

MARITIME TRANSPORT OF GOODS IN THE MEDITERRANEAN:
OUTLOOK 2025

Philippe Vallouis





MARITIME TRANSPORT OF GOODS IN THE MEDITERRANEAN:
OUTLOOK 2025

Cover design: Plan Bleu

Layout: Plan Bleu

Legal Notice

The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of Plan Bleu concerning the legal status of any State, Territory, city or area, or of its authorities, or concerning the delimitations of their frontiers or boundaries.

Copyright

This publication may be reproduced in whole or in part in any form for educational or non-profit purposes without special permission from the copyright holder, provided acknowledgement of the source is made. Plan Bleu would appreciate receiving a copy of any publication that uses his publication as a source. This publication cannot be used for resale or for any other commercial purpose whatsoever without permission in writing for Plan Bleu.

For bibliographic purposes this volume may be cited as:

Plan Bleu : Maritime Transport of Goods in the Mediterranean. Plan Bleu, Valbonne, 2010 (Blue Plan Papers 7).

ISBN : 978-2-912081-27-7

Also available in French under the title:

Les transports maritimes de marchandises en Méditerranée : perspectives 2025

Printed on NEXPRESS SE 3600 digital printing press by IPB Office Solutions
Paper CyclusPrint 130 andt 250

© 2010 Plan Bleu



Plan Bleu
UNEP/MAP Regional Activity Centre
15, rue Beethoven, Sophia Antipolis
06560 Valbonne
France
www.planbleu.org

Contents

Acknowledgements	5
Synopsis	7
Situation of maritime transport in the Mediterranean basin	7
Plan Bleu Outlook 2025	7
Lessons learnt	8
Preamble	9
Diagnostic review	11
Exchanges	11
Predominance of maritime transport	13
Other transport modes	19
Main conclusions	20
Outlook of maritime transport of goods	21
Scenario S1	24
Scenario S2	27
Scenario S3	30
Synthesis of the results of the non-bulk transport scenarios and port supply prospects	33
Lessons learnt	37
Upstream of the transport sector	37
At the level of the transport sector	37
References	39
Annexes	40
Annexe1: Statistical annex	41
Annex 2: Socio-economic hypotheses	45
Annex 3: Non-bulk transport simulation method + Estimate of exchanges matrices in tonnage	47
Annex 4: The Regional Transport Action Plan for the Mediterranean (RTAP) and other regional undertakings	50
Annex 5: The Exclusive Economic Zones : A frame for a transit fee in the Mediterranean?	56
Abbreviations and Definitions	58
Table of illustrations	59

Acknowledgements

Report realised under the direction of Henri-Luc Thibault, director of Plan Bleu and coordinated by Pierre Icard, head of the thematic unit of Plan Bleu.

Author

Philippe Vallouis, with the contribution of NESTEAR for the modelling part (Christian Reynaud, Martine Poincelet).

Supervisory committee

Arthur Germond (AFD), Pierre Icard (Plan Bleu), Mihoub Mezouaghi (AFD), Brigitte Ulmann (Plan Bleu).

Experts who contributed and provided valuable comments

El Habib El Andaloussi, Arthur Germond, Jean-Pierre Giraud, Pierre Icard, Mihoub Mezouaghi, Cécile Roddier Quéfélec.

Experts who participated in the workshop on scenarios definition

Algeria : Yayia Nazef, ancien Secrétaire Général Ministère des Transports

Lebanon: Rami Semaan, consultant SITRAM

Tunisia : Abdefettah Ammous, Université de Sfax

Hassen Abid, Directeur Général du bureau d'études « ETIC », Riadh HAMZAH doctorant

Turkey : Yücel Candemir et Haluk Gercek, chercheurs et consultants, Université technique d'Istanbul

Morocco : Michel Titecat, expert transport, directeur de la stratégie de TMSA, (Agence Spéciale Tanger Méditerranée)

Greece : Dimitrios Tsamboulas, Professeur, Technical University of Athens

AFD : Nicolas Serrie, Arthur Germond

Nestear : Christian Reynaud, Martine Poincelet, Zheng Chen

Plan Bleu : Pierre Icard, Gerard Olivero, Philippe Vallouis

Production team

Statistics annex: Jean-Pierre Giraud.

Cartography: Nestear, Jean-Pierre Giraud et Benoit Briquetti.

Bibliography and documentation: Hélène Rousseaux.

Editing and page layout: Isabelle Jöhr.

Proofreading: Sandra Dulbecco, Isabelle Jöhr

Translation ensured by: Mohamed Mansouri

L'Agence Française de Développement supported the realisation of this report.



The analysis and conclusions of this report do not necessarily reflect the opinion of the Agence Française de Développement.

Synopsis

Situation of maritime transport in the Mediterranean basin

The Mediterranean offers a route for exchanges of manufactured products between Europe and Asia, as well as for the supply of Europe with energy products from the Gulf countries. Around 24% of the goods tonnage consists of energy products, with non-bulk goods accounting for 36% of the total.

The maritime transport capacity deployed in the Mediterranean rose by over 50% between 1997 and 2006. Annual oil transport growth stood at 6%; the growth rate ranges between 7 and 8% for Liquefied Natural Gas (LNG) transport, 10% for container traffic, and 5% for Ro-Ro. The high growth rate of container traffic is due to the development of trade with Asia.

In order to meet the growth of long-distance exchanges, ship-size has increased significantly, thus leading the countries to equip themselves with commensurate port infrastructures. Container ship traffic increased by 71% and average ship-size increased by 55% between 1997 and 2006.

“Non-bulk” traffic originating in Asia and bound for European countries is preferentially unloaded in the ports of the northern range¹. The same applies to the exchanges of the Southern and Eastern Mediterranean Countries (SEMCs) with Europe, for which Hamburg is the chief exchange and transshipment port. The performance of Mediterranean ports remains too insufficient to compete with northern European ports. Few Mediterranean ports are capable of accommodating the larger container ships, of which Port Saïd, Tanger Med, Algeiras, Marsaxlokk (Malta) and Gioia Tauro (Italy). They are dedicated to transshipment activities.

Inter-Mediterranean flows, all goods considered, hardly account for a quarter of the traffic volume. The level of exchanges is low, and the flows operate along a North-South route, with a dominant South-to-North direction, connected with oil and gas exports.

This asymmetry between North and South is also true for foreign trade: the EU accounts, according to the countries, for 20 to 70% of the SEMCs trade,

¹ Ports located in the North of Europe from Le Havre to Hambourg

while the SEMCs account for a modest 8 % of the EU foreign trade. Trade with the EU is conducted mainly in maritime mode (75%), as well as via fixed connections (20 %) consisting of gas pipelines. The remaining 5 % are conducted via land and air routes.

The Mediterranean thus emerges as being characterised by an intense transit transport and a low integration level, particularly with regard to South-South exchanges.

Plan Bleu Outlook 2025

The outlook relates to non-bulk transport of goods which has reported the highest growth over the past ten years. This prospective study takes into account economic growth, price of energy and CO₂ and the various transport policies integrating infrastructures, use of equipments, commercialisation and regulation.

The prospective exercise involves the analysis of three scenarios and their comparison with the baseline situation of 2005:

- Scenario (S1) corresponds to a low economic growth situation (1.5% in the North and 3% in the South) with an oil barrel at 50\$ and a transport policy limited to a few public investments in roads and a private sector-driven port modernisation. The road transport sector remains poorly organised, little concentrated and marked by intense competition.
- Scenario (S2) corresponds to a trend situation of the pre-2008/2009 crisis, with a more steady economic growth (1.8% in the North and 4 % in the South) and a oil barrel at 100\$ (value of 2005). Transport-related measures help achieve economies of scale thanks to a massification of the handling of goods. Investments relate to improvement of road connections with ports and logistic platforms. The logistic chain takes on a professional character with the coming on board of leading international players.
- Scenario (S3) rests on a more dynamic growth (2.1% in the North and 5 % in the South) granting the actors room for engaging significant port investments. Public players may take proactive actions, in terms of development of railway transport (connection to ports, logistic platform, institutional reform). Leading groups hold control over logistic chains. Several “motorways of the sea” begin to emerge. The oil barrel stands at 150\$ and the price of a ton of CO₂ is 100€.

In the three scenarios considered, Asia remains by far the major trade partner and, hence, the main source of

non-bulk transport. Even in the case of scenario three (S3)—which rests on the hypothesis of significant port investments—*intra-Mediterranean* exchanges remain quite low, as compared with exchanges with Asia, and do not alter the status of the Mediterranean as “transit sea”.

This scenario (S3) reveals, however, that a good connection of the ports with the railway network helps multiply railway traffic by 5.5 and road traffic by 2.1. This capture of road traffic—made possible by proactive policies, and prompted by high oil and CO₂ prices—mitigates the saturation of port cities and facilitates the transit of goods.

On the other hand, maritime transport is hardly impacted by fuel or carbon prices since it is possible to keep control over operation costs thanks to ship size, ship speed reduction and the professionalisation of the logistic chains that facilitate access to the Asian production system.

The increase in trade and, especially, the increase in the size of ships, lead the governments to envision scale-ups and construction of deep water ports. The identified projects before the 2008/2009 crisis amount to an increase by a factor of 2.2 over ten years in matter of container handling supply. The trend scenario (S2)—founded on comparable underlying hypotheses—predicts the same increase by a factor of 2.2, but over a twenty-year time period. The supply dynamics seems, therefore, to be twice as rapid as that of demand. Besides, the size of the infrastructures envisioned impedes—by reinforcing gigantism—*intra-Mediterranean* connections and excludes local operators from port management.

Therefore, there is a great risk to witness a port over-capacity on regional level. What is more, this over-capacity risk may give rise to a risk of transport dumping. By causing an even stronger cut-down in infrastructures and equipments user fees, competition will make their amortisation even more difficult and the internalisation of transport external costs rather uncertain.

Lessons learnt

The prospective study conducted by Plan Bleu reveals that pursuing the current transport policies, be it in matter of infrastructures or of interconnections, would establish the Mediterranean in its “transit sea” status. Three major conclusions may be derived from this prospective exercise:

- The marked predominance of maritime traffic with Asia will not experience any significant change, unless the policy of large-scale port infrastructures comes to be revised;
- Transport-related measures promoting the railway mode will help ease the congestion of the road network in the event of an economic recovery, sustained in this by the high costs of energy and CO₂;
- The rise in energy and CO₂ costs would check the increase in energy consumption without affecting, however, maritime traffic.

The conditions of a contribution by transport to Mediterranean integration are to be sought in strengthening proximity exchanges in order to facilitate the complementarity of the Mediterranean productive system, as well as in revising the trend towards gigantism. In matter of public policy in the transport sector, the course of action would be:

- to sustain the development of North-South relations in the form of regular and rapid connections. A densification of the network of ports should allow for a better distribution of *intra-Mediterranean* flows, made more competitive and safer than those with Asia;
- to seek efficiency of Mediterranean ports, rather than pursue gigantism. The development of logistic platforms connected to the railway would reduce space consumption and road congestion;
- to choose one or two entry ports in southern Europe among the existing ports. The Mediterranean does not really offer a southern entry to the densely populated and economic hardland represented by the “blue banana”;
- to consolidate land transport environmental standards at national level, in order to reduce local pollution and energy consumption. An improvement of ship consumption would be possible, providing that fuel subsidies may be removed and a carbon tax introduced.
- to devise financial tools likely to enhance services (waste ...) and controls. A “transit fee” could be applied within the framework of Exclusive Economy Zones currently emerging in certain countries

All the measures outlined above may fit within the framework of a Mediterranean transport plan. Current discussion on the integrated maritime policy in the Mediterranean, by the European Commission, could build on such recommendations. The Union for the Mediterranean (UpM) could serve as a driver of the support mechanisms necessary for their implementation.

Preamble

The Mediterranean is a traditional exchange hub not only between riparian countries, but also between the geopolitical spaces in which they belong: mainly Europe, Maghreb and Mashreq, and the rest of the world. These exchanges are steadily on the increase and, under the combine effect of demographic pressure, economic growth and opening up of markets, they have intensified over recent years, driven in particular by an increase in the flows of goods between Europe and Asia. This growth is not free from risks for the environment, and it entails investment strategies—of a port character, in particular—whose scope must be properly gauged.

In this context marked by the emergence of initiatives aimed at boosting Mediterranean integration, of which the Union for the Mediterranean (UfM), there clearly arises the issue of the role of transport—notably, the maritime mode—not only as a regional integration factor, but also as a sustainable development driver. The riparian countries are already aware of it, since in the Mediterranean Strategy for Sustainable Development (MSSD), adopted in 2005, they state in the chapter dedicated to transport that “the intensification of exchanges over increasingly longer distances is not sustainable in the long term.”

The purpose of this study is to contribute in the debate over this transport issue, by offering a diagnostic review of the situation and proposing—based on several scenarios—a prospective vision for the time frame 2025 of international transport flows in the Mediterranean.

The reflection is focused mainly on maritime flows of goods which constitute the overriding challenge in matter of international transport and have a strong impact on the environment in the Mediterranean. A first part, dedicated to a “diagnostic review”, seeks to highlight the nature and scope of goods flows in the Mediterranean and serves as a foundation for a second part, specifically dedicated to non-bulk goods transport which is now at the heart of the concerns of public authorities and professionals alike. Three scenarios are considered whose hypotheses have been identified in consultation with Mediterranean experts during a regional workshop. A third part is dedicated to the conclusions derived from the said scenarios.



Diagnostic review

Being a transit route of world trade—passing through the Suez Canal, Gibraltar and the Bosphorus—the Mediterranean is one of the regions where maritime traffic is the most intense. It is especially characterised by its being not only a load/ unload zone, but also by its being a trans-shipment and transit area. It receives all types of goods, though with a predominance of energy and non-bulk products which account, respectively, for 24% and 36% of the volumes transported.

The diverse nature of the goods implies a variety of types of packaging and maritime transport whose evolutions must be characterised in order to appreciate and, above all, enlighten the investment strategies ensuing therefrom.

Thus, the transport of energy products accounts for a significant portion of the traffic. Its evolution is driven by demand and governed by well established energy sources. Container traffic, however, depends on production sites which may evolve more rapidly, as well as on the port capacity of recipient countries. These aspects are addressed in more detail further down.

Exchanges

In 2008, the E.U. exchanged around €1000 billion worth with Asia, of which 613 billion for imports from, and 368 billion for exports to, Asia. Asia accounted for 40% of extra-European imports and for 30% of exports, which earned it, henceforth, the rank of chief EU trade partner in terms of value.

It was also in 2008 that Asia outranked the USA with regard to the sale of EU production.

