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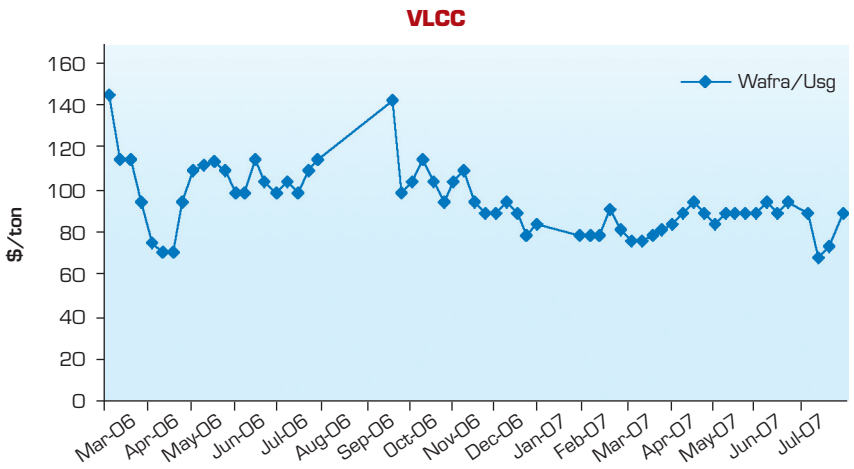
Marine transport of energy sources

It is common knowledge that most of the world's energy needs are satisfied by oil, coal and natural gas, and that the production of these fuels is concentrated in a very few countries located in restricted geographic areas. It is just this asymmetry between the areas of production and the areas of consumption that has stimulated the imposing growth of international commerce, and in particular of marine transport.
The cost of transporting energy sources by sea varies depending on numerous factors. The trend of leasing fees over time shows that this market is very unstable and highly variable. Figures 1, 2 and 3 show the market trend for leasing three types of tanker (VLCC, Aframax and Suezmax) and for some monitored routes (West Africa/US Gulf "Wafra/Usg"; West Africa/Mediterranean Sea "Wafra/Med"; Black Sea/Mediterranean Sea "Blsea/Med"; North Sea/UK Continent "Nsea/UKC").
As is obvious from the graphs, the leasing fees, listed in dollars per ton and verified weekly, show peaks that testify to the high variability of this market.
Therefore, if the energy trade involves exchanges all over the planet, and energy, in its various forms, comes to our continent from the four corners of the earth, being able to interpret and have access to the latest data on the leasing and bunkering rates is of extreme interest to both scholars who observe the market and operators who must negotiate supply and sales contracts of primary energy commodities, like coal and oil, on a daily basis.
This is the reason why the Centro Studi SAFE furnishes this data every week to the readers of QE - Quotidiano Energia – (www.quotidianoenergia.it) in the "Leasing & Bunkering" feature, which reports on the leasing fees for the leading seagoing transport routes, along with the bunkering rates in the main Mediterranean ports. The figures published result from an accurate survey of the market, conducted by SAFE's experts, with the technical support of the biggest operators on the European continent. In addition, a monthly report is compiled on Time Charter trends.

Figure 1. **Leasing trends for oil transport on VLCC tankers: Mar-06/July-07**



Returning to the trend of leasing marine transport, we can see that while they definitely depend on the volume of international trade, they are also strongly affected by the economic, monetary, political and social situations that arise on the international level. Moreover, each single lease refers to pre-established schedules and routes, and is negotiated in view of profiting on the goods transported at the prices and conditions set at that moment.
At the same time, the hold capacity (or load capacity) offered on the international market is based on the previous medium and long term leasing rates, but is also subject to the decisions of individual ship owners of all nationalities, in view of the economic, monetary, political and social conditions in their native countries and abroad.
Single leases are also subject to factors such as the route, the distance, the weight and volume of the goods transported, and so on.
An example of the strong dependency of the marine transport market, and consequently of leases, on political and military events, can be seen in the appearance of the "oceangoing giants" (beginning in the 1960s), huge ships with increased hold capacities that substantially boosted the overall fleet capacity, in response to the events that resulted in the repeated closing and re-opening of the Suez Canal and the turbulence in an unstable Middle East.
The development of marine transport has had important conse-

