughly estimated to usd 20-50 million. Operational costs are lower for the Jetty alternative as barges are not needed. However, this would limit the exploitation of the waiting time for the ships and make bunkering in Panama less attractive.

Bunker sales of 500,000 mt per year are an increase of some 25% relative to present level. Use and eventual modifications of *existing* facilities may be the best solution. Only a detailed and thorough feasibility study will be able to indicate the preferred option: expansion of existing bunker facilities or building of a new.

### **References**

Information used in the bunker facility assessment is mainly provided through telephone discussions with industry people from the following organizations:

- A-Tek, Oslo
- Bergen Engineering, Bergen
- Selmer Skanska, Oslo

## ENVIRONMENTAL IMPACT ANALYSIS

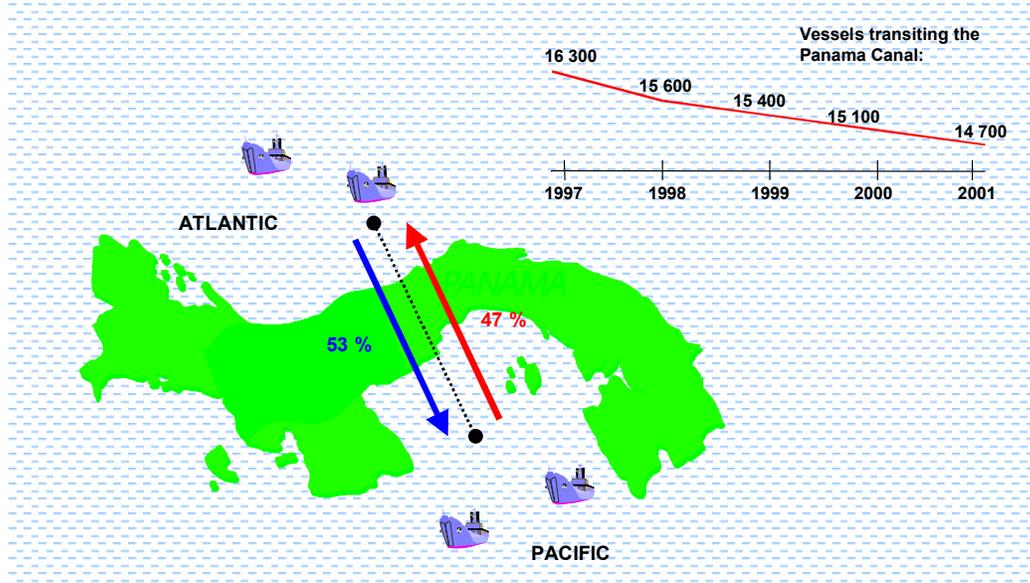
This section provides a summary of some environmental aspects related to bunkering activity, with a focus on oil spill and operational emissions.

### **Assumptions**

Our assumptions that are made as a basis for the environmental risk assessment are listed below.

### **Traffic pattern**

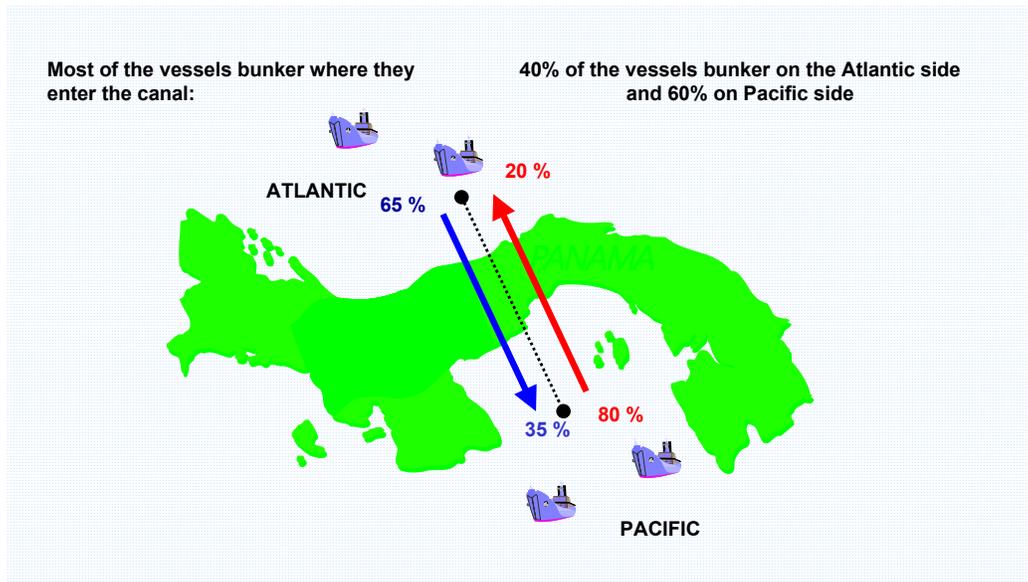
From Panama Canal data, there are more ships transiting the Canal from the Atlantic side than the Pacific side, see figure below.



**Figure 0-1 Traffic volume through the Panama Canal**

As can be seen from Figure 0-1, traffic volumes have decreased over the last 5 years.

Figure 0-2 shows the distribution of the vessels that bunker at the Panama Canal.



**Figure 0-2 Bunkering Patterns at the Panama Canal**

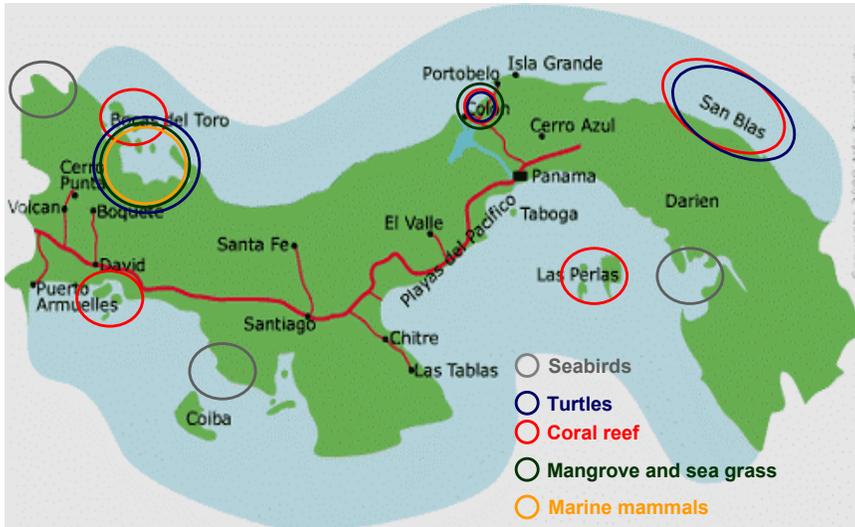
Around 20 % of the vessels that transit the Panama Canal each year bunker there. Most of them bunker on the Pacific side (60%) and the rest on the Atlantic side. The vessels that bunker tend to bunker where they enter the Canal, i.e., 80% of the ships bunker before they transit from the Pacific side, while 65% bunker before they transit from the Atlantic side.

#### **Natural resources in the area**

The following natural resources have been mapped:

- Seabirds
- Turtles
- Coral reefs
- Mangrove and sea grass
- Marine mammals
- Major tourist areas and beaches

Figure 0-3 and Figure 0-4 show where the resources are located:



**Figure 0-3 Important natural resources in the area**



**Figure 0-4 Important tourist areas and beaches in the area**

### The bunkering operation

The main assumptions regarding the following bunkering operations are listed below:

- i. Unloading from shuttle tanker to terminal
- ii. Loading of bunker barge at pier
- iii. Loading of bunker from barge to ship (offshore)

### Bunker volumes/operations:

- Existing bunker activity in Panama has a capacity of around 3 mmt per year (only 1.7 million tonnes sold in 2000), and the potential for increased bunker capacity is assumed to be 500.000 mt. The assessed risk is thus for operations of 500.000 mt bunker per year (and not for 3 million tonnes)
- Average volume of bunker transferred (from barge to cargo ship): 6-800 mt per vessel
- Number of shuttle operations per year (from shuttle to terminal): 10, with each loading about 70,000 mt

- Number of barge fillings at pier (from terminal to barge): 200 per year
- Number of bunker transfers per year (from barge to cargo ship): 600-800.

#### StS (Ship-to-Ship operation):

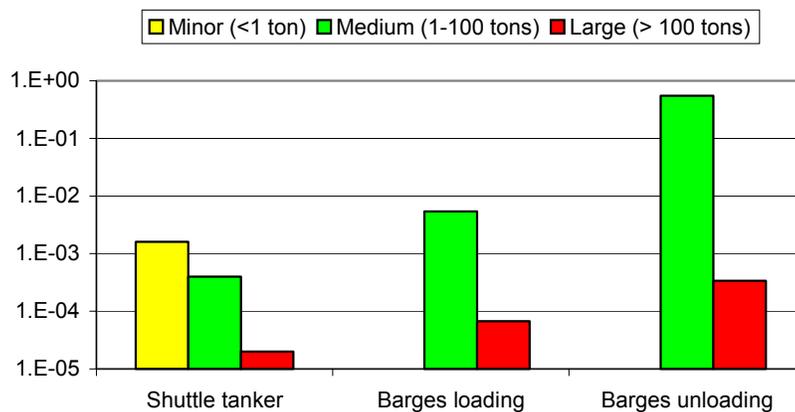
- The risk profile for a Ship-to-Ship (StS) operation is performed with a 5-10,000 dwt product tanker (for which we have extensive accident and operational data)
- The risk for StS-product tanker is assessed to be the same level for StS-barges.

### Results From the Environmental Impact Analysis

This subchapter describes the results (only) from the environmental risk assessment of the following bunker operations:

#### Risk for oil spills from bunker handling

This subchapter describes the assessed risk for oil spill for the bunkering operations in the Panama Canal. Figure 0-5 shows the total oil spill risk from all mentioned phases (i-iii) of the bunkering operations.



**Figure 0-5 Total oil spill risk from the 3 different operations**

As can be seen from the figure above the main environmental risk comes from the unloading operation from barge to cargo vessel. For this operation, a moderate oil spill is expected to happen every 1.8 years. The average cost of a moderate oil spill is usd 0.5 million \*. A “moderate oil spill” (1-100 mt) can be expected every 1.8 years. The yearly estimated accident cost for the bunker operation (500.000 mt) in Panama is therefore about usd 278,000 per year.

\* Note: The figures are based on Lloyds List’ world wide average accident statistics. The risk has been calculated for each of the 3 stages of the bunkering operation: Shuttle tankers deliver bunkers, barge picks up bunkers, and barge delivers bunkers to cargo vessel. All vessels will, at any given time, have a risk of structural failures and fire/explosion, which can potentially lead to an oil spill. Also, during the docking and undocking phase, especially when the barge delivers to the cargo vessel, there is a chance of collision (with the pier or with another vessel), which can potentially lead to penetration of cargo tanks. Added to this, there is a risk of the hose and/or coupling failing during loading and that the tanks are overloaded and oil spilled. This gives a total risk of oil spill from the bunkering operation. The different potential accidents are allocated at defined cost, and this cost figure is based on real-life figures from previous accident and typical pollution cleaning cost. The cost figures are further analyzed by DNV, and they have added their extensive experience to the same costs. This gives a total potential accident cost of usd 250,000 per year. This is, of course, an average cost over many years and will most likely come from larger accidents costing somewhat more (e.g. one accident costing usd 2,500,000 every 10 years will give an average of usd 250,000 per year).

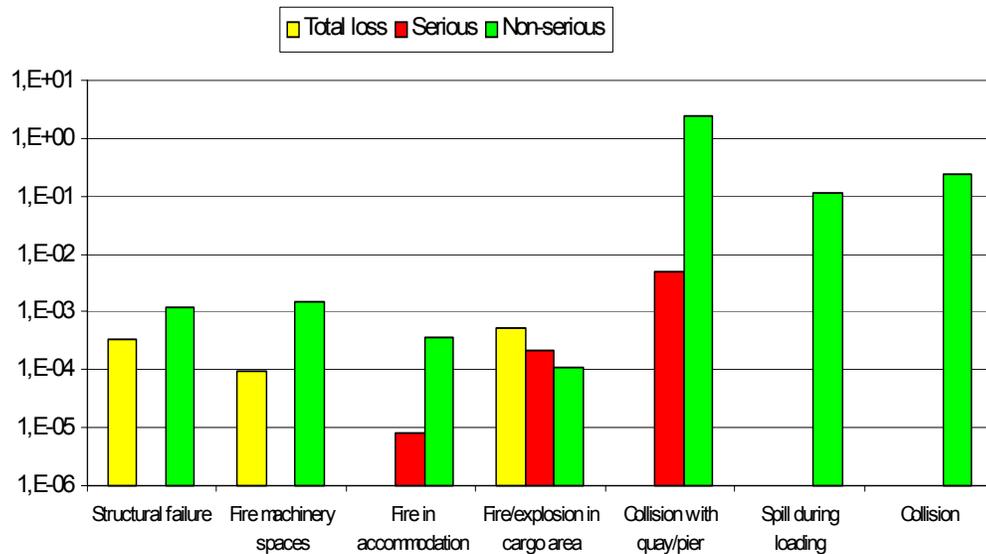
Accidents we have looked at:

- Structural failure
- Fire in machinery spaces
- Fire in accommodation
- Fire/explosion in cargo area
- Collision with other vessel
- Collision with quay/pier
- Grounding due to machinery breakdown
- Grounding due to navigational error
- Spill during loading
- Collision
- Hose or coupling error

The frequencies have been taken from various DNV studies and the individual frequencies are confidential. The different potential accidents are allocated a defined cost, and this cost figure is based on real-life figures from previous accident and typical pollution cleaning cost. The cost figures are further analyzed by DNV, and we have added our extensive experience to the same costs.

### Risk of oil spill from Ship-to-Ship (StS) bunkering operation

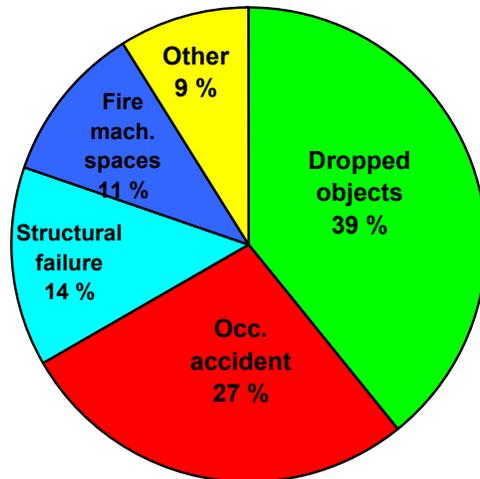
Figure 0-6 shows the accident frequency for the total StS bunkering operation by accident category.



**Figure 0-6 Total accident frequencies from the StS bunkering operations**

As can be seen from the figure above the main risk contributor is fire/explosion in cargo area for “total loss”, and collision with quay/pier for “serious” and “non-serious accidents”. For example, the return period for a “non-serious accident” is 0.3 years, and for a “serious accident” one can expect such an accident every 200 years.

Figure 0-7 shows the fatality frequency for the total StS bunkering operations divided by accident category.

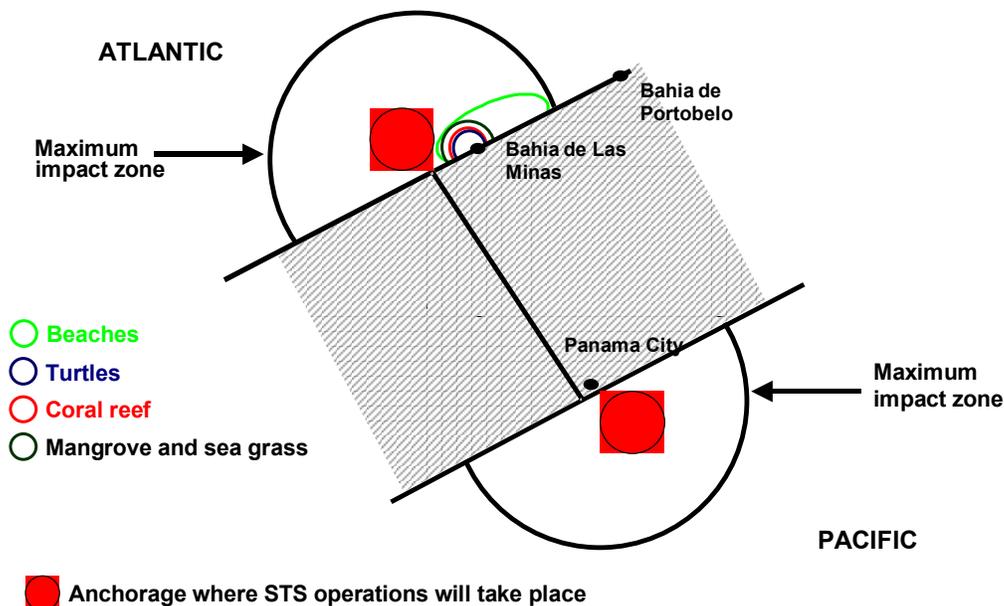


**Figure 0-7 Total risk of loss of life from the StS bunkering operation**

As can be seen from the figure above dropped objects and occupational accidents are the main contributors with 39% and 27% respectively.

### Natural resources

A potential oil spill will have higher consequences if it affects natural resources in the area. Therefore, and as can be seen from Figure 0-8, the *Atlantic* entrance of the Panama Canal is the most vulnerable area. The area contains beaches, turtles, coral reefs, mangrove and seagrass, which might be heavily damaged by an oil spill.



**Figure 0-8 Natural resources impacted by potential environmental accident**

### References

The following references has been used in the environmental impact assessment:

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## ECONOMIC EVALUATIONS

Fearnleys have performed a detailed study on traffic growth in the liquid bulk sector, but have only established rough estimates for traffic growth in all the other shipping segments. The results in this chapter should, therefore, be treated as rough estimates.

In earlier forecasts, we have outlined the difference in bunker sales for an expanded Canal, compared to the existing Canal. The difference in metric tonnes (mt) bunker sales per year is shown in the table below. The difference in bunker sales for the two cases grow from close to zero in fiscal year 2010, to around 180,000 mt in 2015, to around 220,000 mt in 2020, to levels around 300,000 mt per year in fiscal year 2025, for all 3 cases, best, base and worst case.

Year	2005	2010	2015	2020	2025
<b>Best</b>	1,555	3,327	178,881	226,017	304,745
<b>Base Case</b>	1,413	2,773	176,221	219,622	295,078
<b>Worst</b>	(1,447)	(716)	202,904	244,378	320,710

As can be seen above, the difference between the different scenarios (best, base and worst) for the existing and expanded Canal, give a similar growth in bunker sales. Earlier in this study, we have examined the cost of sourcing HFO bunker and the resale value to establish a profit margin. For HFO, this margin was around usd 12.5-15 per mt before cost of barges, storage, adm., taxes, etc. The profit margin was estimated to be 3.8-6.3 per mt.

We did not look at cost levels for MDO or light products, since this is a relatively smaller market with much more price fluctuations and lower sales volumes. We have, therefore, assumed a similar margin for MGO, but adjusted this margin to reflect the higher price of MGO (MGO prices are approximately the double of HFO) as the contribution to Panama's GDP per metric ton of increased sales. Taking MGO sales into consideration, the average margin in the Panama bunker industry increases to usd 15-18 and average profit margin increases to usd 4.6 –7.6 per mt.

To calculate the GDP to the Panamanian economy we have used margins between cost of sourcing bunker and the resale value of usd 15-18 per mt.

The yearly direct contribution to GDP from the increased bunker sales will be as follows:

- 2010 = +/- Zero
- 2011 to 2015 = increasing to usd 2.6 – 3.2 mill.
- 2015 to 2020 = increasing to usd 3.3 – 4.0 mill.
- 2020 to 2025 = increasing to usd 4.4 – 5.3 mill

Yearly contribution to balance of payments will be a similar positive figure, increasing export revenues compared to import expenses with the same delta as above.

Intangible benefits and multiplier effects will come as an addition to the direct contribution to Panama's GDP, listed above. Increased sales volumes will increase barge and terminal storage utilization, improving the economy and competitiveness of these elements. Increased sales will also increase industry efficiency, reduce administration cost, increase profitability, improve know-how and improve the

financial solidity of this industry in Panama. A better financial position may lead to a better negotiating positions when sourcing bunker, improving profit margins or reducing downside risk. These effects are difficult to quantify, but will all add value and contribute to Panama's GDP development. Fearnleys have estimated that intangible benefits and the multiplier effect will increase the total GDP contribution to twice the figures above, resulting in about USD 10 million in 2025.

From the usd 15-18 per mt margin above, the profit margin after barge and storage cost is estimated to be usd 4.6-7.6 per mt. Hence, the barge and storage operation, is a major part of the GDP contribution in Panama.

With regard to the capital inflow to the Panamanian economy, the profit margins in Panama's bunker business were established at levels of some usd 4.6-7.6 per mt as a basis, before tax, marketing and administrative cost. An expanded Canal would, therefore, generate an annual additional profit/capital inflow as follows (fiscal year):

- 2010 = +/- Zero
- 2011 to 2015 = increasing to usd 0.8 – 1.3 mill.
- 2015 to 2020 = increasing to usd 1.0 – 1.7 mill.
- 2020 to 2025 = increasing to usd 1.4 – 2.2 mill

Using a 7% discount rate on this yearly revenue flow, the Net Present Value (NPV) of the increased bunker sale profit is in the range of usd 4-7 million over the period 2010 to 2025, with base year (fiscal year) 2003 and in 2003 usd. In addition, increased profits will be made from the barge and terminal operators. Fearnleys estimate that these profits will increase capital inflow by some 20%.

With increased profits, tax income will also increase. The extra tax income depends on tax levels in Panama for profits earned in the free trade zones and for the bunker industry.

We do not foresee any significant increase in job creation as a consequence of the expansion of the canal and the corresponding increase in bunker sales before current industry overcapacity is absorbed. We estimate that current capacity easily can handle volumes up to 2.5-3.0 mmt. Volumes will, in the best case for the expanded Canal, pass 3.0 mmt levels in 2017. For the reference case in the expanded and unexpanded, bunker sales are estimated to pass 2.5 mmt in 2015 and 2020 respectively.

The additional 300,000 mt bunker sales for an expanded Canal may create some 10-15% more jobs (in fiscal year 2015-2020) in the bunker industry, mainly related to the physical handling of increased sales, including a potential new terminal on the Atlantic side and a few more barges (we estimate this number to be in the range of about 45-55 persons, with 15-18 persons on barges/barge operation, 20-25 persons related to operating a new terminal, 4-6 persons in bunker companies/administration and another 4-6 persons in related activities). Salaries for the personnel, may contribute to Panama's capital inflow, depending on salary levels in Panama.

An expanded Canal will increased bunker sales in Panama. It will stimulate the Panama bunker market and its employment opportunities. It will enhance business opportunities and contribute to a more professional and specialized work force, increasing efficiency, reliability and service.

The turnover in Panama's bunker industry in fiscal year 2000 was the sales volumes times the average bunker sales price. With sales volumes of about 1.7 mmt, 80% IFO and 20% MDO and an average price of 137 and 270, respectively, our estimate for Panama Bunker industry turnover is around usd 280 million.

Our bunker price forecasts are, however, indicating a slowly declining bunker price till year 2007, and then a slowly increasing price. Total turnover from the Panama bunker industry may, therefore, not be significantly higher in the *near* future, but may increase from year 2010 and onwards.

Using the forecasts for bunker sales for the existing canal and our bunker price forecast, we end up with a bunker sale turnover as follows, per fiscal year:

**Existing Canal Bunker Turnover in usd million**

Year	2005	2010	2015	2020	2025
<b>Best</b>	298	315	400	500	629
<b>Base Case</b>	278	282	343	412	508
<b>Worst</b>	252	252	292	353	425

**Expanded Canal Bunker Turnover in usd million**

Year	2005	2010	2015	2020	2025
<b>Best</b>	298	316	426	537	684
<b>Base Case</b>	278	282	369	448	562
<b>Worst</b>	252	251	322	393	483

The expanded Canal versus the existing Canal will show an estimated extra usd 55 million in turnover, totaling usd 560 million in fiscal year 2025. This turnover growth (almost a doubling from today's estimated turnover) will benefit Panama's local banking services. The increased volume will also benefit the local insurance market.

With an 80/20 split in bunker sales between IFO and MDO, the turnover from IFO is about 70% of total and MDO 30% of total bunker sales.

The environmental impact analysis show a yearly average "cost" of usd 278,000 for 500,000 mt increased bunker sales. Some of this cost is collected through the usd 0.05 per mt anti pollution cost for barge operation (some usd 25,000 per year). The rest must be subtracted from the expected increased revenues from the increased bunker operation.

## CONCLUSIONS – Bunker Study

The four main routes to increasing bunkering volumes in the Panama Canal are:

- Increased shipping traffic
- Better price
- Better service
- Better quality products

The two latter are clearly up to the local suppliers, but shipping traffic and to a certain degree, bunker price, depend upon forces beyond their control.

The industry players we have talked to mention the same improvement areas in particular for Panama's bunker market:

- Bunker quality
- Price
- Delivery system
- Less bureaucracy

Panama **bunker quality** is of “acceptable” quality, but it is *not* of such great quality that the Panamanian bunker industry is able to leverage on its reputation as a high-quality bunker port. Now, with Panama's refinery closed, and we do not foresee it being rebuilt in the near future, Panama has no possibility to produce top-quality bunkers by itself, but is dependent on sourcing from other regions. A well-managed sourcing strategy plus a well-functioning bunker quality inspection regime must be assured. Our conclusion is, however, that the quality is acceptable and that there is more to be gained by efforts to improve pricing and service.

The **bunker price** in Panama is high, but not very high, compared to neighbouring bunker regions. However, both Venezuela and Ecuador have changed their pricing policies in recent years and this has increased their competitiveness.

There is not much Panama as a country can do with bunker prices in their region. Taxes are already at very low levels. However, with large storage capacity large quantity purchases may assist in reducing costs. Solid financing may also help to reduce inventory costs.

Further, Panama's bunker **delivery system/service** may be due for a revamp. The “first-come-first-served” strategy for barges works most of the times, but is it good enough for all vessel trades?

One shipowner in the Ro-Ro/Car carrier trade mentioned to us that they usually do not take the chance of using Panama as their preferred bunker station on the way from Europe to the U.S. West Coast because of concerns about losing his Canal transit slot, i.e. the bunker barge is on the way; the vessel is cleared for Canal transit, the vessel may choose to bunker instead of transiting, and by such a choice the vessel loses its place in the Canal convoy. Other shipowners have indicated the same as a concern to them when planning bunker purchases, while others again are quite happy with the delivery system/service in Panama. Our conclusion is that this has to do with which type of trade each owner is involved in.

At present, a shipowner is not guaranteed that the bunker operation is completed prior to the start of a Canal transit, and a lost slot means lost time and money. Although ship agents play an important role in organizing bunker supplies, the first-come-first-serve strategy could be reconsidered amongst the bunker suppliers and barge operators. Especially for vessels with a tight schedule, for instance vessels in liner trade, a system with better bunker delivery guarantees may increase overall sales, but it does also increase cost levels in Panama since there is costs attached to giving delivery guarantees. Our traffic forecast indicate especially more container trades and more dry bulk trades with an expanded Canal.

Some bunker suppliers/agents/terminal owners in Panama also complain about excessive bureaucracy, and the need for modern oil terminals and better infrastructure. This is partially solved now, though, after the new modern fuel storage terminal at Taboguilla Island opened, bettering fuel availability, increasing storage capacity and possibilities for blending and quality control of fuels.

Location is, without doubt, Panama's biggest advantage, and with only one in five transiting vessels bunkering in Panama today there should be room for further growth.

An expansion of the Canal is expected to lead to increased traffic and will also attract larger vessels. This may lead to a potential need for larger barges in the future.

Increased traffic will also lead to increased bunker volumes, as we see it. Panama's bunker market in fiscal year 2000 was some 1.7 mmt. We have estimated that this figure will grow to above 2.7 mmt and above 3.0 mmt in 2025 respectively for an unexpanded and an expanded Canal. This may demand a new storage facility. Although the best location for bunker operations from an environmental view is the Pacific side, near Panama City/Balboa, the increased demand is foreseen on the Atlantic side. Increased bunker sales will benefit the Panamanian economy and create some additional 45-55 positions within this industry.

Environmental impact assessment is performed to determine the risk of oil spill from bunkering operations - shuttle operation, terminal-to-barge, and barge-to-cargo ship. The fuel transfer operation from barge to cargo vessel is the main risk contributor. Expected accident costs for the bunker operation (500.000 mt per year) in Panama are about usd 278.000 per year. This is not a high-risk industry, yet the environment is very vulnerable to oil spills. We would, therefore, suggest a national oil pollution preparedness plan with modern equipment and trained personnel available at both ends of the Canal.