EU exchanges with Mediterranean countries (SEMCs and Balkans), though on the increase, accounted in 2008 for a mere 11% of its imports and 13% of its exports, that is, €340 billion.

SEMCs imports originate, for the major part, in Europe, though their relative share is losing to Asia which is steadily on the increase. Inter-SEMCs imports remain quite low and have hardly increased since 2003.

SEMCs-related trends are derived from the COMTRADE base and are complete only until 2006.

Figure 1 EU imports/exports, 1999-2008 (billions €)

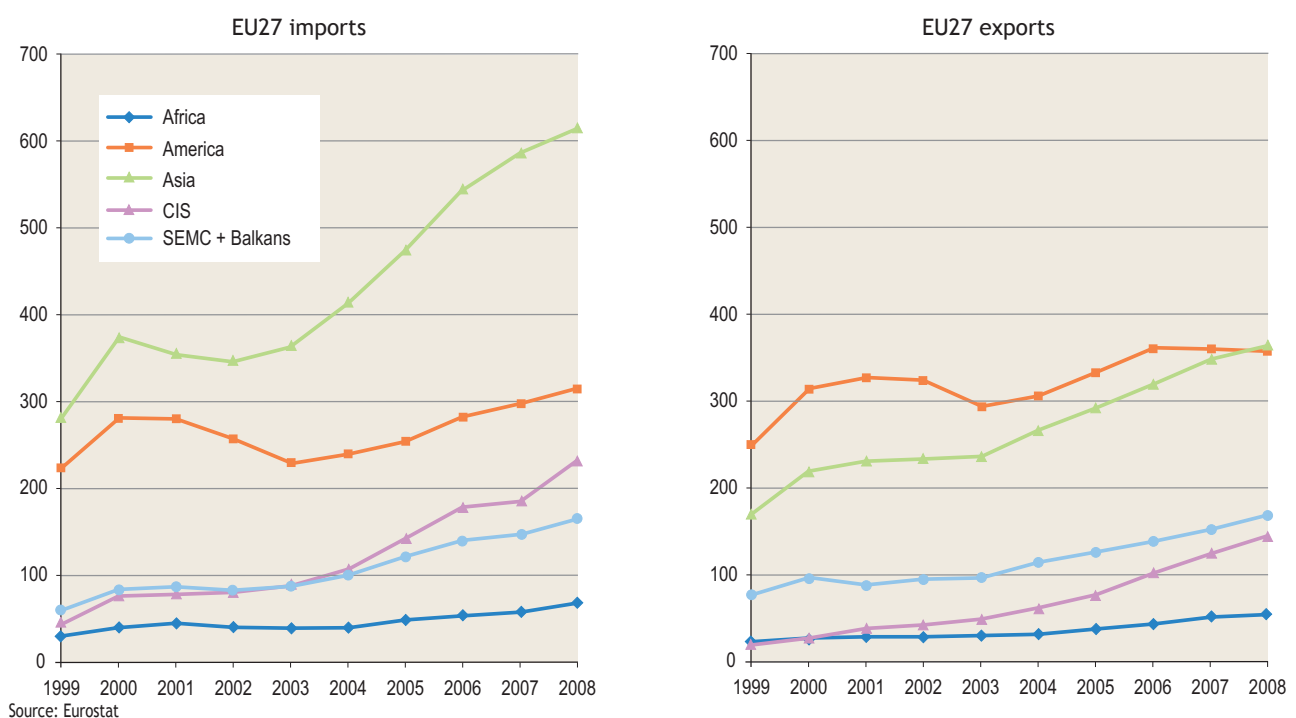


Figure 2 SEMCs imports / exports, 2003-2006 (billions \$)



SEMCs exports to Europe are balanced, in value, to imports (Figure 2).

The USA represents the second exportation zone for the SEMCs, exceeding imports in value, this being partly due to energy products.

Exports to Asia rank in third position and are much lower than imports. As is the case in their exchanges with Europe, a notable exchanges misbalance exists with Asia, which translates into asymmetric ship loads, the ships being more loaded in an Asia-to-Mediterranean direction.

Figure 3 Share of EU-SEMCs Imports / Exports, 2000-2008 (millions €)

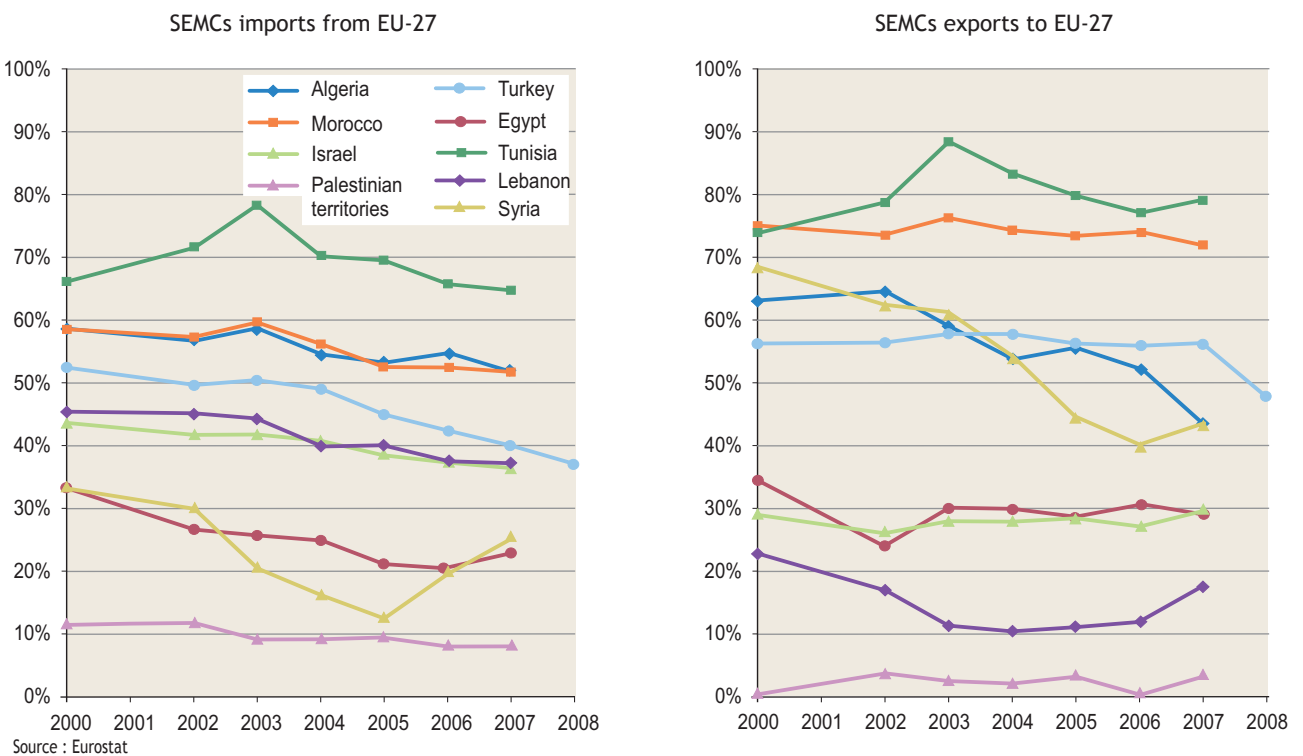
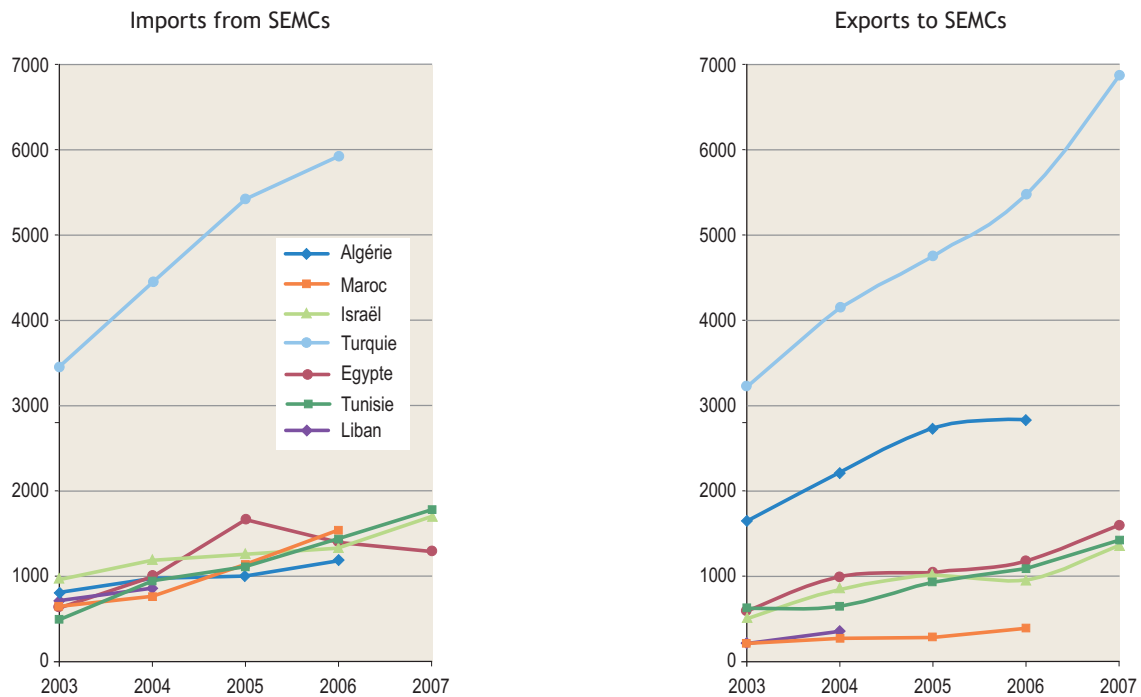


Figure 4 SEMCs-SEMCs imports / exports, 2003-2007 (millions \$)



Source: Comtrade

The analysis of the evolution of SEMCs-EU exchanges reveals that the share of SEMCs imports shrank by at least 5% between 2000 and 2007. This decrease is even more marked for Syria and Turkey. (Figure 3)

The share of exports to E.U remains hardly stable, reporting a notable decrease for Algeria, Syria and Turkey.

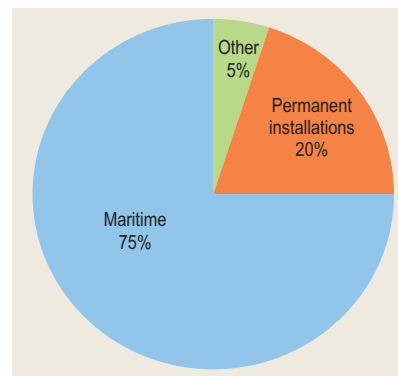
Inter-SEMCs exchanges, according to available data, reveal that Turkey is in the lead and reports significant growth, while the other countries report much lower volumes and more slack growth rates. (Figure 4)

Turkey and Algeria are the main exporters in SEMCs zone. Here again, Turkey is the country most involved in Mediterranean exchanges. Algeria is the supplier in energy products of several countries of the Mediterranean basin.

Predominance of maritime transport

Exchanges with the EU are mainly conducted in maritime mode (75%) and via fixed connections which consist of three gas-pipelines connecting Morocco to Spain, Tunisia to Italy for the exportation of Algerian gas, and Libya to Italy. The remaining 5% are conducted mainly by land and air routes.

Figure 5 Modal split of goods transport in the Mediterranean between EU25 and Mediterranean countries (2004)



Source: Euromed Transport

Maritime transport reported, between 1997 and 2006, a significant growth, with a deployed transport capacity that had increased by over 50%. This rise is due to an increase in ship traffic frequency, by around 15 %, but also, and above all, to an increase in ship size, reporting a 30% growth (source: Lloyd’s MIU). The size of ships in transit has increased to the same proportion and remains three times larger than the size of the ships loading or unloading at a Mediterranean port (15 109 DWT²/ship for Mediterranean ports, as against 50 174 DWT/ship for transit).

2 The Dead Weight Tonnage is the total weight that a ship can carry while maintaining its water level: 1 DWT= 1000 kg

The type of goods determines the transport equipment and port services. It differentiates between :

- Liquid bulk, comprising oil, gas and chemical products carried in tankers;
- Dry bulk, comprising—inter alia—grain, cereal and coal products, transported in bulk carrier ship;
- Non-bulk goods, carried either in containers loaded on container ships, or on trucks embarked (either as two-piece or trailer only) on Ro-Ro.

Table 1 Breakdown of maritime transport supply in the Mediterranean, 1997-2006

	Transport activity		Growth rate/year
	(million DWT)	%	1997 to 2006
Liquid non-bulk (oil + gas – chemical products)	1328	31%	7%
Dry non-bulk (bulk carrier/ cargo)	1148	27%	3%
Non-bulk	1568	36%	8%
<i>Container ship</i>	1131	26%	10%
<i>Ro-Ro+Passengers</i>	437	10%	5%
Other	264	6%	-6%
Total	4308	100%	5%

Source: Plan Bleu, based on data of REMPEC/Lloyd's MIU

Table 1 gives the breakdown of the transport activity in DWT. That is the ratio of the number of ships (on call or in transit) over the average ship capacity. It

gives the volumes, the share of transported goods by type of packaging and their annual evolution over the period 1997 - 2006.