quences for ports as well. In particular, structural modifications have been made to accommodate progressively larger tankers, by dredging the bottoms or by building offshore terminals suitable for these giant ships. The increase in traffic has also required the construction of industries for transforming and using the cargo in the proximity of the terminals.
In addition, the Italian oil tanker fleet has been deeply modified in recent years in order to comply with the IMO and EU directives, the most important of which is indisputably the MARPOL 73/78, concerning the decommissioning of vessels lacking a double hull or equivalent technology. The modernization of the fleet was supported by funds allotted by the government for the construction of new vessels and the scrapping of obsolete ones, according to law 51/2001, as well as by tax breaks extended to companies that make new investments and hire new personnel, thanks to the Tremonti bis law.
In general, marine transport is an internationalized business and reacts, more or less strongly, to events both near and far that threaten its stability. These events may be of various types: a natural disaster that affects the agriculture of a geographic area, a great economic crisis that involves leading producers and/or trading partners at the global level, important political crises that affect the principal producing and/or consumer countries, conflict in general, especially when large areas of ocean are not secure or key navigation points are inaccessible, and so on. It follows that the sector operates in a complex context, in which it is always difficult to predict market trends in the medium or long term.

Figure 2. **Leasing trends for oil transport on Aframax tankers: Mar-06/July-07**

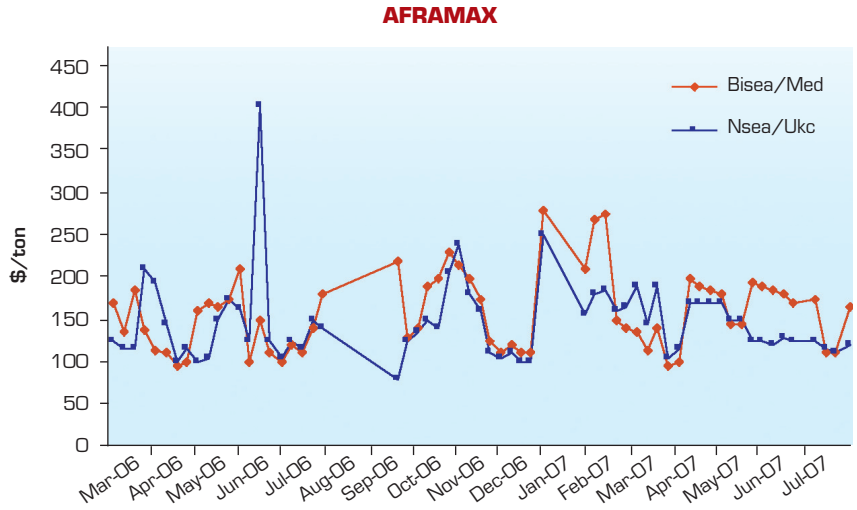
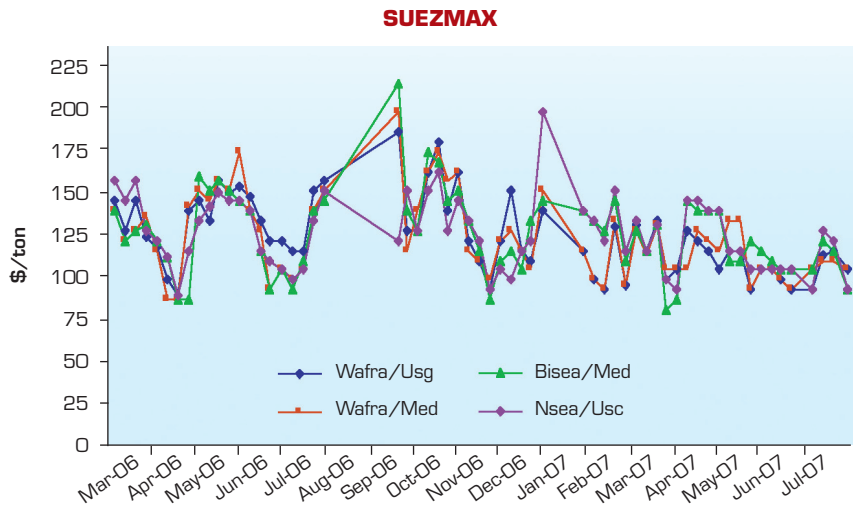