## **APPENDIX**

### **Bunker Sales forecast Model**

The model is built up as follows: we have firstly estimated increased traffic growth per vessel type and per vessel size.

Example:

#### **Container ships**

Post Panamax (4.000 +)  
Panamax (3-4.000 teu)  
Sub Panamax (2-3.000 teu)  
Handy (1000-2000 teu)  
Feeder (100-1000 teu)

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#### **GC ships**

Post Panamax  
Panamax  
Sub Panamax  
Tween  
Coastal

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#### **Passenger Ships**

Post Panamax  
Panamax  
Sub Panamax  
Below 30.000 dwt  
Minicruiser/Ferry

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We have used historical numbers and made a % yearly growth forecast for 5 fiscal year periods 2001-2005, 2006-2010, 2011 to 2015, etc. The growth forecasts depend on our expectations of vessel and trade growth for each segment and for shiptypes within each segment. The economic assumptions given from DRI WEFA, were also used to give the forecasts a better profile. The result is a database with forecast of vessel traffic in types and sizes for each of the 6 cases. The expanded case will include a number of vessels in the Post Panamax size segment to reflect the usage of the Canal by larger ships than today's Panamax vessels.

We have then forecasted average bunker volume per bunker operation for each ship type and size. This forecast is based on the following assumptions:

- Vessels transiting the Canal become larger and larger (also a probable consequence of the new tariff system)
- Average bunker volume slowly increases due to improved competitiveness in Panama

The basis for the forecasts were a study of historical average bunker sales per transit and also based on average size of transited vessels in the Panama Canal (see graphs later in this appendix).

After forecasting both vessel traffic and bunker sales volumes per bunker operation for both vessel size and type, the percentage of how many of the vessels transiting the canal, used the opportunity to bunker, must be established. We, therefore, made forecasts in % for each vessel type and size, reflecting the frequency each ship type and size would use the opportunity to bunker in Panama.

Our forecasts are built up as follows:

1. forecast of increased vessel traffic per ship type and size
2. forecast of average bunker sales per ship type and size
3. forecast of bunkering frequency per ship type and size

Example: firstly, we forecast number of tanker transits in a year (2133 transits in year 2000). Then we forecast tanker vessels average bunker volume, let us say 600 mt.

Finally, we forecast that 20% of each tanker transit will bunker in Panama.

Total bunker sales for fiscal year 2000 for tanker vessels would then be:

$$2133 \text{ transits} * 600 \text{ mt} * 20\% = 256,000 \text{ mt}$$

This is then done for each vessel type and size. The basis for each forecast is estimations and assumptions of recent years activity, using year 2000 as the base year. To establish these assumptions and estimations, we have talked to and interviewed most of the actors in the Panama bunker industry + shipowners.

The difference between the two main cases, existing and expanded Canal, is mainly in the forecasts for vessel traffic and vessel size.

The difference in best, low and high case is variations in frequency of bunkering by each ship type and size.

The forecasts for bunker sales by route are based on Panama Canal traffic figures by route. We have then analyzed each route and established assumptions on how likely/unlikely it is that vessels trading on each route would actually bunker in Panama for this route. Based on the results from this study, we have given each route a percentage deviation from an average weighted figure per route (average weighted figure per route is: total bunker sales per fiscal year, divided by total PCUMS transiting the Canal per fiscal year and then multiplied by the total PCUMS per route for the same fiscal year). We have then forecasted each route's growth in trade over the forecasted period, taking DRI-WEFA economic forecast into account.

## Forecast Bunker Sales by Vessel Size

## Input Data Vessel Traffic Growth, Unexpanded:

Panama Bunker Demand Forecast	2000 BASE YEAR					Yearly traffic increase % in no. of vessels				
	Historical Data - No. Of ship transits					2005	2010	2015	2020	2025
	1998	1999	2000	2001	2002					
<b>Dry Bulk Carriers</b>	<b>4141</b>	<b>4072</b>	<b>3883</b>	<b>3704</b>	<b>3529</b>					
Post Panamax	0	0	0	0	0	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
Panamax (60.000 dwt +)	2485	2443	2330	2222	2117	0.0 %	2.0 %	1.5 %	1.0 %	1.5 %
Handymax (40-60.000 dwt)	621	611	582	556	529	0.0 %	2.0 %	1.5 %	1.5 %	1.5 %
Handysize (25-40.000 dwt)	621	611	582	556	529	-1.0 %	-1.0 %	-1.0 %	-1.0 %	-1.0 %
Coastal Bulkers (0-25.000 dwt)	414	407	388	370	353	-1.5 %	-0.5 %	-0.5 %	-0.5 %	-0.5 %
<b>Container ships</b>	<b>2170</b>	<b>2211</b>	<b>2341</b>	<b>2365</b>	<b>2582</b>					
Post Panamax (4.000 +)	20	25	30	30	30	2.5 %	3.5 %	3.5 %	2.5 %	2.0 %
Panamax (3-4.000 teu)	868	884	936	946	1033	3.0 %	3.5 %	2.0 %	2.5 %	1.5 %
Sub Panamax (2-3.000 teu)	651	663	702	710	775	2.5 %	3.0 %	2.0 %	1.5 %	1.5 %
Handy (1000-2000 teu)	434	442	468	473	516	2.5 %	2.0 %	1.5 %	0.5 %	0.5 %
Feeder (100-1000 teu)	217	221	234	237	258	0.5 %	0.5 %	-0.5 %	-0.5 %	-0.5 %
<b>GC ships</b>	<b>1321</b>	<b>1100</b>	<b>1000</b>	<b>1110</b>	<b>985</b>					
Post Panamax	20	20	20	21	22	1.0 %	1.0 %	2.0 %	2.0 %	2.0 %
Panamax	66	55	50	56	49	2.0 %	2.0 %	2.0 %	2.0 %	2.0 %
Sub Panamax	132	110	100	111	99	1.0 %	1.0 %	1.0 %	1.0 %	1.0 %
Tween	462	385	350	389	345	0.0 %	0.5 %	0.5 %	-0.5 %	-0.5 %
Coastal	661	550	500	555	493	-1.0 %	-0.5 %	-0.5 %	-1.0 %	-1.0 %
<b>Passenger Ships</b>	<b>313</b>	<b>296</b>	<b>273</b>	<b>235</b>	<b>206</b>					
Post Panamax	10	10	10	10	10	0.0 %	1.0 %	1.5 %	1.5 %	1.0 %
Panamax	125.2	118.4	109.2	94	82.4	-1.0 %	2.5 %	3.5 %	2.0 %	1.5 %
Sub Panamax	78.25	74	68.25	58.75	51.5	-2.0 %	2.0 %	2.0 %	1.5 %	1.5 %
Below 30.000 dwt	62.6	74	68.25	58.75	51.5	-2.0 %	1.0 %	1.0 %	1.0 %	1.0 %
Minicruiser/Ferry	46.95	29.6	27.3	23.5	20.6	-2.0 %	0.2 %	0.2 %	0.2 %	0.2 %
<b>Reefers incl. Fishing Vessels</b>	<b>2428</b>	<b>2454</b>	<b>2307</b>	<b>2403</b>	<b>2436</b>					
Post Panamax	0	0	0	0	0	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
Panamax	0	0	2	2	2	0.0 %	2.0 %	2.0 %	1.0 %	1.0 %
Handymax	728	736	692	721	731	1.0 %	1.0 %	1.0 %	0.0 %	0.0 %
Handy	728	736	692	721	731	0.5 %	0.5 %	0.5 %	0.0 %	0.0 %
Coastal	971	982	919	957	970	0.0 %	-0.5 %	-0.5 %	-0.5 %	-0.5 %
<b>Tankers &amp; Gas Carriers</b>	<b>2151</b>	<b>2122</b>	<b>2133</b>	<b>2053</b>	<b>1802</b>					
Post Panamax (75.000 dwt+)	1	2	3	3	3	0.0 %	0.0 %	2.0 %	2.0 %	2.0 %
Panamax (60-75.000 dwt )	430.2	424.4	426.6	410.6	360.4	0.5 %	1.7 %	1.7 %	1.5 %	1.5 %
MR (25-60.000 dwt)	430.2	424.4	426.6	410.6	360.4	0.5 %	2.5 %	2.5 %	2.2 %	2.0 %
Small tankers (10-25.000 dwt)	645.3	636.6	639.9	615.9	540.6	-0.5 %	1.5 %	1.5 %	1.0 %	0.5 %
Coastal (0-10.000 dwt)	645.3	636.6	639.9	615.9	540.6	-1.0 %	0.0 %	-1.0 %	0.0 %	0.0 %
<b>Barges, Tugs, Dredges, etc.</b>	<b>1188</b>	<b>736</b>	<b>288</b>	<b>235</b>	<b>263</b>					
Post Panamax	0	0	5	5	5	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
Panamax	59	37	14	12	13	0.0 %	1.0 %	1.0 %	1.0 %	1.0 %
Above 30.000 dwt	59	37	14	12	13	0.0 %	2.0 %	2.0 %	2.0 %	2.0 %
Below 30.000 dwt	119	74	29	24	26	0.0 %	1.0 %	2.0 %	2.0 %	2.0 %
Coastal	950	589	230	188	210	0.0 %	1.0 %	1.0 %	1.0 %	1.0 %
<b>Others/Navy ships</b>			<b>78</b>	<b>93</b>	<b>59</b>					
Handymax	37	54	78	93	59	3.0 %	-1.0 %	0.0 %	0.0 %	0.0 %
<b>TOTAL</b>	<b>13749</b>	<b>13045</b>	<b>12303</b>	<b>12198</b>	<b>11862</b>					
Transits per day	37.67	35.74	33.71	33.42	32.50					

## Input Data Vessel Traffic Growth, Expanded:

Panama Bunker Demand Forecast	2000 BASE YEAR					Yearly traffic increase % in no. of vessels				
	Historical Data - No. Of Transits					2005	2010	2015	2020	2025
	1998	1999	2000	2001	2002					
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Post Panamax	0	0	6	0	0	0.0 %	0.0 %	30.0 %	10.0 %	5.0 %
Panamax (60.000 dwt +)	2485	2443	2330	2222	2117	0.0 %	2.0 %	1.5 %	1.0 %	1.5 %
Handymax (40-60.000 dwt)	621	611	582	556	529	0.0 %	2.0 %	1.5 %	1.5 %	1.5 %
Handysize (25-40.000 dwt)	621	611	582	556	529	-1.0 %	-1.0 %	-1.0 %	-1.0 %	-1.0 %
Coastal Bunkers (0-25.000 dwt)	414	407	388	370	353	-1.5 %	-0.5 %	-0.5 %	-0.5 %	-0.5 %
<b>Container ships</b>	<b>2170</b>	<b>2211</b>	<b>2341</b>	<b>2365</b>	<b>2582</b>					
Post Panamax (4.000 +)	20	25	30	30	30	2.5 %	3.5 %	20.0 %	15.0 %	15.0 %
Panamax (3-4.000 teu)	868	884	936	946	1033	3.0 %	3.5 %	2.0 %	2.0 %	1.0 %
Sub Panamax (2-3.000 teu)	651	663	702	710	775	2.5 %	3.0 %	2.0 %	1.5 %	1.5 %
Handy (1000-2000 teu)	434	442	468	473	516	2.5 %	2.0 %	1.0 %	0.5 %	0.5 %
Feeder (100-1000 teu)	217	221	234	237	258	0.5 %	0.5 %	-0.5 %	-0.5 %	-0.5 %
<b>GC ships</b>	<b>1321</b>	<b>1100</b>	<b>1000</b>	<b>1110</b>	<b>985</b>					
Post Panamax	20	20	20	21	22	1.0 %	1.0 %	2.0 %	3.0 %	3.0 %
Panamax	66	55	50	56	49	2.0 %	2.0 %	2.0 %	2.0 %	2.0 %
Sub Panamax	132	110	100	111	99	1.0 %	1.0 %	1.0 %	1.0 %	1.0 %
Tween	462	385	350	389	345	0.0 %	0.5 %	0.5 %	-0.5 %	-0.5 %
Coastal	661	550	500	555	493	0.0 %	-0.5 %	-0.5 %	-1.0 %	-1.0 %
<b>Passenger Ships</b>	<b>313</b>	<b>296</b>	<b>273</b>	<b>235</b>	<b>206</b>					
Post Panamax	10	10	10	10	10	0.0 %	1.0 %	10.0 %	3.0 %	3.0 %
Panamax	125.2	118.4	109.2	94	82.4	-1.0 %	2.5 %	3.5 %	2.0 %	1.0 %
Sub Panamax	78.25	74	68.25	58.75	51.5	-2.0 %	2.0 %	2.0 %	1.5 %	1.5 %
Below 30.000 dwt	62.6	74	68.25	58.75	51.5	-2.0 %	1.0 %	1.0 %	1.0 %	1.0 %
Minicruiser/Ferry	46.95	29.6	27.3	23.5	20.6	-2.0 %	0.2 %	0.2 %	0.2 %	0.2 %
<b>Reefers incl. Fishing Vessels</b>	<b>2428</b>	<b>2454</b>	<b>2307</b>	<b>2403</b>	<b>2436</b>					
Post Panamax	0	0	0	0	0	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
Panamax	0	0	2	2	2	0.0 %	2.0 %	2.0 %	1.0 %	1.0 %
Handymax	728	736	692	721	731	1.0 %	1.0 %	1.0 %	0.0 %	0.0 %
Handy	728	736	692	721	731	0.5 %	0.5 %	0.5 %	0.0 %	0.0 %
Coastal	971	982	919	957	970	0.0 %	-0.5 %	-0.5 %	-0.5 %	-0.5 %
<b>Tankers &amp; Gas Carriers</b>	<b>2151</b>	<b>2122</b>	<b>2133</b>	<b>2053</b>	<b>1802</b>					
Post Panamax (75.000 dwt+)	1	2	3	3	3	0.0 %	20.0 %	70.0 %	10.0 %	5.0 %
Panamax (60-75.000 dwt )	430.2	424.4	426.6	410.6	360.4	0.5 %	1.7 %	1.0 %	1.0 %	1.0 %
MR (25-60.000 dwt)	430.2	424.4	426.6	410.6	360.4	0.5 %	2.5 %	1.0 %	2.0 %	2.0 %
Small tankers (10-25.000 dwt)	645.3	636.6	639.9	615.9	540.6	-0.5 %	1.5 %	1.0 %	1.0 %	0.5 %
Coastal (0-10.000 dwt)	645.3	636.6	639.9	615.9	540.6	-1.0 %	0.0 %	-1.0 %	0.0 %	0.0 %
<b>Barges, Tugs, Dredges, etc.</b>	<b>1188</b>	<b>736</b>	<b>288</b>	<b>235</b>	<b>263</b>					
Post Panamax	0	0	5	5	5	0.0 %	0.0 %	1.0 %	1.0 %	1.0 %
Panamax	59	37	14	12	13	0.0 %	1.0 %	1.0 %	1.0 %	1.0 %
Above 30.000 dwt	59	37	14	12	13	0.0 %	2.0 %	2.0 %	2.0 %	2.0 %
Below 30.000 dwt	119	74	29	24	26	0.0 %	1.0 %	2.0 %	2.0 %	2.0 %
Coastal	950	589	230	188	210	0.0 %	1.0 %	1.0 %	1.0 %	1.0 %
<b>Others/Navy ships</b>			<b>78</b>	<b>93</b>	<b>59</b>					
Handymax	37	54	78	93	59	3.0 %	-1.0 %	0.0 %	0.0 %	0.0 %
	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>					
<b>TOTAL</b>	<b>13749</b>	<b>13045</b>	<b>12303</b>	<b>12198</b>	<b>11862</b>					
Transits per day	37.67	35.74	33.71	33.42	32.50					

**Input Data Expanded Canal:**

Bunker Forecast Model		By ship type and ship size					By ship type and ship size				
Most Probable Case Existing Canal		% of vessels Bunkering - before or after passing the Canal					Average Bunkering Volume				
Year		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
Dry Bulk Carriers		20 %	20 %	20 %	20 %	20 %	865	897	928	958	987
Container Ships		24 %	24 %	28 %	28 %	28 %	1082	1121	1160	1197	1234
GC Ships		20 %	20 %	20 %	20 %	20 %	288	299	309	319	329
Passenger Ships		17 %	17 %	17 %	17 %	17 %	1038	1076	1114	1150	1185
Reefers		18 %	18 %	18 %	18 %	18 %	611	633	655	676	790
Tankers		10 %	10 %	10 %	10 %	10 %	577	598	619	639	790
Barges, Tugs, dredges, etc.		20 %	20 %	20 %	20 %	20 %	288	299	309	319	329
Others/Navy ships		20 %	20 %	20 %	20 %	20 %	288	299	309	319	329
Post Panamax		20 %	20 %	24 %	24 %	24 %	2500	2600	2700	2800	2900
Panamax		23 %	24 %	24 %	25 %	25 %	1200	1200	1200	1200	1200
Handymax/MR		22 %	22 %	22 %	22 %	22 %	650	680	715	750	780
Handymin/Small tankers		18 %	18 %	18 %	18 %	18 %	310	315	325	355	380
Coastal/Small tankers		18 %	18 %	18 %	18 %	18 %	200	205	215	230	250
Best Case Existing Canal		% of vessels Bunkering - before or after passing the Canal					Average Bunkering Volume				
Year		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
Dry Bulk Carriers		22 %	23 %	24 %	25 %	26 %	865	897	928	958	987
Container Ships		27 %	30 %	33 %	36 %	39 %	1082	1121	1160	1197	1234
GC Ships		22 %	24 %	26 %	28 %	28 %	288	299	309	319	329
Passenger Ships		19 %	21 %	23 %	25 %	25 %	1038	1076	1114	1150	1185
Reefers		20 %	22 %	24 %	26 %	26 %	611	633	655	676	790
Tankers		12 %	14 %	16 %	18 %	18 %	577	598	619	639	790
Barges, Tugs, dredges, etc.		22 %	24 %	26 %	28 %	28 %	288	299	309	319	329
Others/Navy ships		22 %	24 %	26 %	28 %	28 %	288	299	309	319	329
Post Panamax		20 %	22 %	27 %	27 %	27 %	2500	2600	2700	2800	2900
Panamax		27 %	29 %	30 %	31 %	32 %	1200	1200	1200	1200	1200
Handymax/MR		22 %	23 %	24 %	24 %	25 %	650	680	715	750	780
Handymin/Small tankers		18 %	19 %	20 %	21 %	22 %	310	315	325	355	380
Coastal/Small tankers		18 %	19 %	20 %	21 %	22 %	200	205	215	230	250
Worst Case Existing Canal		% of vessels Bunkering - before or after passing the Canal					Average Bunkering Volume				
Year		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
Dry Bulk Carriers		18 %	17 %	16 %	16 %	15 %	865	897	928	958	987
Container Ships		24 %	24 %	28 %	28 %	28 %	1082	1121	1160	1197	1234
GC Ships		18 %	18 %	17 %	17 %	17 %	288	299	309	319	329
Passenger Ships		14 %	14 %	13 %	12 %	12 %	1038	1076	1114	1150	1185
Reefers		15 %	15 %	14 %	14 %	14 %	611	633	655	676	790
Tankers		6 %	6 %	6 %	6 %	6 %	577	598	619	639	790
Barges, Tugs, dredges, etc.		17 %	17 %	17 %	17 %	17 %	288	299	309	319	329
Others/Navy ships		13 %	13 %	13 %	13 %	13 %	288	299	309	319	329
Post Panamax		18 %	18 %	22 %	22 %	22 %	2500	2600	2700	2800	2900
Panamax		20 %	20 %	20 %	20 %	21 %	1200	1200	1200	1200	1200
Handymax/MR		19 %	18 %	17 %	17 %	17 %	650	680	715	750	780
Handymin/Small tankers		17 %	15 %	15 %	14 %	14 %	310	315	325	355	380
Coastal/Small tankers		16 %	15 %	14 %	14 %	14 %	200	205	215	230	250

**Input Data Unexpanded Canal:**

Bunker Forecast Model		By ship type and ship size					By ship type and ship size				
Most Probable Case Existing Canal		% of vessels Bunkering - before or after passing the Canal					Average Bunkering Volume				
Year		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
Dry Bulk Carriers		20 %	20 %	20 %	20 %	20 %	865	897	928	958	987
Container Ships		24 %	24 %	24 %	24 %	24 %	1082	1121	1160	1197	1234
GC Ships		20 %	20 %	20 %	20 %	20 %	288	299	309	319	329
Passenger Ships		17 %	17 %	17 %	17 %	17 %	1038	1076	1114	1150	1185
Reefers		18 %	18 %	18 %	18 %	18 %	611	633	655	676	790
Tankers		10 %	10 %	10 %	10 %	10 %	577	598	619	639	790
Barges, Tugs, dredges, etc.		20 %	20 %	20 %	20 %	20 %	288	299	309	319	329
Others/Navy ships		20 %	20 %	20 %	20 %	20 %	288	299	309	319	329
Post Panamax		22 %	22 %	22 %	22 %	22 %	2500	2600	2700	2800	2900
Panamax		23 %	24 %	24 %	25 %	25 %	1200	1200	1200	1200	1200
Handymax/MR		22 %	22 %	22 %	22 %	22 %	650	680	715	750	780
Handymin/Small tankers		18 %	18 %	18 %	18 %	18 %	310	315	325	355	380
Coastal/Small tankers		18 %	18 %	18 %	18 %	18 %	200	205	215	230	250
Best Case Existing Canal		% of vessels Bunkering - before or after passing the Canal					Average Bunkering Volume				
Year		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
Dry Bulk Carriers		22 %	23 %	24 %	25 %	26 %	865	897	928	958	987
Container Ships		27 %	30 %	33 %	36 %	39 %	1082	1121	1160	1197	1234
GC Ships		22 %	24 %	26 %	28 %	28 %	288	299	309	319	329
Passenger Ships		19 %	21 %	23 %	25 %	25 %	1038	1076	1114	1150	1185
Reefers		20 %	22 %	24 %	26 %	26 %	611	633	655	676	790
Tankers		12 %	14 %	16 %	18 %	18 %	577	598	619	639	790
Barges, Tugs, dredges, etc.		22 %	24 %	26 %	28 %	28 %	288	299	309	319	329
Others/Navy ships		22 %	24 %	26 %	28 %	28 %	288	299	309	319	329
Post Panamax		30 %	30 %	30 %	30 %	30 %	2500	2600	2700	2800	2900
Panamax		27 %	29 %	30 %	31 %	31 %	1200	1200	1200	1200	1200
Handymax/MR		22 %	23 %	24 %	24 %	25 %	650	680	715	750	780
Handymin/Small tankers		18 %	19 %	20 %	21 %	22 %	310	315	325	355	380
Coastal/Small tankers		18 %	19 %	20 %	21 %	22 %	200	205	215	230	250
Worst Case Existing Canal		% of vessels Bunkering - before or after passing the Canal					Average Bunkering Volume				
Year		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
Dry Bulk Carriers		18 %	17 %	16 %	16 %	15 %	865	897	928	958	987
Container Ships		24 %	24 %	23 %	23 %	23 %	1082	1121	1160	1197	1234
GC Ships		18 %	18 %	18 %	18 %	18 %	288	299	309	319	329
Passenger Ships		15 %	15 %	15 %	15 %	15 %	1038	1076	1114	1150	1185
Reefers		15 %	15 %	14 %	14 %	14 %	611	633	655	676	790
Tankers		6 %	6 %	6 %	6 %	6 %	577	598	619	639	790
Barges, Tugs, dredges, etc.		17 %	17 %	17 %	17 %	17 %	288	299	309	319	329
Others/Navy ships		13 %	13 %	13 %	13 %	13 %	288	299	309	319	329
Post Panamax		19 %	18 %	18 %	18 %	19 %	2500	2600	2700	2800	2900
Panamax		20 %	20 %	20 %	20 %	21 %	1200	1200	1200	1200	1200
Handymax/MR		20 %	20 %	20 %	20 %	20 %	650	680	715	750	780
Handymin/Small tankers		17 %	15 %	15 %	14 %	14 %	310	315	325	355	380
Coastal/Small tankers		16 %	15 %	14 %	14 %	14 %	200	205	215	230	250

**Bunker Sales in metric ton by Vessel Type - Expanded Canal**

Most Probable Vessel Traffic by Vessel Size	Year				
	2005	2010	2015	2020	2025
Panamax	1,111,775	1,305,560	1,416,917	1,577,201	1,681,793
Handymax/MR	389,390	451,500	510,004	567,942	627,831
Handymin/Small tankers	224,129	200,393	280,317	166,368	149,594
Coastal/Small tankers	103,769	105,405	107,983	113,607	121,532
Post Panamax	39,481	47,518	178,300	310,305	508,637
<b>Total</b>	<b>1,868,544</b>	<b>2,110,375</b>	<b>2,493,521</b>	<b>2,735,422</b>	<b>3,089,387</b>
Best Case Vessel Traffic by Vessel Size	Year				
	2005	2010	2015	2020	2025
Panamax	1,305,127	1,577,552	1,771,147	1,955,729	2,152,695
Handymax/MR	389,390	472,023	556,368	619,573	713,444
Handymin/Small tankers	162,147	147,941	233,796	217,741	173,243
Coastal/Small tankers	103,769	111,261	119,981	132,541	148,539
Post Panamax	39,481	52,269	200,587	349,093	572,217
<b>Total</b>	<b>1,999,913</b>	<b>2,361,045</b>	<b>2,881,878</b>	<b>3,274,676</b>	<b>3,760,138</b>
Worst Case Vessel Traffic by Vessel Size	Year				
	2005	2010	2015	2020	2025
Panamax	966,760	1,087,967	1,180,764	1,261,761	1,412,706
Handymax/MR	336,291	369,409	394,094	438,864	485,142
Handymin/Small tankers	261,133	292,705	358,275	322,847	195,870
Coastal/Small tankers	92,239	87,837	83,986	88,361	94,525
Post Panamax	35,533	42,766	163,441	284,446	466,251
<b>Total</b>	<b>1,691,957</b>	<b>1,880,684</b>	<b>2,180,561</b>	<b>2,396,279</b>	<b>2,654,494</b>

**Unexpanded Canal**

Most Probable Vessel Traffic by Vessel Size	Year				
	2005	2010	2015	2020	2025
Panamax	1,111,775	1,305,560	1,421,978	1,598,492	1,722,475
Handymax/MR	389,390	451,500	516,262	576,193	637,306
Handymin/Small tankers	221,911	199,736	217,387	165,621	242,872
Coastal/Small tankers	102,887	104,523	107,081	112,689	120,583
Post Panamax	40,129	46,284	54,592	62,805	71,073
<b>Total</b>	<b>1,866,092</b>	<b>2,107,603</b>	<b>2,317,300</b>	<b>2,515,800</b>	<b>2,794,310</b>
Best Case Vessel Traffic by Vessel Size	Year				
	2005	2010	2015	2020	2025
Panamax	1,305,127	1,577,552	1,777,473	1,982,130	2,135,869
Handymax/MR	389,390	472,023	563,195	628,574	724,211
Handymin/Small tankers	145,091	134,700	168,907	220,842	351,016
Coastal/Small tankers	102,887	110,330	118,978	131,471	147,380
Post Panamax	54,722	63,114	74,443	85,643	96,917
<b>Total</b>	<b>1,997,216</b>	<b>2,357,719</b>	<b>2,702,997</b>	<b>3,048,660</b>	<b>3,455,394</b>
Worst Case Vessel Traffic by Vessel Size	Year				
	2005	2010	2015	2020	2025
Panamax	966,760	1,087,967	1,184,982	1,278,793	1,446,879
Handymax/MR	353,991	410,454	469,329	523,812	579,369
Handymin/Small tankers	245,606	258,008	195,395	210,262	152,368
Coastal/Small tankers	91,455	87,102	83,285	87,647	93,787
Post Panamax	34,657	37,868	44,666	51,386	61,381
<b>Total</b>	<b>1,692,469</b>	<b>1,881,400</b>	<b>1,977,657</b>	<b>2,151,900</b>	<b>2,333,784</b>