Liquid bulk

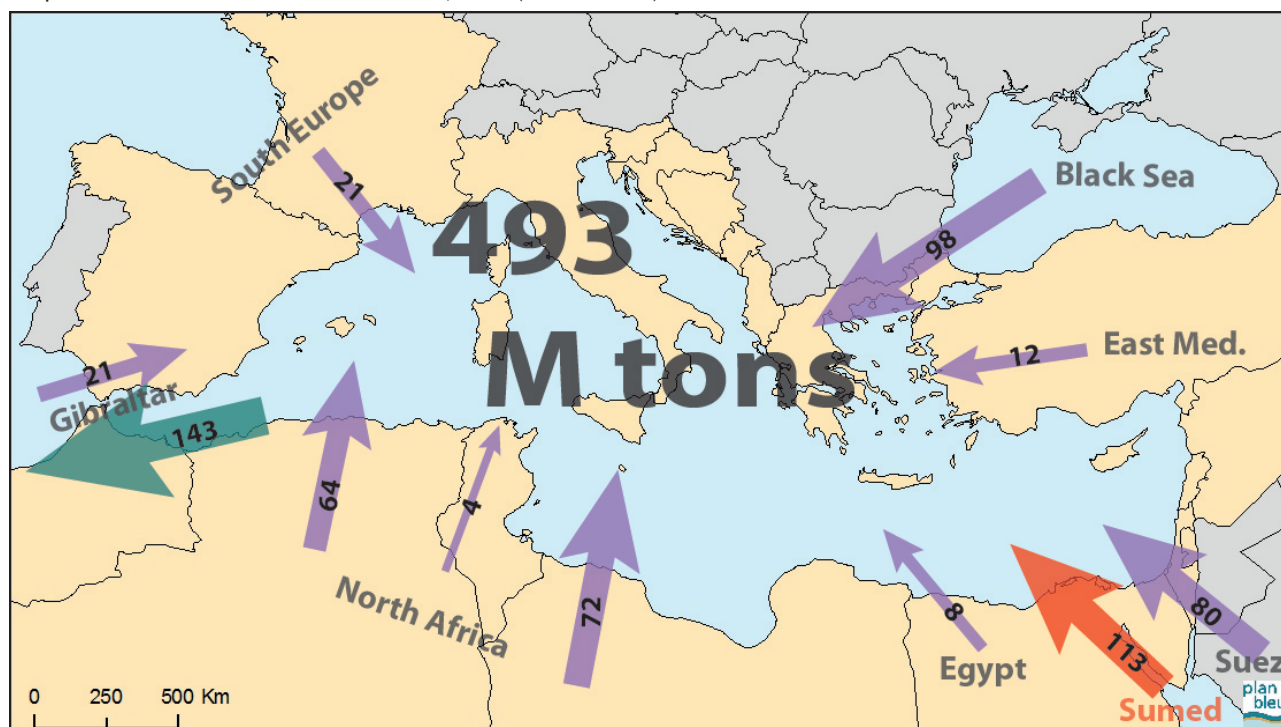
Liquid bulk is composed of energy products, oil and gas (24%), and—to a lesser extent—chemical products (7%).

Oil transport, a significant component of maritime transport in the Mediterranean, deploys the larger ships (125 000 DWT, on average). Their size has increased by 26% within 10 years. Port traffic rose by 6%/year between 1996 and 2006. Oil originates in North Africa, the Persian Gulf and the Black Sea, and is conveyed to Europe (northern and southern) and the USA. Oil exports from the Persian Gulf transit via the Suez Canal or via the port of Sidi Kerir in Egypt which receives the SUMED oil pipeline from the Red Sea. Flows from the Black Sea come, for the major part, from Novorossiysk (Russia) via the Bosphorus.

In 2006, around 493 million tons of oil products transited across the Mediterranean out of a global total of 2600 Mt, that is, around 20%.

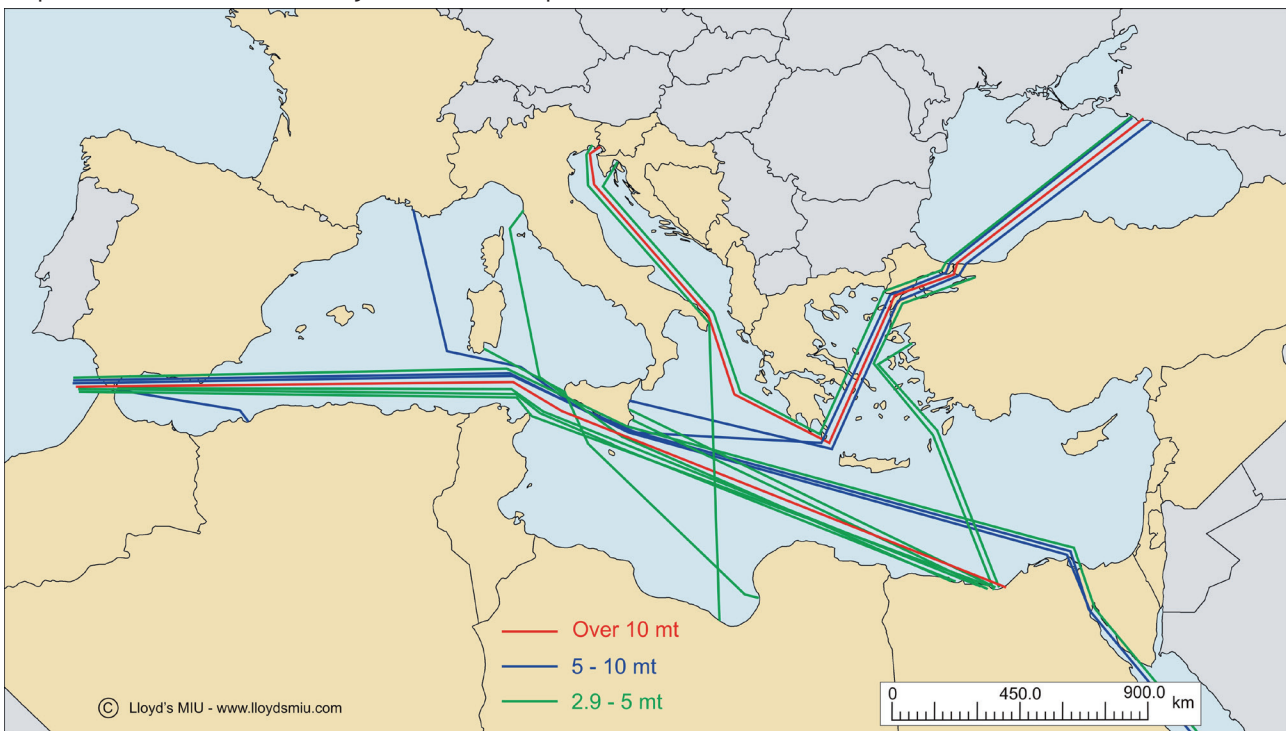
North Africa remains the largest exporter to Europe. Since 2003 and the conflict in Iraq, the Eastern Mediterranean reported a dwindling of its exports

Map 1 Oil flows in the Mediterranean, 2006 (millions tons)



Source: IEA, BP, Mediterranean Energy Observatory (/MEOME)

Map 2 Crude oil traffic in major Mediterranean ports - 2006



Source : Lloyd's MIU (data 2006)

from 57 Mt to 12 Mt in 2006. The latter are now picking up, with the opening of the BTC³ oil pipeline which delivers oil from Azerbaijan at Ceyhan (Turkey). The East Mediterranean is likely to report a considerable increase of its traffic over the coming years. Oil tanker routes are concentrated along well established and regular lines originating in the Red Sea and crossing, over the larger portion of the routes, the Mediterranean Sea. Map 2 presents the large capacity port-to-port routes (over 2.9 Mt).

Liquefied Natural Gas (LNG), carried by methane tankers represents a lower volume than that of oil, though with a high growth prospects due to an increase in demand, a decrease in north European gas production, the coming on stream of new fields in the Gulf and the construction of super-size gas liquefaction plants in Qatar.

Over the past ten years, LNG has reported an increase by 7 to 8%/year. In 2007, the LNG volumes transiting across the Mediterranean were around 100 million liquid m³, that is, 60 billion gaseous m³, which accounts for 27% of LNG global trade. Out of these 60 billion gaseous m³, the larger portion (53%) originated from North Africa (Algeria, Egypt and Libya) and from Nigeria.

3 BTC Oil pipeline: Bakli-Tbilisi-Ceyhan

Gas crosses the Mediterranean also via the Maghreb – Europe gas pipeline which extends from Algeria (via Morocco) to Spain, via the Transmed gas pipeline which extends from Algeria to Italy (via Tunisia) and via the Greenstream gas pipeline connecting Libya to Italy.

Dry bulk

Dry bulk has reported a moderate increase (3%/ year) over the 1997 – 2006 period. Indeed, this is dedicated transport (minerals, cereals ...) which increases at a slower pace than the other goods segments. The northern Adriatic ports (Venice, Ravenna, and Koper in Slovenia) are the natural entry ports to Eastern Europe and Central Europe, but the lack of land infrastructures has hampered the extension of the latter ports in favour of the ports of the Northern Europe. This situation is likely to change with the Trans – European Transport Network (TEN-T) project since this zone lies at the crossroads between the corridors connecting Lisbon and Kiev and the new Baltic-Adriatic corridor. The development of these corridors is likely to significantly increase traffic via the Otrando strait to the Adriatic.

Non-bulk transport

Non-bulk transport, deploying two types of vessel—Ro-Ro ships and container ships—reported the

highest growth, with 8% per year between 1997 and 2006.

Container ship transport deploys a range of ships that is much larger than that of Ro-Ro ships. Thus, the capacity generated in 2006 by container ships stood at 960 million DWT for 35 000 port calls, while Ro-Ro services generated a smaller capacity of 430 million DWT for 75 000 port calls.

Another specificity is that transport distances are different. Ro-Ro routes are intra-Mediterranean and follow a North-South direction (Algeria-France, Morocco-Spain), but also a East-West direction between Greece, Italy and Turkey. Large container ships present mainly a East-West direction: they start off in Asia, head towards the ports of the north European range and undertake transshipment with smaller units in the Mediterranean.

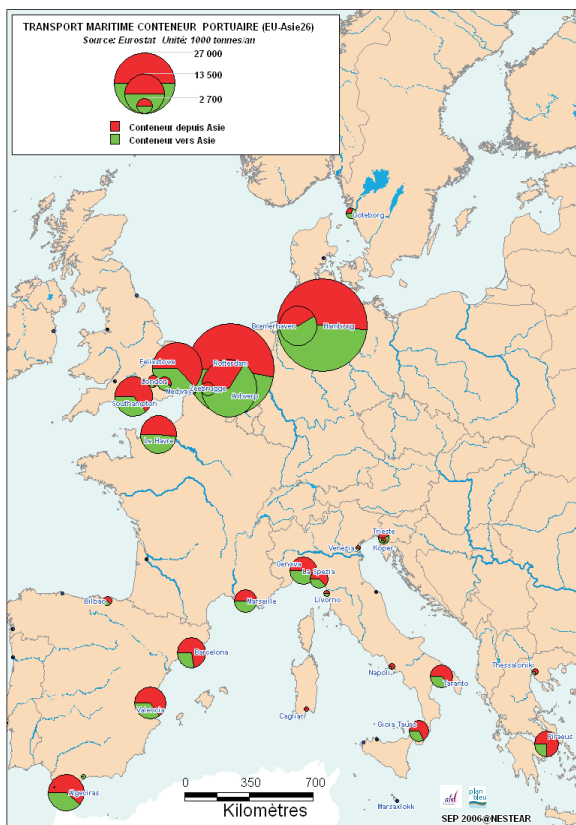
Ro-Ro transport reported an annual growth by around 5% over 10 years, due to a 33% rise in frequency and a 31% increase in average ship size over 10 years. Its organisation could be enhanced via the “motorways of the sea” services that the European authorities and certain riparian countries intend to develop.

Container ship transport reported a quite high average annual growth by 10% over the past ten years, due to a port traffic growing by 71 % and a ship size increasing by 55 %.

On the whole, the growth of exchanged volumes is due to ship size, but it is also due to the new accommodation capacities that the SEMCs have equipped themselves with in order to meet increasing demand and to respond to the boom of container transport: construction and franchise of new wharfs, as well as development of maritime hubs initiated back in the 1990s in the Northern Mediterranean Countries (NMCs) and pursued with the opening of the Tanger-Med. As of 2008, port handling capacity had almost been completely used. Forecasts of a high growth have driven the pursuit of port development.

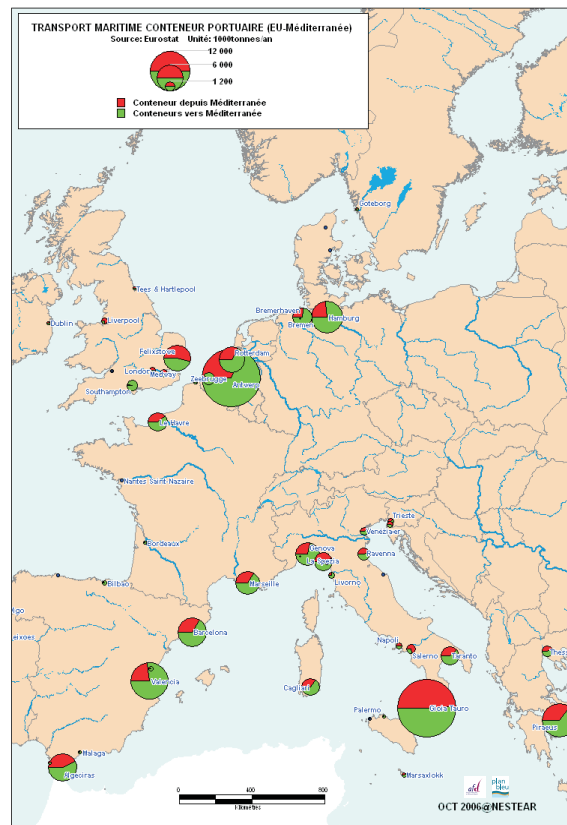
Yet, container ships continue to preferentially use the ports of the northern range (Hamburg, Rotterdam, Antwerp...), as EU entry and exit ports, rather than those of the south. The ports of the northern range offer shorter dwell times than those of the southern range where equipment efficiency and, above all, port formalities slow down the logistical chain. Such a situation also entails consequences in terms of

Map 3 Maritime container port transport (EU - Asie-26), 2005 (thousand tons/year)



Sources: Eurostat data

Map 4 Maritime container port transport (UE - Méditerranée), 2005 (thousand tons/year)



emissions of pollutants that could be avoided if the ports of Southern Europe were better utilised.

Map 3 reveals the predominance of the container port traffic of the EU northern range, in relation to Asia. For the Northern ports, the arrivals of containers loaded in Asia (in red) are slightly higher than the departures (in green). Mediterranean ports quite clearly receive more from Asia than they send to it.

Map 4, reveals that the ports of the Northern range play a significant role in the exchanges with the SEMCs. Europe sends into the Mediterranean more manufactured goods than it receives (green part of the diagrams). The volume appearing in southern Italy (Gioia Tauro) attests to the significant container transshipment between container ships and feeders, these involving neither exports nor imports.