Figure 3. **Leasing trends for oil transport on Suezmax tankers: Mar-06/July-07**



Future challenges

The Panama Canal and its enlargement

The most traveled maritime routes are strongly conditioned by "strategic straits", true bottlenecks whose dimensions have an important influence on freedom of navigation. One of the principal ones is the Panama Canal.
The Panama Canal is an artificial passage leading from the Caribbean Sea to the Pacific Ocean, cutting across the North American continent at its narrowest point, the isthmus of Panama. Presently, ninety-two years after its inauguration, 5% of the world's commercial naval traffic passes through its locks. Every day, forty ships of up to 75,000 t traverse it, for a total of 14,000 per year, carrying 275 million tons of cargo.
Its dimensions do not, however, permit the passage of supertankers and mega-cargo freighters, the new oceangoing giants that represent the current answer to the constant search for the optimal cost-efficiency ratio, the ultimate product of the development of marine transport.
Thus, after almost a century of intense and profitable activity, the Canal would appear to face an inevitable decline.
Recently, though, with a referendum conducted by the Autoridad del Canal de Panamà, the population of the republic of Panama approved a plan for widening the canal. Thus,

Figure 4. **Leasing trends for transport of coal on Capesize freighters: Mar-06/July-07**

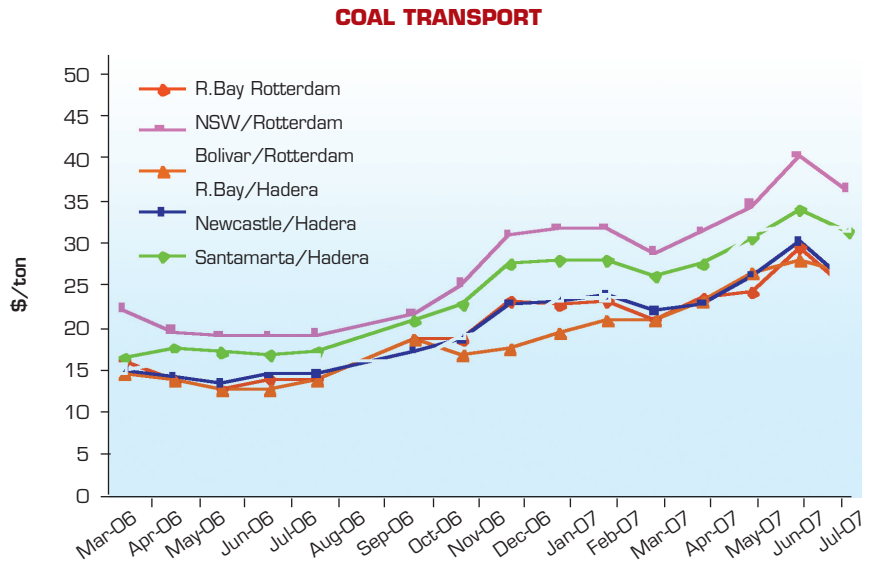
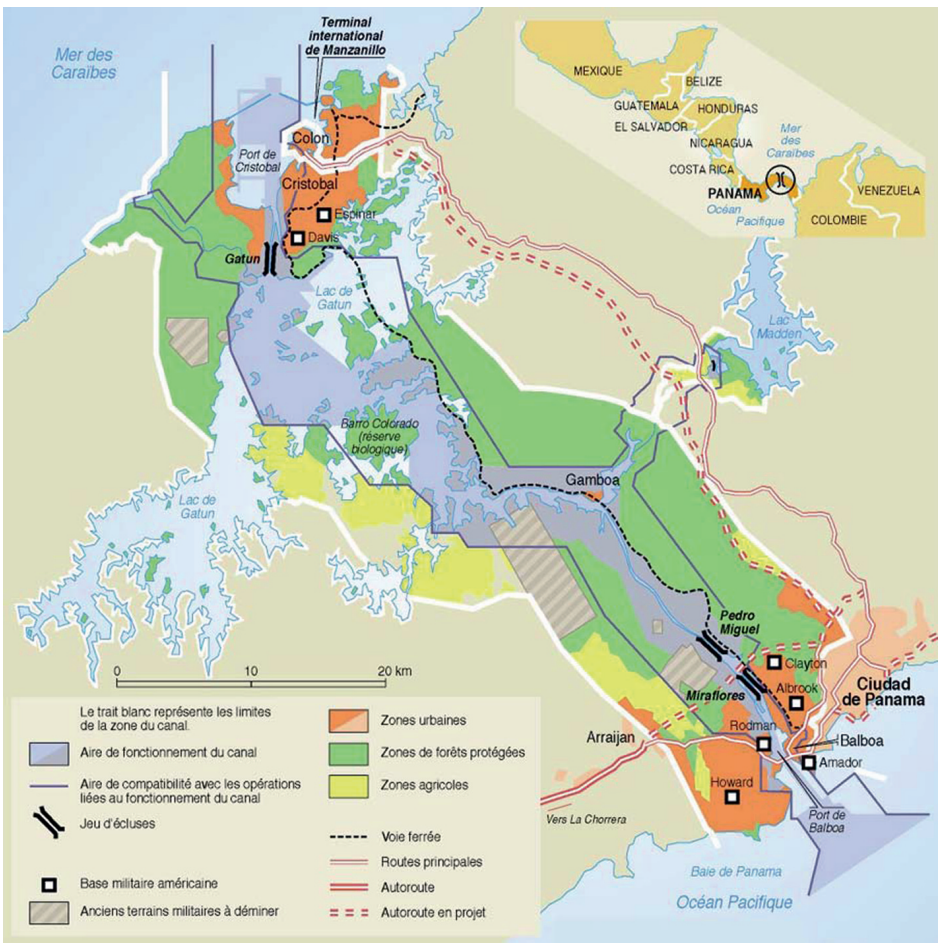


Figure 5