## Unexpanded Canal: Vessel Traffic (no. of transits) by Vessel Type per Year

Vessel Traffic by no. of Ships	1998	1999	2000	2001	2002	2005	2010	2015	2020	2025
Dry Bulk Carriers	4141	4072	3883	3704	3529	3826	4093	4307	4469	4720
Container ships	2170	2211	2341	2365	2582	2684	3082	3358	3640	3866
GC Ships	1321	1100	1000	1110	985	1007	1016	1028	1012	999
Passenger ships	313	296	273	235	206	262	286	319	344	367
Reefers	2428	2454	2307	2403	2436	2358	2390	2426	2404	2383
Tankers	2151	2122	2133	2053	1802	2110	2255	2384	2525	2653
Barges, Tugs, dredges, etc.	1188	736	288	235	263	293	308	326	345	366
Others/Navy ships	37	54	78	93	59	90	86	86	86	86
<b>Total</b>	<b>13749</b>	<b>13045</b>	<b>12303</b>	<b>12198</b>	<b>11862</b>	<b>12630</b>	<b>13516</b>	<b>14235</b>	<b>14827</b>	<b>15440</b>
<b>Vessel Traffic by Vessel Size</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Post Panamax						73	81	92	102	111
Panamax	4033	3962	3868	3742	3657	4028	4533	4937	5328	5742
Handymax/MR	2701	2656	2586	2578	2558	2723	3018	3282	3492	3714
Handymin/Small tankers	3073	2958	2830	2836	2740	2858	2965	3071	3097	3108
Coastal/Small tankers	3905	3415	2939	2947	2846	2858	2833	2767	2722	2680
<b>Total</b>	<b>13712</b>	<b>12991</b>	<b>12223</b>	<b>12103</b>	<b>11801</b>	<b>12540</b>	<b>13430</b>	<b>14149</b>	<b>14741</b>	<b>15354</b>

## Unexpanded Canal: Bunker Sales Volumes (mt) by Vessel Type per Year

Most Probable Case										
Bunker Volume by no. of Ships (mt)	1998	1999	2000	2001	2002	2005	2010	2015	2020	2025
Dry Bulk Carriers	689,511	717,575	687,003	638,010	634,655	662,106	734,360	799,363	856,232	931,891
Reefers	436,651	418,279	396,229	415,829	424,676	259,203	272,435	285,993	292,627	338,764
Tankers	366,633	364,455	369,107	357,906	316,455	121,729	134,826	147,469	161,285	209,519
Container ships	382,401	391,183	403,235	425,321	440,096	696,633	829,315	934,914	1,046,173	1,144,754
GC Ships	233,719	189,474	179,840	189,197	169,174	58,075	60,764	63,590	64,637	65,737
Barges, Tugs, dredges, etc.	204,040	127,362	50,208	41,269	46,521	16,901	18,446	20,191	22,064	24,075
Passenger ships	53,914	53,233	46,532	40,361	35,647	46,229	52,315	60,461	67,290	73,911
Others/Navy ships	6,403	9,414	13,698	16,450	10,511	5,216	5,143	5,320	5,492	5,659
<b>Total</b>	<b>2,373,272</b>	<b>2,270,974</b>	<b>2,145,851</b>	<b>2,124,344</b>	<b>2,077,735</b>	<b>1,866,092</b>	<b>2,107,603</b>	<b>2,317,300</b>	<b>2,515,800</b>	<b>2,794,310</b>

Best Case										
Bunker Volume by no. of Ships (mt)	1998	1999	2000	2001	2002	2005	2010	2015	2020	2025
Dry Bulk Carriers	689,511	717,575	687,003	638,010	634,655	728,317	844,513	959,236	1,070,290	1,211,459
Reefers	436,651	418,279	396,229	415,829	424,676	288,003	332,976	381,324	422,683	489,326
Tankers	366,633	364,455	369,107	357,906	316,455	146,074	188,756	235,950	290,313	377,134
Container ships	382,401	391,183	403,235	425,321	440,096	696,633	829,315	934,914	1,046,173	1,144,754
GC Ships	233,719	189,474	179,840	189,197	169,174	63,883	72,916	82,667	90,492	92,032
Barges, Tugs, dredges, etc.	204,040	127,362	50,208	41,269	46,521	16,901	18,446	20,191	22,064	24,075
Passenger ships	53,914	53,233	46,532	40,361	35,647	51,668	64,625	81,800	98,956	108,992
Others/Navy ships	6,403	9,414	13,698	16,450	10,511	5,737	6,171	6,916	7,688	7,923
<b>Total</b>	<b>2,373,272</b>	<b>2,270,974</b>	<b>2,145,851</b>	<b>2,124,344</b>	<b>2,077,735</b>	<b>1,997,216</b>	<b>2,357,719</b>	<b>2,702,997</b>	<b>3,048,660</b>	<b>3,455,394</b>

Worst Case										
Bunker Volume by no. of Ships (mt)	1998	1999	2000	2001	2002	2005	2010	2015	2020	2025
Dry Bulk Carriers	689,511	717,575	687,003	638,010	634,655	596,896	624,206	639,491	684,985	698,918
Reefers	436,651	418,279	396,229	415,829	424,676	216,002	227,029	222,439	227,598	263,483
Tankers	366,633	364,455	369,107	357,906	316,455	73,037	80,895	88,481	96,771	125,711
Container ships	382,401	391,183	403,235	425,321	440,096	696,633	829,315	895,959	1,002,583	1,097,056
GC Ships	233,719	189,474	179,840	189,197	169,174	52,268	54,687	57,231	58,174	59,164
Barges, Tugs, dredges, etc.	204,040	127,362	50,208	41,269	46,521	14,366	15,679	17,162	18,754	20,464
Passenger ships	53,914	53,233	46,532	40,361	35,647	40,790	46,161	53,348	59,374	65,215
Others/Navy ships	6,403	9,414	13,698	16,450	10,511	3,477	3,428	3,546	3,661	3,773
<b>Total</b>	<b>2,373,272</b>	<b>2,270,974</b>	<b>2,145,851</b>	<b>2,124,344</b>	<b>2,077,735</b>	<b>1,692,469</b>	<b>1,881,400</b>	<b>1,977,657</b>	<b>2,151,900</b>	<b>2,333,784</b>

**Expanded Canal: Vessel Traffic (no. of transits) by Vessel Type per year**

<b>Vessel Traffic by no. of Ships</b>	1998	1999	2000	2001	2002	2005	2010	2015	2020	2025
Dry Bulk Carriers	4141	4072	3883	3704	3529	3826	4099	4330	4505	4766
Container ships	2170	2211	2341	2365	2582	2684	3082	3395	3733	4112
GC Ships	1321	1100	1000	1110	985	1031	1040	1051	1036	1023
Passenger ships	313	296	273	235	206	262	286	325	352	373
Reefers	2428	2454	2307	2403	2436	2358	2390	2426	2404	2383
Tankers	2151	2122	2133	2053	1802	2110	2259	2411	2592	2744
Barges, Tugs, dredges, etc.	1188	736	288	235	263	293	308	327	346	367
Others/Navv ships	37	54	78	93	59	90	86	86	86	86
<b>Total</b>	<b>13749</b>	<b>13045</b>	<b>12303</b>	<b>12198</b>	<b>11862</b>	<b>12655</b>	<b>13550</b>	<b>14351</b>	<b>15054</b>	<b>15855</b>
<b>Vessel Traffic by Vessel Size</b>	1998	1999	2000	2001	2002	2005	2010	2015	2020	2025
Post Panamax						73	91	275	462	731
Panamax	4033	3962	3868	3742	3657	4028	4533	4920	5257	5606
Handymax/MR	2701	2656	2586	2578	2558	2723	3018	3242	3442	3659
Handymin/Small tankers	3073	2958	2830	2836	2740	2858	2965	3038	3082	3072
Coastal/Small tankers	3905	3415	2939	2947	2846	2882	2856	2790	2744	2701
<b>Total</b>	<b>13712</b>	<b>12991</b>	<b>12223</b>	<b>12103</b>	<b>11801</b>	<b>12584</b>	<b>13464</b>	<b>14265</b>	<b>14968</b>	<b>15769</b>

**Expanded Canal: Bunker Sales Volumes (mt) by Vessel Type per Year**

<b>Most Probable Case</b>										
<b>Bunker Volume by no. of Ships</b>	1998	1999	2000	2001	2002	2005	2010	2015	2020	2025
Dry Bulk Carriers	689,511	717,575	687,003	638,010	634,655	663,145	735,436	803,498	863,106	940,931
Reefers	436,651	418,279	396,229	415,829	424,676	259,203	272,435	285,993	292,627	338,764
Tankers	366,633	364,455	369,107	357,906	316,455	121,729	135,093	149,180	165,526	216,722
Container ships	382,401	391,183	403,235	425,321	440,096	696,633	829,315	1,102,771	1,251,695	1,420,763
GC Ships	233,719	189,474	179,840	189,197	169,174	59,489	62,193	65,032	66,139	67,325
Barges, Tugs, dredges, etc.	204,040	127,362	50,208	41,269	46,521	16,901	18,446	20,207	22,097	24,128
Passenger ships	53,914	53,233	46,532	40,361	35,647	46,229	52,315	61,522	68,741	75,095
Others/Navv ships	6,403	9,414	13,698	16,450	10,511	5,216	5,143	5,320	5,492	5,659
<b>Total</b>	<b>2,373,272</b>	<b>2,270,974</b>	<b>2,145,851</b>	<b>2,124,344</b>	<b>2,077,735</b>	<b>1,868,544</b>	<b>2,110,375</b>	<b>2,493,521</b>	<b>2,735,422</b>	<b>3,089,387</b>

<b>Best Case</b>										
<b>Bunker Volume by no. of Ships</b>	1998	1999	2000	2001	2002	2005	2010	2015	2020	2025
Dry Bulk Carriers	689,511	717,575	687,003	638,010	634,655	729,459	845,751	964,197	1,078,882	1,223,211
Reefers	436,651	418,279	396,229	415,829	424,676	288,003	332,976	381,324	422,683	489,326
Tankers	366,633	364,455	369,107	357,906	316,455	146,074	189,130	238,687	297,946	390,100
Container ships	382,401	391,183	403,235	425,321	440,096	696,633	829,315	1,102,771	1,251,695	1,420,763
GC Ships	233,719	189,474	179,840	189,197	169,174	65,438	74,631	84,541	92,594	94,255
Barges, Tugs, dredges, etc.	204,040	127,362	50,208	41,269	46,521	16,901	18,446	20,207	22,097	24,128
Passenger ships	53,914	53,233	46,532	40,361	35,647	51,668	64,625	83,235	101,090	110,433
Others/Navv ships	6,403	9,414	13,698	16,450	10,511	5,737	6,171	6,916	7,688	7,923
<b>Total</b>	<b>2,373,272</b>	<b>2,270,974</b>	<b>2,145,851</b>	<b>2,124,344</b>	<b>2,077,735</b>	<b>1,999,913</b>	<b>2,361,045</b>	<b>2,881,878</b>	<b>3,274,676</b>	<b>3,760,138</b>

<b>Worst Case</b>										
<b>Bunker Volume by no. of Ships</b>	1998	1999	2000	2001	2002	2005	2010	2015	2020	2025
Dry Bulk Carriers	689,511	717,575	687,003	638,010	634,655	596,830	625,121	642,798	690,485	705,699
Reefers	436,651	418,279	396,229	415,829	424,676	216,002	227,029	222,439	227,598	263,483
Tankers	366,633	364,455	369,107	357,906	316,455	73,037	81,056	89,508	99,315	130,033
Container ships	382,401	391,183	403,235	425,321	440,096	696,633	829,315	1,102,771	1,251,695	1,420,763
GC Ships	233,719	189,474	179,840	189,197	169,174	53,540	55,973	55,277	56,218	57,226
Barges, Tugs, dredges, etc.	204,040	127,362	50,208	41,269	46,521	14,366	15,679	17,176	18,783	20,509
Passenger ships	53,914	53,233	46,532	40,361	35,647	38,071	43,083	47,046	48,523	53,008
Others/Navv ships	6,403	9,414	13,698	16,450	10,511	3,477	3,428	3,546	3,661	3,773
<b>Total</b>	<b>2,373,272</b>	<b>2,270,974</b>	<b>2,145,851</b>	<b>2,124,344</b>	<b>2,077,735</b>	<b>1,691,957</b>	<b>1,880,684</b>	<b>2,180,561</b>	<b>2,396,279</b>	<b>2,654,494</b>

**Forecast Bunker sales per Route....Expanded Base Case**

From	To	2005	2010	2015	2020	2025
East Coast US	Asia	3,961,511	4,513,338	5,318,051	5,872,437	6,667,044
East Coast US	WC South America	1,085,346	1,236,531	1,457,000	1,608,887	1,826,587
Round the world		1,302,415	1,447,928	1,706,089	1,847,361	2,076,849
Europe	West Coast South America	1,031,078	1,180,457	1,418,471	1,581,727	1,778,216
Europe	Asia	1,085,346	1,218,506	1,435,762	1,554,650	1,756,376
Europe	West Coast U.S./Canada	488,406	542,973	639,783	692,761	778,818
East Coast US	West Coast Central America	434,138	497,035	597,251	659,512	741,439
South America Intercoastal		434,138	482,643	568,696	615,787	692,283
West Indies	West Coast Central America	162,802	189,134	230,624	258,426	293,394
US Intercoastal		325,604	369,150	434,968	482,666	542,625
East Coast US/Canada	Oceania	271,336	307,625	362,473	402,222	454,413
EC South America	West Coast U.S./Canada	217,069	246,100	289,979	321,777	361,750
Other Routes		1,346,345	1,486,020	1,748,739	1,882,030	2,111,222
<b>Total Bunker Sales</b>	barrels	12,145,534	13,717,439	16,207,886	17,780,243	20,081,017
<b>Total Bunker Sales</b>	million tonnes	1.869	2.110	2.494	2.735	3.089
<b>Bunker sales per PCUMS</b>		50,163	51,009	54,974	54,447	55,987

**Forecast Bunker sales per Route....Existing Canal Base Case**

From	To	2005	2010	2015	2020	2025
East Coast US	Asia	3,961,511	4,513,338	5,318,051	5,872,437	6,667,044
East Coast US	WC South America	1,085,346	1,236,531	1,457,000	1,608,887	1,826,587
Round the world		1,302,415	1,447,928	1,706,089	1,847,361	2,076,849
Europe	West Coast South America	1,031,078	1,180,457	1,418,471	1,581,727	1,778,216
Europe	Asia	1,085,346	1,218,506	1,435,762	1,554,650	1,756,376
Europe	West Coast U.S./Canada	488,406	542,973	639,783	692,761	778,818
East Coast US	West Coast Central America	434,138	497,035	597,251	659,512	741,439
South America Intercoastal		434,138	482,643	568,696	615,787	692,283
West Indies	West Coast Central America	162,802	189,134	230,624	258,426	293,394
US Intercoastal		325,604	369,150	434,968	482,666	542,625
East Coast US/Canada	Oceania	271,336	307,625	362,473	402,222	454,413
EC South America	West Coast U.S./Canada	217,069	246,100	289,979	321,777	361,750
Other Routes		1,330,409	1,467,998	603,303	454,485	193,218
<b>Total Bunker Sales</b>	barrels	12,129,597	13,699,417	15,062,451	16,352,698	18,163,012
<b>Bunker Sales</b>	million tonnes	1.866	2.108	2.317	2.516	2.794
<b>Bunker sales per PCUMS</b>		50,097	50,942	51,089	50,075	50,639

Figures in barrels except from last two lines (in million metric tonnes and in metric tonnes per PCUMS)

## Forecast Bunker sales per Route....Existing High Case

From	To	2005	2010	2015	2020	2025
East Coast US	Asia	3,961,511	4,513,338	5,318,051	5,872,437	6,667,044
East Coast US	WC South America	1,085,346	1,236,531	1,457,000	1,608,887	1,826,587
Round the world		1,302,415	1,447,928	1,706,089	1,847,361	2,076,849
Europe	West Coast South America	1,031,078	1,180,457	1,418,471	1,581,727	1,778,216
Europe	Asia	1,085,346	1,218,506	1,435,762	1,554,650	1,756,376
Europe	West Coast U.S./Canada	488,406	542,973	639,783	692,761	778,818
East Coast US	West Coast Central America	434,138	497,035	597,251	659,512	741,439
South America Intercoastal		434,138	482,643	568,696	615,787	692,283
West Indies	West Coast Central America	162,802	189,134	230,624	258,426	293,394
US Intercoastal		325,604	369,150	434,968	482,666	542,625
East Coast US/Canada	Oceania	271,336	307,625	362,473	402,222	454,413
EC South America	West Coast U.S./Canada	217,069	246,100	289,979	321,777	361,750
Other Routes		2,182,718	3,093,752	3,110,333	3,918,074	4,490,263
<b>Total Bunker Sales</b>	barrels	12,981,907	15,325,170	17,569,480	19,816,288	22,460,058
Bunker Sales	million tonnes	1.997	2.358	2.703	3.049	3.455
Bunker sales per PCUMS		53,617	56,987	59,593	60,681	62,620

## Forecast Bunker sales per Route....Expanded Low Case

From	To	2005	2010	2015	2020	2025
East Coast US	Asia	3,961,511	4,513,338	5,318,051	5,872,437	6,667,044
East Coast US	WC South America	1,085,346	1,236,531	1,457,000	1,608,887	1,826,587
Round the world		1,302,415	1,447,928	1,706,089	1,847,361	2,076,849
Europe	West Coast South America	1,031,078	1,180,457	1,418,471	1,581,727	1,778,216
Europe	Asia	1,085,346	1,218,506	1,435,762	1,554,650	1,756,376
Europe	West Coast U.S./Canada	488,406	542,973	639,783	692,761	778,818
East Coast US	West Coast Central America	434,138	497,035	597,251	659,512	741,439
South America Intercoastal		434,138	482,643	568,696	615,787	692,283
West Indies	West Coast Central America	162,802	189,134	230,624	258,426	293,394
US Intercoastal		325,604	369,150	434,968	482,666	542,625
East Coast US/Canada	Oceania	271,336	307,625	362,473	402,222	454,413
EC South America	West Coast U.S./Canada	217,069	246,100	289,979	321,777	361,750
Other Routes		198,530	(6,970)	(285,502)	(322,402)	(715,586)
<b>Total Bunker Sales</b>	barrels	10,997,718	12,224,449	14,173,646	15,575,811	17,254,209
Bunker Sales	million tonnes	1.692	1.881	2.181	2.396	2.654
Bunker sales per PCUMS		45,422	45,457	48,074	47,696	48,105

## Forecast Bunker sales per Route....Existing Low Case

From	To	2005	2010	2015	2020	2025
East Coast US	Asia	3,961,511	4,513,338	5,318,051	5,872,437	6,667,044
East Coast US	WC South America	1,085,346	1,236,531	1,457,000	1,608,887	1,826,587
Round the world		1,302,415	1,447,928	1,706,089	1,847,361	2,076,849
Europe	West Coast South America	1,031,078	1,180,457	1,418,471	1,581,727	1,778,216
Europe	Asia	1,085,346	1,218,506	1,435,762	1,554,650	1,756,376
Europe	West Coast U.S./Canada	488,406	542,973	639,783	692,761	778,818
East Coast US	West Coast Central America	434,138	497,035	597,251	659,512	741,439
South America Intercoastal		434,138	482,643	568,696	615,787	692,283
West Indies	West Coast Central America	162,802	189,134	230,624	258,426	293,394
US Intercoastal		325,604	369,150	434,968	482,666	542,625
East Coast US/Canada	Oceania	271,336	307,625	362,473	402,222	454,413
EC South America	West Coast U.S./Canada	217,069	246,100	289,979	321,777	361,750
Other Routes		201,863	(2,317)	(1,604,375)	(1,910,861)	(2,800,201)
<b>Total Bunker Sales</b>	barrels	11,001,051	12,229,102	12,854,773	13,987,352	15,169,594
Bunker Sales	million tonnes	1.692	1.881	1.978	2.152	2.334
Bunker sales per PCUMS		45,436	45,474	43,601	42,832	42,293

Figures in barrels, except from last two lines (in million metric tonnes and in metric tonnes per PCUMS)

## Forecast Bunker sales per Route....Expanded High Case

From	To	2005	2010	2015	2020	2025
East Coast US	Asia	3,961,511	4,513,338	5,318,051	5,872,437	6,667,044
East Coast US	WC South America	1,085,346	1,236,531	1,457,000	1,608,887	1,826,587
Round the world		1,302,415	1,447,928	1,706,089	1,847,361	2,076,849
Europe	West Coast South America	1,031,078	1,180,457	1,418,471	1,581,727	1,778,216
Europe	Asia	1,085,346	1,218,506	1,435,762	1,554,650	1,756,376
Europe	West Coast U.S./Canada	488,406	542,973	639,783	692,761	778,818
East Coast US	West Coast Central America	434,138	497,035	597,251	659,512	741,439
South America Intercoastal		434,138	482,643	568,696	615,787	692,283
West Indies	West Coast Central America	162,802	189,134	230,624	258,426	293,394
US Intercoastal		325,604	369,150	434,968	482,666	542,625
East Coast US/Canada	Oceania	271,336	307,625	362,473	402,222	454,413
EC South America	West Coast U.S./Canada	217,069	246,100	289,979	321,777	361,750
Other Routes		2,200,248	3,115,376	4,273,061	5,387,182	6,471,104
<b>Total Bunker Sales</b>	barrels	12,999,437	15,346,794	18,732,209	21,285,395	24,440,899
Bunker Sales	million tonnes	2.000	2.361	2.882	3.275	3.760
Bunker sales per PCUMS		53,680	57,087	63,536	65,188	68,142

**Forecast Bunker sales per Route....Existing High Case**

From	To	2005	2010	2015	2020	2025
East Coast US	Asia	3,961,511	4,513,338	5,318,051	5,872,437	6,667,044
East Coast US	WC South America	1,085,346	1,236,531	1,457,000	1,608,887	1,826,587
Round the world		1,302,415	1,447,928	1,706,089	1,847,361	2,076,849
Europe	West Coast South America	1,031,078	1,180,457	1,418,471	1,581,727	1,778,216
Europe	Asia	1,085,346	1,218,506	1,435,762	1,554,650	1,756,376
Europe	West Coast U.S./Canada	488,406	542,973	639,783	692,761	778,818
East Coast US	West Coast Central America	434,138	497,035	597,251	659,512	741,439
South America Intercoastal		434,138	482,643	568,696	615,787	692,283
West Indies	West Coast Central America	162,802	189,134	230,624	258,426	293,394
US Intercoastal		325,604	369,150	434,968	482,666	542,625
East Coast US/Canada	Oceania	271,336	307,625	362,473	402,222	454,413
EC South America	West Coast U.S./Canada	217,069	246,100	289,979	321,777	361,750
Other Routes		2,182,718	3,093,752	3,110,333	3,918,074	4,490,263
<b>Total Bunker Sales</b>	barrels	<b>12,981,907</b>	<b>15,325,170</b>	<b>17,569,480</b>	<b>19,816,288</b>	<b>22,460,058</b>
Bunker Sales	million tonnes	1.997	2.358	2.703	3.049	3.455
Bunker sales per PCUMS		53,617	56,987	59,593	60,681	62,620

**Forecast Bunker sales per Route....Expanded Low Case**

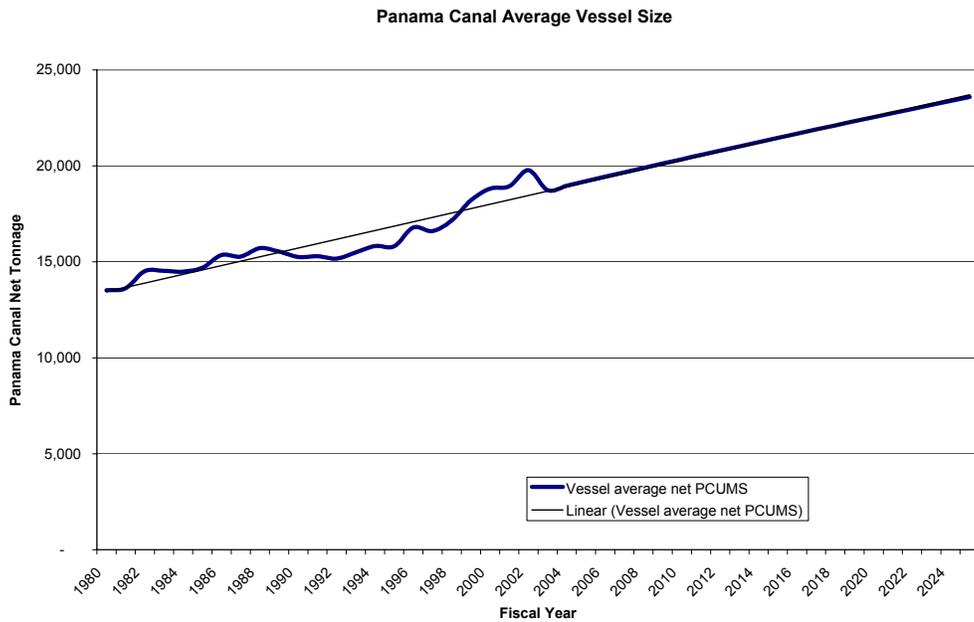
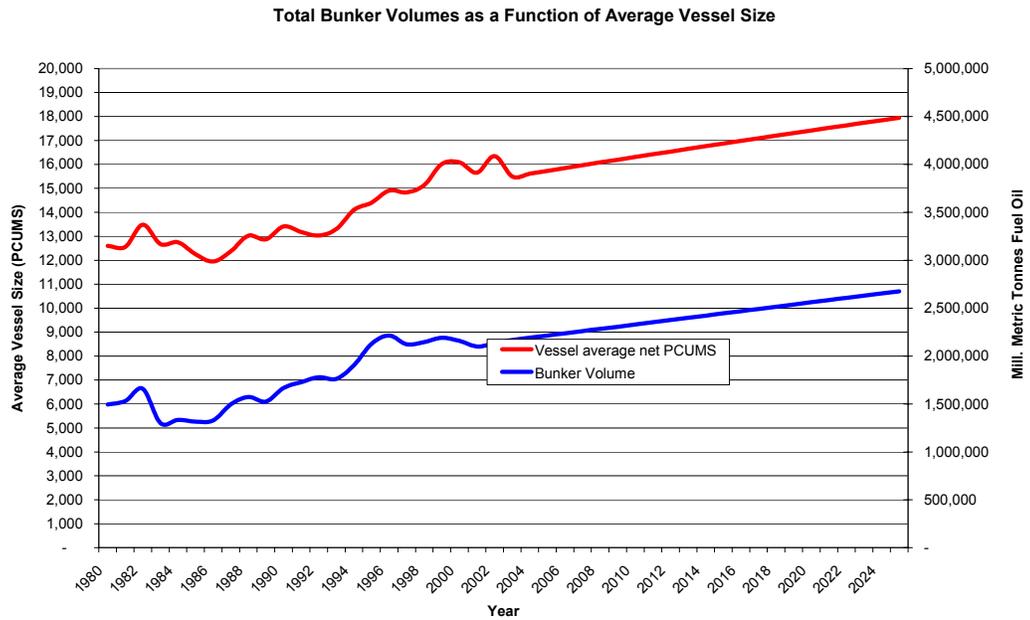
From	To	2005	2010	2015	2020	2025
East Coast US	Asia	3,961,511	4,513,338	5,318,051	5,872,437	6,667,044
East Coast US	WC South America	1,085,346	1,236,531	1,457,000	1,608,887	1,826,587
Round the world		1,302,415	1,447,928	1,706,089	1,847,361	2,076,849
Europe	West Coast South America	1,031,078	1,180,457	1,418,471	1,581,727	1,778,216
Europe	Asia	1,085,346	1,218,506	1,435,762	1,554,650	1,756,376
Europe	West Coast U.S./Canada	488,406	542,973	639,783	692,761	778,818
East Coast US	West Coast Central America	434,138	497,035	597,251	659,512	741,439
South America Intercoastal		434,138	482,643	568,696	615,787	692,283
West Indies	West Coast Central America	162,802	189,134	230,624	258,426	293,394
US Intercoastal		325,604	369,150	434,968	482,666	542,625
East Coast US/Canada	Oceania	271,336	307,625	362,473	402,222	454,413
EC South America	West Coast U.S./Canada	217,069	246,100	289,979	321,777	361,750
Other Routes		198,530	(6,970)	(285,502)	(322,402)	(715,586)
<b>Total Bunker Sales</b>	barrels	<b>10,997,718</b>	<b>12,224,449</b>	<b>14,173,646</b>	<b>15,575,811</b>	<b>17,254,209</b>
Bunker Sales	million tonnes	1.692	1.881	2.181	2.396	2.654
Bunker sales per PCUMS		45,422	45,457	48,074	47,696	48,105

**Forecast Bunker sales per Route....Existing Low Case**

From	To	2005	2010	2015	2020	2025
East Coast US	Asia	3,961,511	4,513,338	5,318,051	5,872,437	6,667,044
East Coast US	WC South America	1,085,346	1,236,531	1,457,000	1,608,887	1,826,587
Round the world		1,302,415	1,447,928	1,706,089	1,847,361	2,076,849
Europe	West Coast South America	1,031,078	1,180,457	1,418,471	1,581,727	1,778,216
Europe	Asia	1,085,346	1,218,506	1,435,762	1,554,650	1,756,376
Europe	West Coast U.S./Canada	488,406	542,973	639,783	692,761	778,818
East Coast US	West Coast Central America	434,138	497,035	597,251	659,512	741,439
South America Intercoastal		434,138	482,643	568,696	615,787	692,283
West Indies	West Coast Central America	162,802	189,134	230,624	258,426	293,394
US Intercoastal		325,604	369,150	434,968	482,666	542,625
East Coast US/Canada	Oceania	271,336	307,625	362,473	402,222	454,413
EC South America	West Coast U.S./Canada	217,069	246,100	289,979	321,777	361,750
Other Routes		201,863	(2,317)	(1,604,375)	(1,910,861)	(2,800,201)
<b>Total Bunker Sales</b>	barrels	<b>11,001,051</b>	<b>12,229,102</b>	<b>12,854,773</b>	<b>13,987,352</b>	<b>15,169,594</b>
Bunker Sales	million tonnes	1.692	1.881	1.978	2.152	2.334
Bunker sales per PCUMS		45,436	45,474	43,601	42,832	42,293

Figures in million barrels, except from last two lines (in metric tonnes and in metric tonnes per PCUMS)

**Historical Data for Bunker sales and Canal Vessel Traffic:**



## **Guide To Bunker Quality<sup>4</sup>**

### KINEMATIC VISCOSITY

Kinematic viscosity of oil is its resistance to flow at a specific temperature. The viscosity of a fuel decreases with increasing temperature. The viscosity of the fuel at the injectors has to be within the limits prescribed by the engine manufacturers. Incorrect viscosity at the injectors may lead to poor combustion, deposit formation and energy loss.