Container ship traffic is highly concentrated in the northern part of the Mediterranean and less so in the eastern part, while it is quasi absent in the south. (Map 5)

Growth has been particularly steady in the Black Sea and in Port Saïd, since its extension, and container-ship ports in the Western Mediterranean have reported

a markedly higher growth than those of the Northern Mediterranean. (Map 6)

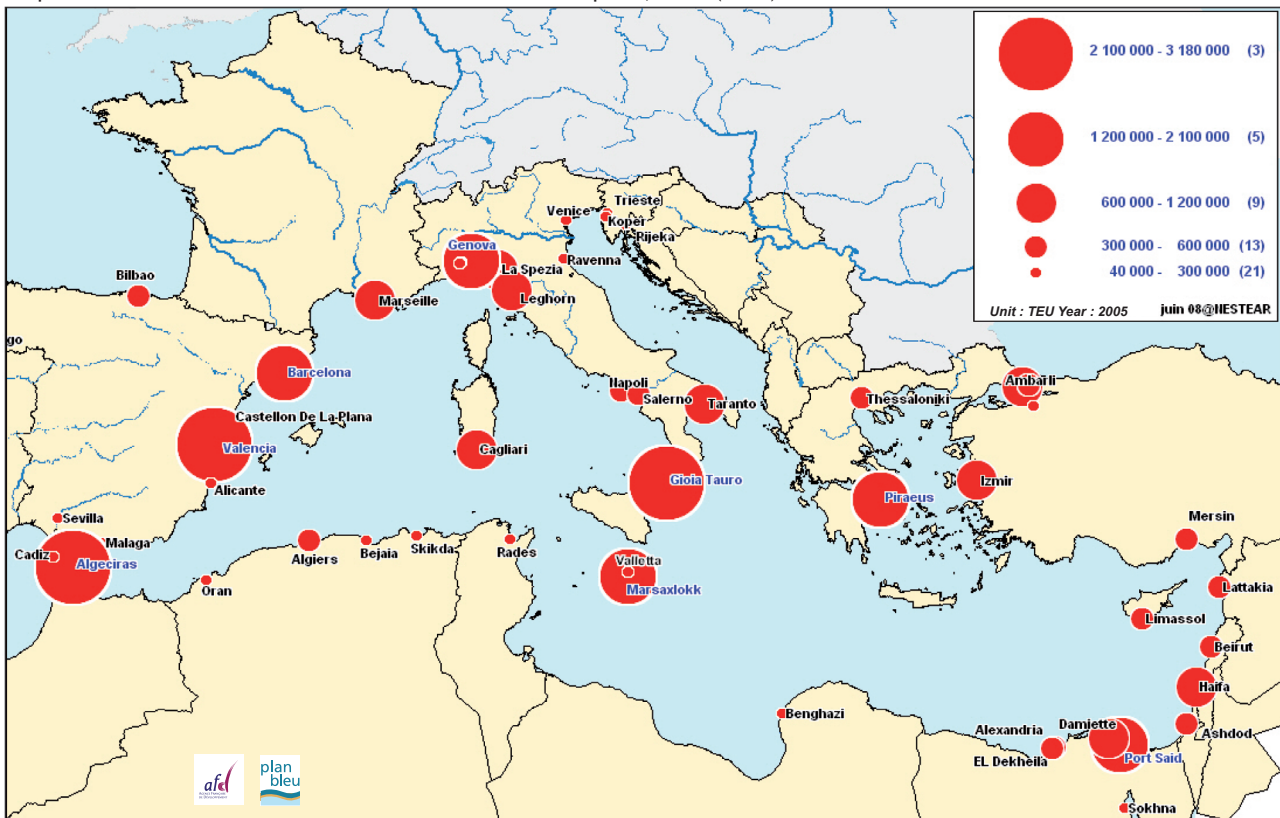
Tanger Med, opened in July 2007, envisions a gradual scale-up to reach a handling capacity of 3.5 million TEU⁴ in 2012 and reach up to 8 million with TangerMed 2 in 2015

Container ships follow a transshipment logic in hubs that are often without a hinterland. Thus, the larger container ships are supplied and downloaded by smaller feeders which ensure links with Mediterranean ports. These hubs are located along the direct maritime route between the Suez Canal and Gibraltar, at exit of the Suez Canal, at the centre of the Mediterranean (Malta, southern Italy) and in the western zone (Tangiers, Algeiras). Container traffic of the southern ports has, until now, been fairly limited.

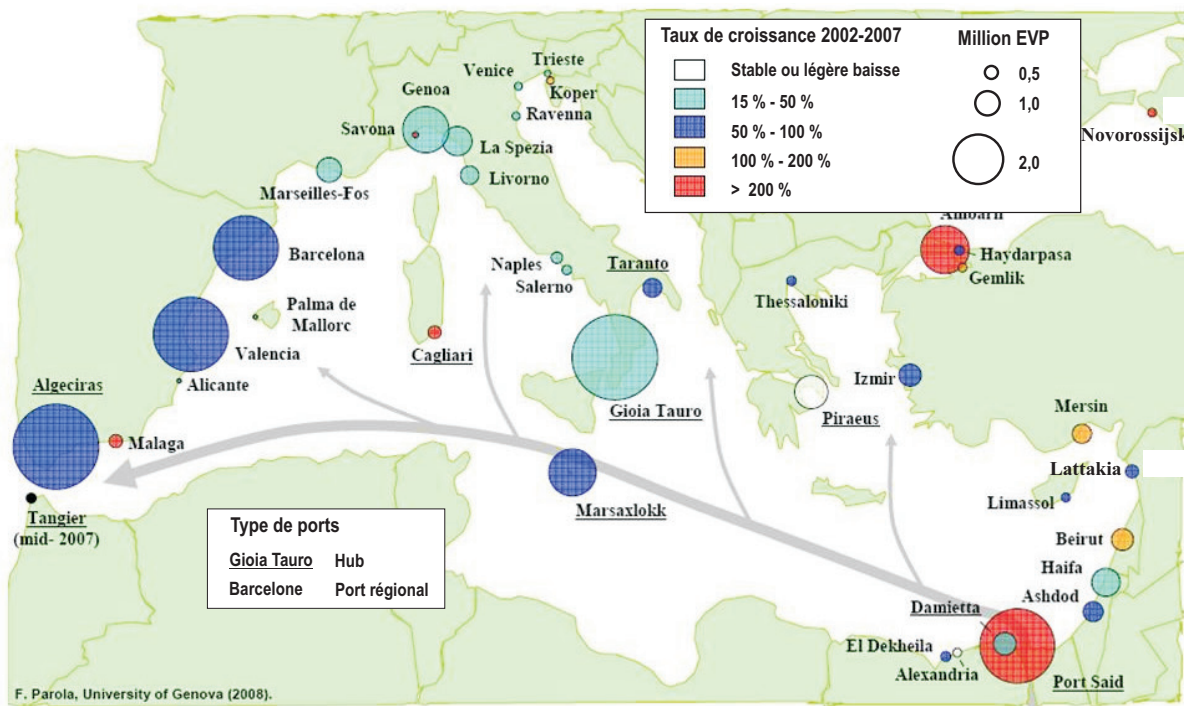
Logistic integration of transport chains in the SEMCs is still inefficient, by comparison with the Europe – Asia chains, with scarcely any provision of port – railway connections (except for Tanger-Med). Steps need to be taken; otherwise, exchanges will continue

4 TEU Twenty foot Equivalent Unit

Map 5 Maritime container volume of Mediterranean ports, 2005 (TEU⁴)



Source: NESTEAR

Map 6 Container capacity in Mediterranean ports of interest, 2007 (million TEU⁴)

Source: author's elaboration from CI on-line (2007 data)

to prioritise the ports of the northern range which, though more remote, are faster and more reliable.

The modelling—conducted with the consultancy Nestear—has allowed a reconstruction of container ship flows (Map 7). It highlights the importance of the hubs which “split” their goods according to the Mediterranean countries: Port Said for the East, Gioia Tauro for Italy, Central Europe and Malta – Sardinia for Italy, France and Spain, and the bigger flows to the ports of the North Sea and the English Channel, such as Le Havre, Felixtowe, Antwerp, Hamburg (Bremen), it being noted that Hamburg serves as a “hub” for the whole Mediterranean. Within this configuration, the northern ports maintain a dominant position in European exchanges with Asia.

This significant growth of non-bulk traffic is connected not only with non transport related decisive factors, such as economic growth, opening up of markets and urban concentration to which ports give access, but also with transport related factors, such as its costs which comprise time value and operation costs, being themselves sensitive to energy prices. The infrastructures, their connection, and the loading/unloading facilities are also components that will be taken into consideration in the prospective part of the study.

Other transport modes

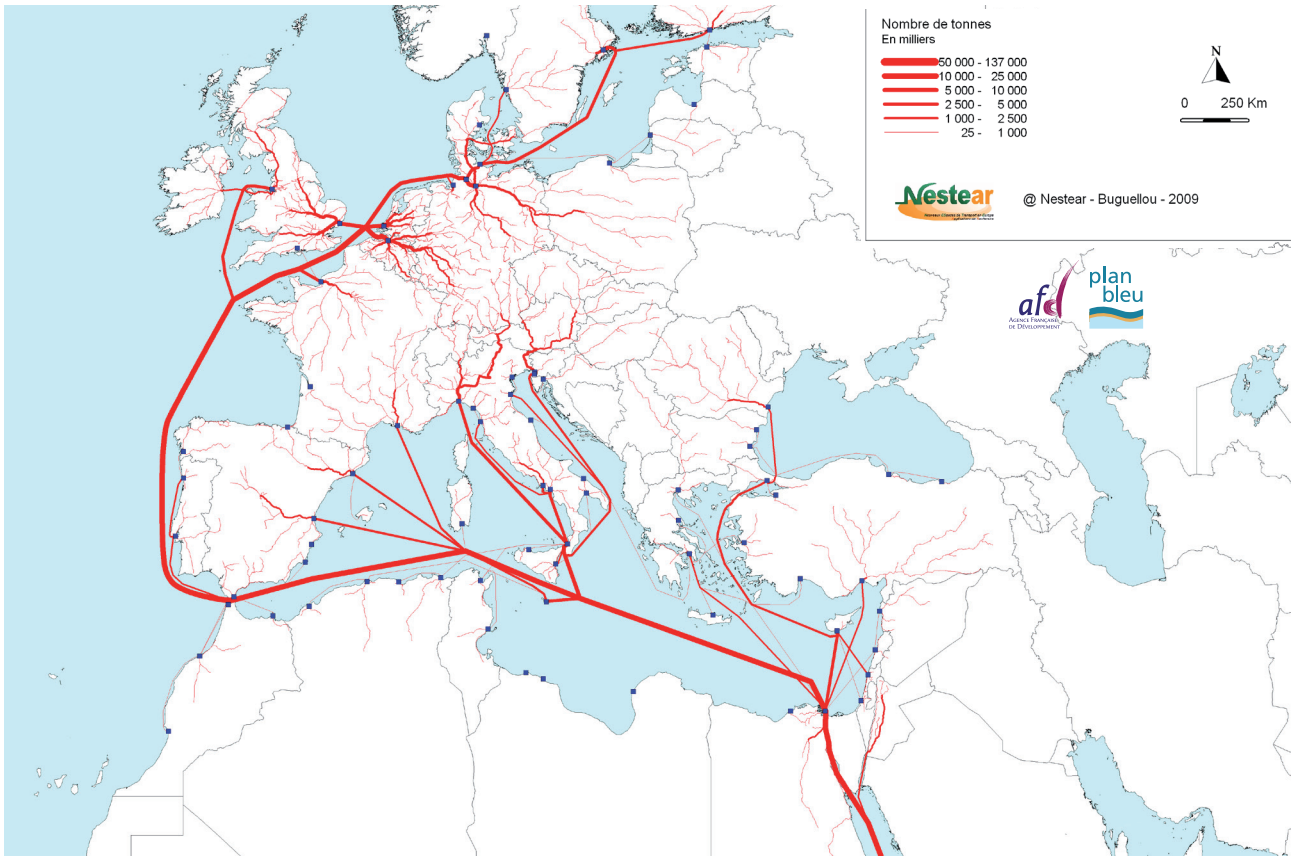
• Land traffic

Land exchanges among the SEMCs remain low, due to administrative or political border crossing difficulties. In 2004, the share of exchanges in volume of SEMCs was less than 1% for imports and of 4% for exports. The only significant road exchanges involve Turkey and Europe, via the Trans-European highway between Ankara and the Bulgarian border which constitutes an extension of the Pan-European corridor 4. In 2004, these accounted for 13% of the exchanges in volume between Turkey and the EU (Eurostat). International road transport of goods is, in fact, generated by ports for distribution in major national cities.

- SEMCs **rail transport** of goods is mainly connected with ports. It allows the exportation of national production: phosphate for Morocco; oil, iron ore, coal and metal for Algeria; and steel and coal for Egypt.

In order to intensify inter-country rail transport, a prerequisite would consist in developing the national networks. However, freight traffic of the SEMCs (in ton*km) reported a decrease by 3.3

Map 7 Container capacity in Mediterranean ports of interest, 2007 (million tons)



Source: NESTEAR

%/year between 1997 and 2001. Only Egypt and Israel reported an increase by 2 % and 2.8 %/year. This decline in traffic is connected with the low operability of the networks of the Southern Mediterranean Countries (SMCs) whose linear network length remained unchanged between 2000 and 2006 (Source: Eurostat 2008). The following map highlights the contrast between the south and the north. Thus, as the situation now stands, only Tunisia has a level of accessibility to railway infrastructures comparable to those of the Northern Mediterranean Countries (NMCs).

Besides the construction and up-grading of infrastructures, the RTAP (Regional Transport Action Plan for the Mediterranean Region 2007-2013), issuing from the Euromed Transport project, recommends an interoperability of the national networks and a separation between infrastructure management and transport operations. This entails that access to railway infrastructures (slot allocation ...) be decided independently of one or several railway transport companies.