instead of navigating around the tip of South America, or passing through the Indian Ocean, the Suez Canal and the Mediterranean before entering the Atlantic, vessels (of a maximum length of 399 m and a maximum width of 49 m) coming from the Far East and headed for the East coast of the United States or Europe will be able to pass through the canal (fig. 5). The project, which will be finished by 2014, not only satisfies the requirements of modern international maritime transport by making the Canal more competitive, but will also serve as a driver for the country's development, transforming it into a global maritime hub and altering the geopolitical map of seagoing transport.

Marine transport and the environment

In recent years there have been numerous legislative initiatives intended to improve the quality of fuels used on land, but nothing has been done to reduce the impact of fuels used to power seagoing vessels. This despite the fact that the pollution caused by international maritime traffic is anything but negligible. The greenhouse gas emissions produced by the "oceangoing giants" are calculated at between 600 and 700 thousand tons of CO2 (5% of the world's total), in addition to the residue of crude left in ocean waters. These emissions are not regulated by the Kyoto protocol (in the case of the former) and not covered by national legislation, because the vessels move in international waters and have a high pollution potential, being the product of combustion of heavy oil (in the case of the latter).

An initial attempt was made with the introduction, in May 2005, of Appendix VI of MARPOL (International convention for protection from maritime pollution), the ratification of directive 2005/33 and the designation of SECA (Sulfur Emission Control Area) zones.