### DENSITY

Density is the weight of one liter of the fuel, at 15oC, expressed in kg. Density is used in the calculation of the quantity of the fuel delivered and invoiced to the customer. From a more technical viewpoint the density gives an indication of the heating value of a fuel within a certain product class.

### CETANE NUMBER, CETANE INDEX

Cetane number and the cetane index are applicable primarily to gasoil and distillate fuels. The cetane number is a measure of the ignition/combustion quality of the fuel in a diesel engine. The higher the rpm of the engine, the higher the required cetane number.

The cetane number of a fuel is determined in an engine test procedure. The cetane index is a calculated value, based on the density and the distillation of the fuel.

### MICROCARBON RESIDUE, RAMSBOTTOM AND CONRADSON CARBON RESIDUE

Microcarbon residue, ramsbottom and conradson carbon residue are three different test methods to check the same characteristic of a diesel fuel and a heavy fuel: the residue formed when the combustion takes place under reduced air supply. This residue contains incompletely burned fuel particles and also the ash formed by the fuel upon combustion.

### FLASH POINT

Flash point is the temperature at which the vapours of a fuel ignite, under the specific conditions of the test, when an external ignition device (flame) is applied.

For safety reasons, the minimum flash point for all fuels (with the exception of DMX) to be used onboard ships has been set at 60oC.

### WATER CONTENT

A small amount of water in fuel is a common contaminant and has to be removed by onboard purification of the fuel. Excessively high water content of the fuel after purification may lead to erratic engine operation.

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<sup>4</sup> This information is taken from [www.fammllc.com/htmlpub/FUEL\\_guide\\_quality.htm](http://www.fammllc.com/htmlpub/FUEL_guide_quality.htm)

## ASH

Ash content of a fuel is a measure of the metal content in the fuel.

## SULPHUR

Sulphur is an inherent element of certain fuel molecules. Depending on the crude oil origin, the sulphur content of an IFO can easily vary from below 1.0% to above 4.0%. Sulphur is oxidized during combustion and produces oxides of sulphur, which may lead to corrosive wear in the engine if the proper lubricants are not used.

## POUR POINT

Pour point is the lowest temperature at which the fuel will pour or flow when chilled under prescribed test conditions.

Bunker fuels originating from a complex refinery generally have pour points below 5 °C. This is reflected in the fact that bunker fuel is generally not completely heated anymore, but only before the fuel transfer pump. If a vessel receives high pour straight run bunker fuel heating of the fuel above the pour point temperature is required.

Cold temperature behavior can also be important for marine distillate fuels.

## VANADIUM

Vanadium is one of the metals found in most crudes and fuel oils from these crude types. Some vanadium oxides formed during combustion, particularly in the presence of sodium, have critical melting temperatures which may lead to deposit formation in diesel engines turbochargers and boilers of steam turbine ships.

## SEDIMENT BY EXTRACTION

Sediment determination gives the amount of inorganic sediment (rust, sand) in the fuel (applicable only to DMB type marine diesel).

## TOTAL POTENTIAL SEDIMENT

Total potential sediment gives the total amount of sediment that can be formed under normal storage conditions, excluding external influences. Fuel oil stability is guaranteed if the total potential sediment meets the specification of 0.10 % max.

## SILICON AND ALUMINUM

During one of the refining processes for the production of gasoline fractions, an aluminum silicate type catalyst is used. Catalytic fines are often present in the heavy process streams from this operation which is then used in blending IFO's. Fuel purification onboard vessels are an effective means of removing most of the silicon and aluminum particles from the IFO's.

## **Country/Regional Bunker Market Profiles<sup>5</sup>**

### **Directory of Bunker Suppliers, Traders and Brokers<sup>3</sup>**

#### **U.S.A. – U.S. EAST COAST**

Normally the U.S. East Coast is more expensive than the U.S. Gulf and Rotterdam, its main competitors in the bunker market. However, in late 2001 and during the first two months of 2002, New York and Philadelphia were offering bunker prices that were highly competitive with Rotterdam even though the European port is one of the world's biggest refining centers, and there are no refineries on the U.S. East Coast that produce significant volumes of bunker fuel on a regular basis.

With very limited supplies of locally produced bunker fuel, the East Coast has become dependent on exports from Venezuela.

Despite the recent slowdown in the U.S. economy and the effects of September 11, the Port of New York/New Jersey remains a busy maritime center, handling close to 20 million tonnes of general cargo a year. The Port of Philadelphia and Camden, located on the upper Delaware River, handles around 7.5 million tonnes a year.

The main players in New York and Philadelphia include Fuel and Marine Marketing LLC (FAMM), BP Marine Americas Inc., Bominflot Inc., Chemoil Corporation, Coastal Oil New York Inc. Chemoil is one of the main suppliers in New York. Its operations in Philadelphia are on a smaller scale.

Delphi Petroleum Inc., and Plaza Marine Inc. are also fairly active. Other companies will appear on the market on a more occasional basis. These include Koch Fuel (which is an important player in the inland markets), FC Haab and Caribou Marine Services, which also make deliveries of marine gasoil (mgo) in Florida and the Caribbean.

#### **Storage and supply**

BP Marine has its own terminal in New York and FAMM uses the Gordon terminal. Both the majors use the nearby Amerada Hess terminal for their Philadelphia bunkering operations. Chemoil has access to 575,000 barrels of storage capacity at the IMTT terminal in New Jersey for its New York operation. In Philadelphia, the company has storage at the Delaware Terminal.

All the suppliers in Philadelphia and New York use common carriers and barge deliveries. In New York, the main operator is K-Sea, which was formed following a management buy out of Eklof Transportation Inc, although there are other companies such as Gellatly Petroleum and Towing Corporation, which started making deliveries for Chemoil in mid-2000.

In Philadelphia, Vane Brothers runs most of the barges. Vane has a fleet of more than a dozen barges, and is also active in Baltimore, Norfolk and New York.

New Jersey-based Delphi Petroleum supplies bunker fuel and diesel ex-pipe at Sun's

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<sup>5</sup> Most of the text and background information in this chapter in this appendix is taken from [www.bunkernews.com](http://www.bunkernews.com)'s country profiles, but text is briefly rewritten and adjusted to suit this study.

<sup>3</sup> see above

Fort Mifflin facility, as well as offering diesel to the tugs, barges and self-powered dredgers which service the port area. In Philadelphia, Delphi supplies both fuel oil and diesel by road tank wagon (rtw).

Gasoil deliveries are a speciality for Plaza Marine from Portland, Maine to the Gulf Coast. The company also has its own dockside operation at Elizabeth, New Jersey, where it supplies mgo and lubricants.

New Jersey-based Harbor Petroleum Inc is also an established gasoil specialist, supplying from the ports of New England down to Norfolk, Virginia. In Philadelphia, Harbor Petroleum has its own barge, the 490 mt Daniel F., while in New York it uses the fleet of both K-Sea and Gellatly.

Bunkering activities north of New York up to the Canadian port of Halifax are fairly limited. The state of Maine has two ports where bunkering facilities have been available. Global Petroleum has run bunker barge deliveries in Maine, but this is a limited market. Sprague Energy also arranges barge deliveries in the Boston area (using the B-30 vessel operated by the common carrier Boston Towing). The company operates a bunkering terminal in Quincy, near Boston, from which it supplies fuel oil and distillates.

In the Chesapeake Bay region, the main bunkering centres are Norfolk and Baltimore and BP Marine is the main supplier in both ports. The company does face competition in Norfolk from independents Plaza Marine and Primary Oil on the diesel front, and from fellow oil major ExxonMobil in the fuel oil market.

Continuing southwards, the key ports after Norfolk are Wilmington (in North Carolina), Charleston (South Carolina), Savannah (Georgia) and Jacksonville in Florida. In Wilmington, the main supplier is Colonial Oil Industries, which uses the barging facilities of local operator Hanover Towing. Apex Oil is also present in Wilmington. Colonial Oil is one of the main suppliers in Savannah, where it uses the barging services of Chatham Towing, a wholly owned subsidiary. Chatham Towing has five barges and three tugs. On the Cooper River, Colonial runs a bunkering operation from Charleston (which, like Savannah, is an important port for container traffic). Colonial is also the principal supplier in Jacksonville, Florida. Through its acquisition of Aectra Refining and Marketing Inc. in mid-2001, Colonial took control of the long-established bunker supplier Steuart Petroleum. Steuart Petroleum leased storage space from ST Services and had access to a fleet of five barges, all of which are chartered from local barging company, Sun State Marine. These arrangements have stayed in place following the change in company ownership. Both Steuart and Colonial have had long-term arrangements for sourcing fuel cargoes from Venezuela.

## **US GULF**

The U.S. Gulf is one bunker market where the Chevron Texaco merger has had a significant impact. This is not so much because of the link-up between Texaco and Chevron, but a consequence of the unbundling of Texaco's U.S. downstream partnership with Shell and Saudi Refining Inc. (SRI).

The partnership between Texaco, Shell and SRI, set up in 1998, led to the formation of Equilon Enterprises LLC and Motiva Enterprises LLC, which ran the Shell/Texaco downstream base, as well as Equiva Trading Company which acts as their trading and supply unit to the bunker market.

Shell Marine has recently bought Equiva Trading, a major bunker operator, and are expanding their lubricating oil business. Ove Wrist has bought Lonestar Marine & Industrial Supply in Texas. Further consolidation in this area is foreseen as independent companies and oil majors compete for market shares.

The largest independent marine fuel marketer, World Fuel Services, is also based in the U.S., and has offices in more than 150 countries. They have bought a string of companies; amongst recent acquisitions are Dubai's Marine Energy and Norway-based Norse bunker.

### **Untying the Shell/Texaco Knot**

Equilon assumed control of five refineries in the western and mid-western U.S., four in California and one in Washington State, which collectively have a capacity of 480,000 barrels a day (b/d). Motiva took over the refineries in the eastern and Gulf Coast regions. Its four refineries, the Convent and Norco Refining Company plants in Louisiana, as well as the refineries in Delaware City, Delaware and Port Arthur, Texas are capable of refining 825,000 b/d. Motiva's 225,000 b/d Convent plant situated about 30 miles southeast of Baton Rouge is often a useful source of product for the Gulf Coast bunker market.

In order to complete its merger with Chevron, Texaco had first to divest its assets in Motiva and Equilon. Shell was keen to buy out its erstwhile partner, but with billions of dollars at stake, it took some time to reach an agreement that would satisfy both the principal parties and the regulators. On 6th February 2002, the U.S. Federal Trade Commission approved Shell's acquisition of Texaco's interests in Equilon to make it the 100% owner. Also, Shell and SRI were given the green light to acquire Texacos interests in Motiva, giving Shell and SRI each a 50% interest.

For the bunker business, the change has meant that some of the refineries that were previously feeding the FAMM network are now linked to Equiva.

Equiva does not have much involvement on the U.S. West and East Coasts, but in the Gulf it has arguably more access to locally-sourced product than any of its competitors. In Houston, Equiva can source product from Motiva's Deer Park and Port Arthur refineries, while in New Orleans, it can call upon both the Convent and NORCO facilities. These two ports, Houston and New Orleans, account for the bulk of the bunker business in the U.S. Gulf, while Mobile and Corpus Christi are on the next level down.

### **New Orleans**

Located 75 miles up the Mississippi river from the Gulf of Mexico, New Orleans receives more than 6,000 vessels annually. BP Marine has traditionally been one of the leading players in New Orleans, working with Gretna-based bunker supplier John W. Stone Oil Distribution Inc.

John W. Stone operates its large fleet of barges in the market centred around New Orleans and along the Mississippi river. The company uses its barges to make black oil, or bunker fuel, deliveries for BP Marine, and it also operates independently in the marine gasoil (mgo) sector. While John W. Stone is closely associated with BP Marine, Progressive Barge Line and Hollywood Marine are the leading common carriers, working for all the port's suppliers.

In addition to BP Marine, the other main suppliers in New Orleans include both

Equiva and FAMM as well as the independents Chemoil Corporation and Bominflot Inc. As outlined above, Motiva's two Louisiana refineries, Convent and Norco, are key local sources of material for the New Orleans bunker market and this gives Equiva a significant advantage.

### **Houston A Heavyweight Port**

Houston is the number one U.S. port in terms of foreign tonnage, and number two on total tonnage. The city of Houston has long been recognised as Oil Town, U.S.A., as the hub of so many companies' export and refining networks.

More than 6,500 ships a year work their way along the 50-mile Houston Ship Channel to enter the port. An ongoing dredging project, which should be completed next year, will both deepen and widen the Channel. According to local sources, this will allow ships to utilise their capacity fully and also reduce the risk of collisions and oil spills.

The Port of Houston handles general cargo, grain, dry/liquid bulk, containers, RO/RO and cruise ships. Currently, more than half of the container cargo handled in the Gulf of Mexico goes through the Barbours Cut Terminal.

### **Houston Bunker Suppliers**

Bunker demand in Houston appears to be fairly stable and the market supports a wider selection of suppliers. Some of the key players in New Orleans, Chemoil, BP Marine, Equiva, FAMM and Bominflot also have a solid presence. Additional names in Houston include: Enjet Inc., Houston Marine Services (HMS), MGI Inc. and Matrix Marine Fuels, a subsidiary of Oiltanking Houston.

In April 2001, BP Marine and Houston Marine Services announced a new joint venture, under which BP Marine now markets Houston Marine Services products in Port Arthur and Lake Charles while HMS focuses on technical issues and operations. Houston Marine Services has its own storage facilities and a fleet of bunkering vessels. In March 2001, BP started offering ex-pipe deliveries out of the Baytank terminal in Houston.

Tesoro Coastwide Marine Services owns and operates its own barges and has traditionally been known for supplying mgo to the offshore exploration and production industry. Tesoro's acquired the 100,000 b/d Anacortes refinery formerly operated by Shell.

While Houston Marine Services and Tesoro use their own vessels, most suppliers in Houston use the barging services of Hollywood Marine (which also operates in New Orleans) and local player Buffalo Marine Service.

The principal sources of product for Houston include the Motiva plants, as well as the ExxonMobil refineries in Baytown and Beaumont; BPs Texas City plant; and the TotalFinaElf refinery in Port Arthur.

In April 2001, ExxonMobil's bunkering arm ExxonMobil Marine Fuels (EMMF) announced that there would be an increase in fuel oil product from the Beaumont plant. Consequently, EMMF's profile in the U.S. Gulf market has been raised. However, the increase in Beaumont has, to some extent, been countered by the recent introduction of a cracker at the Baytown refinery.

**Corpus Christi Bunkering**

Corpus Christi has traditionally been an important oil centre, but there are plans to broaden its range and entice more cruise ships. With its nearby 95,000 b/d refinery offering one of the main local sources of fuel oil, Coastal Corporation (now part of the El Paso group) has traditionally been a strong player in the Corpus Christi bunker market. Other suppliers in Corpus Christi include Valero and Enjet. In addition to Coastals facility, Koch Refinery also provides bunker fuel.

**Mobile**

Coastal used to supply in Mobile but withdrew from the market in September 2000. This left Midstream Fuel Service Inc. and FAMM as the Alabama port's remaining suppliers. Midstream Fuel Service operates its own fleet of barges, supplying not only in Mobile, but also in Pascagoula, Gulfport and in Florida's Panama City.

On the west coast of Florida, the main bunkering port is Tampa. Coastal is dominating the fuel oil side of the business, but Central competes on supply of marine gasoil and diesel in Tampa, Port Manatee and St. Petersburg.

**US SOUTH WEST COAST**

Throughout the second half of 2001 and in early 2002, Los Angeles bunker suppliers were able to match, or even undercut, their Singapore competitors on price. Price is an important factor in this market, and the local bunker suppliers, and their customers, were not happy with the new state government sales taxes on bunkers.

**Los Angeles suppliers**

Chemoil Corporation supplies in both San Francisco and Los Angeles, although it is in the latter where it has its most substantial presence, arguably as the leading supplier. Other players in the Los Angeles/Long Beach market include Westport Petroleum, Petro-Diamond Incorporated (PDI), Fuel and Marine Marketing (FAMM), Tesoro (having acquired BP Marines west coast bunkering infrastructure in 1999), and Tosco. Dolphin Marine Fuels Inc. specialises in supplying low-vanadium fuel oil and marine diesel in Los Angeles and Long Beach.

The primary bunkering terminals in Los Angeles are owned and operated by Chemoil, GATX Terminals Corp., Wickland and VOPAK.

Although the California bunker market tends to be fed on a steady diet of Venezuelan cargoes, there will also be imports from other sources such as Ecuador or Peru, and the local refineries and topping plants do provide some material. In early 2002, for example, turnarounds at local refineries including those operated by Ultramar and Valero brought more fuel oil into the bunker pool.

**San Francisco**

For many years, Chevron had been the dominant player in San Francisco, using product from its nearby 230,000 b/d Richmond refinery to supply about 60% of the market. Texaco, meanwhile, obtained fuel oil from its 57,760 b/d topping unit in Bakersfield. As the bunkering arm of the recently-merged ChevronTexaco, FAMM has access to both these assets.

In the U.S. Gulf, the ChevronTexaco merger has meant that Equiva now controlled by Shell has access to the Motiva and Equilon refineries. This has had a big impact on the U.S. Gulf market. In California, the effect is less marked although it does mean that Equiva now makes occasional plays in the Los Angeles market, when product is available from the local Shell refinery.

Tosco is another significant presence in the San Francisco area. The company has tankage in Oakland and Richmond (where it leases some of its storage capacity to other bunker suppliers) and sources fuel both from its Ferndale refinery, and from its two California plants.

Most bunker suppliers in California will use the common carrier barging companies for carrying out deliveries. Even Chemoil, which owns several vessels through affiliated companies, uses the common carriers.

Foss Maritime, one of the main operators in Seattle and Portland, is also present in California. Other main bunker barging companies include Wilmington Transportation and Jankovich & Sons.

### **U.S. NORTH WEST COAST**

Seattle and Portland, the main bunkering centres on the United States northwest coast must, like ports of California, compete for business with the Asian market.

Tesoro bought the Anacortes refinery in 1998. The former Shell plant has been an important supply source for the Puget Sound and Portland bunker market. BP Marine Americas Inc., which had been one of the key suppliers in the region, relied quite heavily on the refinery for its bunker fuel. Prior to the Anacortes refinery acquisition, Tesoro was already involved in the West Coast bunker market through its ownership of the 72,000 b/d Kenai refinery, but its direct bunkering activities were mainly confined to supplying marine gasoil (mgo) to the offshore exploration and production industry in the U.S. Gulf.

In addition to Tesoro, the main bunker suppliers in the northwest include Tosco Corporation, and ChevronTexaco's Fuel and Marine Marketing (FAMM). FAMM is currently the only supplier which has a consistent presence in all four key West Coast centres Seattle, Portland, San Francisco and Los Angeles and owns locally-based refineries producing heavy fuel oil on a regular basis. Whether this remains the case now Texaco no longer has a share in Motiva and, more importantly for the northwest, Equilon, remains to be seen. Tosco sources product for its northwest bunkering operations from its 88,500 b/d Ferndale refinery. The company has tankage in Portland, Seattle and Tacoma. The two refineries based in Tacoma, the 41,000 b/d U.S. Oil & Refining plant and Sound Refining Inc's 11,900 b/d refinery, also provide marine fuel on an occasional basis. Sound Refining's residual product is primarily earmarked for the asphalt market, although it will sometimes offer diesel to the marine sector.

All the northwest bunker suppliers use the barges of Foss Maritime and Olympic Tug and Barge for bunker deliveries.

Portland, and the Columbia River region, is one of the main wheat export centres of U.S. shipping activity, and hence bunker volumes are at their peak in the local grain season, which runs from about October to February. The key suppliers again include

Tosco, Tesoro and FAMM as well as locally based McCall Oil & Chemical Corp. The company's core business is asphalt, although a sizeable proportion of its Portland terminal is given over to bunkering. Foss and Olympic both operate in Portland, from which they also undertake deliveries to the nearby ports of Vancouver, Washington, as well as Longview Kalama and Astoria Anchorage. Portland product generally comes from the same refinery as Seattle but the suppliers have had to bear the cost of transporting the fuel south. The cost is generally passed onto the customer, so Portland bunker prices are usually a few dollars a tonne above Seattle.

### **Alaska**

Delta Western continues to supply product to the marine market in Alaska. A key player in the local oil distribution market, Delta Western runs a fleet of bunkering vessels and operates storage terminals at Dutch Harbour, Dillingham, St Paul Island, Juneau, Homer/Seldovia and also supplies in Anchorage. The other supplier in Alaska include Petromarine Services and Union Oil. There are other local distributors which will supply marine diesel, as well as companies which will arrange deep-sea deliveries in the fishing fields on an ad-hoc basis. The harsh climate of Alaska makes the use of heavy fuel oil impractical and only marine diesel is available.

### **Directory of International Bunker Suppliers, Traders and Brokers for US**

ABC Bunkeroils (USA) Inc.  
Supplier and trader  
4521 PGA Boulevard  
Suite 255  
Palm Beach Gardens  
FL 33418  
USA  
Tel: +1 561 627 4270  
Fax: +1 561 627 4363  
e-mail: bunkoilabc@aol.com

American Oil Trading Inc.  
Trader  
315 Main Street  
Westport  
CT 06880  
USA  
Tel: +1 203 226 4400  
Fax: +1 203 226 3939  
e-mail: ameroil@aol.com

A.P. International Services, Inc.  
Broker  
7385 SW 115 Court  
Miami  
FL 33173  
USA  
Tel: +1 305 273 8389  
Fax: +1 305 273 1430

e-mail: venezuelaprimero@hotmail.com

Asamar Inc.  
Trader  
1099 Wall Street West  
Suite 138  
Lyndhurst,  
NJ 07071  
USA  
Tel: +1 201 372 1790  
Fax: +1 201 372 1761  
e-mail: asamar@asamar.com

ASCO US  
Supplier  
3421 N. Causeway Blvd  
Suite 502  
Metairie  
LA 70002  
USA  
Tel: +1 504 832 8600  
Fax: +1 504 832 8066  
Web: www.lloilco.com

Bominflot Inc.  
Supplier and trader  
10777 Westheimer  
Suite 955  
Houston, TX 77042  
USA  
Tel: +1 713 952 5151  
Fax: +1 713 977 1275  
e-mail: mail@bominbunkers.com

Bominflot Inc.  
Supplier and trader  
2439 Manhattan Blvd  
Suite 309  
Harvey  
LA 70058  
USA  
Tel: +1 504 368 6800  
Fax: +1 504 366 3663  
e-mail: mail@intl.bominbunkers.com

BP Marine Americas Inc.  
Supplier  
200 Westlake Park Boulevard  
Houston  
TX 77079-2682

USA  
Tel: +1 281 560 4300  
Fax: +1 281 597 2194  
Telex: 774362  
e-mail: marine-sales@bp.com  
Web: www.bpmarine.com

Bunkerfuels Corporation  
Broker  
45 Wyckoff's Mills Road  
PO Box 569  
Cranbury, NJ 08512  
USA  
Tel: +1 609 395 8500  
Fax: +1 609 395 8070  
Tlx: 824207 bkrfl uf  
e-mail: billm1@bunkerfuels.com

Bunkers International Corp.  
Broker and Trader  
3551 West Lake Mary Blvd  
Suite 210, Lake Mary  
FL 32746  
USA  
Tel: +1 407 328 7757  
Fax: +1 407 328 0045  
e-mail: bunkers@iag.net

Bunker's LLC  
Trader and broker  
90 Broad Street  
7th Floor  
New York  
NY 10004  
USA Tel: +1 212 785 1888  
Fax: +1 212 785 5488  
e-mail: bunkersllc@worldnet.att.net

Bunkers of St Croix Inc.  
Supplier  
PO Box 24778  
60 Castle Coakley  
Gallows Bay  
St Croix USVI 00824  
USA  
Tel: +1 340 778 8066  
Fax: +1 340 778 8715

Canega Bunker Brokers  
Broker

18333 Egret Bay Blvd  
Suite 260  
Houston, TX 77058  
USA  
Tel: +1 281 333 2433  
Fax: +1 281 333 2466  
Tlx: 264668 canega hou  
url: www.canega.com  
e-mail: bunkers@canega.com

Caribou Marine Services Inc.  
Supplier and trader  
One Suffolk Square  
Suite 230  
Islandia NY 11722  
USA  
Tel: +1 631 232 0101  
Fax: +1 631 232 0148  
e-mail: cms.bnkr@prodigy.net

Central Oil Co. Inc.  
Supplier  
1001 McCloskey Blvd  
Tampa, FL 33605  
USA  
Tel: +1 813 248 2105  
Fax: +1 813 247 3567  
e-mail: comarine@aol.com

Chemoil Corporation  
Supplier and trader  
4 Embarcadero Center  
Suite 1100  
San Francisco, CA 94111-5951  
USA  
Tel: +1 415 268 2740  
Fax: +1 415 268 2704  
e-mail: market@chemoil.com  
Web: www.chemoil.com

Chemoil Corporation  
Supplier and trader  
2365 E. Sepulveda Blvd  
Long Beach  
CA 90810-1944  
USA  
Tel: +1 562 427 6611  
Fax: +1 562 427 4621  
Tlx: rca 278210  
e-mail: glenna@chemoil.com

Coastal Refining & Marketing Inc.  
Supplier  
c/o El Paso Corporation  
1001 Louisiana Street  
Suite 932N  
Houston TX 77002  
USA  
Tel: +1 713 420 4949  
Fax: +1 713 420 6917  
e-mail: miami.bunkers@elpaso.com

Cockett Marine Oil (USA) LLC  
Trader and broker  
2461 Port West Boulevard  
West Palm Beach  
FL 33407  
USA  
Tel: +1 561 842 4567  
Fax: +1 561 542 2877  
Telex: uk 8952619 cocket g  
e-mail: enquiries@cockettusa.com

Colonial Oil Industries  
Supplier  
1301 Riverplace Blvd  
Suite 2646  
Jacksonville  
FL 32207  
USA  
Tel: +1 904 396 1388  
Fax: +1 904 858 6699  
e-mail: khigginbot@spcjax.com

Colonial Oil Industries Inc.  
Supplier  
Cape Fear Terminal  
1002 South Front Street  
Wilmington  
North Carolina 28401  
USA  
Tel: +1 910 762 2271  
Fax: +1 910 762 2359  
e-mail: cblume@mindspring.com

Coral Petroleum Services L.L.C.  
Broker  
PO Box 705  
Hightstown  
New Jersey 08520

USA  
Tel: +1 609 371 7334  
Fax: +1 609 371 7336  
e-mail: coralpetro@aol.com

Custom Fuel Services  
Supplier  
2704 Engineers Road  
Belle Chasse  
New Orleans, LA 70037  
USA  
Tel: +1 504 391 6700  
Fax: +1 504 391 6750  
e-mail: cfs@mgrambarge.com

Delphi Petroleum Inc.  
Supplier  
40 Avenue at the Common  
Shrewsbury  
New Jersey 07702  
USA  
Tel: +1 732 389 5600  
Fax: +1 732 542 8669  
Telex: 214984  
e-mail: delhipetroleum@mycomcast.com

Delta Western Inc.  
Supplier  
2700 W. Commodore Way, Suite 301  
Seattle, Wa. 98199  
Tel: +1 206-270-9609  
Fax +1 206-213-0103  
E-mail: scottc@deltawestern.com

Dolphin Marine Fuels Inc.  
Supplier  
34213 Pacific Coast Hwy Ste F  
Dana Point CA 92629  
USA  
Tel: +1 949 240 7626  
Fax: +1 949 240 5818

Enjet Inc.  
Supplier  
5373 West Alabama  
Suite 502  
Houston, TX 77056  
USA  
Tel: +1 713 552 1559\*  
Fax: +1 713 552 1255

Telex: 790791  
e-mail: [jhumphrey@enjet.com](mailto:jhumphrey@enjet.com)

Equiva Trading Company  
Supplier  
One Allen Centre  
200 Dallas  
Texas 77002  
USA  
Tel: +1 713 277 5607  
Fax: +1 713 246 8645  
Web: [www.equiva.com](http://www.equiva.com)

ExxonMobil Marine Fuels  
Supplier  
Foom 701  
396 Alhambra Circle  
Coral Gables  
Florida 33134  
USA  
Tel: +1 305 459 1516  
Fax: +1 305 459 1521  
e-mail: [emmf@exxonmobil.com](mailto:emmf@exxonmobil.com)

Fuel and Marine Marketing  
Supplier  
Jefferson Chemical Building  
3336 Richmond, Suite 410  
Houston, TX 77098  
USA  
Tel: +1 713 752 3280  
Fax: +1 713 752 3284  
Web: [www.fammlc.com](http://www.fammlc.com)

Fuel and Marine Marketing  
Supplier  
2000 Westchester Avenue  
White Plains  
NY 10650  
USA  
Tel: +1 914 253 4000  
Fax: +1 914 253 6319  
Telex: 1791144  
Web: [www.fammlc.com](http://www.fammlc.com)

Fuel and Marine Marketing LLC  
Supplier  
Concord Gateway II  
1855 Gateway Blvd, Ste 540  
Concord CA 94520

USA

Tel: +1 925 969 3266

Fax: +1 925 969 3299

Fuels-At-Sea, Inc.