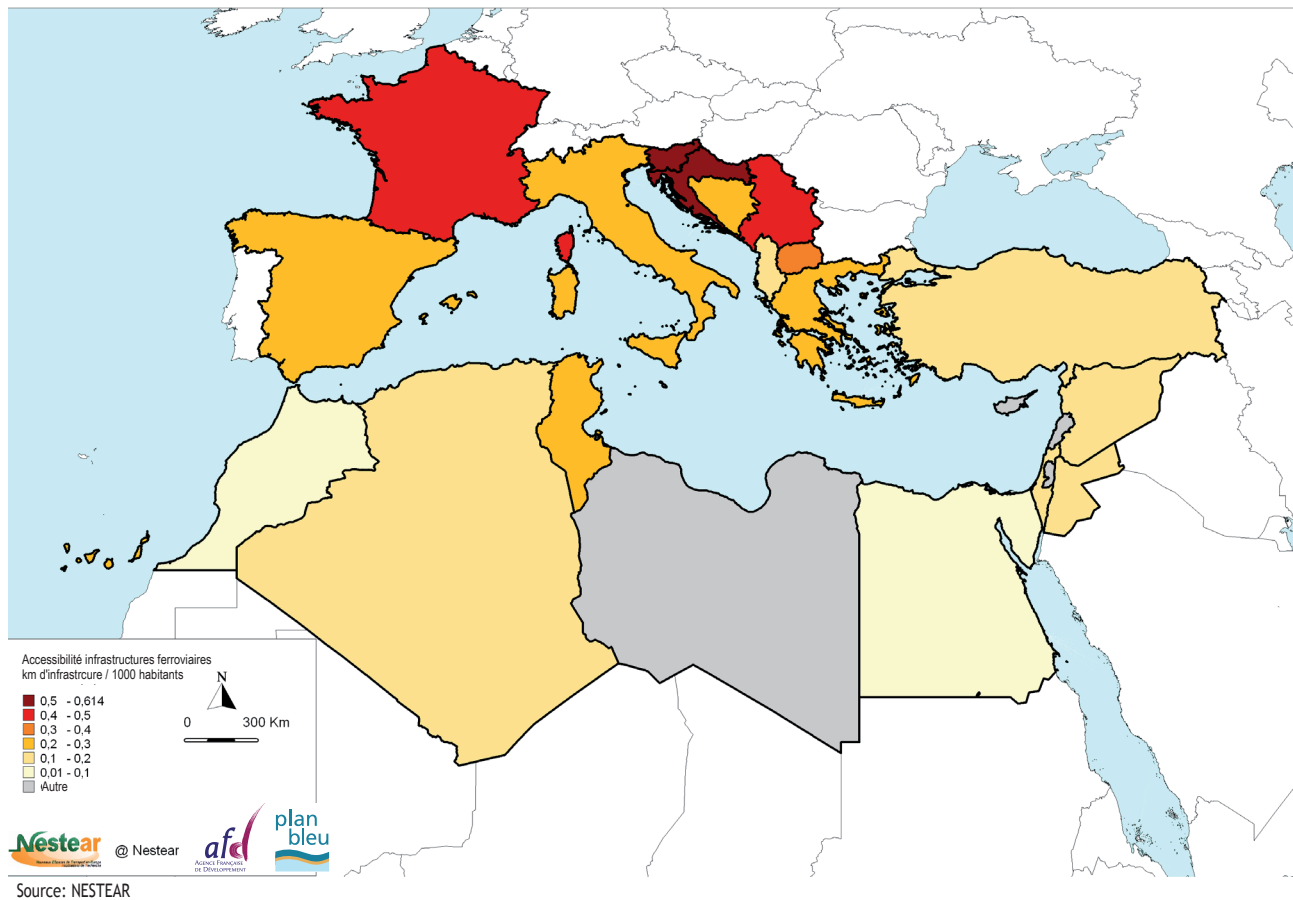
- **Air traffic**, being mainly dedicated to passenger transport, accounts for 0.2 % of the tonnages exchanged. This mode is actually used for high market value goods which claimed some 18 % of the value exchanged between SEMCs and E.U in 2004. The Euromed project had estimated that the average unit value of the goods exchanged by air with the European Union amounted to €6 200/ton, while that which is transported by sea stood at €536, and that carried by rail stood at €401.

Main conclusions

From the preceding paragraphs, one may draw the following conclusions :

- EU trade is the chief driving force of traffic in the Mediterranean.
- Asia is E.U's chief trade partner (claiming 40% of its imports and 30% of its exports).
- Inter-Mediterranean flows, all goods considered, hardly account for a quarter of the traffic volume. Inter-SEMCS exchanges are low, and the flows

Map 8 Population access to railway infrastructure (in km of infrastructure/1000 inhabitants)



operate along a North-South route, with a dominant South-to-North direction, connected with oil and gas exports.

- The SEMCs, particularly those of the Eastern Mediterranean, highly look to Asian countries, especially with regard to imports which amount to over 20%.
- Goods exchanges are mainly conducted in maritime mode (75 %) and are distributed into energy transport by tanker (24%), dry bulk transport (27%) and non-bulk transport (36%), mainly by container ship.
- Energy transport is determined by well-established location of production sources (North Africa and Gulf countries). Transport thus serves as a connection between resources countries and consumer countries. The increase observed over the past 10 years, by around 7%/year, could be more moderate if policies of energy conservation and development of renewable energies were put in place.
- Non-bulk transport offers the largest capacity and reports the highest growth (+8%/year). The

lowest production costs prevailing in Asia have led transport to adapt, through a “massification” of goods aboard very large-sized ships which reduce the conveyance costs associated with long distances. This justifies the 10%/year growth of container transport over the past ten years. This growth has led the countries to envision more large-scale port infrastructures, as well as deeper ports. Each of the SEMCs has currently one or several projects of this type.

- The Mediterranean is, thus, characterised by an intense transit transport and a low integration level, particularly as far as South-South exchanges are concerned.
- Non-bulk transport emerges, in view of its scope and growth, as a key challenge in the framework of Mediterranean integration.

Accordingly, the second part of this study will seek to outline the possible evolutions of non-bulk transport in terms of volume and distribution of the flows. This will be conducted via three scenarios based on economic evolutions and more or less dynamic transport development policies.

Outlook of maritime transport of goods

The prospective study 2025 concerns non-bulk transport. It is this transport segment which reports the highest growth and which constitutes, by the volumes concerned, the key stake for goods transport. The purpose is to appreciate the foreseeable flows, in terms of volume and according to their geographic distribution (origin/destination). This prospective study rests on a method developed by the Nestear consultancy (detailed in *Annex 3*).

The purpose is to see how this baseline situation in 2005, itself the outcome of the evolutions observed over the past ten years, can be projected into 2025, notably in terms of port traffic, according to three scenarios based on sets of economic and sector hypotheses. These scenarios have been identified in a collaborative framework grouping several Mediterranean experts..

The issue of transport of energy products is, advisedly, not included in this prospective study. Reference may be made, in relation to this particular aspect, to the Plan Bleu study entitled “Infrastructures and Energy Development in the Mediterranean: 2025 Outlook” whose analysis is summed up in Box 1.

The **first scenario (S1)** corresponds to a lasting crisis situation where the room for manoeuvre available to the authorities and the professionals is limited by a low economic growth.

The **second scenario (S2)** corresponds to a situation marked by a post-crisis recovery (2008/2009). This scenario corresponds to the economic growth foreseen before the crisis and gives a possibility to the various players to pursue the evolution envisioned before 2008.

The **third scenario (S3)** assumes a more dynamic growth offering the players room for manoeuvre to rapidly engage port development actions. Besides, public players engage measures intended to foster the development of railway transport.

The socio-economic hypotheses summed up in *Table 2* comprise, on the one hand, a regular demographic growth for the scenarios, of 0.2 %/year for the NMCs and of 1.2 %/year for the SEMCs and, on the other hand, a economic growth for the trend scenario (S2) of 1.8 % for the NMCs and 4 % for the SEMCs, according to World Bank data.

The economic growth hypotheses are derived from the trend scenario (S2), with a variation of +/- 0.3 % of GDP for the NMCs and of +/- 1 % of GDP for the SEMCs, based on the discussions of the experts' workshop (*Annex 2*).

The scenarios integrate, respectively, an increase in oil price per barrel (50\$, 100\$ and 150\$, value of 2005), as well as the introduction of a carbon tax of 100€ per ton for the third scenario (S3).

Table 2 Socio-economic

Average annual growth rates between 2005 and 2025			
	S1	S2	S3
Population - NMCs	0,2 %	0,2 %	0,2 %
Population - SEMCs	1,2 %	1,2 %	1,2 %
GDP - NMCs	1,5 %	1,8 %	2,1 %
GDP - SEMCs	3 %	4 %	5 %
Barrel price (non bulk)	50 \$	100 \$	150 \$
CO ₂ price (non bulk)			100 €

Source : Plan Bleu

Each of the scenarios assumes an organisation of the transport sector, identified based on public policies and private sector actions for the following four parameters: infrastructure, operation of networks and equipment, commercialisation and regulation

The methodology rests on simulations derived from a gravity model and a mode allocation model. The gravity model helps work out the exchange flows according to the major directions, in an analogous way to the Euromed project.

The allocation model distributes these flows among the various transport modes: both maritime (distinguishing feeder, Ro-Ro in the Mediterranean, maritime transit routes) and land transport in which are considered the generalized transport costs. They incorporate operational cost and time, broken down into voyage time, and loading/ unloading and procedures port time). This simulation work uses a model called NEST-MED (*Annex 3*) which is an application to the Mediterranean of the Nestear consultancy LOGIS model used in European projects.

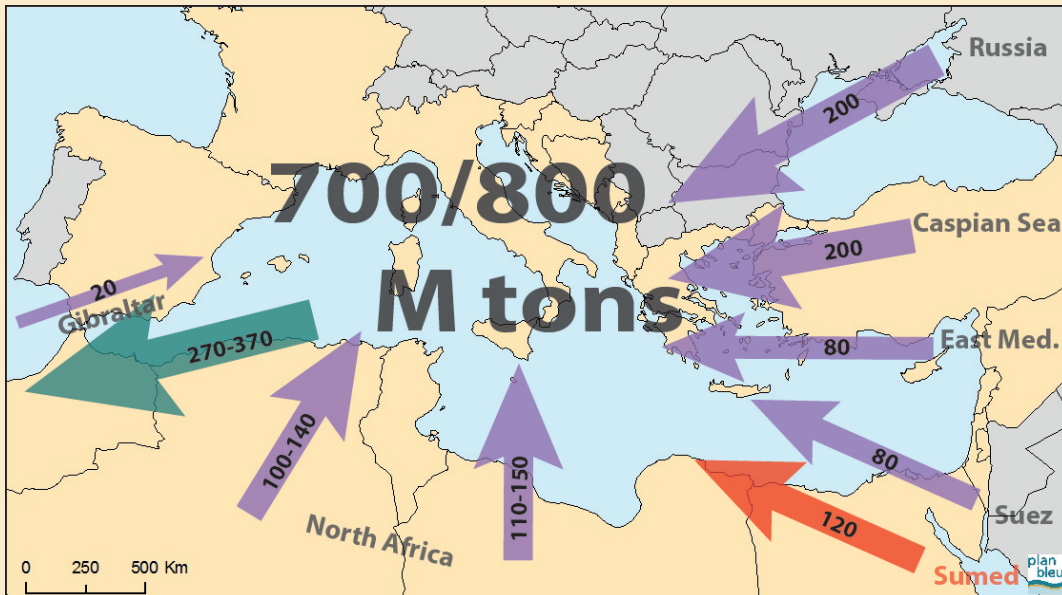
Box 1 Energy transport

Based on the elements of the Plan Bleu study entitled *Infrastructures and Energy Development in the Mediterranean: Outlook 2025*.

Oil transport

According to the trend scenario, the exchanges are set to rise from 500 million tons (Mt) in 2005/2006 to around 750 Mt by 2025. This growth would result in an annual increase of the tonnage transported by 2.1%/ year.

Map 9 Oil flows via the Mediterranean region (Mt)



Sources IEA, BP, OME

The energy alternative scenario rests on the implementation of sustainable development policies and incorporates the initiatives engaged by the Union for the Mediterranean - UpM (convergence of the energy policies of the SEMCs and Mediterranean Solar Plan). It would help save 154 Mt/year into 2025. As this involves less tons to carry, the oil flows would decrease to less than 600 Mt, according to a volume growth of less than 0.9 %/ year between 2005 and 2025. This would help avoid around 1500 tankers/year⁵ out of the 6700 likely to navigate in 2025, according to the trend scenario, and to scale-down, if not avoid, the extensions, or the creation of new oil ports.

Gas transport

As is the case for oil, the strategic character of gas leads the various players to predict a shipping and transport supply in line with the demand. According to a preliminary estimate into 2025, the portion in transit via the Mediterranean would be around 380 billion m³. The LNG portion is set to considerably increase in the trend scenario, with a growth rate of around 7.7 %/ year, that is +280 % between 2005 and 2025.

Table 3 Evolution of gas volume origin (billion m³)

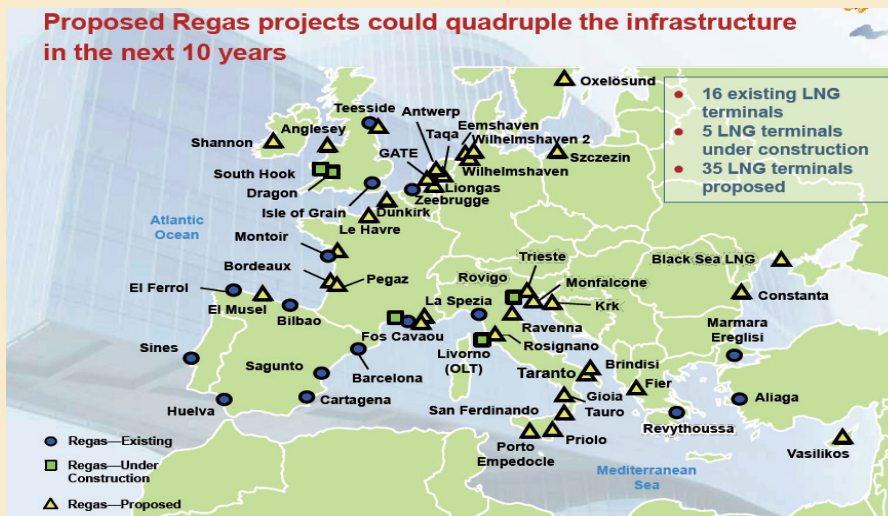
LNG from:	2007	2025	% 2007-2025
North Africa	32	76	4,90
West Africa	17	25	2,20
Gulf countries	8	113	15,80
Latin America	3	11	7,50
Norway	0,2	2	13,60
TOTAL	60	227	7,70

Sources: MOE/OME study, Gas supply to Europe - Plan Bleu

This high growth estimate in the trend scenario seems to be supported by the number of methane tankers on global level which has increased over the past few years by over 10 % per year, reaching 291 ships in 2007. One hundred twenty eight (128) additional vessels are being built. The reception infrastructure consists of 16 LNG regasification terminals around the Mediterranean. The current capacity of 110 billion m³ per year of these LNG terminals is set to grow fourfold within the coming ten years (424 billion m³ per year).

5 Llyod's reckons 6045 tanker calls + 500 transit in 2006, with a average capacity of 125 000 DWT. Unit capacity rose from 125 000 to 160 000 DWT in 2025, that is a factor of 1.28.
 Baseline scenario: 6500 * 1.5/1.28 = 7600.
 Alternative scenario: f 6500*1.2/1.28 = 6100

Map 10 Status and projects of gas infrastructures



Source: Cedigaz

The alternative scenario should allow the saving of 82 Mtoe equivalent to 100 billion m³ (bcm) of gas into 2025, that is a growth rate of 4.3 %/year, from 60 bcm in 2007 to 127 bcm/year in 2025. This means a reduction of the traffic of loaded ships by 900 methane tankers/year, as against the 2300 methane tankers of the trend scenario. Proactive energy policies would allow a significant reduction of these traffic volumes, of pollution risks and of equipment needs.