These legislative initiatives are aimed at limiting atmospheric pollution caused by marine traffic, in terms of sulfur oxide emissions and carbon

GLOSSARY

Considering the cargo transported, and thus vessels specifically designed for the different types of cargo, the market can be split into two large segments:

- **Bulk transport**
- **Specialized transport**

Bulk transport refers to single loads of the same type of cargo, of substantial dimensions, usually able to completely fill, or nearly completely, the entire hold capacity of the vessel. There are two types:

- **Solid bulk** (metal-bearing ores, coal, grain, etc...) transported on bulk carriers - Dry bulk.
- **Liquid bulk** (mostly crude mineral oils or refinery products) transported on tankers equipped with multiple holds and tubes permitting rapid connections to the specialized petroleum product terminals.

Dwt (dead weight tonnage)

Measure of the capacity of the vessel's hold (expressed in metric tons), this is the variable that ships are classified by.

Handysize e Handymax

Name used to indicate small sized bulk transport vessels, up up to 35,000 dwt and up to 50,000 dwt, respectively. Handymax vessels operate in areas characterized by limited trading and geographically distant, transporting mainly grain and minor bulk loads like steel, lumber and fertilizer. They are designed to moor in ports that present limitations in terms of waterfront space or maximum draft, or lacking the infrastructures used for loading and unloading cargo. This category name is also used for small oil tankers.

Panamax

Vessels of the maximum size that can pass through the Panama Canal (274.3 m in length, 32.3 m in width and with a draft of 11.28 m). Used to identify both tankers, bulk freighters and specialized vessels, the Panamax category includes ships from 50,000 to 80,000 dwt, with an average capacity of 65,000 dwt.

Capesize

Definition used for ships that cannot pass through the Suez and Panama Canals, not necessarily because of their exceeding the maximum tonnage, but because of their dimensions. A Capesize ship is thus forced to "round" both Cape Horn (South America) and the Cape of Good Hope (South Africa).

Aframax

tankers of standard dimensions, ranging between 75,000 and 120,000 dwt.

Suezmax

this standard has been modified over the years, to take advantage of the widening of the Suez Canal. In 1967, the Suez Canal could be navigated by ships with a capacity of not more than 80,000 dwt. When the canal was re-opened, in 1975, the maximum gross load increased to 180,000 dwt. In 2010, the work to deepen the canal should be completed, permitting the passage of ships of up to 360,000 dwt.

VLCC

Very Large Crude Carrier, fino a 250000 dwt.

ULCC

Ultra Large Crude Carrier, a 500000 dwt.

dioxide, and cover only passenger ships plying regular navigation routes in EU waters.

An initial intervention, which will only slightly improve overall emissions from seagoing vessels, but will certainly have repercussions on the entire international maritime transport system, above all in terms of cost, seeing that it is up to the ship owners to use bunkering facilities with low environmental impact.

LNG AND THE NEW TECHNOLOGIES FOR ITS TRANSPORT

In recent years, in order to meet the growing demand for natural gas and the necessity of diversifying supply, more emphasis has been put on using methane transported in its liquid form, or LNG. The gas is liquefied and transported by special methane carrying tankers to re-gasifying plants near the main consumption and distribution centers. In response to the increased demand for transport of LNG, the number of methane tankers under construction and in circulation has risen sharply, and the technology governing the marine transport of LNG has improved dramatically. In fact, vessels have been built with new types of holds and tanks, guaranteeing greater stability and safety in navigation at the same time as they increase cargo capacity. The new tanks have dimensions designed to ensure uniform pressure, substantially reducing losses from evaporation. The hull is increasingly shielded from the cargo through the construction of tanks separated from the hull. Thus, along with methane tankers designed with double membrane tanks, we now have vessels with prismatic membrane tanks and with spherical tanks.

Obviously, the introduction of these new technologies, with different costs and construction times, affects the entire LNG market. In particular, the charter rate (daily ship rental fee), a fundamental variable in the cost of transporting LNG, is strongly affected by the introduction of these new construction technologies. ■