Supplier

2615 Fourth Avenue

Suite 700

Seattle, WA 98121

USA

Tel: +1 206 443 0202

Fax: +1 206 443 0567

Telex: 49656008 fuelssea sea

e-mail: fas@fuelsatsea.com

Glander International Inc.

Broker

2401 PGA Boulevard

Suite 236

Palm Beach Gardens

FL 33410

USA

Tel: +1 561 625 5500

Fax: +1 561 625 5525

Telex: 6732171 glan uw

e-mail: bunkers@glander.net

Web: www.glander.net

Global Yacht Fuel, Inc.

Trader and broker

2550 Eisenhower Blvd

Suite 308

PO Box 22637

Fort Lauderdale FL 33335

USA

Tel: +1 954 462 6050

Fax: +1 954 462 7467

e-mail: info@globalyachtfuel.com

Web: www.globalyachtfuel.com

Harbor Petroleum Inc.

Supplier

161 Main Street

Manasquan

NJ 08736

USA

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Fax: +1 732 223 7070

e-mail: oil@coopmail.net

Houston Marine Services Inc.  
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Houston, TX 77007  
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Tel: +1 713 868 2000  
Fax: +1 713 868 5688  
Web: www.hmsfuels.com

Independent Marine Oil Services Corp. (IMOS)  
Broker  
PO Box 1750  
Jupiter, FL 33468  
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Tel: +1 561 575 3448  
Fax: +1 561 575 3432  
e-mail: imos@bellsouth.net

International Petroleum Services Inc. (IPS)  
Trader and broker  
8295 North Military Trail Suite J  
Palm Beach Gardens  
FL 33410  
USA  
Tel: +1 561 630 3088  
Fax: +1 561 630 8190  
e-mail: ipsinc@bellsouth.net

Isbrandtsen Marine Services Inc.  
Trader  
299 Riversville Road  
Greenwich  
CT 06831  
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Tel: +1 203 869 7778  
Fax: +1 203 869 7774  
e-mail: hisbrandts@aol.com

Island Marine Oil Brokers Inc.  
Broker  
55 Jericho Turnpike  
Suite 203  
Jericho, NY 11753  
USA  
Tel: +1 516 997 4777  
Fax: +1 516 997 4788  
e-mail: bunkers@islandmarineoil.com

Isobunkers L.L.C.

Supplier and trader  
5353 East. Princess Anne Rd  
Suite E  
Norfolk, VA 23502  
USA  
Tel: +1 757 855 0900  
Fax: +1 757 855 6200  
e-mail: isobunkers@aol.com

John W. Stone Oil Distribution Inc.  
Supplier  
PO Box 2010  
Gretna, LA 70054-2010  
USA  
Tel: +1 504 366 3401  
Fax: +1 504 263 0490

K.P.I. Oil Associates, Inc.  
Broker  
80 Broad Street  
Suite 2M  
Red Bank, NJ 07701  
USA  
Tel: +1 732 219 7900  
Fax: +1 732 219 7919  
Telex: rca 224502  
e-mail: usa@oilshipping.com  
Web: www.oilshipping.com

LQM Petroleum Services Inc.  
Broker  
80 Broadway  
Cresskill, NJ 07626  
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Tel: +1 201 871 9010  
Fax: +1 201 871 3141  
Telex: 220497  
e-mail: lqm@lqm.com  
Web: www.lqm.com

LQM Petroleum Services Inc.  
Broker  
101 FM 3237, Suite D  
Wimberley  
Texas 78676  
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Tel: +1 512 847 6600  
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Marine International Petroleum Company Inc.

Trader  
1035 Hooper Avenue, Suite 3  
Toms River  
NJ 08753-8355  
USA  
Tel: +1 732 914 0505  
Fax: +1 732 914 0555  
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Matrix Marine Fuels, L.L.C.  
Supplier  
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Houston, Texas 77015  
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Tel: +1 281 457 7921  
Fax: +1 281 457 7953  
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Merlin Petroleum Co. Inc.  
Broker  
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Westport, CT 06880  
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Midstream Fuel Service Inc.  
Supplier  
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107 St Francis Street  
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USA  
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Fax: +1 251 432 8350  
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Web: www.midstream.com

Naf Maritime Consultants Inc. (Nafmar)  
Trader and broker

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Ocean Energy Inc.  
Supplier and trader  
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Patriot Petroleum Inc.  
Broker  
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Newburyport, MA 01950  
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Tel: +1 978 462 5544  
Fax: +1 978 462 6140  
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Petro-Diamond Incorporated  
Supplier  
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Fax: +1 949 553 8295

Petromar Marketing, Inc.  
Trader and broker  
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Plaza Marine Incorporated  
Supplier  
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New York 11552  
USA

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Web: www.plazamarinefuel.com

Praxis Energy Agents L.L.C  
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USA  
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Fax: +1 201 818 1130  
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Web: www.praxisenergyagents.com

Sea Bunkering Americas LLC  
Broker  
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USA  
Tel: +1 561 841 1900  
Fax: +1 561 841 1971  
Web: www.northseagroup.nl

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Telex: 6731970 seabunkers  
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SK Global  
Supplier and trader  
110 55th Street  
6th Floor  
New York, NY 10022  
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Tel: +1 212 906 8122  
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Statia Terminals Inc.  
Supplier  
800 Fairway Drive  
Suite 295  
Deerfield Beach, FL 33441

USA  
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Fax: +1 954 481 3584  
Telex: 441176 staterm  
e-mail: [marketing@statiaterm.com](mailto:marketing@statiaterm.com)

Sun Coast Resources, Inc.  
Supplier  
6922 Cavalcade  
Houston, Texas 77028  
USA  
Tel: +1 713 844 9600  
Fax: +1 713 844 9699  
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733 Bishop Street  
Honolulu  
Hawaii 96813  
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Tel: +1 808 547 3205  
Fax: +1 808 547 3274  
Web: [www.tesoropetroleum.com](http://www.tesoropetroleum.com)

Tesoro Marine Services, Inc.  
Supplier  
9426 Telephone Road  
Houston  
TX 77075  
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Tel: +1 713 991 0990  
Fax: +1 713 991 8302  
e-mail: [centraldispatch@tesoropetroleum.com](mailto:centraldispatch@tesoropetroleum.com)  
Web: [www.tesoropetroleum.com/marine](http://www.tesoropetroleum.com/marine)

Tesoro West Coast Company  
Supplier  
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Auburn 98001-5931  
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Fax: +1 253 896 7215  
e-mail: [tanderson@tesoropetroleum.com](mailto:tanderson@tesoropetroleum.com)  
Web: [www.tesoropetroleum.com](http://www.tesoropetroleum.com)

Tosco Refining Company  
Supplier - US West Coast

1500 N. Priest Drive  
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Tel: +1 602 728 7900  
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e-mail: [www.tosco.com](http://www.tosco.com)

TotalFinaElf Marine Bunkers  
Supplier and trader  
Elf Development Inc.  
5847 San Felipe Road  
Suite 2100  
Houston TX 77057  
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Trans-Tec Services Inc.  
Trader and broker  
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Fax: +1 201 462 9207  
Telex: 229927 trans ur  
e-mail: [NJBROKER@WFSCORD.COM](mailto:NJBROKER@WFSCORD.COM)  
Web: [www.wfscorp.com](http://www.wfscorp.com)

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Fax: +1 415 925 1998  
Telex: 6717761 ttecsf  
e-mail: [sfbrokers@wfscorp.com](mailto:sfbrokers@wfscorp.com)

Triton Marine Fuels Inc.  
Trader and broker  
3191 Coral Way Suite 202  
Miami, Florida 33145  
USA  
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Fax: +1 305 444 2773  
Telex: 6736357  
e-mail: [bunkers@tritonusa.com](mailto:bunkers@tritonusa.com)

Tropic Oil Company  
Supplier  
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Miami, FL 3317-81409  
USA  
Tel: +1 305 888 4611  
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Valero Marketing and Supply Co.  
Supplier  
One Valero Place  
San Antonio  
TX 78212  
USA  
Tel: +1 210 370 2000  
Fax: +1 210 370 2765  
Telex: 76-2845  
Web: [www.valero.com](http://www.valero.com)

Westport Navigation Inc.  
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Telex: 221951 ships ur+1 203 775 3787  
e-mail: [ships@westnav.com](mailto:ships@westnav.com)

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Trader  
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Telex: 188354 wpt ut  
e-mail: [psmyth@wpidirect.com](mailto:psmyth@wpidirect.com)  
Web: [www.wpidirect.com](http://www.wpidirect.com)

Worldwide Bunker Services L.L.C.  
Broker  
178 South Street  
Suite 3  
Freehold, NJ 07728-2617  
USA  
Tel: +1 732 845 5941

Fax: +1 732 845 3206

e-mail: [gbwwb@aol.com](mailto:gbwwb@aol.com)

Web: [www.bunkerworldwide.com](http://www.bunkerworldwide.com)

**COLUMBIA**

The Colombian bunker market did not have a particularly good 2001. In April, there was talk of a new 16% tax on marine distillates (although this does not appear to have been imposed), and towards the end of the year the availability of intermediate fuel oil (ifo) was hit by quality problems at the 75,000 barrels a day (b/d) refinery operated by state-owned oil company Empresa Colombiana de Petróleos (Ecopetrol). In early 2002, the recent quality (amongst others, high levels in the Total Sediment Potential (TSP) test) and availability problems in Cartagena had been resolved. However, we understand that ifo availabilities are still causing problems.

Although most of the ifo sold in the local bunker market is sourced from Ecopetrol's Cartagena refinery, the state oil company also operates a number of smaller refiners and production units.

Ecopetrol's biggest refining facility is the 205,000 b/d Barrancabermeja Industrial Complex (CIB), based near Santander. This plant produces marine lubricants, but no ifo for the marine market. Bunker fuel is also sometimes available from the small-scale 15,000 b/d Refinería del Nare complex in Antioquia.

Ecopetrol does not sell bunker fuel to end users, but supplies directly to wholesale distributors at the delivery terminals. The company offers 180 centistoke (cst) and marine diesel (mdo) and the local suppliers can blend products to customers' requests.

Ecopetrol calculates the price at which it sells ifo and mdo to the bunker suppliers using formulae based on U.S. oil markets. The price of mdo is set weekly, and based on the U.S. Gulf Waterborne market, with an added premium.

**Bunkering ports**

Situated on the Atlantic/Caribbean coastline, Cartagena handles about 40% of all cargo moved through Colombias ports. The port is also a popular destination for cruise ships and the high season for cruise ships, running from October to April, usually generates an increase in bunker demand.

Barranquilla, located at the mouth of the Magdalena River, is both an important maritime and fluvial port, and a gateway for channelling goods to and from the Colombian interior.

Santa Marta is an important centre for coal, bananas and general cargo. It is the only port on the Atlantic coast where the rail lines run straight through to the terminal docks.

In all three of these ports, ifos and mdo are available by barge or truck.

On the Pacific coast, the only major port is Buenaventura. The company Aredea has two 450 metric tonne (mt) barges for ifo and distillate deliveries.

**Bunker suppliers**

ExxonMobil Marine Fuels (EMMF): Has its own terminal in Cartagena linked by pipeline to the Ecopetrol refinery. In the past, the oil major has operated four bunker barges but currently uses a mix of owned and third-party barges.

When suitable product is available, EMMF can supply ifo grades from 30 cst through to 380 cst both by barge and rtw in Cartagena. At Santa Marta, EMMF can arrange fuel oil deliveries by barge in the summer months for orders of between 1,000 and 1,250 mt. EMMF can also deliver mgo in Buenaventura.

AREDA: When Ecopetrol launched its 380 cst product in late 1998, Areda started making fuel oil deliveries in addition to MGO. In early 2002, Areda operated six barges. Areda uses its fleet both to service its own bunker sales, and to deliver product on behalf of the other suppliers. The company uses its barges in Cartagena and Barranquilla, and supplies by truck in Santa Marta and Coveñas (another port on the Atlantic Coast).

ExxonMobil and Areda currently make most of the fuel oil in Colombia accounting for between 70% and 80% of the market.

Terpel del Norte: Of the other independents, Terpel del Norte is perhaps the most established. Headquartered in Barranquilla, Terpel del Norte is involved in a wide range of markets, including automotive, industrial and marine lubricants, as well as bunker fuel. In the bunkering sector, Terpel del Norte has concentrated its activities in Cartagena, where it co-owns a large petroleum products storage facility with ExxonMobil. Terpel mostly charters vessels when it needs to make bunker deliveries by barge. The company is stronger in the mdo field than in fuel oil and it also sells marine lubricants.

#### **Directory of International Bunker Suppliers, Traders and Brokers**

Arede Marine Fuel C. I. Limitada

Supplier

Bocagrande

Carrera 6 No. 6 - 430

Cartagena

Colombia

Tel: +575 655 7478\*

Fax: +575 665 9045\*

Telex: 5756650228

Web: [www.aredamarine.com](http://www.aredamarine.com)

Bunkers International Ltd

Supplier and trader

Edificio Banco de Colombia

501 La Matuna

Cartagena

Colombia

Tel: +1 407 328 7758

Fax: +1 407 328 0045

Telex: 37621

e-mail: [bunkers@iag.net](mailto:bunkers@iag.net)

ExxonMobil Marine Fuels

Supplier

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Coral Gables  
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Terpel Del Norte S.A.  
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Edificio Las Americas  
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Colombia  
Tel: +57 5 353 1780  
Fax: +57 5 360 0444  
e-mail: [infor@terpeldelnorte.com](mailto:infor@terpeldelnorte.com)  
Web: [www.terpeldelnorte.com](http://www.terpeldelnorte.com)

## VENEZUELA

Venezuela and the state-owned Petróleos de Venezuela SA (PDVSA) are major-league players in the global oil market. The country is among the world's top five in terms of proven oil reserves and its export patterns have a significant impact on crude prices.

Venezuela has a particularly strong influence on the bunker market, which extends far beyond its own local ports. As United States' refineries have reined in their heavy fuel oil production through the increasing use of crackers, cokers and other upgrading units, Venezuelan cargoes have become a key source of product for American bunker suppliers. This is particularly noticeable in California, and in the East Coast ports such as New York, Philadelphia and Jacksonville.

In Venezuela itself, PDVSA handles bunkering through its subsidiary Deltaven S.A. Up until 1997, PDVSA had three subsidiaries Lagoven S.A., Corpoven S.A. and Maraven S.A., which each played a role in bunkering. It was a set-up that confused some customers, so the decision to merge the bunkering operation into one company, Deltaven, was welcomed as a logical step.

In 2002, confrontations between the Venezuelan President Hugo Chavez and the staff of PDVSA sparked some major strikes. There were concerns that a prolonged dispute could have a significant impact on bunkering activities across the Americas. Reports now indicate that the production and exports are about to be resumed, but the political situation is still very unclear.

According to Deltaven, Venezuela's principal 25 ports receive about 5,300 ship calls a year. As oil is the bedrock of the Venezuelan economy, tankers account for more than half of all these ship calls. Liner services, containers and general cargo represent about one third of calls, and bulk carriers account for most of the remainder. Most of the Aframax crude tankers are bound for the U.S. Gulf, while product carriers are trading mainly with the U.S. East Coast. The bulkers, carrying grains, cement, bauxite, cement, fertilizer, steel, lumber, and other commodities, mainly operate in the Atlantic Basin. There is also a steady flow of inter-Caribbean liners, and Panamax tankers regularly carry crude to PDVSA's own Caribbean refineries in Bonaire and Curaao.

### Sources of product

PDVSA operates more than 20 refineries in Venezuela, the United States and Europe, processing about 2,500,000 barrels a day (b/d). The main sources of supply for the Venezuelan bunker market are the Paraguaná Refining Complex Amuay/Cardón (CRP) and the Puerto La Cruz refinery.

Ex-pipe deliveries to the tankers calling at refineries account for a significant proportion of the bunker demand in Venezuela. Ex-pipe deliveries are possible at the oil terminals located in Amuay Bay, Cardón, Puerto Miranda, Bajo Grande, La Salina, Puerto La Cruz, although not at the terminal in El Tablazo. Most of the terminals provide offshore bunkering facilities. Fuel oil, marine diesel oil (mdo), marine gasoil (mgo) and marine lubricants are available at all the oil terminals.

Bunker fuel can be delivered by barge in the commercial harbours of Maracaibo,

Puerto Cabello, Puerto La Cruz and La Guaira. Deliveries are also possible in the waters offshore Guanta, Pertigalete and Puerto Ordaz on the Orinoco river. Deliveries by road tank wagon (rtw) can be made in all commercial ports, and all fuel oil grades as well as mgo and mdo are available.

#### Tankers and barges

The Orinoco is an important conduit for Venezuela's minerals trade. The bigger ships that cannot cope with the rivers draft load their minerals cargo at a floating storage terminal in the Orinoco Delta - and this is key source of business for Deltaven's local bunkering service.

Deltaven supplies bunkers in the region using the 3,000 metric tonne (mt) capacity Eco, which is based in Puerto La Cruz and replaced the 7,000 mt Tradewind River in early 2001. The Eco is owned by Transemar, a company based in Cumana, Sucre State. It has been leased to Deltaven on a permanent basis. The Eco is based at Puerto La Cruz, working alongside the 5,000 mt Hyalite and the 3,382 deadweight tonnes (dwt) Ann B, which began supplying offshore in May 2001.

The 5,600 mt Chem Fortune makes offshore deliveries in the Amuay Bay area. The tanker came into operation in April 2000, replacing the 5,500 mt Sail Peter.

The 3,100 mt Mekhanik is used to shuttle product from Puerto La Cruz to Puerto Cabello, where Deltaven supplies bunkers with the 3,800 mt push-barge TBV31. Deltaven also has one small tanker, the 1,300 mt Marine II, based in Maracaibo.

In the Caribbean, PDVSA owns the BORCO storage terminal in Freeport, Bahamas (see Caribbean profile). In addition to supplying ex-pipe, deliveries are also made using the 2,000 mt capacity barge Martha.

#### Bunker prices

Until recently, Deltaven set daily posted prices that took into account the going rate for bunkers in the U.S. Gulf and New York. In addition, there would be a premium charged for the higher quality product source from the Puerto La Cruz refinery (because of its low vanadium and low sulphur properties).

Currently, however, Deltaven says that it has adapted its pricing strategy to make it more flexible and more competitive for its customers. In practice, this means that there can be some leeway for negotiation on price.

#### Marine Lubricants

The PDV range of marine lubricants are backed by TotalFinaElf through The Lub Marine Club.

#### **Directory of Internatinal Bunker Suppliers, Traders and Brokers**

PDVSA Deltaven S.A.

Av. Principal La Floresta c/c, Av. Francisco De Miranda

Edificio PDVSA, La Floresta, Torre Norte, Piso 2 Urb. La Floresta, Caracas 1060

Venezuela

Tel: +58 212 208 0077

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e-mail: [bunkers@pdvsa.com](mailto:bunkers@pdvsa.com)

Web: [www.pdvsa.com/pdv](http://www.pdvsa.com/pdv)

## **ECUADOR**

The Ecuadorian bunker market have seen some recent positive developments. Firstly, the government have taken positive steps to rein in the rate of inflation, restoring stability to the economy. But, more specifically for the bunker market, the government decided in mid-2001 to lower the prices which state-owned Petroecuador was charging the marine suppliers for their bunker fuel.

Essentially the government and Petroecuador agreed to restore a pricing formula which kept local bunker prices in line with those charged in competing markets, such as the US West and Gulf Coasts and Panama. The price formula had been abandoned in 2000, when internal supply problems had led to an escalation in domestic fuel prices. The restoration of the price formula was a breakthrough event for Guayaquil's bunker market, and the culmination of many months of hard lobbying by the local suppliers. The subsequent drop in fuel oil prices had an immediate and very positive impact on bunkering.

State owned Petroecuador is the sole producer of bunker in this market and also a supplier, but there are a few independent bunker suppliers.

### The Ports

Ecuador has five main ports and bunkering centres (market share in percent):

- **Guayaquil – 60%**
- **Puerto Bolívar – 15%**
- **La Libertad – 8%**
- **Manta – 10%**
- **Esmeraldas – 7%**

### **Guayaquil**

Guayaquil is by far the busiest port, handling more than 70% of Ecuador's total cargo volumes. Reefer ships lifting banana export cargoes account for much of Guayaquil's business. There are nine berths for general cargo, container and reefer ships, a bulk facility which mainly handles wheat, and a molasses terminal. There is a draft limitation of about 10 metres at the entrance of the 30 kilometre (km) channel.

At the Rio Guaya's side of the port there are private berths for dry bulk cargoes, chemicals and petroleum products. The port's oil terminal handles a wide range of products, including Liquefied Petroleum Gas (LPG) and fuel oil.

Ships in Guayaquil can take bunkers alongside while working cargo, or at anchorage while waiting for an available berth. Bunkers are supplied 24-hours a day, without overtime charges.

The refinery La Libertad provides the fuel oil. Bunker suppliers in Guayaquil obtain product by barge from the 45,000 barrels a day (b/d) La Libertad refinery, about 160 km away.

The fuel oil produced at La Libertad is reported to be of high quality. The 380 centistoke (cst) product typically has a sulphur content of less than 1.2% and a vanadium level of 110 parts per million (ppm). The 180 cst products vanadium level is about 100 ppm, and its sulphur content is typically 1.1%.

**La Libertad**

The oil terminal dominates the port of La Libertad, although there is also a small amount of fishing-related traffic. The local refinery processes Ecuador's Oriente crude oil and, besides supplying the local bunker market, also produces significant volumes of fuel oil for export. La Libertad is described as the best location for bunkers-only calls in Ecuador. The jetty at La Libertad is mainly used for loading coastal tankers of up to 5,000 deadweight tonnes (dwt) with fuel oil for the local power plants and industry, and it can also load bunker fuel into the barges and tankers. There is also a smaller installation nearby at Cautivo which can handle barges of up to 3,000 dwt and is mainly used for loading bunker fuel.

Although Guayaquil is the biggest single bunker market, most of the bunkers-only calls are concentrated in La Libertad, which offers the advantage of being closer to the refinery and requires less deviation from the main shipping lines than Guayaquil.

**Puerto Bolívar**

Puerto Bolívar, which is located about 60 km from the Peruvian border, caters almost exclusively to reefer vessels transporting bananas, although general cargo vessels and container ships will occasionally call at the port. The port has four berths, with draft limitations of 7.5-9.5 metres. Bunker fuel is barged in from La Libertad, which is about 12 hours sailing time away, and either delivered alongside the berth or at anchorage. Deliveries at anchorage are more frequent in the high season, when the reefer ships will have to wait longer for a berth.

**Fishing vessels in Manta**

Up until about five years ago, Manta saw a significant throughput of container traffic, but it is now almost entirely a fishing port. Bunker barges typically take about ten hours to reach the port from La Libertad and deliveries can be made at anchorage or alongside vessels while working cargo. The port is also the home base of the bunker supplier Marzan SA, which is mostly involved in marine gasoil (mgo) sales.

**Esmeraldas**

In the northern part of Ecuador the main commercial port is Esmeraldas, which has three berths, all with ro-ro facilities. Cars, forest products, steel and livestock are the main cargoes. Esmeraldas also includes the Bilao oil terminal which handles all the exports of crude oil, and most of the fuel oil exports and shipments to the local market. No mooring manoeuvres are allowed at night in either the Esmeraldas commercial port, or at the Bilao oil terminal.

Although the nearby 110,000 b/d Esmeraldas refinery is the biggest in Ecuador, almost all marine fuel supplied here is brought in from La Libertad, as the Esmeraldas operation is not geared to bunkering. Bunker barges take about 24 to 30 hours to sail from La Libertad to Esmeraldas, but local sources report that the service is reliable.

There is a planned pipeline project that would carry Amazonian crude from Lago Agrio in the north-east to Bilao. The pipeline was due to be completed by the end of 2003. The potential influx of tankers could lead to a significant increase in the volume of bunker fuel sold in Bilao.

### Bunker Suppliers

Navipac S.A. The largest Independent supplier is Navipac S.A. At present its market share is 63 % of the Ecuador market. Supplying in all the major ports, the company currently has seven barges which are used both for bunkering and transporting fuel oil for power plants and other utilities. In 2001, Navipac introduced 2 new barges, the 4,750 mt capacity Cautivo and the 2,000 mt capacity Salango. Navipac's fleet also includes the 2,000 mt Rio Java, the 5,400 mt Cabo Pasado, the 5,200 mt Bonito and the 4,400 Cabo San Lorenzo, and the Chiquita. The company also has a small 100 mt capacity barge called Clear Flame, supplying diesel and water in the Guayaquil area. In addition to supplying bunkers to ships, Navipac also has contracts with Petroecuador and power generating companies in Guayaquil, including Electroguayas and Electroecuador, for transporting fuel oil. The larger-volume Cabo Pasado, Bonito and Cabo San Lorenzo are mostly used to service the utility contracts, although they are also used for bunker supplying.

In mid-2001, Navipac branched out along the west coast of South America, by forming a new joint venture company, Bunkersea Corporation, with Peruvian oil wholesaler Trayecto S.A. and logistics company Marítima del Pacífico (Marpac). The three partners in Bunkersea Corporation plan to collectively offer a bunkering service in all the main Ecuadorian and Peruvian ports. Navipac plans to use its 5,200 mt bunker barge Bonito in Peru. The company also purchased a 2,000 mt tanker, the Valdivia, which was expected to start operations in Ecuador but transfer across to Peru later.

Vepamil S.A. Established in 1993 as a distributor of Mobil lubes and in the following year it signed a deal with Petroecuador for supply fuel to industrial users and the automotive market. The company entered the marine sector in 1998, supplying to the local fishing fleet. In March 1999, the company signed a new contract with Petroecuador and started supplying bunkers to foreign-flagged merchant ships. In March 2001, Vepamil launched its fully-owned barge María del Carmen, which has capacity for 2,500 mt of fuel oil and 200 mt of mgo.

Servamain S.A. A new bunker supplier in Ecuador with its own Tanker-Barge "Andes" with a total capacity of around 2,400 mt for various marine fuels, serving the ports of Guayaquil, La Libertad, Esmeraldas, Manta and Puerto Bolivar. Since March 2002, Petrocomercial S.A. named Servamain S.A. as its distributor in the international bunkering business for transportation and sales of IFO and MDO, according to the announcement. Servamain's bunker barge "Andes" has blending machinery on-board, has 6 separated tanks, 4 of those for IFO (about 199 tons each) and 2 for MGO (MDO) (about 600 tons each). With blending machinery the company's barge can mix up any IFO grade, but mostly supplies IFO180 and IFO380. Pumping capacity is 300 TNS/hour, according to company owner.