In sum, the transport of the two main energy products goes as follows:

Table 4 Evolution of energy products exchanges

Annual growth in quantities	Trend scenario	Alternative scenario
Oil		
Annual growth	2,1 %	0.9%
Growth factor 2005-2025	1.5	1.2
Nbr of super tankers avoided/ year (corresponding to 150 Mt/ year)		1500
LNG		
Annual growth	7.7 %	4.3%
Growth factor 2005-2025	3.8	2.1
Nbr of super tankers avoided/ year (corresponding to 100 billion m ³)		900

Source : Plan Bleu

The alternative scenario would help avoid, in total, 2400 super tankers/year despite the hypothesis of an economic growth higher by 1% in the SEMCs and by 0.3% in the NMCs, with respect to the trend scenario.

Table 5 Primary energy consumption by source in the two scenarios (in Mtoe)

	Carbon	Oil	Gas	Nucl.	Hydro	RE	Total	% Carbon	% Gas	% Oil	% RE+Hydro
Baseline 2007	119	391	251	130	18	47	955	12	26	41	6.8
Trend 2025	190	558	474	140	30	55	1449	13	33	39	6
Alternative 2025	135	404	392	115	30	83	1162	12	34	35	10
Energy savings	54	154	82	25	0	-27	287				

Sources: Plan Bleu, MOE/OME

The results concern :

- international maritime transport of extra-Mediterranean exchanges (Mediterranean countries with non Mediterranean countries) and intra-Mediterranean exchanges,
- land transport for distances of over 70 km (exclusive of local traffic) by road and by rail for port related traffic.

In order to facilitate the reading of the origin/ destination matrices of international maritime traffic (*Annex I*) the following main flows have been extracted: EU-Asia, SEMCS-Asia, EUmed-EUmed, EUmed-SEMCS, SEMCS-SEMCS, EU non med-SEMCS.

These traffic flows will be accompanied by energy consumption and CO₂ emissions estimates.

Baseline year 2005

• Maritime transport

The breakdown of exchanges in tonnages has been estimated based on the value of the exchanged products, as derived from the Comtrade base, according to the method presented in Annex 3.

This matrix helps to calibrate the baseline situation (2005).

Table 6 Volume of goods exchanged - Baseline year 2005

Baseline year 2005		
	%	10 ⁶ tons
Intra Med	25	
<i>EU Med-EU Med</i>	17	
<i>EU Med-SEMCS</i>	7	
<i>SEMCS-SEMCS</i>	1	
EU non Med-SEMCS	8	47
Asia	28	
<i>EU-Asia</i>	26	146
<i>SEMCS-Asia</i>	2	11
Other	39	218
Total	100	564

Source : Plan Bleu

The Mediterranean is a zone of transit and exchange with the rest of the world. Out of the 564 million tons (Mt) of non-bulk goods in transit, only 25% are intra-Mediterranean, while 75% have an origin and/ or a destination outside of the Mediterranean. Among these extra-Mediterranean flows, exchanges with Asia predominate at 28 %, followed by those of the EU non Med – SEMCS connection (8%).

Domestic transport

This type of transport is dominated by road transport, with a rail share scarcely exceeding 5 % in Mediterranean countries, except in France and in Italy. The estimate of this traffic stands, for the baseline year, at 342 billion ton*kilometer (tkm)⁶ with regard to road transport and at 27 billion tkm with regard to rail transport.

Scenario S1

Set of hypotheses

Apart from the demographic growth rate, common to the three scenarios, the following specific hypotheses have been selected:

Growth and exchanges

Under this scenario, the economies of Mediterranean countries do not manage to recover from the 2008 financial crisis. After ten years of a fairly high GDP growth, ranging between 3 and 5%, growth stabilises at around 1.5% per year for the Northern Mediterranean Countries (NMCs) and 3% per year for the Southern and Eastern Mediterranean Countries (SEMCS).

Concerning the exchanges, globalisation and international exchanges remain an undisputable fact: indeed, economies have become interdependent. Economic competition and market rules remain the driving force of exchanges in the countries and on international markets.

As regards international economic relations, the NMCs have to maintain a precarious balance, with international exchanges that continue to grow faster than national exchanges according to an elasticity likely to range between 1.5 and 2 in the North, while being likely to remain around 1 in the South.

The oil barrel would stabilise at 50\$ (value of 2005) due to low growth.

Transport policy

The transport sector is characterised by public policies that are too minimalist and budget resources that are too limited for the development of structuring infrastructures.

A disparity obtains between an international transport that remains fairly vibrant and a domestic transport whose structures are characterised by a slack development. Port areas, being in direct

⁶ tkm : number of ton-kilometers is the weight in tons of material transported (t) multiplied by the number of kilometers driven (km)

connection with the organisation of international transport, are the areas more likely to benefit from a slow modernisation of transport and the development of an outbound logistics. Outside of these areas, the constraints of a domestic market remain strong.

Road transport is the sector favoured by the initiatives of individual operators who manage to adapt to market change, in a context of fierce competition and, hence, to adequately meet a low growth of production and distribution. These individual operator initiatives, or small and medium size enterprises (SMEs), are also sub-contractors of global operators. There is little incentive to modernise the equipment or rationalise the domestic distribution channels.

The domestic system is hardly under control and inefficient. The level of exchanges between the southern Mediterranean countries remains low, with still cumbersome land border crossings.

Railway transport cannot sustain road competition, and remains confined to dedicated heavy goods industrial markets, without any reform or modernisation.

● **Infrastructures**

The context being one of a lack of public, national and international funding, the infrastructures constructed will be:

- those likely to attract private funding, such as those related to the development of ports and airports, according to the growth pace of Mediterranean and global trade,
- those of a road type, connected with the increasing use of the private car due to urban sprawl and to the demand on road transport of goods between major cities.

Highway infrastructures will also be constructed between major cities, knowing that toll fees will contribute significantly to construction costs. Thus, only railway segments will be constructed, such as the TGV (high speed train) between major cities in Morocco and in Turkey. Low growth level does not allow the envisioning of international funding towards the implementation of other ambitious projects.

Oil producing countries have a more favourable position, despite a low price of the oil barrel at 50\$: they devote part of these resources to investments in road infrastructures and in certain railway connections (Algeria, Gulf countries).

● **Transport equipment and operation**

The grim climate is, in this scenario, hardly conducive to technological innovation which oil prices are far from stimulating. A certain progress can, however, be made towards eliminating, in the southern Mediterranean countries, the more polluting road vehicles and restricting the importation of hardly efficient second-hand equipment.

Truck performance and size are improving slowly but steadily. The professionalisation of road transport reports a slight improvement with the coming on board of SMEs dedicated to transport on behalf of third parties, though they remain too scattered to achieve a rapid modernisation.

In the Northern Mediterranean Countries (NMCs), these constraints are stronger for road vehicles, and rail transport manages to maintain its market share, as the railway reform has actually been implemented. The development of inter-modal transport helps sustain this market share.

In maritime transport, the ISO container has become established within an ongoing process of globalisation of exchanges. Ro-Ro transport, being more specific to the Mediterranean, manages—not without difficulty, though—to cut itself a niche, except on very short distances where it is taken over by ferry-type transport. The concept of “motorways of the sea” is, indeed, abandoned, and only a few measures for modernising coastal navigation and facilitating port transit have been adopted. The capacity offered by the container ships ordered before the crisis of 2008 launches on the market an offer that is short of being fully utilised.

● **Commercialisation**

In the countries of the south, new comers (European private operators) limit their activity to port servicing, from major inland centres for goods, when the national regulations allow for it. The trade dynamism is essentially due to road enterprises in the countries of the south, offering limited logistic services. In the players’ action, large distribution enterprises that operate in metropolises or in their vicinity have a predominant role.

Rationalisation of distribution generates productivity gains that attract private capital, but which also influence the developments so that they grant priority order to the car and heavy goods vehicles, and this, in the absence of alternative solutions.

● Regulation

Regulation is this scenario's weakness. As far as the environment is concerned, while the standard Euro 5⁷ is in force in road transport in the north, the south will adopt—as reference for emissions—the Euro 2 type which initiates a taking into account of emissions.

In the countries of the south, certain operations are facilitated, such as the modernisation of ports and airports, the set-up of road enterprises and the establishment of transport and logistics operators, for purposes of facilitating the supply of major metropolitan centres, including even rail servicing of the ports. However, there is no modernisation of the transport sector, strictly speaking. Old organisation modes coexist with more recent ones, thus giving rise to a “dual” system, resulting in the long run in tensions within the transport sector itself.

Results of scenario 1

Impact on traffic

● Maritime transport

International maritime traffic in the Mediterranean would grow at a rate of 3.4% per year, reaching a volume of 1108 million tons (Mt) by 2025. This belongs in the logic of the globalisation of exchanges which, even in period of lower GDP growth, sustains a fairly dynamic growth of international exchanges.

Europe – Asia exchanges would report a high growth rate by 5% per year. This exchange relation would, then, account for 35% (389 Mt) of Mediterranean flows. In total, exchanges with the rest of the world and transit would account for 80%. There would remain 20% for inter-Mediterranean exchanges, which represents a significant decline with respect to the baseline year (25%).

Europe's exchanges with the SEMCs would increase, further consolidating the dominance of the ports of the northern European countries. Finally, SEMCs-SEMCs exchanges would significantly increase at a rate of 6.6%/year, though remaining low in terms of traffic, with 2.3% of the total volume, from 1.2% in 2005.

⁷ European legislation is increasingly strict with regard to diesel engine waste. “Euro” emissions standards become more restrictive overtime. Euro 2: vehicles operated after 1996.

Table 7 Volume of exchanged goods into 2025
Scenario 1

	%	10 ⁶ tons	annual growth
Intra Med	20		
<i>EU Med-EU Med</i>	12	129	1.4 %
<i>EU Med-SEMCs</i>	6	65	2.9 %
<i>SEMCs-SEMCs</i>	2	25	6.6 %
EU non Med-SEMCs	8	89	3.2 %
Asia-26	37		
<i>EU-Asia-26</i>	35	389	5.0 %
<i>SEMCs-Asia-26</i>	2	22	3.2 %
Other	35	389	2.9 %
Total	100	1108	3.4 %

Source: Plan Bleu

More specifically, container traffic would increase at a rate of around 3 % in the countries of the north and would range between 4 and 5 % in the countries of the south:

- in the countries of the north, this increase results from a GDP elasticity, of around 2, that is, the growth of exchanges would be twice that of GDP, in a context where containerization channels are already organized;
- in the countries of the south, this increase results from a lower GDP elasticity, ranging between 1.2 and 1.5 (but with higher GDP growths than in the north), and this, for containerization channels that are developing and container port traffic that is still low.

In this scenario, envisioned new container ports are developing in the countries of the south, though staggered in time, each country opting at least for the development of one large-scale port. These ports may, possibly, have a transshipment role when located along major transit routes for container ships. Low economic growth does not always allow a rapid execution of these projects, as large-scale maritime equipments are strongly affected by the 2008-2010 financial crisis. The national strategies, with the help of certain sovereign funds (Gulf, Asia), will continue, nevertheless, to look upon these investments as of priority order.

As regards final forwarding, the predominance of the ports of the northern range would be established, as long as the railway connections of the ports of the south continue not to provide sufficient quality services.

In the eastern Mediterranean, the growth of traffic via the already jammed Bosphorus becomes truly problematic. In this scenario, it is difficult to imagine

the operation of railway “land links” via Turkey, thus offering an alternative route.

- **Land transport**

The land transport of the SEMCs would report a road volume of 727 billion tkm, corresponding to an annual growth rate by 3.8%.

Over a 20-year period, this implies a doubling up (x 2.1) of road traffic of goods in the countries of the south, which exerts pressure towards the engagement of road or highway investments.

As regards rail, goods traffic would simply stabilise due, in particular, to the traffic of heavy goods (minerals) which it is more efficient to convey by rail.

Energy and environmental impact

The increase in oil consumption of transport would continue to grow at a rate that is slightly lower than the growth of the traffic of goods, and this, due to the use of slightly more efficient trucks. However, the barrel price of 50\$ is not an incentive for real saving with regard to energy consumption.

As regards emissions, slow replacement of the fleet with hardly binding standards does not bring any real improvement concerning air pollution.

Indeed, the easiest transport option, described above, is harmful to the environment and lacks a future vision as regards equipment. Even with low economic growth, it leads to a serious environmental crisis, characterised by slow but certain depletion of energy resources and inescapable destruction of the Mediterranean environment, especially in densely populated coastline areas.

In this scenario, traffic evolves according to a market law that does not mainstream a sustainable development vision. The default of public policies (transport, environment) leaves the region to contend with flows originating in Asia.

Scenario S2

Set of hypotheses

Growth and exchanges

This scenario assumes that, after several years of economic difficulties, the world economy would recover its growth “fundamentals”.

GDP growth rate is around 2% per year for developed countries and 4% for emerging countries. A growth logic driven by the globalisation of exchanges makes

it possible to envision a GDP foreign trade elasticity of over 2, for developed countries, and ranging between 1.5 and 2, for emerging countries.

Inasmuch as the economies of the Southern Mediterranean Countries (SMCs) become diversified and that competition between neighbouring countries becomes less fierce than in the period when they found themselves vying to conquer the markets of the Northern Mediterranean Countries (NMCs), inter-SMCs relations increase. Their increase is comparable to that of the exchanges with the rest of the world, rising from a very low level. Borders between neighbouring countries gradually open up.

The oil barrel stands at 100\$ (value of 2005)

The price of the barrel, being relatively high (100\$), does not impact economic growth. It is offset by the possible productivity gains. Besides, this barrel price earns resources to producing countries which they invest also in transport. The high barrel price acts as an incentive to check the unit consumptions of the equipment, with high-return investments at the economic level. Production and distribution modes are big consumers of more efficient transport.

Transport policy

The production-to-distribution logistic chains become more complex, with a larger number of stages that entail a multiplication of exchanges at national and international level. However, consolidation of traffic over long distances allows full benefit of economies of scale down to the final collection and distribution link in the chain, such as illustrated by container transport on ships of a 12 000 TEU capacity and massive rail transport, as in the USA. Thus, the transport and logistics efficiency allows, surely and increasingly, a removal of distances that no longer impact market competitiveness.

- **Infrastructures**

Concerning infrastructures, the economic growth recovered in the SMCs helps complete the highway networks covering the national territories. The high growth of motorisation rates and the increase in transport of goods give rise to a road demand pressure which is harnessed to the financing of infrastructures via toll fees.

In the oil-producing countries, the barrel price at 100\$ helps release funds that largely facilitate the financing of a highway network, as well as of certain railway lines.

For international financiers, emphasis is placed on trans-border connections, with a contribution to the realization of still low-return investments, given the existence of “border effects”.

As regards the rail system, funds remain hard to find and their cost-effectiveness does not show as clearly as with road investments. Only a few lines are constructed between major metropolises, with the introduction of high-speed trains in Morocco, Algeria and Tunisia. Private and public investors can partner, insofar as the operation of high-speed trains becomes, with rapid equipment rotation and high utilisation rates, fairly quickly economically profitable. The only impediment is the existence of an uneven relief making railway investment quite costly.

Public or private investors might be attracted by the servicing of ports to inland terminal destination. Here again, these would be dedicated connections put in place to service such ports as that of Tangiers in Morocco, or of Djen-Djen in Algeria.

Such servicing systems might also be developed in Turkey, originating from Mediterranean ports or Black Sea ports for such destinations as the inland cities of Ankara, Kayserie, Kossya or Eskisehir. They might also concern Egypt with departure from the ports located at both ends of the Suez Canal and with departure from the inland terminals that would be located around Cairo. These investments, not considered in the previous scenario, are made in this scenario.

Airports, too, attract investors, even though their opening up is often more limited by national regulations. In countries such as Turkey, the air transport and airport sector has been opened up. Private undertakings can be invested in airport logistic platforms and, particularly, in those specialized in the exportation of food products to the Gulf countries.

Finally, inland logistic platforms, “dry ports”, could also attract private funds by leading international transport operators, if not major distribution enterprises seeking to rationalise their own logistic chains from origin to destination. However, in this scenario, the objective would mainly be that of logistic chain efficiency without any real concern for land development of either the origin or destination zone.

• **Transport equipment and its operation**

For container ships, the only difference with the previous scenario is a more steady demand on long-

distance transport allowing more rapid absorption of the over-capacity phase of currently under-used container ships. This being the case, the disappearance of a large number of ship-owners during the crisis could exacerbate the phenomenon of an oligopoly of surviving ship-owners.

As regards Ro-Ro ships, a more rapid growth of inter-Mediterranean exchanges could facilitate the operating of “motorways of the sea” along a few routes where traffic concentration and, hence, frequency, are sufficient, that is, mainly between the NMCs. For so doing, new types of ships, this time more sizeable and more efficient, will be preferred.

The globalisation of the economic system, together with growth, would encourage renewal efforts for less polluting and more efficient equipment, with a fairly high oil price serving as further incentive. However, the environmental impact is not a decisive objective in this scenario where cost effectiveness remains dominant.

• **Commercialisation**

The supply of global transport remains quite efficient, both in terms of rates and of service quality, thus diminishing the motivation for trade relations between closer riparian countries. The trade supply would remain largely dominated by the maritime system put in place within a global scale operation logic, with the development of hubs and “feeder” services.

Between neighbouring countries, land exchanges are made, for the major part, by road. Indeed, road transport slowly modernises and becomes professional in the land transport sector. Logistic know-how spreads insofar as it further sustains the dominance of a global logistic organisation, prevalent in the production and distribution system.

The players’ action is controlled by international operators that largely call upon local road sub-contracting which they move towards a modernisation of the equipments and communication means that is more profitable to them. These global operators do not engage in railway ventures unless they are assured of a minimum of massification of the flows which ensures them a fair return and the use of renewed and reliable railway equipment.

Finally, inter-continental exchanges can be, as a result of massification, less costly than the exchanges between Mediterranean neighbouring countries, which—in the long run—is not conducive to a greater

Mediterranean integration and does not foster border projects.

- **Regulation**

Regulation is mainly that of market and return, with a vibrant maritime sector and a land transport dominated by a flexible road sector. There are, therefore, no veritable incentive and planning for a long-term orientation to alternative modes, such as the railway mode.

Regarding the transport of goods, this would also entail efforts towards opening up the railway system and conducting far-reaching reforms so that new competitive services could be proposed as alternatives to the road. The example of countries that have engaged such railway transport reforms reveals that productivity gains are possible in relation to the use of manpower and equipment, and that the organisation of mass freight trains reduces costs considerably.

This may obtain by a concentration of services on inter-modal platforms, in ports or on inland platforms. At the technical level, the operation of railway networks can be largely enhanced by new control systems via satellite (of the ERTMS type in Europe). However, such opportunities are only partially used and certainly not sufficiently enough to engage far-reaching reforms of the railway system.

Result of scenario 2

Impact on les traffic

Broadly speaking, this scenario entails a steady growth of traffic, both domestic and international.

- **Impact of energy price**

The impact of the price of the oil barrel at a fairly high level of 100\$ (value of 2005) on transport cost is not such that it would hamper an overall increase in mobility driven by economic growth and the globalization of exchanges of goods.

The analysis of the costs of the various modes reveals that a doubling up of the price of the oil barrel at 100\$ would cause the total transport cost to rise by between 10 and 15%. With the current equipments, this cost would remain at fairly low level with respect to the value of the goods carried, especially over a long maritime distance (transport being likely to represent 1 to 2% of the value of the products).

A reduction of ship speed constitutes a variable that can be put to efficient use. A speed reduction by 22.5

to 18 knots would cut down consumption by 30%, without affecting traffic, in the sense that voyage time is less constraining than port dwell time. Besides, this increase in cost could be easily offset by increasing ship size (massification phenomenon).

Road transport would also be sensitive to a 100% rise in fuel which induces an increase ranging from 20 to 25% of operating costs. However, this scenario does not offer any alternative in matter of railway transport, and the road remains practically the only solution. The rise in fuel price could be offset by the consumption savings of a fleet of more modern, if not more sizeable, trucks (giga trucks) of lower unit consumption.

In this scenario, long term energy consumption of land transport would diminish (elasticity around -0.3 with respect to energy price rise); however, fuel price rises would not have any real impact on the traffic of goods in view of the technical and organizational advances.

On the other hand, it is worth pointing out that the higher barrel price would not have any beneficial effect on consumption, if certain States were to decide to subsidise this overcost, thus incurring public expenditure which could have been allocated to more sustainable actions.

- **International transport**

Total international exchanges would amount to 1 331 million tons (Mt), thus more than doubling up within 20 years (factor of 2.36), which corresponds to an annual growth rate of 4.4 %.

Europe – Asia exchanges would increase at a rate of 6.3 %/year, that is a higher rate than the 5 % of the first scenario (S1). This Europe-Asia relation would, then, account for 38 % (500 Mt) of Mediterranean flows. Transit and exchange transport with “extra Mediterranean” countries would be further consolidated, accounting for 81 % of the exchanges.

Europe’s exchanges with the SEMCs would report the same growth rate of 4 %/year, while still presenting a marked predominance for exchanges with northern European ports. This parallel growth is the mark of a saturation of the ports of the northern range, leading the southern range to better position itself. Finally, exchanges between the SEMCs would increase more rapidly at a rate of 7.7 %/year, though still representing but a small part of these total exchanges, that is, 2.3 %, which is identical to “The Foregone Mediterranean”

scenario. For the Mediterranean, this would mean a dilution in the globalization of exchanges.

Table 8 Value of exchanged goods into 2025 Scenario 2

	%	10 ⁶ tons	Annual growth
Intra Med	19		
<i>EU Med-EU Med</i>	11	144	2.0 %
<i>EU Med-SEMCs</i>	6	76	3.6 %
<i>SEMCs-SEMCs</i>	2	31	7.7 %
EU non Med-SEMCs	8	103	4.0 %
Asia-26	39		
<i>EU-Asia-26</i>	38	500	6.3 %
<i>SEMCs-Asia-26</i>	2	25	4.0 %
Other	34	453	3.7 %
Total	100	1331	4.4 %

Source : Plan Bleu

● Domestic transport

The Southern Mediterranean countries (SMCs) would report a volume of road transport of 783 billion tkm, corresponding to a growth rate of 4.2 %/year (as against 3.8 % for S1), and would multiply by a factor of 2.3 with respect to 2005. Railway transport would not increase in volume and, hence, would decline in relative share.

The railway transport market share would stabilise in the Northern Mediterranean Countries (NMCs) where railway reform is engaged, with—in particular—a growth of combined transport offering an alternative to road transport. However, such a scenario does not apply to the SMCs where railway reform has not been engaged and where the networks are not structured. There will only be concerned a few market segments of a rather specific nature, such as port conveyance, which is not sufficient enough to check road dominance.

Energy and environmental impact

The situation is quite alarming, as maritime traffic continues to increase at an accelerated pace, both with a destination to the NMCs and to the SEMCs, without—however—the enactment of strict pollution reduction standards. While, admittedly, large-size container ships present lower unit consumptions, the distances are extended and transshipments are multiplied in order to “massify” the flows. Besides, feeder or Ro-Ro based intra-Mediterranean transport still does not offer similar prospects of reduction of unit consumption. Oil price is an incentive, no

doubt, but it must be backed by a cost related to the carbon ton emitted. Assuming a sensitivity of energy consumption to price (elasticity) of -0.3, a doubling up of barrel price would lead to a reduction of unit consumption by 26 % (reduction factor: 0.74). However, as traffic would increase by a factor of 2.36, this would lead to a rise in total consumption by a factor of 1.75.

As regards road transport, the enforcement of Euro 2 standards should lead to a reduction in unit emissions (NO_x, CO₂, particulates...) via a modernisation of the fleet. Concerning CO₂, assuming that the sensitivity of consumption to price were of -0.35 (elasticity), a doubling up of barrel price would lead to a reduction in consumption and CO₂ emissions by a factor of 0.7. However, traffic is set to increase by a factor of 2.3, which leads to an increase in CO₂ emissions by 1. This scenario shows that the Mediterranean remains a transit and exchange sea with the rest of the world, without any portion of this traffic being related to intra-Mediterranean exchanges. Transport policy continues to evolve within a globalisation logic where environmental improvements take place in isolation from the equipments and their utilisation.

Scenario S3

Set of hypotheses

In the third scenario (S3), economic growth is stronger and allows the various players to act more promptly on transport components, anticipate a high energy price and better mainstream environmental impact.

Growth

In order to simulate the case of a reasonably dynamic regional economy, the growth hypotheses selected have been set as being of 2.1%/year, for the NMCs, and of 5%/year, for the SEMCs, on average. This Mediterranean growth is particularly stimulated by the facilitation of exchanges within the framework of a free trade zone underpinning the Euromed project.

High oil barrel price, and the CO₂ ton has a price

High global growth contributes to the high price of the oil barrel which stands at 150\$ (value of 2005). The price of the ton of CO₂ helps incorporate part of the externalities in the economic calculation of the choice of long term investments. This price has been set as 100€ in order to influence investment options. This alternative has been explored under the MEDA TEN-T project and assumes a systematic effort of data collection, as well as the establishment

of Mediterranean-wide “monitoring” and evaluation procedures.

Transport policy

The transport sector involves dynamic policies that help improve the efficiency of the various modes. Ship dwell and goods handling time is significantly improved. With technological advances and the new operation modes, railway transport is a mode that can considerably improve its economic efficiency, the capacity of its infrastructures and its environmental impact.

The reforms necessary to boost railway transport are undertaken. The railway becomes more cost-effective, especially due to massification, and more environment friendly due to the use of recent equipment and locomotives that meet new emission and noise standards.

Concerning the road transport mode, the standards policy is strict (Euro 5 standard type) in order to achieve environmental emissions reduction objectives.

The principle of internalisation of external costs is adopted based on a cost assigned to the ton of CO₂.

● Infrastructures

In such a scenario, the railway networks get structured in the Mediterranean in connection with trans-European networks. In the eastern Mediterranean, the railway networks service the Middle Eastern and Gulf countries, and are integrated with the Turkish and Iranian railway networks. The railway networks of the Maghreb countries are interconnected.

Financing by oil producing countries, benefiting from the high price of the oil barrel at 150\$, would facilitate the construction of such networks in several Southern Mediterranean Countries (SMCs) connecting, to the east, the Gulf and Mediterranean seafronts. This is the case of the Middle East and the Gulf region, with connections to the countries of Central Asia, themselves being oil producing.

In the Maghreb, interconnection is provided based on a significant effort by Algeria connecting the Moroccan and Tunisian borders, where the east-west and north-south railway corridors are constructed.

With regard to road transport and maritime transport, the situation is not much different from that of the previous scenario. Highway networks are constructed due to the growth of motorisation, but with a greater mainstreaming of environmental impacts. Finally, port investments are more attractive in view of the

development of maritime traffic due to global and Mediterranean exchanges.

The market is organised based on the new transport costs. Developments involve the construction of logistic platforms, accessible by the various modes, allowing:

- massification over a long distance for railway and maritime transport;
- rationalisation of collection and distribution lines in densely populated areas;
- greater control by enterprises over logistic chains.

Multi-modal logistic platforms are constructed in the vicinity of high activity and densely populated areas, linking domestic and international transport, with a local distribution/collection of products.

The case of TangerMed, which seeks to integrate large-scale logistic area, marine hub and railway connections, is considered as completed. However, the question arises as to a multiplication of this type of development and its impact on Mediterranean integration.

● Equipments and operation systems

The equipments are more efficient, following the enactment of strict standards for all modes, hence, the need for new investments which, in return, facilitate productivity gains via a more intensive use of the equipments related to alternative modes to the road. Railway operation systems, too, are modernised, using most advanced satellite based control techniques. This entails a gain of infrastructure capacity.

Concerning maritime transport, the recovery of a growth of international exchanges leads to the use of large-scale container ships which recover an operation balance due to their low energy consumption to the transported ton at moderate speed (20/21 knots) in a context of high oil price.

In this scenario, this environmental constraint of the price of a CO₂ ton is applied to all ships, including feeder ships, thus entailing a renewal of the fleet and a reflection on less-consuming and less-polluting motorization systems. This reflection on the use of new maritime technologies also applies to Ro-Ro ships for direct services between the countries. The building of these ships gets industrialised, with new standards making the purchase less costly. A significant progress margin exists both on the level of costs and of technical and environmental efficiency, as already experienced by container ships.

● Commercialisation

Two new services are implemented : the Roro as “Motorway of the Sea” and the rail with the intermodal service offer.

The new RoRo services offer grow when the transport costs are able to challenge those of the road, thus allowing the development of maritime motorways and concerns especially:

- services between Southern and Eastern European countries (Spain, Italy, France, Greece),
- services between Southern countries of the Mediterranean,
- Services north-south from one hand on the east of the Mediterranean (Turkey, Near East, East Europe) and on the other hand the Maghreb and Europe to the west.