Transmabo S.A. and Fluviasa S.A.: affiliates of the Noboa group. Use their own barges as well as contractors' road tank wagons (rtws) to make deliveries in all the major ports. The Noboa group is a major player in the local banana business.

### **Directory of International Bunker Suppliers, Traders and Brokers**

**Fluviasa - Supplier**

El Oro 101 y La Ria

Guayaquil, Ecuador  
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**Marzam** - Supplier  
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**Navipac S.A.** - Supplier  
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Web: [www.navipac.com](http://www.navipac.com)

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**COSTA RICA**

In February 1998, Costa Rica's sole refinery shut down for an upgrade programme that was scheduled to take no more than six months, but actually lasted for more than two years. By late 2001, the refinery, operated by national oil company Refinadora Costarricense de Petróleo S.A. (RECOPE), was finally back on line and producing bunker fuel. RECOPE can make ex-pipe deliveries of 180 centistoke (cst) and 380 cst fuel oil in Port Moin, but marine diesel oil (mdo) deliveries are made by road tank wagon (rtw).

RECOPE delivers all fuel oil and mdo by rtw in Port Limón. The company provides product for bunker deliveries outside the ports of Limón and Moin, but shipowners generally do not go directly to the state oil company and instead buy through bunker traders and brokers, which then arrange the rtws with the local independent operators. On the Caribbean coast of Costa Rica, the demand for bunker fuel comes mainly from the owners of reefer ships exporting bananas. Fishing vessels account for most of the bunker sales volumes on the Pacific coast, where the principal ports are Caldera and Golfito.

**PERU**

Is the Peruvian bunker market due for a major shake-up in 2002? For so long a rather sleepy backwater of the bunker industry monopolised by a state-owned oil company, Peru has recently seen the arrival of an ambitious new player which has promised to offer competitive prices and boost bunker sales significantly.

The liberalisation of Peru's oil industry began back in June 1996, when the first sale of Petróleos del Perú (Petroperú) assets included a 60% share in the 102,000 barrels a day (b/d) La Pampilla plant. The shares were bought by an international consortium led by Spain's Repsol Petróleo S.A. and including U.S. oil major Mobil and YPF of Argentina.

The government of the time planned to follow up this initial step by selling shares in the country's other refining assets which include the 62,000 b/d Talara plant, as well as smaller facilities in Conchán and Iquitos. Today, however, Talara is still controlled by Petroperú.

The companies which bought shares in La Pampilla have all been the subject of some major restructuring. Mobil is now part of ExxonMobil, while Repsol and YPF have merged to form the most powerful non-government owned energy group in Latin America.

When the international oil companies first bought into La Pampilla, there was some expectation that at least one of them might use the refinery's fuel oil output to start up a bunkering operation in Callao which is Peru's main port and relatively nearby.

For five years, there was no news on this front. But in the August 2001, Repsol YPF Trading y Transporte S.A. (RYTTSA) said that it hoped to be supplying bunkers in Callao before the end of the year. In the event, the service got underway in March 2002, as the company encountered a few setbacks in bringing its 7,000 metric tonne (mt) capacity tanker Virginia up to the high safety standards required for modern bunkering operations.

RYTTSA anticipated that the Virginia would be making three or four trips a month to La Pampilla to reload with bunkering products so the company presumably expects that its sales in Callao will amount to at least 250,000 mt of bunker fuel a year.

Once the Callao operation is up and running, RYTTSA also plans to start supply of bunkers ex-pipe to tankers calling at the refinery.

But the ex-pipe delivery will be for the larger deliveries of at least 1,500 mt, according to RYTTSA. Repsol YPF plans to offer spot bunker quotes on a daily basis whereas Petroperu publishes weekly prices and be competitive with neighbouring markets in Chile and Ecuador.

RYTTSA's operation not only signals the arrival of a new supplier; it will mean that the Callao market will at last be able to rely on a regular, and significant volume of bunker fuel coming out of La Pampilla.

Even when Petroperu controlled La Pampilla, it sourced most of its fuel from the Talara plant, which is more than one thousand kilometres away.

Petroperu will continue to use product from Talara to supply in Callao. The state-owned company has implied that it will try to compete with RYTTSA on price but the cost of shipping product the 1,000 km down the coast does place it at a disadvantage.

One option that Petroperu is currently pursuing is to encourage more shipowners to bunker in Talara. At the moment Petroperu only supplies bunkers in Talara ex-pipe to tankers working cargo, but it is exploring the possibility of setting up a bunkers only service in the bay area of Talara, using two or three 1,000 mt capacity barges.

Even if Petroperu does develop a new service in Talara, Callao is likely to remain the key market in Peru, as it is by far the country's biggest port and currently accounts for almost all bunker sales volumes.

#### Callao terminal

While RYTTSA will deploy the Virginia as a mother ship for its new bunker service, Petroperu stores its Talara-sourced bunker fuel at the Callao terminal operated by Serlipsa VOPAK, a 70/30 joint venture between Peruvian company Serlipsa and Netherlands-based VOPAK.

The terminal (which is also used for a variety of other products besides bunkers) has a total capacity of about a million barrels, with space for 300,000 barrels of marine gasoil (mgo) and 215,000 barrels of Bunker C heavy fuel oil. Product is received through pier number seven, and all bunkering operations are funnelled through pier number four.

All bunker supplies from the terminal are handled by barge, while domestic supplies are delivered by truck.

Petroperu will sometimes undertake to contract the barge for the customer, but the company prefers to undertake deliveries on an ex-wharf basis.

The terminal has three dedicated lines for mgo; light fuel oils, up to 100 centistoke (cst) viscosity; and heavy fuels, of 120 cst and above. The pumping rate is 1,000 barrels per hour.

Petroperu operates a 24-hour bunkering service in Callao and reports that it can sometimes deliver bunkers during the loading or discharging operations at the pier except at pier 11 when grain discharging operations are underway.

The Peruvian Navy, which runs a number of vessels on a commercial basis, has its own barges which are available for bunker deliveries, and over the past year or so the Navy is reported to have been working with a company called International Business Corporation (IBC). The Navy and IBC's barges include the 1,150 mt Supe and 900 mt Gauden, which both carry only fuel oil, and the 900 mt Noguera, which carries both fuel oil and mgo.

There are also a number of independent barge operators and managers, such as Deltamar SAC, Rosslin and Ocean Marine which, as mentioned above, is now working with RYTTSA. Most of the other independents tend to operate small barges of 200 mt capacity or smaller for mgo-only deliveries.

Many of the South American-based bunker brokers and traders can arrange bunker deliveries in Peru, and a number of the big global companies like Bominflot, Tramp Oil and Marine and World Fuel Services have had good links to the market.

Peru also has a locally-based player in Trayecto S.A., which was first established some time ago as an oil wholesaler. It stepped up its activities in the bunker market in the summer of 2001, when it also set up a new joint venture company, Bunkersea Corporation, together with local logistics company Marítima del Pacífico (Marpac) and the long-established Ecuadorian bunker supplier and barge operator Navipac S.A.

Trayecto plan to supply in all the ports of Peru. Market sources indicate that Trayecto may be working with both Petroperu and Repsol YPF.

#### **Directory of International Bunker Suppliers, Traders and Brokers**

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e-mail: bunkersperu@agunsa.com.pe

Petroleos del Peru (Petroperu) S.A. Supplier

Terminal Callao

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Repsol-YPF Trading 7 Transportes S.A. (RYTTSA)- Supplier

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Tel: +511 517 2025  
Fax: +511 577 6882  
Web: [www.repsol-ypf.com](http://www.repsol-ypf.com)

Trayecto S.A. - Supplier  
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San Isidro  
Lima 27, Peru  
Tel: +51 1 222 6118  
Fax: +51 1 221 4951  
e-mail: [bunkers@trayecto.com.pe](mailto:bunkers@trayecto.com.pe)

**CHILE**

COPEC is the Chilean bunker market's biggest physical supplier with 15 storage plants, all along the Chilean coast. Besides being a physical supplier, COPEC sells directly to shipowners or through brokers or traders. 7 out of 10 vessels that load fuel in Chilean ports use COPEC's Fuel Marine Service. The largest independent bunker trader is PACSA, an independent bunker broker. However, PMC/PACSA may make a claim for its terminal in the Chilean port of Puerto Ventanas.

Three barges (two Supply Vessels and one Product Tank) are available to operate in the extreme north and central zone ports of the country, plus a well-equipped fleet of trucks and auxiliary equipment, and submarine pipelines from Arica to Punta Arenas. COPEC is renewing its barge fleet and a new barge arrived in late 2002.

The ownership and operational development of the Puerto Ventanas-based PACSA bunkering terminal was, once again, the key issue in the Chilean bunker market in 2001. PACSA first emerged as a joint-venture project between the Colorado-based Cordex Petroleum's and Chile's own power generating company Chilgener in the mid-1990s. Although the new 18-tank bunkering and asphalt terminal took longer to build than first anticipated, it duly opened in September 1999, offering storage capacity for about 100,000 metric tonnes (mt) of fuel oil and full blending facilities at Puerto Ventanas Quintero Bay. The company has undergone several corporation changes since then. Cordex Petroleum withdrew from the project several years ago. Chilgener changed its name to Gener. Puerto Ventanas S.A., an affiliate of Gener, acquired PACSA's assets in early 2000. Later that year, Gener was bought by the U.S. energy corporation AES, and renamed AESGener.

Soon after the acquisition, AES announced plans to concentrate on the power generation business and divest the Chilean company of non-core assets. The assets to be sold included a number of marine-related concerns, and the bunkering business. The auctioning process encountered a few setbacks, but in August 2001 a consortium led by Chilean construction firm Sigdo Koppers acquired AESGener's 66% holding in Puerto Ventanas and PACSA for a reputed \$60 million. Later reports then indicated that PACSA had started working with international trading company Glencore although there was no official announcement on the alliance. Market sources felt that the tie-up between PACSA and Glencore made sense operationally, as Glencore had been the source for many of the fuel oil cargoes coming into the PACSA terminal.

While all the speculation about its ownership was circulating the market, PACSA quietly developed its bunkering operations. In early 2001, PACSA launched the 3,000 mt tanker PACSA II, now working alongside the PACSA I. The two barges not only deliver in the local Quintero Bay, but also in Chile's main port of Valparaiso and from Los Vilos in the north to San Antonio in the south. PACSA also supplies ex-pipe at the terminal, which has four quays, and is capable of receiving and delivering bunkers to vessels up to the Panamax class. Sources within PACSA have, in the past, spoken about possible plans for setting up satellite bunkering in the north of Chile but there have been no new developments on this score. The PACSA terminal is the most high-profile operation in the Chilean market, but there are of course other supply points most notably the country's main port Valparaiso and other suppliers. In 2002, PACSA quietly changed its name to PMC.

**Local refineries**

While PACSA's relationship with Glencore, and the storage capacity at its terminal, has meant that it can receive a high volume of fuel oil imports, other suppliers source

fuel locally, from the refining subsidiaries of state-owned energy company Empresa Nacional del Petróleo (ENAP).

The ENAP subsidiary Refinería de Petróleo Concón (RPC), operates the 78,600 barrels a day (b/d) Concón refinery, which is not only the main source of bunker fuel for Valparaíso and San Antonio but also for the other main ports to the north such as Huasco, Caldera, Antofagasta, Iquique and Arica, next to the Peruvian border.

The 89,570 b/d Petrox SA plant is the main source for the local ports of Talcahuano and San Vicente, as well as other southern bunkering centres such as Puerto Montt, Puerto Chacabuco and Punta Arenas at the base of South America.

ENAP also has a topping plant in Gregorio, located about 120 kilometres (km) north east of Punta Arenas, Chile's southernmost port in the Magellan region. ENAP uses product from Gregorio for its bunkering service in the Magellan region

### **COPEC's bunkering ports**

Among the well-established bunker suppliers is Compañía de Petróleos de Chile S.A. (COPEC), which has been in the market for 66 years.

Copec is one of Chile's biggest privately-owned enterprises, with extensive interests in forestry, fishing, electricity generation and mining, as well as the retail and distribution of petroleum products. The company has terminals at most of the major ports including Valparaíso, Talcahuano, San Antonio and Punta Arenas.

COPEC uses two barges in Chile's Central Zone, serving the main port of Valparaíso as well as San Antonio and Quintero. The Don Pancho and the Oficina Porvenir are owned by SONAP and Olympo respectively. In early 2001, COPEC announced the launch of a third barge, the Atenea, in the north of country. The Atenea started off covering the ports of Iquique and Tocopilla and extended its range into Antofagasta in the latter part of 2001. The Atenea also serves the northern ports of Patillos, Patache and Mejillones, which are important centres for the copper and salt mining industries. In many Chilean ports, however, bunkers are delivered by road tank wagon (rtw) and COPEC uses its trucking subsidiary Transcom.

According to COPEC, the Chilean bunker market accounted for sales of 600,000 mt of fuel oil and distillates. COPEC claimed that it accounted for more than 60% of the total Chilean bunker market.

COPEC can supply most grades of intermediate fuels oils (ifos) and marine gasoil (mgo) in the ports of Iquique, Tocopilla, Antofagasta, Huasco, Coquimbo Quintero, Ventanas, Puerto Montt, Puerto Chacabuco and Valparaíso. COPEC supplies only 180 cst fuel oil and mgo at Coronel; Lirquen; San Antonio (by truck or using the Don Pancho or Porvenir); San Vicente (but only for vessels working cargo at the monobuoy); and at Talcahuano (but only for vessels working cargo at Bravo Terminal).

The oil majors Shell and ExxonMobil also have a presence in the Chilean market, as does Coastal Petroleum NV Chile Ltd, part of the El Paso group. ExxonMobil has a 24,000 mt storage terminal at Valparaíso, as well as tank farms at Talcahuano, Antofagasta and Iquique. In addition to its bunkering activities, Shell is one of the leading suppliers of marine lubricants with production plants in Antofagasta and Valparaíso. Another oil major, BP Marine, also operates a national supply network for marine lubricants in Chile. Launched in 1999, the service comprises a lubricant supply facility at 14 ports along the Chilean coast from the southern port of Puerto Montt to Iquique in the north. The service is coordinated through BP offices in

Santiago de Chile, and is aimed at BP's international shipping customers as well as the local coastal shipping industry. The main traders and brokers in Chile include Agunsa and Ian Taylor y Compañía S.A. One of the largest maritime agencies in Latin America, Agunsa has a presence in all Chile's principal ports and terminals and has close links with many of the local bunker suppliers. Since 1991, Agunsa has expanded its operations beyond Chile to other countries, including Argentina, Peru, Paraguay, Colombia, Venezuela and Ecuador.

Ian Taylor y Compañía S.A. is one of the leading ship agency companies in Latin America and has been involved with the bunker industry for a number of years. Both Agunsa and Ian Taylor y Compañía have played an important role in developing the Chilean bunker market.

### **Directory of International Bunker Suppliers, Traders and Brokers**

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Telex: 645177

Web: [www.agunsa.cl](http://www.agunsa.cl)

Coastal Petroleum NV Chile Ltd - Supplier

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Compañía de Petróleos de Chile S.A. (Copec)- Supplier

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P O Box 308

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Ian Taylor y Compañía S.A.- Trader and broker

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**MEXICO**

In April 2002, the price of marine diesel was a staggering \$620 a tonne and it had been at this level for many months. Why have the Mexican authorities, and the national oil company Petróleos Mexicanos (Pemex) set the prices so high?

Mexico has never been a cheap bunkering option but its marine diesel oil (mdo) prices went way outside the global price spectrum at the end of May 2001. According to reports, the government pushed up the tax on mdo in response to allegations that subsidised marine diesel was being sold illegally into the inland domestic market. Similar scams have taken place in other countries but in most cases the authorities have reacted by tightening up controls over the market, or drying the marine fuel in order to make it more difficult to sell in the domestic market without detection. The Mexican solution of levying the full tax on marine sales was more extreme. Local bunker suppliers, and their international trading partners, were dismayed, saying the exorbitant prices would kill the market. Sales volumes of mdo have plummeted, and bunkering companies have been lobbying hard for a reversal policy.

The main bunkering centres in Mexico Gulf Coast include Altamira/Tampico, Coatzacoalcos, and Pajaritos and Veracruz. Both fuel and diesel are available by barge or road tank wagon (rtw), and sometimes ex-pipe, at these ports subject to availability

On the Pacific Coast, barge services are available at Salina Cruz, Acapulco, Lázaro Cárdenas, Manzanillo, Puerto Vallarta and Mazatlán.

There are also many smaller ports on both coasts where diesel is delivered by rtw.

Pemex and other Bunker Suppliers in Mexico

Pemex controls the supply of all the fuel oil into the Mexican market and owns a considerable amount of physical supply infrastructure. However, there are a number of independents, some of whom have close relationships with bunker traders based in North America.

The main players include Bunkers de Mexico, Bunkers del Golfo, Naval Mexicana and Petrolíferos.

Naval Mexicana is closely associated with the Canadian trader ICS Petroleum Ltd, which has offices in Montreal and Vancouver. ICS have access to three bunker tankers on the west coast, as well as one tanker, four barges and three tugs on the Gulf Coast. Altamira and Tampico are served by the Naval Mexicanas barge Dalila and the tug Jason. In Coatzacoalcos, the company uses the tug Sanson and the barge Calypso. In the Gulf ports of Dos Bocas, Cayo Arcas, Ciudad del Carmen and Lerma/ Campeche, the tanker Orfeo supplies offshore.

On the Pacific Coast, the tankers Orion and Ajax cover the ports of Acapulco, Lázaro Cárdenas, Manzanillo, Puerto Vallarta and Mazatlán.

The company also organises rtw and ex-pipe deliveries in a number of ports.

The bunkering activities of ICS in Mexico are not confined to the deliveries made using Naval Mexicana: the company has a network of agents in all the main ports and has a direct credit line with Pemex.

Bunkers de Mexico has a close working relationship with New York-based trader and broker Bunkers LLC. Bunkers de Mexico has three barges/tankers: the Golfa, which has capacity for 1,000 mt of fuel oil and 200 mt of diesel marino especial; the Golfa

II, which has capacity for 900 mt of fuel oil and 100 mt of diesel marino especial; and the 1,400 mt capacity Pacifica II. We understand that Bunkers de Mexico have the Golfa II based in Manzanillo, covering its Pacific Coast operations and the Pacifica II is based in Coatzacoalcos, and servicing the Gulf Coast operations.

Bunkers de Mexico can also arrange ex-pipe and rtw deliveries across Mexico.

Bunkers del Golfo operates the Bona I (previously known as the Pacifica I) as well as a fleet of rtw's. In April 2002, the Bona I was reported to be the only barge operating at Veracruz, and ICS/Naval Mexicana reported that they were the principal contractors of Bona I employment at Veracruz. In Lázaro Cárdenas and Manzanillo, Bunkers del Golfo can arrange ex-pipe deliveries using the Pemex facilities.

### PEMEX

Established as a general distributor of Pemex oil products in 1996, Petrolíferos first entered the bunker market in early 1998. The company owns a large fleet of trucks, which are used for bunkering and other purposes. Petrolíferos is part of the Mexican-owned Cafica group of companies, whose interests extend from oil distribution and retail to leisure and entertainment facilities.

Pemex refineries do not have crackers or cokers so all the bunker fuel sold in Mexican ports is straight-run material and does not contain catalytic fines. However, the product does have relatively high levels of vanadium.

The 330,000 barrels a day (b/d) Salina Cruz refinery provides the bunker fuel for the west coast, while the 200,000 b/d plant at Minatitlán is the main source for Veracruz and Pajaritos. The ports of Tampico and Altamira mainly rely on the 195,000 b/d Madero refinery.

The refineries produce a very heavy fuel oil, known as combustoleo pesado or cope, which is blended with distillate to produce the 180 centistoke (cst) Intermedio 15. According to ICS: Intermedio 15 is an intermediate marine fuel and equates to an IFO-180 product which generally meets the ISO 8217 RMF 25 specification (without a guarantee).

The other product is diesel marino especial which equates to a marine gasoil product to ISO 8217 DMA specification (again, without guarantee) when delivered by pipeline or truck. In some ports, diesel marino especial may have to be transported to the vessel in a dirty barge tank which will result in the downgrading of the product to a high-quality mdo.

### **Directory of International Bunker Suppliers, Traders & Brokers**

Bunkers de Mexico S.A. De C.V. Supplier

Darwin 32 - 1er Piso

Col. Nueva Anzures

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Tel: +52 5 536 0096

Fax: +52 5 536 4433

e-mail: [bunkers@bunkers.com.mx](mailto:bunkers@bunkers.com.mx)

Web: [www.bunkers.com.mx](http://www.bunkers.com.mx)

Bunkers LLC - Trader and broker

90 Broad Street- 7th Floor

New York, NY 10004, USA  
Tel: +1 212 785 1888  
Fax: +1 212 785 5488  
e-mail: bunkersllc@worldnet.att.net

Bunkers del Golfo S.A. de C.V. - Supplier and Trader  
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Col. Nueva  
C.P. 91850  
Veracruz, Ver., Mexico  
Tel: +52 29 382833  
Fax: +52 29 382822  
e-mail: bunkers1@prodigy.net.mx

Bunkers del Golfo S.A. de C.V. Supplier  
Altavista No. 28  
Col. San Angel Inn  
Z.C. 01000  
Mexico City D.F., Mexico  
Tel: +52 5 550 4838  
Fax: +52 5 550 2077  
e-mail: bunkers@ver1.telmex.mx

ICS Petroleum Ltd - Supplier, trader and broker  
Suite 2360, Box 12115  
555 West Hastings St, Vancouver BC, Canada V6B 4N6  
Tel: +1 604 685 6221  
Fax: +1 604 685 7352  
e-mail: bunkers@ics-vcr.com  
Web: www.icspet.com

ICS Petroleum (Montreal) Ltd- Supplier, trader and broker  
430 Ste. Helene, Suite 302  
Montreal, Quebec, Canada H2Y 2K7  
Tel: +1 514 849 1223  
Fax: +1 514 849 0517  
e-mail: bunkers@ics-mtl.com  
Web: www.icspet.com

Petrolíferos S.A. de C.V - Supplier  
Francisco Solis S/N  
Col. Franciso Villa  
Mazatlan, sinaloa, Mexico  
Tel: +52 69 865656  
Fax: +52 69 865048  
e-mail: petro@petroliferos.com.mx  
Web: www.petroliferos.com.mx

## CARIBBEAN

MIAMI: Miami is the hub of the Caribbean cruise market and an important intercontinental gateway between the Americas. Coastal Refining and Marketing Inc. (now part of the El Paso Corporation) has dominated this market for many years as the only major large-volume supplier of intermediate fuel oil (ifo) grades, although there are independent suppliers such as Tropic Oil Co. operating in the marine gasoil (mgo) sector. Coastal can source bunker fuel for its Miami operation from its own 170,000 barrels a day (b/d) San Nicolas refinery on the island of Aruba, located in the southern Caribbean off the coast of Venezuela.

ARUBA: Aruba is itself an important bunkering centre, with three main supply points. In the commercial port of Oranjestad, Coastal supplies both fuel oil and mgo by barge to general cargo and cruise ships. For the offshore market, Coastal operates a large tanker, loaded with both 380 centistoke (cst) and 180 cst fuel oil as well as marine diesel oil (mdo). Coastal also supplies ex-pipe from its refinery in San Nicolas. In general, this service caters for the tankers working cargo at the refinery, although other vessels do call at San Nicolas for 'bunkers-only' deliveries.

St. Eustatius: The other key island-based supplier in the Caribbean catering for high volume bunkering business from tankers and large general cargo vessels is Statia Terminals of St Eustatius. Many of the ships bunkering at St Eustatius are working cargo at Statia's cavernous terminal, which handles products across the oil spectrum. With 11.3 million barrels of storage capacity, the terminal also has ample space for bunker fuel and is therefore open for 'bunkers-only' business from passing vessels. St Eustatius may not meet the grade as a shop-stop for the mega-cruise ships but it has a deep draft and is conveniently situated for large vessels looking to make a quick bunkers-only stop with minimal deviation. Statia Terminals also sees a high volume of business from reefers and general cargo vessels working the Puerto Rican port of San Juan. While bunkering is possible ex-pipe, this tends to be reserved for vessels with very large volume requirements. Statia Terminals does most of its bunkering in the anchorage area, using its own fleet of barges.

In November of last year, the US-based Kaneb Pipe Line Operating Partnership announced a definitive agreement to acquire the Statia subsidiaries for \$193 million in cash plus the assumption of \$107 million of Statia debt. The shareholders of the Statia Terminals Group voted to approve the sale of 'substantially almost all of the company' at a special general meeting to be held on 22 February in Curacao, Netherlands Antilles. In addition to the St Eustatius site, Statia operates a 7.5 million barrel terminal in Point Tupper, Nova Scotia, Canada. Kaneb's own terminaling subsidiary, Kaneb/ST Services, has bunkering operations being run out of its terminal in Jacksonville, Florida, where the principal bunker supplier is Colonial Oil (see U.S. East Coast profile).

Very large crude carrier (VLCC) and Ultra large crude carriers (ULCC) operators looking for bunkering options in the Caribbean can also use the ports of Venezuela, where Deltaven - a subsidiary of state-owned Petroleos de Venezuela SA (PDVSA) controls the marine fuel supply business.

A number of other islands in the Caribbean are also trying to boost their bunkers-only business - from tankers and general cargo vessels as well as cruise ships.

Trinidad: The Petroleum Company of Trinidad and Tobago (Petrotrin) last year announced a new 'fuels alliance' with oil major BP Marine, which it hopes will boost its international presence.

Trinidad has five ports for bunkering: Pointe-a-Pierre, Port of Spain, Point Fortin, Point Lisas and Chaguaramas. The company's Pointe-a-Pierre refinery is the primary source of bunker fuel for all five ports, providing all grades of fuel oil and mgo. There is an ex-pipe service at Pointe-a-Pierre but this is mainly restricted to mgo deliveries.

Petrotrin have the 5,000 metric tonne (mt) capacity Mirabella + two chartered tankers, the 4,000 mt Sabine XI and the Atlantic, but may redeliver one of the chartered tankers.

Curaçao: Another Caribbean bunker supplier which expects to see a significant growth in sales volumes is Curoil, the state-owned supplier on Curaçao, one of the islands to the north of Venezuela. Curoil supplies bunker fuel on a 24-hour basis, with no overtime charges, in the ports of Curacao and in neighbouring Bonaire. Sourcing product from the 320,000 b/d Emmastad refinery operated by PDVSA, Curoil offers DMA grade gasoil, DMB diesel, and all IFO grades from 30 to 380 cst. In the Santa Anna Bay harbour area, Curoil delivers at the Emmastad refinery, Willemstad, the drydock/Brion wharves and the Mega Cruise ship/bunkers-only terminal which opened in February 1999.

Located just 200 metres to the west of the main harbour inlet and extending some 100 metres into the sea, the new Mega Cruise terminal was primarily constructed to accommodate the newest generation cruise liners, the so-called 'Mega' cruise ships. However, Curoil has installed bunker facilities, enabling bunker deliveries ex-pipe at this pier directly from its main depot at Willemstad and, when not occupied by cruise ships, it offers a 'bunkers-only' option for all types of vessels in the area. The main advantage of the pier is that it provides a berth outside of the main harbour, thereby offering both lower calling costs and a faster bunkering operation.

The pier has a maximum draft of 50 feet and the maximum GRT and LOA have for now been set at 170,000 tonnes and 1,150 ft. respectively. Low-vanadium ifos and mgo are available, and mdo can be provided on special request - and only for quantities of 300 metric tonnes (mt) or more. The pumping rates at the pier are up to 350 cubic metres (m<sup>3</sup>) of fuel oil per hour and up to 150 m<sup>3</sup> per hour, for gasoil and diesel. There have been reports that a second Mega Cruise Pier may be built in Curaçao - although the exact location remains undecided.

At the Willemstad wharves, Curoil supplies ex-pipe to cruise ships, container vessels and tankers calling for bunkers only. All grades of product are available including both low and 'regular' vanadium content fuel oil.

There are no fixed onshore bunker facilities at the drydock/Brion wharves (where the container terminal is located) although Curoil offers mgo by barge and truck deliveries can be arranged.

At the jetties at the Isla refinery by the Emmastad wharves, Curoil supplies ex-pipe to tankers loading or discharging at the oil terminal. However, low-vanadium fuel and mgo are supplied by barge.

Located to the west of the Santa Anna Bay, Bullen Bay is a deep sea port particularly suited for ULCCs or other large vessels working oil cargoes or calling for bunkers only. A wide range of ifos as well as mdo and mgo are supplied ex-pipe. Again, low-vanadium fuel and mgo are supplied by barge.

To the east of Santa Anna Bay are the Caracas Bay and Fuik Bay area. The two piers at Caracas Bay are mainly used by ships undergoing repairs and fuel can be supplied by barge.

The Fuik Bay is exclusively for cargo vessels loading and unloading sand/rocks at the Curaçao Mining Co. and Curoil can arrange truck and barge deliveries of gasoil only.

#### Venezuelan Influence

In addition to providing product to Curoil, PDVSA also uses takes a more direct role in some Caribbean bunkering centres. In Bonaire, Deltaven supplies bunker fuel ex-pipe to tankers working cargo at its storage terminals.

In the northern Caribbean, PDVSA supplies in Freeport, Bahamas - one of the region's biggest cruise centres - through its subsidiary Bahamas Oil Refining Company International Ltd (BORCO).

BORCO, which was purchased by PDVSA in 1990, operates a terminal with a 20 million barrel crude and products storage capacity. According to Deltaven, the capacity in use at present is 10.2 million barrels, of which 4 million is devoted to crude oil storage, 4.7 million to fuel oil, and 1.5 million barrels to distillates and gas. Freeport terminal is well positioned for key tanker trades. Deltaven calculates that it is two days shorter on the USG-Arabian Gulf route than Aruba, one and a half days shorter on the USG-West Africa route than Aruba, and equal to Statia.

In terms of bunker demand, Freeport competes with the U.S. Gulf ports for the U.S. to North Sea trade. There is also steady business from ships calling at the expanding Freeport container port.

In June 2001, Deltaven announced that it had started supplying low vanadium fuel in Freeport. The company said that the product had a maximum vanadium content of 180 parts per million (ppm) and complied with the International Standards Organisation's ISO 8217 RMG-35 and RME-25 specifications.

Puerto Rico: Puerto Rico's San Juan has long been a major draw for cruise ships and the port has also seen its fair share of bunker suppliers come and go. Exxon, Statia Terminals and Crowley Marine Service Inc. have all put in an appearance, however locally based Harbor Fuel Service Inc. has so far been the only supplier of fuel oil to stay the course for a consistent period of time.

Harbor Fuel Service operates five barges and a tug boat. Harbor Fuel Service also delivers bunkers by road tank wagon (rtw) at the ports Mayaguez and Ponce. Harbor Fuel Service's barge Millennium, which has capacity for 2,200 metric tonnes (mt) of 380 cst fuel oil and 400 mt of mgo, will supply both in-port and offshore Ponce. It will also deliver at Guayanilla and Guanica to the west of Ponce, and Aguirre and Yabucoa to the east. Harbor Fuel Service is currently using the Millennium in Puerto Rico's main port, San Juan. Launched in 2000, the double-bottomed barge was built for Harbor Fuel Service at the Bollinger shipyards in New Orleans, Louisiana.

Another bunkering centre popular with cruise ships is the St Croix-based operation of Hovensa, an Amerada Hess and PDVSA joint venture which runs the local 525,000 b/d refinery.

Jamaica: Of the other Caribbean islands, Jamaica has a fairly well-established bunkering presence, with fuel oil and distillates available in Ocho Rios, Montego Bay,

Port Antonio and Kingston. Prices are high, however, compared to the region's main bunkering centres such as Aruba, Curacao or Miami. Demand mainly comes from container ships, and in most cases they are 'topping up', in expectation of taking large deliveries when they dock at a port offering more competitive prices.

The principal source of product for the Jamaican bunker market has traditionally been the local 35,000 barrels a day (b/d) Kingston refinery operated by Petrojam Ltd. In most ports deliveries are made by truck, although Kingston does have ex-pipe facilities on some berths. However, Petrojam have announced that it planned to introduce a barge delivery service for bunkers.

Cuba: Bunkering companies have often been reported to be eyeing up the possibilities of setting up a major bunkering facility on Cuba. A number of companies, notably the Canada-based Reiter Petroleum, have links to the bunker market in Cuba.

Haiti and the Dominican Republic - neighbouring countries on the Caribbean's second-biggest island - have not been able to attract a high volume of commercial shipping. Bunkering facilities are therefore limited.

Suriname One new Caribbean bunkering market which has begun to show significant promise over the past couple of years is Suriname. The state-owned Staatsolie Maatschappij Suriname NV started supplying bunkers a couple of years ago, using trucks to deliver product from its own 7,000 barrels a day (b/d) Paramaribo refinery. In October 2000, Staatsolie made its first barge delivery of 120 cst product, using the 1,500 mt capacity Staatsolie V. The Staatsolie V started supplying in the port of Paramaribo, and then extended its coverage to out-of-port sales at the mouth of the Suriname river in January 2001. The company later announced that it planned to replace the Staatsolie V with the 1,200 mt capacity Staatsolie IV, which was to be adapted to carry both intermediate fuel oils (ifos) and distillates. The Staatsolie IV was also to be equipped with automatic samplers, meters and separate pipe work for both fuel oil and diesel.

In March 2001, Staatsolie launched a new 300 mt dedicated gasoil barge, Pioneer, which is operating in all the ports of Suriname and at anchorage. The company also announced that it was operating a bunkers-only service at the Suzannasdaal area in the mouth of the Suriname river. Staatsolie bunker sales for 2001 were six times higher than for its first full year, and it hoped to at least double its 2001 figures in 2002.

Most of the leading international bunker brokers will have links to the Caribbean market. There are a number of companies, such as Glander International Inc. and Sea Bunkering Americas LLC, which are located in Florida. Other specialised players include the Guadeloupe-based broker and trader The Caribbean Oil Trading Company (Carotrad Sarl).

#### **Directory of Bunker Suppliers, Traders and Brokers**

CAROTRAD SARL - The Caribbean Oil Trading Company- Trader  
13 Bellevues de Convenance  
97122 Baie-Mauault  
Guadeloupe

Tel: +590 590 252902  
Fax: +590 590 945559  
e-mail: bunkers@carotrad.com  
Web: www.carotrad.com

Coastal Refining & Marketing Inc. - Supplier  
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Suite 932N  
Houston TX 77002  
USA  
Tel: +1 713 420 4949  
Fax: +1 713 420 6917  
e-mail: miami.bunkers@elpaso.com

Curoil NV- Supplier  
PO Box 3927  
AM Chumaceiro Blvd 15  
Curacao, Netherlands Antilles  
Tel: +599 94 320000  
Fax: +599 94 613335  
e-mail: curoil@curoil.com  
Web: www.curoil.com

Harbor Fuel Service Inc.- Supplier  
PO Box 9023111  
San Juan, P.R. 00902-3111  
Puerto Rico  
Tel: +1 787 723 1182  
Fax: +1 787 723 8187  
e-mail: bunker@harborfuelpr.com

PDVSA Deltaven S.A.- Supplier  
Av. Principal La Floresta c/c, Av. Francisco De Miranda  
Edificio PDVSA, La Floresta, Torre Norte, Piso 2 Urb. La Floresta, Caracas 1060  
Venezuela  
Tel: +58 212 208 0077  
Fax: +58 212 208 0496  
e-mail: bunkers@pdvsa.com  
Web: www.pdvsa.com/pdv

Petrojam Limited- Supplier  
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PO Box 241  
Kingston, Jamaica  
Tel: +876 923 4040  
Fax: +876 9230365  
e-mail: mail@petrojam.com

Petroleum Company of Trinidad & Tobago

Supplier  
Southern Main Road  
Pointe a Pierre  
Trinidad  
Tel: +1 868 658 4200  
Fax: +1 868 658 1213  
Telex: 39367  
Web: www.petrotrin.com

SEL Maduro & Sons (Curaçao) Inc.  
Supplier  
Maduro Plaza, PO Box 3304  
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## CANADA

Canada's bunker market does not tend to generate much news. However, its leading port, Vancouver, saw a long-awaited breakthrough in its fuel tax system in 2001 which has given an extra boost to bunker sales.

The country has four main bunkering regions. Vancouver is the principal centre on the west coast. On the eastern side, the markets are grouped around the ports of Halifax on the Atlantic Coast; and Montreal in Quebec.

The St. Lawrence Seaway provides access to Canada's fourth bunkering region, the immense Great Lakes.

Vancouver is the largest port in Canada, handling more than 70 million tonnes of cargo a year. Vancouver, perhaps more than any other North American port, is sensitive to the swings of the Asian economy. Japan is the key trading partner for Vancouver, followed by South Korea, China and Taiwan.

Vancouver's container port, which broke through the one million twenty-foot equivalent unit (teu) mark in 1999, continues to grow and the local cruise market is one of the biggest in North America, handling close to a million passengers a year. The height of the cruise season runs from May to October - and this brings extra business for all the port's service providers - including the bunker suppliers. In fact, the cruise ships consume about half of the bunker fuel sold in Vancouver.

In July 2001, the Vancouver market received a significant boost when the newly-elected Liberal government of British Columbia announced the elimination of the 7% sales tax on bunker fuel used for large ships. The tax dated back to 1947. Local traders report that they have seen an increase in sales volumes as a result of this change.

The main bunker suppliers in Vancouver include Imperial Oil, as well as ICS Petroleum Ltd and Marine Petrobulk Ltd.

Imperial Oil, Canada's leading oil company and bunker supplier, is 69.6% owned by the oil major ExxonMobil. In October 2001, Imperial Oil and ExxonMobil Marine Fuels (EMMF) announced the addition of a new double-hulled barge to their operations in Vancouver. The ITB Provider has a capacity for 2,200 metric tonnes (mt) and can deliver intermediate fuel oils (ifos) and marine gasoil (mgo) simultaneously with a pumping rate of up to 500 mt an hour. The ITB Provider works alongside the ITB2 and the Imperial Nootka.

There are no local refineries producing significant volumes of bunker fuel. Imperial Oil's solution is bring in bunker fuel by rail truck from its 176,000 barrels a day (b/d) Strathcona refinery in Edmonton, Alberta, more than 1,000 kilometres (km) from Vancouver. The other suppliers generally source fuel oil from the refineries across the United States border clustered around Seattle, Washington, which are about eight hours from Vancouver by barge. Consequently, bunker prices in Vancouver generally follow trends in Seattle, with a premium. Tosco Corporation's 88,500 b/d Ferndale plant in Puget Sound and Equilon's 135,000 b/d Anacortes plant are the principal sources of product.

ICS operates two barges. The 2,500 deadweight tonnes (dwt) PT25 was built in 1988. The 3,600 dwt PT36 was built in 1980 and refitted in 1997.

Marine Petrobulk currently owns and operates three barges: the 2,100 mt PB14; the 1,900 PB12; and the 2,900 mt PB20, which was launched in August 2001.

'Bunkers-only' deliveries are made in the inner harbour. Vessels with grain, coal or other bulk commodity cargoes are allowed to bunker at the loading berths, although bunkering is not permitted when ships are loading sulphur or methanol cargoes.

Most of the terminals handling chemicals, crude oil, petroleum products and other liquid cargoes will have some bunkering restrictions at the berth. Bunkering is currently not permitted at the Roberts Bank, Deltaport or English Bay anchorage areas.

The Vancouver-based barges can make deliveries at a number of locations on Vancouver Island, where major pulp mills and lumber exporting terminals are situated. These include Crofton, and Harmac, which are both about five hours steaming time from Vancouver, and Victoria, which is about six hours away. Port Mellon and Squamish are located on Howe Sound to the North of Vancouver. According to ICS, fuel oil can be barged into these ports from Vancouver, but the poor weather and strong winds in winter can hamper deliveries. Beyond the Vancouver region, New Westminster on the Fraser River is the only other port on the Canadian West Coast where fuel oil is readily available. Deliveries of marine diesel oil (mdo) and mgo are also available by road tank wagon (rtw). The other bunkering centres include Prince Rupert, which is about two days steaming to the north of Vancouver, and Kitimat. Gasoil is available by truck in these ports, and there are barging services but costs can be high.

Eastern Canada The key bunkering centre is Montreal. The port is located on the St. Lawrence River, 1,600 kilometres (km) inland from the Atlantic Ocean. The main suppliers in the Montreal bunker market are Shell, Petro-Canada, Imperial Oil and local independent Kildair Service. Traders include Hampton Bunkering Ltd, ICS Petroleum and Reiter Petroleum.

Shell operates a 125,500 b/d refinery in Montreal, while Petro-Canada has a 89,300 b/d plant. Shell has its own barge, the 2,500 mt capacity Horizon Montreal, and also uses rtws for deliveries from Montreal to Quebec City. Imperial Oil has operated the Imperial Lachine in Montreal in the past, but currently has no barge. Kildair has a one million barrel capacity fuel oil storage terminal in Tracy, 50 km east of Montreal, from which it barges in product. Traditionally active in the inland markets, Kildair directs around 5% of activity to the bunker industry. The company sells product to the other suppliers in Montreal as well as directly to shipowners. Imperial, PetroCanada and Kildair can arrange ex-pipe deliveries from a local Montreal oil terminal (which was formerly owned by Olco). Fuel availability in Montreal can sometimes be tight in September/October, as the local refineries may be directing more heavy product to the asphalt market, taking advantage of the last, hectic spurt of road-building activity before the onset of winter.

The St Lawrence Seaway, which first opened to navigation in 1959, extends from the Atlantic Ocean to Duluth, Minnesota, on Lake Superior - a distance of more than 3,700 km, and almost nine sailing days. The Seaway handles about 1,700 vessel

transits a year and encompasses more than 245,000 square kilometres of navigable waters, 15 major international ports and 50 regional ports.

While the St Lawrence River between Montreal and the Atlantic is navigable all year round, the St Lawrence Seaway, which connects Montreal to the Great Lakes, closes from late December to March, due to Canada's extreme winter weather. The exact re-opening date can depend on the prevailing weather conditions. In 2002, the Seaway re-opened on 26 March.

The draft in the Seaway west of Montreal is relatively shallow, which means that laden ships going further into the Great Lakes area may choose not take on large deliveries of bunker fuel. Most large quantities are taken at Montreal on the way out.

#### Great Lakes of Industry

The Seaway leads into the massive in-land waters known as the Great Lakes, which extend into both the United States and Canada. The Great Lakes area, and particularly the US part of this region, is now home to some of the most industrialised cities in North America, such as Chicago and Detroit.

The waterways of the Great Lakes, and the St Lawrence Seaway, provide a vital transportation link between the cities in the area, and beyond into Europe. The primary products moved by the Great Lakes fleet, include iron ore, coal, limestone, grain and cement.

The Great Lakes region accounts for close to 500,000 mt of bunker fuel a year. Most bunker business is conducted on a contractual basis, with very little spot market activity. The main grades of fuel oil are Bunker C and 180 centistoke (cst) product, while mdo represents a significant proportion of the total demand.

In the Canadian section of the Great Lakes, the main bunkering centres are Hamilton, on the west coast of Lake Ontario, where Provmar is the main supplier, and Sarnia, at the eastern tip of Lake Huron. Shell and Imperial Oil both operate refineries and supply bunker fuel in Sarnia. Shell also supplies in Port Colborne. Other suppliers in the Great Lakes include Sterling (in Windsor, Ontario). On the US side of the Great Lakes suppliers include Koch (in Duluth, Minnesota), Bigane (Chicago, Illinois), Warner (Detroit, Michigan) and Halron (Cleveland, Ohio).

#### Halifax and Atlantic Coast

The main bunkering centres on the Atlantic Coast include Halifax and Port Hawkesbury in Nova Scotia, St John's, Newfoundland, Charlottetown, Prince Edward Island and Saint John, New Brunswick.

The port of Halifax handles about 15 million tonnes of cargo a year. Sourcing product from its nearby 85,000 b/d Dartmouth refinery, Imperial Oil supplies bunker fuel in Halifax both ex-pipe and by barge. The Imperial Dartmouth carries 1,700 mt of fuel oil and 500 mt of mdo and is equipped with onboard meters and blenders. The barge can service vessels at any location within the harbour.

With one refinery playing such a central role in providing fuel for the local bunker market, shipowners should take careful note of its maintenance and turnaround schedules.

#### Saint John, New Brunswick

Irving Oil Ltd also supplies limited volumes in Halifax, but the company's bunkering stronghold is in Saint John, New Brunswick, where it operates a 220,000 b/d refinery. Irving currently supplies distillates ex-pipe and by rtw. The ex-pipe service at the refinery is available to both vessels working cargo and 'bunkers-only' callers.

About 300 km from Halifax, Statia Terminals Canada Inc. operates an oil trans-shipment, storage and blending terminal in Port Hawkesbury, Nova Scotia. Port operations for the terminal, which has a total capacity of more than 7.5 million barrels, are managed by Point Tupper Marine Services Ltd. Statia Terminals supplies bunker fuel ex-pipe to crude carriers working cargoes and other vessels.

In 2002, Kaneb Pipeline finalised its agreement for the purchase of Statia Terminals (see Caribbean profile).

In Newfoundland, Irving Oil, Imperial and Ultramar have storage depots but they supply only mgo and no fuel oil.

North Atlantic Refining Ltd obtains product from its local 99,750 b/d Come-By-Chance refinery. Bunkers are supplied by its subsidiary North Atlantic Petroleum. In addition to supplying mgo in a number of ports in the region, North Atlantic Petroleum can supply 380 cst fuel oil in Clarenville, near to its Come-By-Chance plant. The refinery supplies bunker fuel to tankers working cargo, but 180 cst and lighter grades are not available. Ex-pipe deliveries are available at the jetty. In addition to supplying the tankers discharging crude and loading products, the refinery caters for the shuttle vessels working in the Hibernia oil fields.

The port of St John's, Newfoundland, also provides bunker fuel to vessels involved in the offshore oil business. Situated on the east side of the Avalon Peninsula, St John's is Canada's most easterly port. Although there is no supply of intermediate fuel oils in St John's, the combination of the offshore business and the local fishing fleets has generated a significant demand for distillates. The main bunker suppliers in St John's are Imperial Oil, Irving Oil, North Atlantic Refining and Petro-Canada.

In addition to eastern and western seaboard and the Great Lakes, Canada also has the vast Hudson Bay to the north. Although a relatively small market, Churchill, Manitoba on the Hudson Bay is a grain port servicing about 30 vessels a year during their short shipping season. The port is open from July to early November, and mgo is available ex-pipe or by rtw.

### **Directory of International Bunker Suppliers, Traders and Brokers**

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**BRAZIL**

Changes are underway in the Brazilian bunker industry, although it may be some time before it becomes apparent in which direction the industry is heading, and at what speed. Following a five-year transition period, the Brazilian oil industry was opened up for the establishment of a free market in the domestic distribution and international trade of some oil derivatives on 1 January 2002.

Over the past five years, various areas of the oil industry have already been opened up to private interests, particularly in the upstream sector, and in the trade of some derivatives. In 2002, the process was taken further when the last barrier on gasoil and gasoline was breached. What does this mean for bunkers?

In theory, there should now be more opportunities for new players to enter the market and compete with giant national oil company, Petrobras.

In practice, Petrobras is likely to remain the only large-scale supplier of bunker fuels in Brazil for some time yet. With its huge network of refineries, offices and distribution centres, Petrobras would be a formidable competitor. For other bunkering companies, the most effective way to do business in Brazil at the moment is to operate as traders and brokers and work with Petrobras.

Some players, notably Shell and Tramp Oil (Brasil) Ltd do organise bunker deliveries on occasion. But these tend to be limited to supplying marine gasoil (mgo) by road tank wagon and they account for only a very small portion of the overall Brazilian bunker market. Tramp primarily sees its occasional deliveries as a back-up service to Petrobras.

Bominflot, another well-established player in the Brazilian industry, said that companies were studying the new situation but, for now at least, Petrobras still controls the supply of bunkers in Brazil. Over the past few years, the company says it has been investing heavily in its bunkering operations, extending its coverage into new ports and upgrading its facilities. According to Petrobras, this investment has been repaid with increased sales. In 2001, Petrobras sold 3.6 million metric tonnes (mt) of bunker fuel, compared to 3.2 million mt in 2000. Bunker volumes were up by 31% in Santos, 16% in Vitoria, and 12% in both Rio Grande and Rio de Janeiro.’ In Salvador, bunker volumes were up by 90% - mainly because of cruise vessels. Petrobras expects that sales will continue to increase, and it is hoping to break through the four million tonnes barrier. To put this in perspective, in 1990 Petrobras sold just 786,000 metric tonnes (mt) of bunker fuel.

Santos is the largest port in South America and accounts for about 40% of the Brazilian bunker market. For bunker deliveries in Santos, Petrobras uses the barge fleet of Navega o So Miguel Ltda (NSM). NSM has six bunker barges in Santos. Most are relatively small, but the Alia has capacity for 5,000 mt, making it suitable for the bigger deliveries. Petrobras can also supply by rtw and ex-pipe in Santos.

Rio de Janeiro, in the Bay of Guanabara, is Brazil's second biggest port and bunkering centre. In addition to the barge deliveries in the port of Rio itself, Petrobras supplies bunker fuel through its ex-pipe facility at the Ilha d'Agua terminal, which is connected to the nearby Duque de Caxias refinery. Petrobras also delivers ex-pipe from the Ilha Grande terminal, which is some 100 kilometres (km) from Rio but connected by pipeline to the Duque de Caxias refinery. NSM is also the contracted barge operator in Rio de Janeiro. According to Petrobras, there are six bunker barges in Rio de Janeiro, but there are no vessels with the Alias capacity. NSM is reportedly building at least two new barges in the 3,500 mt range and this could strengthen the

barge fleets in both Rio de Janeiro and Santos.

Further down the coast from Rio de Janeiro, Petrobras supplies all grades of fuel oil at the deep-sea oil terminal of Angra do Reis and the nearby port of Sepetiba.

Barge deliveries are possible in most of the other main ports in Brazil, including Rio Grande, Paranagua, Salvador, Sepetiba and Vitoria

In each port, Petrobras has a contracted barge operator. NSM not only covers Santos and Rio de Janeiro, but an affiliated company operates in Vitoria.

In Rio Grande, Petrobras uses the services of Guarita, while Transbunker provides the barging in Paranagua.

There are also two barges based at the in-land port of Manaus, which is located on the Rio Negro, near the rivers confluence with the Amazon.

Petrobras usually delivers by barge in Belem.

Petrobras offers ex-pipe facilities at a number of ports, including Itaqui, Fortaleza, Suape and Recife, which is an important export centre for Brazils sugar industry.

Looking to the future, Petrobras has plans to set up a bunkering service at the newly-opened port of Pecem, which, like Fortaleza, is in the state of Ceara. Pecem is scheduled to be fully operational by 2004-5, but some container vessels are already calling at the port.

Meanwhile, Petrobras is still keen to pursue its goal of setting up an offshore bunkering service in the northeast of the country. This scheme has been on the drawing board for some time now, and has undergone some revisions.

In April 2002, Petrobras said that the current plan was to base the offshore service at the port of Macapa, in the state of Amapa. However, Petrobras said there were logistical and environmental issues to sort out. Although this area makes a good bunkering location because of its proximity to shipping routes, Petrobras does not have any refineries nearby.

Petrobras also has plans for new bunkering activities outside Brazil. As part of a recent asset swap with the Spanish Argentine oil company Repsol YPF (which now has a bunker trader based in its Rio de Janeiro office), Petrobras has acquired the EG3 refinery in Argentina's Bahia Blanca (see country profile on Argentina). The EG3 refinery is a well-established source of product for the Bahia Blanca market. This has continued with the change in ownership, but Petrobras are looking to take a more direct involvement in the Argentine market, as a physical supplier.

### **Directory of Internatioal Bunker Suppliers, Traders and Brokers**

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**NETHERLAND**

Environmental concerns over sulphur emissions from ships' engines are beginning to have a big impact on the European bunker market - and the Netherlands super-port Rotterdam is in the eye of the storm.

The global campaign to reduce sulphur emissions has focused on Annex VI of the the International Maritime Organisation's Marpol 73/78 Convention. This will impose a global sulphur cap of 4.5% and a maximum limit of 1.5% in SOx emissions in SOx emission control areas ((Soxecas) such as the Baltic and North Seas and English Channel. There are also limits on the sulphur content of marine gasoil (mgo) and marine diesel oil (mdo).

However, Annex VI will only come into effect when ratified by at least 15 flag states representing at least 50% of world tonnage. At present, only a few states have ratified Annex VI. Frustrated by the lack of progress on the IMO initiative, the European Commission decided to force the pace by introducing its own legislation. In July 2000, the EC's Directive 1999/32/EC came into force. The Directive limits the sulphur content of mdo to 0.2%, and will cut the maximum still further to 0.1% in 2008. The Directive also ruled that heavy fuel consumed from January 2003 must not exceed a 1% sulphur limit. Fuel for use in refineries and seagoing ships are currently exempt from this law - although there have been suggestions that the EC may also impose its own unilateral limits on heavy fuel oil for ships operating in European waters. Many in the industry have questioned how the authorities can police the SOx reduction programme - and they are not pleased with EC's answer to the problem. The EC appears to have concentrated on monitoring the sulphur content of fuel at the point of sale, rather than consumption. Suppliers in European ports have argued that this places them at a disadvantage to their competitors in the Far East, Americas or Middle East. When the legislation was introduced, many suppliers claimed that there had been no proper consultation process with the industry and there was some doubt as to whether the EC and maritime authorities would take decisive action to impose the new sulphur caps on distillates. In November 2001, it became clear that the Directive was no idle threat, and that Netherlands in particular was taking a strong line, when the authorities confirmed that they had been taking samples of distillate fuels from vessels at Rotterdam, and anchorages outside the port. A spokesman for the Netherlands' Department of the Environment told BunkerNews that 88 fuel samples had been taken since the directive had come into force and that in eight cases reports on the samples had been handed to the Department of Justice.

In reaction to the news, Nederlandse Organisatie voor de Energiebranche (NOVE), an organisation representing independent suppliers of petroleum products in the Netherlands, urged shipowners to put pressure on the European Union not to take any further unilateral steps on bunker fuel specifications. The International Bunker Industry Association (IBIA) has registered its willingness to play its part. The Association will be monitoring the way different European Union countries were responding to the European Commission's directive. The IBIA Chairman Chris Leigh-Jones called for the bunker industry to become less complacent about proposed environmental legislation, adding that IBIA would lead the change to more 'pro-active involvement'. Although some have maintained that the EC legislation could place Rotterdam at a disadvantage to its rivals from outside the European Union, the port is sure to remain a key centre for global bunkering. Collectively, the Netherlands ports of Amsterdam, Rotterdam and Belgium's Antwerp (widely-known as the ARA) account for around 13 million metric tonnes (mt) of bunker sales a year. Out of this

total, Rotterdam on its own is responsible for more than eight million mt of bunker fuel. The ARA's success as a bunkering centre is based on its role as the European hub for international shipping, and a major refining and distribution centre for oil. ARA is home to some of the Europe's biggest refineries and is the hub of the European fuel oil cargo market.

### **Majors and Refiners**

With its giant Pernis refinery providing a ready source of fuel oil and distillates, Shell has traditionally held a powerful influence over local bunker market, both as a direct supplier and source of product to other players.

Fuel and Marine Marketing (FAMM), the bunkering arm of recently-merged oil major ChevronTexaco, is another key figure in the market. FAMM can draw upon supplies from the Netherlands Refining Co. (Nerefco) Europoort plant, in which Texaco had a 35% stake. The remaining 65% of Nerefco is held by fellow oil major BP. Both BP Marine and FAMM also use imported material, from sources such as Russia. Esso Benelux has a 180,000 b/d refinery in Rotterdam, but it sources almost all its product for the Netherlands and Belgium from its 246,000 b/d plant in Antwerp, where most of its sales are concentrated. TotalFinaElf shares a 150,000 b/d refinery with Dow Chemical Europe in Flushing, and its bunkering arm has been a key supplier in Rotterdam as well as in Flushing, Terneuzen and the inland Belgian port of Ghent. Total is now part of the TotalFinaElf conglomerate, and Fina's refinery in Antwerp is another source of product for the company's ARA bunkering activities.

### **Barges**

The majors, and many independent suppliers, will frequently use barges from Verenigde Tankrederij / Unilloyd (VT), which operates a fleet of more than 25 bunkering vessels, ranging in capacity from 500 mt to 4,000 mt. In 2000, VT was in the process of re-shaping its fleet, so that it will include barges in the 7,000 mt to 10,000 mt range. A new barge, the Vlessengen, will for instance have a capacity of 8,000 metric tonnes (mt) of bunker fuel and a pumping rate of 2,000 mt per hour.

### **Independent Suppliers**

The Netherlands has a very strong community of independent players, most of whom are members of NOVE. Founded in 1907 as a trade association for companies involved in the coal business, NOVE now has more than 300 members, whose activities range from owning service stations or storage depots to running fleets of road tank wagons (rtws) and bunker barges. NOVE has four main committees: retail; inland navigation and fishery; international trade and gas; international bunkering. In the bunkering arena, NOVE has brought together more than 20 independent players. The Rotterdam Municipal Port Management regards NOVE as an important voice in the local bunkering community and the association participates in its Bunker Monitor Platform as the independent suppliers' representative. Bominflot is not an NOVE member, but it is one of the best-known independent players. North Sea Petroleum BV supplies marine diesel and gasoil sourced from the main refineries in Rotterdam as well as the 10,000 b/d plant operated by Smid & Hollander Raffinaderij BV. In September 2001, North Sea Petroleum celebrated its first 25 years in the bunker industry. North Sea Petroleum was set up as a joint venture between Esha (Smid and Hollander) and the group's managing director, Cor Brongers. Expanding into the North Sea Holding Group, the company broadened its horizons, with an investment in 25 sea-going vessels and a network of traders and suppliers.

In 1990, Sea Bunkering International (SBI) was created as a joint venture between North Sea Petroleum and the Groningen-based reefer company, Seatrade.

SBI became the exclusive lubes and bunker purchaser for the 120-strong pool of Seatrade reefers, as well as arranging worldwide bunker and lube deliveries for its client base.

Other companies in the North Sea Holding group include Oliehandel Klaas de Boer BV in Urk/Ijmuiden, and Bunkers@Sea in Antwerp, as well as the UK-based Linsay Blee, Sea Bunkering Ltd and Highland Fuels, Estuary Fuels in Ireland and Sea Bunkering Americas in Florida.

While North Sea Petroleum has its new super-barge on order, sister company Klaas de Boer took delivery of a more modest vessel in 2001. The 360 mt capacity distillate barge Nellie was scheduled to come into operation in December, following some refitting work. Esha sold its holding in North Sea Petroleum to Brongers in 1990, and eight years later the independent Dutch oil refining group Petroplus bought 90% of the company. In June 2001, Petroplus increased its involvement in the ARA bunker market still further, through the acquisition of Dordrecht-based Frisol Bunkering BV, one of the largest independent suppliers in the region.

Atlantic Aardolieproducten Maatschappij BV, a sister company of Postoils BV, has a large fleet of barges, which it uses for both its own sales and to make deliveries on behalf of other suppliers. Modusa Aardolieproducten Amsterdam BV operates a fleet of seven barges: five are owned by the Bunker & Transport MY Amsterdam BV holding company and two are on long-term charter. Modusa is also a physical supplier in the ports of Zaandam, Beverwijk, Velsen, Ijmuiden, Den Helder and Harlingen.

Other Rotterdam suppliers include Calpam BV and ABC Bunkeroils as well as NIOC Bunkering, which has access to several barges owned through its associate company in Belgium, Wiljo. Ceebunker Services BV operates its own barges in Rotterdam and has a bunkering facility and barges in Dordrecht.

Gulf Oil Nederland BV has a substantial fleet of relatively small barges and a storage facility of 60,000 tonnes at Nigthevith. It targets the gasoil industry supplying to customers in international shipping, fishing and inland.

Scaldis International makes deliveries to Flushing, Terneuzen and Sluiskil, as well as Ghent in Belgium. The company has five barges and a small floating storage facility in Terneuzen. US-based Chemoil Corporation made its entrance in 1998, when it took a 50% share in Rotterdam fuel oil trader Allround Fuel Trading.

The Russian-owned Ecophoenix group also has a presence in Rotterdam.

Looking to the future, observers believe that the trend for bigger barges will continue, and they also argue that Rotterdam may need to expanding its terminalling facilities for bunkering. Certainly, there were a number of occasions in 2001 when prompt deliveries were hard to organize, due to terminal congestion.

### **Directory of Bunker Suppliers, Traders and Brokers**

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## **GIBRALTAR**

### **Gibraltar Straits**

The suppliers operating in the ports clustered around the Gibraltar Straits are the gatekeepers to the Mediterranean bunker market. Ships entering the Mediterranean from the west, or leaving for the Atlantic, have to pass through the Straits. This means that around 80,000 potential customers pass by the region's bunkering terminals every year. There are three main bunkering centres in the Straits: the Spanish port of Algeciras and the British-owned Gibraltar are to the west; and the Spanish enclave of Ceuta is on the north African coastline. Collectively, these three ports represent one of the world's most important 'bunkers-only' markets. Spain's Compania Espanola de Petroleos SA (CEPSA) is the region's leading player, with a strong presence in all three ports.

### **Algeciras refinery**

CEPSA's Refineria Gibraltar 205,000 barrels a day (b/d) refinery in Campo de Gibraltar is the lynchpin for its bunkering operations, providing fuel for all the markets. In Algeciras, CEPSA uses the bunker barges operated by Ciresa, a member of the Madrid-based Boluda group. With its refinery so near at hand, CEPSA obviously has an advantage over Repsol YPF, the former state-owned Spanish oil company which sources most of its bunker fuel for Algeciras from its refinery in Cartagena. Repsol YPF arranges barge deliveries through Compania Logistica de Hidrocarburos (CLH) - the national fuel distributor in which the main players in the Spanish oil markets all have a stake (see country profile on Spain).

### **Gibraltar**

While Algeciras accounts for significant bunkering volumes, much of CEPSA's business is done on a contract basis, with vessels calling at the Maersk terminal. Gibraltar has a more active spot market and competition between its leading players. It is also the port that has really made its mark as a bunkers-only hub. In the 1980s, the Gibraltar market bore no comparison to what it has become. Shell was the only serious supplier of fuel oil in the area. Using a tank farm leased from the UK Ministry of Defence (MoD) and operating two barges, the 4,000 metric tonne (mt) capacity Fiona and the 1,000 mt 111, the oil major would sell about 200,000 mt of bunker fuel a year - every year. It was a lucrative, but static business. However, in 1989 the locally-based Gibunco Group and CEPSA formed a new joint venture company, CEPSA (Gibraltar) Ltd, to liven up the market. With two serious players in the game, Gibraltar's bunkering business took off. Within two years, Shell had raised its annual volumes to 600,000 mt, and CEPSA (Gibraltar) Ltd was supplying about 400,000 mt.

The statistics for ship-calls to Gibraltar also told a tale of sustained success. In 1989, only 932 of the deep-sea merchant ships arriving in Gibraltar listed bunkering as their main purpose for calling. By 1996, more than 2,500 ships were calling at Gibraltar primarily to lift bunkers.

For the past six years, Shell and CEPSA (Gibraltar) Ltd have had a working relationship as well as a healthy competition. In 1995, Shell decided that it would source all its bunker fuel from CEPSA (Gibraltar) Ltd - and share the company's barging and supply infrastructure.

Shell's two barges, the Fiona and 111, were purchased by Maritime Gibraltar, the shipping company co-owned by Gibunco and the Boluda Group. These barges are still

in operation, under their new names Caleta and Calpe Cape. Maritime Gibraltar has brought in two more vessels, the Eileen and the Montarik.

In June 2001, Maritime Gibraltar announced that it had commissioned two new 5,000 mt capacity bunker tankers. The vessels will both be double-hulled - a costly investment but one which the company is convinced will prove justified in the long term.

The Gibunco Group also includes the London-based supplier and trader Peninsula Petroleum Ltd, which is an established player in Gibraltar and Algeciras and, more recently, Ceuta and the Canary Islands.

When Shell made its supply agreement with CEPSA (Gibraltar), it also vacated the MoD tank farm. After Shell's lease on the MoD tank farm came to an end, the installation was taken up by Texaco. The US oil major has since become a key figure in the Gibraltar bunker market. Fuel and Marine Marketing (FAMM) - which brought together most of the global bunkering operations of Texaco and Chevron some time before the two oil majors announced their fullscale merger last year - has not only seen its own bunker volumes increase but it has also been instrumental in bringing other new suppliers to the market. When Texaco first entered the market, it used the bunkering fleet of Greek-based supplier Vemaoil, which included the 35,000 mt floating storage unit Vemaoil XXXV as well as three barges, the 4,200 mt Vemaoil V, and the Vemaoil and Vemachem IV (each with 3,000 mt capacity). In 1998, Texaco forged a new partnership with another Greece-based supplier, Aegean Marine Petroleum SA / Aegean Oil SA, which, like Vemaoil, operates three bunker barges. In January 2001, however, the oil major (now operating as FAMM) switched back to Vemaoil, leaving Aegean Marine to continue operating as an independent, with a new floating storage unit.

Another international bunker player, Bominflot, set up an office and bunker supply operation in Gibraltar in January 2001. Bominflot (Gibraltar) Ltd charters fuel oil barges from the local operators. For gasoil deliveries, however, Bominflot uses the 300 mt capacity Teisaro - which it operates as part a joint venture with Spanish ship agency, transportation and warehousing group Maritima del Estrecho.

FAMM, Vemaoil and Aegean Marine all rely on imported cargoes to support their Gibraltar operations. Some argue that this gives CEPSA (Gibraltar) an advantage from a logistical point of view, because its source of supply is so much nearer to hand. While the influx of new suppliers has certainly helped to expand the market, there have also been concerns over the quality of the fuel now being sold. With its links to CEPSA's neighbouring refinery, CEPSA (Gibraltar) Ltd knows exactly where and how its product has been produced. There have been a number of reports of 'off-spec' bunker deliveries being made in Gibraltar this year and while there has been no official confirmation of which supplier, or suppliers, were involved, it does seem that none of the incidents involved fuel from the CEPSA plant.

**Ceuta:** Located on the African side of the Straits, Ceuta is not in the same league as Gibraltar as a bunkers-only centre. CEPSA is one of the main suppliers, alongside Bominflot and Petrolifera Ducar. Bominflot is an established player in Ceuta and its bunkering operations are handled by the company's Madrid office. Deliveries at Ceuta are made both ex-pipe and by barge. All the suppliers in Ceuta use the barge Harbour Service I, which is operated by Ciresa.

As a fellow member of the Boluda group, Ducar has corporate links to Ciresa. Ducar has a 80,000 cubic metre (m<sup>3</sup>) bunkering installation on the Levante berth, on the east

side of Ceuta, and a 36,000 m<sup>3</sup> facility on the west side of the port. The two facilities are linked by underwater pipeline, allowing product to be exchanged between them. Peninsula Petroleum SL, a subsidiary of Peninsula Petroleum (UK), started operating as physical supplier in Ceuta and the Canary Islands 18 months ago.

Looking to the future, the ports of the Gibraltar Straits will probably build on their reputation as one of the Mediterranean's most important bunkers-only centres.

### **Directory of Bunker Suppliers, Traders and Brokers**

Addax Bunkering Services

Supplier

[www.addax-oryx.com](http://www.addax-oryx.com)

A Division of Addax BV Geneva Branch

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CH-1211 Geneva 12

Switzerland

Tel: +41 22 702 9040

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Tlx: 412174 abs ch

e-mail: [abs@aog ltd.com](mailto:abs@aog ltd.com)

Bominflot SA

Supplier

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2nd Floor

28001 Madrid

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Tel: +34 91 426 4321

Fax: +34 91 431 0991

Tlx: 49212 bofl e

e-mail: [enquiries@bominflot.es](mailto:enquiries@bominflot.es)

Bominflot (Gibraltar) Ltd

Supplier

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CEPSA (Compania Espanola de Petroleos SA)

Supplier

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Vemaoil Company Limited  
Supplier  
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Ragged Staff Wharf  
Queensway Quay  
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**JAPAN**

Even though Japan's bunker prices are far from competitive, it has a relatively large bunker market with estimated annual sales of between four and five million metric tonnes. A high proportion of those sales, however, are made to Japanese-flagged vessels - many of whom will have company affiliations with the local suppliers. There is certainly no shortage of refining capacity in Japan, with more than 30 units spread across the country generating a total capacity of around five million barrels a day (b/d).

Indeed, many have long argued that Japan has too much refining capacity and in recent years the refiners have sought to rationalise their activities through mergers and refinery closures.

In October 1999, Cosmo Oil and Nippon Mitsubishi Oil Corporation (itself a product of an earlier merger between Nippon Oil and Mitsubishi) announced a broad tie-up of their operations. By joining forces on crude oil purchases and tanker allocations, as well as the use of their combined 12 refineries and 150 terminals and their distribution systems, the companies hope to save at least Y15 billion within three years.

Late last year, Nippon Mitsubishi said that it planned to reduce its crude distillation capacity by 9% to 1.23 million b/d by April 2001 while Cosmo decided to cut back by 8% to 595,000 b/d. Despite these cuts, the two companies still control about 40% of Japan's refining capacity.

In March this year, Japan Energy Corp and Showa Shell Sekiyu KK set up a new joint-venture, JS Initiative Ltd, to consolidate their refining operations. The refiners plan to reduce their combined capacity by 150,000 b/d. Shell announced that it would be cutting production at its Yokkaichi refinery to 210,000 b/d from 260,00 b/d by the end of March, while Japan Energy is closing down its 100,000 b/d refinery in Nagoya completely.

The latter change, in particular, may have a direct impact on the bunker market as Nagoya is a major bunkering port and the closure of the Japan Energy plant could open the way for a new trader or supplier.

With these two new alliances, Japan's refining industry now has four main power blocks: Nippon Mitsubishi and Cosmo (now the biggest); the Idemitsu Kosan Co. group, which controls six refineries; Japan Energy and Showa Shell Sekiyu; and oil major ExxonMobil, which of course is itself the product of a recent global merger. This consolidation process may help to make Japan's refining sector more economically stable; but it will also shrink the refining base and concentrate power in fewer hands - hardly a recipe for a more competitive bunker market.

Even before the current rationalisation in refining, bunker fuel in Japan had traditionally been expensive and subject to tight availability. As one of the world's industrial powerhouses, Japan's has a rapacious domestic demand for fuel oil, and bunkers have not been a top priority.

All grades of marine fuel are available in Japan and in-line blending is used in the major ports. The fuel has a reputation for good quality; as Japan still has a relatively low level of secondary refining units compared to, say, the United States.

The most noticeable added cost in bunker transactions is the delivery process. The majority of bunker deliveries are made by barge and are strictly controlled by the authorities. Barges are not allowed to make 'milk runs' (where a barge is loaded up with product for more than one delivery). Instead, each barge is loaded specifically to cater for pre-booked individual stems. Also, anti-pollution measures are strict and booms are mandatory during bunkering. Although this adds to the expense, and can cause delays and congestion during busy periods, short deliveries are practically

unheard of. The reliance on barges and the lack of fuel storage facilities in some ports can also make it important for buyers to place orders well in advance to avoid expensive delays. According to one of the key local traders, 24-hour short-notice deliveries are very difficult, if not impossible, to arrange in many ports.

Barge sizes vary, with 300mt to 500 mt capacity vessels common in Tokyo Bay and Mikawa Bay; 500 mt to 1,000 mt barges in Western Japan and barges up to 2,000 mt in use in North Coast ports. During the winter months, rough weather and more active product distribution can cause some restrictions in barge availability.

The key barge operators in Japan include Asahi Tanker Co. Ltd and Tsurumi Yuso Co. Ltd. Uyeno Transtec Co. Ltd concentrates its activities in Tokyo Bay and Mikawa Bay. Heiwa Kisen Kaisha Ltd. , Chitose Co. and Nippon Tanker Co. are also important in certain ports.

Tokyo Bay accounts for an estimated 40% of the country's total bunker market. In addition to the capital, the Bay area also comprises significant ports in Kawasaki, Chiba, Funabashi, Kisarazu and Yokohama. The Bay acts as the hub of the Japan's coastal shipping trade and provides access to the capital and to a population of around 30 million people. All the big refiners have plants or storage capacity in the Tokyo and the port has a large bunker barge fleet of more than 50 vessels, so availability is relatively good.

To the west, Kobe and Osaka Bay and the Inland Sea area also provide much of the demand for Japan's bunker industry. Again, most of the major refiners are represented in the area. Not all the ports on the Inland Sea have storage facilities and barges will often have to sail from Kobe, Mizushima, Tokuyama or Moji to supply bonded fuel elsewhere. The Moji Shimonoseki area has considerable bunkers-only business and accounts for around 10% of the total market. Between the Inland Sea and Tokyo Bay, the Ise Bay area, headed by the general cargo port of Nagoya, is also an important bunker area, commanding a 10% share of the market.

The mergers between refiners has reduce the number of suppliers to some extent, but there are still about 20 major players in the bunker market.

Most fuel supplied in Japan is sold either direct from one of the refiners or through one of the trading houses (sogo shosha). Some of the shosha have links with one or more of the refining units and/or the shipping lines which form the bulk of the customer base - up to 75% of bunker sales in Japan are to Japanese vessels.

Of the refiners, Idemitsu and Mitsubishi, through its bunkering arm MC Marine, are perhaps the biggest suppliers. While Idemitsu claims to sell about 1.1 million metric tonnes (mt) of bunker fuel a year, MC Marine reports annual sales of about 900,000 mt. The other refiners also sell significant volumes.

#### Trading houses

Marubeni Corporation is one of the biggest trading houses. The company reports that it currently sells about 500,000 metric tonnes (mt) a year. With no refineries of its own in Japan, Marubeni imports most of its product, with South Korea being one of the main providers. Marubeni has its own storage facility in Osaka, and also supplies in all the major ports.

Other significant trading houses include Sumitomo Corporation and Kanematsu Corporation , which supplied over 400,000 mt in Japan last year and is particularly strong in Western Japan and has storage both in Kyushu and Nagoya. Itochu exerts its presence in the bunker market through its bunkering subsidiary CI Bunker Co. Ltd while international trading house Mitsui operates through its wholly owned subsidiary

Mitsui Bussan Marine Service Co. Ltd . Hanwa Co. Ltd , which has sourcing contracts with Shell and ExxonMobil, concentrates on the main ports such as Tokyo with only a limited presence in western Japan.

Several companies occupy niche bunker markets. Sigma Foreign Services (Panama) SA for example, concentrates its efforts in Nagoya domestically and internationally for the Toyota fleet of car carriers, while bunker trader Hikawa Shoji Kaisha Ltd , is involved in organising supplies for the huge fleet of its parent company, Nippon Yusen Kaisha (NYK) group. The trading houses are also concerned with organising deliveries in ports outside Japan, both to Japanese and foreign owners. Sumitomo, for example, trades around 2.5 million tonnes of fuel a year worldwide to over 300 customers. It has its own barge supply operation in Singapore, and is particularly strong in the Asia-Pacific, European and African regions.

### **Directory of Bunker Suppliers, Traders and Brokers**

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Tlx: 252-2358

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Idemitsu Kosan Co. Ltd

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Kanematsu Oil Corporation (formerly KGI Ltd)  
Supplier and trader  
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2-4-1 Shiba Koen  
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Marubeni Marine Oil Co. Ltd  
Supplier and trader  
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MC Marine and Bunkering Inc. (formerly MC Marine Co. Ltd)  
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Fax: +81 3 5251 2583

e-mail: takao.atsumi@mcmarine.jp.mitsubishicorp.com

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Trader

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Panoco Trading Co. Ltd

Supplier, trader and broker

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8-8 Akasaka 4-Chome

Minato-Ku

Tokyo 107 C052

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Tel: +81 3 3405 5840

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Y. Katoh Showa Shell Sekiyu K.K.

Supplier

Daiba Frontier Building

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Sigma Foreign Service (Panama) SA

Trader

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2-chome, Aikawa, Tenpaku-ku, Nagoya City

Aichi-Pref

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e-mail: [info@sigma-shoji.co.jp](mailto:info@sigma-shoji.co.jp)

Sinanen Co. Ltd.

Supplier

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e-mail: [hakuyu@sinanen.co.jp](mailto:hakuyu@sinanen.co.jp)

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SK Group Japan Co. Ltd

Supplier and trader

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**KOREA**

Despite the problems of the late 1990s, South Korea's GNP has seen an average annual increase of about 8% over the past 15 years. In order to fuel this new activity, the country also expanded its refining base significantly in the early 1990s - with a consequent increase in the production of fuel oil suitable for the bunker market. South Korea currently has a total refining capacity of 2.2 million barrels a day (b/d). SK Corporation's Ulsan plant has a design capacity of 880,000 b/d, while the LG Caltex refinery in Yosu has been lifted to 650,000 b/d. S-oil (formerly SsangYong) can push 560,000 b/d through its Onsan refinery while Hyundai Oil's Daesan facility has capacity for 390,000 b/d. Finally Incheon Oil (which has merged with Hyundai) has a 225,000 b/d plant in Incheon.

Collectively these five refineries produce an estimated 30 million tonnes of fuel oil a year. Even though a fair proportion of this is exported to China, Singapore, Japan, there is still plenty of product left for the home bunker market.

As a result, Korea is now firmly established among the bunker industry's Big Four, behind Singapore, the Amsterdam-Rotterdam-Antwerp (ARA) region and Fujairah. In 15 years, South Korea has seen its bunker volumes grow five-fold, from 520,000 mt in 1984 to almost 11 million mt in 1999 (and players expect that the 2000 figures will show further growth).

According to a paper presented by S.I. Sim, the Director of the South Korean office of Bunkersfuels Corp, the combined refineries of Hyundai and Incheon together sold about 3.6 million mt of bunker fuel to the local marine market in 1999. SK Corp provided about three million mt of bunker fuel. LG Caltex was not far behind with 2.9 million mt, while S-Oil sold about 1.4 million mt.

SK Corp has traditionally been the main player, but Hyundai's acquisition of Incheon has pushed it to the top spot. Nevertheless, according to Sim of Bunkersfuels, SK Corp still retains a very big influence. While most of the refineries have term contracts with major South Korean shipping lines such as Hyundai Merchant Marine, Hanjin Shipping or Pan Ocean Shipping, SK Corp has relatively low volume of contract business - thereby allowing it to play a leading role in the spot market.

With such a strong local refining base, South Korean bunker prices have become very competitive. In general, the refiners tend to keep prices at about \$5 a tonne higher than the going rate in Singapore.

In addition to supplying the domestic market, most of these companies have bunker trading operations in other major markets in the world. While the refiners sell a substantial proportion of their bunker fuel directly and have large contract agreements, there is also a strong local community of traders, brokers and independent suppliers.

The oil majors ExxonMobil, BP, Shell and TotalFinaElf have established local office offices. International independent traders and suppliers with local offices include not only Bunkersfuels but also Trans-Tec Services, Tramp Oil & Marine and Bominflot. Other major local players include Sae-Han Fuel Co. Ltd, as well as Korea Ocean Energy, Yoo Jon International Co. Ltd and Nabuco (Navi-Bunkering Corp) .

Bunker fuel supplied in South Korea has a reputation for high quality, with much of the fuel oil production being derived from predominantly Mideast crudes. Cracking and coking facilities are catching up with the expanded production, which in the longer-term could lead to a decrease in both in quality and quantity. Currently, however, straight-run product is the norm. Indeed, Sim of Bunkersfuels reports that Korean marine fuel is '100% straight-run product', with almost no metal content and a

low CCR, relatively low density and good compatibility. This is also a good range of blended product from 30 up to 450 centistoke (cst) material. However, there is no DMB diesel oil because the local refineries offer only DMC grade and marine gasoil oil (mgo).

#### Bunker Deliveries

With the exception of the Liquefied Petroleum Gas (LPG) port of Pyongtaek in the North West and the LNG terminal at the Inchon refinery - where the nature of the cargo requires ex-pipe deliveries of fuel oil - all bunker deliveries in South Korea are made by barge. This is a legal requirement enabling the bunker market to conform to strict customs regulations. The refiners can draw upon a fairly large pool of independent barge operators, but they keep a tight control on their contracted companies. The largest bunker barge company in the country is Korea Marine Bunkering Co. Ltd (KMBC) . Established more than 30 years, KMBC has about a dozen barges and tankers. KMBC also acts as a broker and trader in its own right. Every bunker delivery to an ocean-going vessel has to be cleared by Customs for tax-exemption purposes - so barges have to be loaded individually for each delivery, and 'double loading' is not permitted. There is a minimum barging charge of \$300 for deliveries under 100 mt, which will have to be added on to the quoted MTD price per metric tonne. For sales over 100 mt, suppliers simply quote a straight delivered price.

#### Main Ports

Pusan is the most important bunker port in South Korea. It is the base for the country's largest shipping companies and accounts for at least 50% of South Korea's total bunker market. There is no refinery in Pusan so all product is shipped into the refiners' storage terminals in the port. All of Korea's refiners supply here, although the proximity of the SK and S-oil refineries in Ulsan does give these companies an advantage in terms of reduced transport costs. Ulsan, to the east of Pusan, supports not only the two refineries but also a petro-chemical plant.

Inchon, on the mouth of the river Han, is a key port in the northwest. Pohang, the largest port on the east coast, is the base for Korea's steel industry and handles over 1,500 vessels a year. Bunkers are delivered here by KMBC barges which source product predominantly from Yukong's Ulsan refinery.

#### **Directory of Bunker Suppliers, Traders and Brokers**

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## CHINA

The potential of China's shipping - and bunkering - industries is immense. Most notably, Shanghai has become the third largest port in the world, after Rotterdam and Singapore, and its handling capacity has remained above 100 million tonnes for 15 years in succession. Statistics for 2000 were expected to show the ports breaking through the 1,000 million tonne barrier last year - an increase of more than 30%. Shanghai has shown the most growth, but Da Lian, Qin Huangdao, Qing Dao, Lian Yungang, Guang Zhou, Zhan Jiang and Tian Jin are also important maritime centres. So the potential demand for bunker fuel is considerable - and China can also boast some imposing figures on the supply side. Its refining sector is the fourth largest in the world in terms of throughput, behind the USA, Japan and Russia. Some foreign companies already have a presence in this sector through joint-ventures with the state-refiner China Petroleum and Chemical Corp (Sinopec) and their influence is expected to widen after WTO. In September 2000, Sinopec announced its intention to offer about 18 billion shares in a \$3 billion initial public offering (IPO). Oil majors ExxonMobil, BP Amoco and Royal Dutch/Shell were all reported to be interested in taking a 'strategic investment'. The signs are that China's refining capacity will grow over the coming years - but in the short-term the country will probably have to rely on more imports to fuel the growth of its economy.

From the perspective of bunkering, the refineries' output of fuel oil has clearly failed to keep pace with demand. The number of foreign trading vessels calling at China's ports showed steady growth in 1997 and 1998, but then jumped off the graph in 1999 with a spurt of more than 50%. In 2000, it was confidently expected that the 40,000 vessel mark would be surpassed.

But in terms of bunker sales, there was a modest increase in 1997 (2.98 million mt compared to 2.67 million mt), a drop 1998 (to 2.69 million mt), and then an even big drop in 1999 (to 2.3 million mt).

'Due to a shortage of domestic oil resources, duty-free oil products mainly depend on importing from the international market. It is hard to reduce costs including freight and port charges. Thus, our bunkering price is higher than other countries and regions,' said a local player, adding: 'The available oil products in Chinese ports are only MGO and 180 cst in many years, which can not meet the shipowner's demand.'

All bunker fuel in China is currently supplied by barge - and Chimbusco controls a fleet of more than 100 bunkering vessels, with a combined deadweight tonnage of 115,000. Its national grid of oil tank storage farms has a total capacity of 800,000 cubic metres. Chimbusco also has more than 20 branch offices in all the major sea ports and along the Yangzi river. Its international offices in Singapore, Hong Kong, South Korea, Japan, the Netherlands and the United States not only take orders for deliveries in China's ports but fix deals for Chinese ships operating overseas. Effectively, Chimbusco is Chinese bunkering. There are some small one-port suppliers independent of the Chimbusco network, but these deal with domestic customers and work only in Chinese currency.

In terms of quality and quantity, Chimbusco has a good reputation. Its own specifications are similar to International Standards Organisation (ISO) specs and there are few complaints of short deliveries. Chimbusco supplies both 120 centistoke (cst) and 180 cst heavy fuel. The bulk of the fuel oil supplied in the marine market is

generally imported from either South Korea or Singapore, and, sometimes, from Russia. For marine distillates, the most common product is light diesel oil (ldo). The one port which stands apart from the rest of the Chinese bunker market is, of course, Hong Kong. Even today, the former British colony has its own distinctive character and market conditions.

**Directory of Bunker Suppliers, Traders and Brokers**

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## ***Abbreviations***

mt or MT = metric tonnes

mmt = million metric tonnes

MR = Medium range tanker, typically between 25.000 and 50.000 dwt

Dwt = deadweight tonnes, measurement of vessels loading capacity

USD or usd = united states dollars

Barrel = measurement used for mainly oil. One barrel is approximately 159 litres.