The supply of inter-modal services takes the form of a veritable supply of combined transport services, integrating maritime and railway, for long distance transport, as an alternative to the road. The opening up of the railway systems, pursuant to reforms undertaken in the sector, serves as an incentive for such a targeted supply due to an increase in regional exchanges.

● Market regulation

Market regulation affects the behaviour of the players and the development needs. The enforcement of standards concerns the new principles of taxation and pricing to promote alternative modes, and this, via the taxation of the CO₂ emitted, and the internalisation of external costs for the pricing of the infrastructures.

Results of scenario 3

Impact on traffic

● International transport

The total volume of international exchanges is around 1.650 million tons (Mt), that is, 24% higher than for the second scenario (S2). The growth of this traffic with respect to the baseline year 2005 is considerable, it being around 5.5% per year due to economic growth rates that are higher than those applied in the “globalised” scenario.

Exchanges between the SEMCs increase significantly, passing from 1.2% to 3.3% of the total exchanges, with an unprecedented annual growth rate of around 11%.

This share remains, however, a small one; indeed, it remains difficult to contain the attraction of emerging countries, especially that of the countries of South and East Asia, for the SEMCs, compared with the attraction of EU countries, whose demographic and economic growth rates are slower.

Table 9 Volume of exchanged goods into 2025 Scenario 3

	%	10 ⁶ tons	Annual growth
Intra Med	19		
<i>EU Med-EU Med</i>	10	161	2.0 %
<i>EU Med-SEMCs</i>	6	104	3.6 %
<i>SEMCs-SEMCs</i>	3	54	7.7 %
EU non Med-SEMCs	9	143	4.0 %
Asia-26	40		
<i>EU-Asia-26</i>	39	638	6.3 %
<i>SEMCs-Asia-26</i>	2	28	4.0 %
Other	32	519	3.7 %
Total	100	1646	4.4 %

Source: Plan Bleu

Transit and exchanges with “extra Mediterranean” countries remain quite high, with 81% of the exchanges, leaving—here, again—a mere 19% for intra-Mediterranean traffic. It is still the Europe – Asia connection, accounting for around 40% of the total Mediterranean traffic, which reports the most significant growth in traffic volume, at an annual growth rate of 7.6%

● Domestic transport

In this scenario, the total volume of road traffic in the SEMCs increases by a modest 3.8%/year to reach 722 billion tkm. This growth, being less rapid than that of maritime traffic, is due to a more dynamic railway transport policy. Railway traffic reports a high growth rate of 9%/year, passing from 27 billion to 148 billion tkm, which amounts to 121 billion tkm claimed from the road and explains why road traffic into 2025 should fall below that of the first scenario (S1).

Thus, the contribution of this scenario lies mainly at the local and national level of the SEMCs, by shifting part of the road traffic to the railway.

Energy and environmental impact

It seems that a oil barrel at 150\$ (value of 2005) and a carbon tax at 100€/ton, for a 20-year time frame, would not alter to any significant extent the distribution of exchanges in a context of buoyant economic development, the production and consumption forces being so determinant. Nevertheless, a more costly

energy and a much more stringent policy in matter of emissions standards would be conducive to a more satisfactory energy and environmental balance for all transport modes. In order to appreciate the related impact, the cost of 100€/ton of CO₂ has been assimilated to an additional cost of 60\$/barrel⁸ which would bring the oil barrel to a price of 210\$ (value of 2005).

With a energy consumption/ energy price elasticity of -0.3 in the long term, the rise of the price of the barrel from 50\$ to 210\$ would result in a decrease by 60 % in unit consumption. This proportion can be achieved by 2025 based on a combination of the technological, organizational and behavioural aspects. Thus, with a maritime traffic that would grow threefold, consumption and emissions would increase by a factor of a mere 1.2 with respect to 2005.

For land transport, a higher energy price partly justifies the competitive advantage of the railway with respect to the road, the other factor being the railway productivity gain. Accordingly, one may assume that, with a road traffic passing from 342 billion to 722 billion TK and a fuel consumption elasticity of -0.35 connected with the professionalisation of the sector and the massification margin—based on larger sized trucks—, unit consumption would be reduced by 67 % for a traffic that grows by a factor of 2.1, that is an increase in consumption and CO₂ road emissions by a factor of 0.7 less than for 2005, which is satisfactory in view of climate change concerns; these figures need, however, to be complemented by the emissions of the railway transport which depend on the type of traction (electric or fossil) and of the energy used for electric traction.

This scenario in which public policy has allowed the railway mode to significantly improve the situation from a sustainable development perspective consolidates the predominance of maritime exchanges with Asia. This scenario—which would represent a “Integrated Mediterranean”—highlights, in fact, an accelerated globalisation.

Synthesis of the results of the non-bulk transport scenarios and port supply prospects

Results of non-bulk transport

Maritime traffic growth would report accelerated rates ranging from a doubling to a tripling of the volumes transported with respect to 2005 (factor of 1.9 to 2.9).

⁸ 1 barrel emits 0.42 tons CO₂; since 3 tons CO₂/TOE and 7.2 barrel/TOE, if we have 100€/ton CO₂, this yields 42 / barrel, that is around 60 \$/barrel

Land transport is connected with the growth of maritime traffic. The proportions are slightly higher due to a consideration of the distances (TK). Simulations reveal an accelerated growth by a factor of 2.1 and 2.3, for road transport, in the first two scenarios, together with a stabilisation for railway traffic. Scenario three (S3), a quite dynamic one, manages to contain the road transport growth factor at 2.1% and multiplies railway traffic by 5.5. This scenario (S3) reveals that a good connection of ports to the railway network helps capture road traffic, this relationship being furthered by the high oil and CO₂ price, and helps ease the saturation of port cities by facilitating goods transit

Table 10 Comparison of the growth factors of goods exchanges in the Mediterranean

Growth factor	Baseline 2005	S1	S2	S3
Maritime traffic (ratio in tons)	1.0	1.9	2.2	2.9
Road traffic (ratio in tkm)	1.0	2.1	2.3	2.1
railway traffic (ratio in tkm)	1.0	1.0	1.0	5.5

Source: Plan Bleu

In the three scenarios considered, Asia remains by far the main trade partner and, consequently, the main origin of non-bulk transport. Thus, the share of intra-Mediterranean traffic would pass from 25% in 2005 to 19% in the third scenario (S3) and that of traffic with Asia would pass from 28% to 40%.

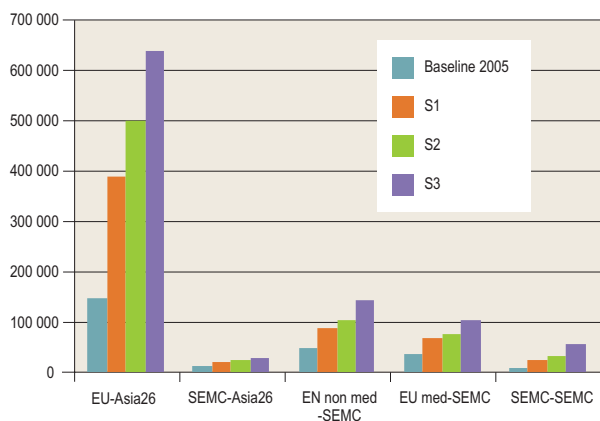
Table 11 Distribution of Intra-Med and Asia non-bulk maritime traffic, according to the scenarios

Traffic share 2025	Intramed	Asia
Baseline	25%	28%
S1	20%	35%
S2	19%	38%
S3	19%	40%

Source: Plan Bleu

Even in the case of the third scenario (S3), assuming significant port investments, intra-Mediterranean exchanges remain quite low, compared with exchanges with Asia, and do not modify the status of the Mediterranean as “transit sea”.

Figure 6, worked out based on the complete results of Table 9, reveals the increasing weight of maritime transport of the EU-Asia relation with respect to all other relations.

Figure 6 Volume of exchanged goods into 2025
(in thousand tons/ year)


Source: Plan Bleu

This little change in the predominance of Asia-bound exchanges is due to the fact that the logic of production costs of goods outweighs by far that of transport costs. Besides, transport in connection with Asian countries is often cheaper than Mediterranean transport due to a massification of large-size container ships and shorter dwell times. Thus, economic growth consolidates the exchanges already in place, which an operational improvement of the ports and of their connection facilitates and which higher energy costs do not affect.

Table 12 Results of the simulation for 2025

	baseline scenario 2005	S1	S2	S3
MARITIME	Million tons/year (bi-directional)	Annual growth		
EU-Asia26	148	5.0%	6.3%	7.6%
SEMCs-Asia26	11	3.2%	4.0%	4.6%
EU non med-SEMCs	47	3.2%	4.0%	5.7%
EU med-EU med	97	1.4%	2.0%	2.6%
EU med-SEMCs	37	2.9%	3.6%	5.3%
SEMCs-SEMCs	7	6.6%	7.7%	10.8%
Total maritime non-bulk		3.3%	4.1%	5.5%
LAND	Million tons/year (bi-directional)	Evolution annuelle		
Road traffic	342	3.8%	4.2%	3.8%
Railway traffic	27	0.0%	0.0%	8.9%

Source : Plan Bleu

The prospective study reveals that traffic growth in connection with Asia will be dominant, irrespective of the scenario under consideration. It is not certain that an improvement of the organisation of maritime transport would constitute, by itself, an alternative to the ongoing containerization-based massification. The third scenario (S3) predicts a development

of the “motorways of the sea” which remains too insufficient to capture a portion of the flows with Asia. The development of hubs or of container ports capable of receiving the larger sized ships requires detailed consideration insofar as it consolidates the massification dynamics that promotes connections with Asia.

A more drastic scenario of a re-focusing of exchanges on intra-Mediterranean relations thus seems to be fundamental for the time frame 2025, if the objective is to make of maritime transport a factor of regional integration. Such a scenario assumes that the economies of the SEMCs should act as complementary with those of the European countries. Mediterranean countries are also called upon to come closer together in order to adopt a common position aimed at protecting the Mediterranean region both in environmental terms and in terms of transport “quality”.

Is there a port overcapacity risk?

In the wake of the accelerated growth of international containerisation in the past few years, the SEMCs have engaged a process of seeking to scale up reception capacity via port reforms and infrastructure projects. The Regional Transport Action Plan for the Mediterranean (RTAP) of the Euro-med transport project has identified several actions likely to ease the impediments to exchanges and to boost the productivity of transport modes. It proposes to enhance procedures, border transit and load/ unload productivity. Ports would seek a productivity that should gear them towards a privatisation of a management that is professionalisation-oriented and that is increasingly concentrated in the hands of leading operators (*Box 2*).

A regular monitoring is made on the infrastructures by a group of Euro-Mediterranean senior staff. Some part of the port projects (*Annex 4*) scheduled by the countries are presenting on an infrastructures’ priority list given by the RTAP.

The works of the Ocean Shipping Consultants allow a comparison between demand forecasts and those of port capacity for 2015, keeping the growth rates observed over the past ten years. Table 10 reveals that, in the West Mediterranean⁹ capacity will amply meet demand with a infrastructure utilisation rate of

⁹ Southern and eastern Spain, Mediterranean France, Morocco, Algeria.

78%. In Central Mediterranean¹⁰, this rate will rise to 89.6%. It is in the East Mediterranean and Black Sea¹¹ that capacity might be short of the demand, with a utilisation rate of 112.4%, though this over-utilisation is especially connected with a high traffic growth in the Black Sea.

Box 2 Major port operators	
Presence of major container terminal operators in European and Mediterranean container ports (early 2006)	
APM Terminals	Rotterdam, Bremerhaven, Zeebrugge, Dunkirk, Aarhus, Algeciras, Gioia Tauro, Constantza, East Port Said, Tangiers
Eurogate	Hamburg, Bremerhaven, Gioia Tauro, Ma Spezia, Livorno, Ravenna, Cagliari, Lisbon, Rijeka, Ust Luga, Tangiers
Hutchison Ports	Felixstowe, Thamesport, Rotterdam, Gdynia, Barcelona, Alexandria
DP World	Southampton, Tilbury, Shellhaven, Antwerp, Le Havre, Marseilles, Constantza, Yarmouk
PSA Corporation	Antwerp, Zeebrugge, Flushing, Genoa, Venice, Mersin
Source: Ocean Shipping Consultants	
Specialised terminals of major container carriers - Status of European and Mediterranean container ports (early 2006)	
Maersk (APM Terminals)	Rotterdam, Bremerhaven, Zeebrugge, Dunkirk, Aarhus, Algeciras, Gioia Tauro, Constantza, East Port Said, Tangiers
Evergreen	Taranto
Cosco	Antwerp, Naples, East Port Said
CMA/CGM	Antwerp, Zeebrugge, Le Havre, Marseilles, Tangiers, Marsaxlokk
MSC	Antwerp, Bremerhaven, Marseilles, Las Palmas, Valencia, Tangiers, Genoa, La Spezia, Naples, Venice, Ambarli
Source: Ocean Shipping Consultants	

On the whole, the Ocean Shipping Consultants forecasts predict an increase in capacity by a factor of 2.2, within a period of 10 years only, while the trend scenario (S2) predicts an identical increase in traffic (x 2.2), though over a 20-year period.

These forecasts have been reckoned based on data previous to the mid-2008 crisis and are revealing of a projection of a “globalisation” scenario type. They help estimate the demand for which major operators need to position themselves with their expertise and capital.

¹⁰ Italy, Malta, Slovenia, Croatia, Serbia and Montenegro, Tunisia.

¹¹ Greece, Rumania, Bulgaria, Ukraine, Black Sea part of Russia, Georgia, Turkey, Cyprus, Israel, Lebanon, Syria, Mediterranean Egypt.

Each project is backed by hypotheses of high traffic growth; in reality, however, the growth of flows will be distributed among structures that will have become more numerous, if they materialize. Accordingly, the growth rates for each of the projects should be lower than those reported over the past ten years.

Table 13 Forecasts of growth in demand and port capacity into 2015 (million TEU/year)

		2005	2010	2015
West Mediterranean	Capacity	12.67	23.74	30.78
	Demand	10.51	16.81	24.03
	Utilisation	82.9%	70.8%	78.1%
Central Mediterranean	Capacity	15.53	24.42	29.37
	Demand	12.06	18.18	26.32
	Utilisation	77.7%	74.5%	89.6%
East Mediterranean and Black Sea	Capacity	13.37	25.50	29.21
	Demand	12.30	21.22	32.83
	Utilisation	92.0%	83.2%	112.4%

Source: Ocean shipping consultant

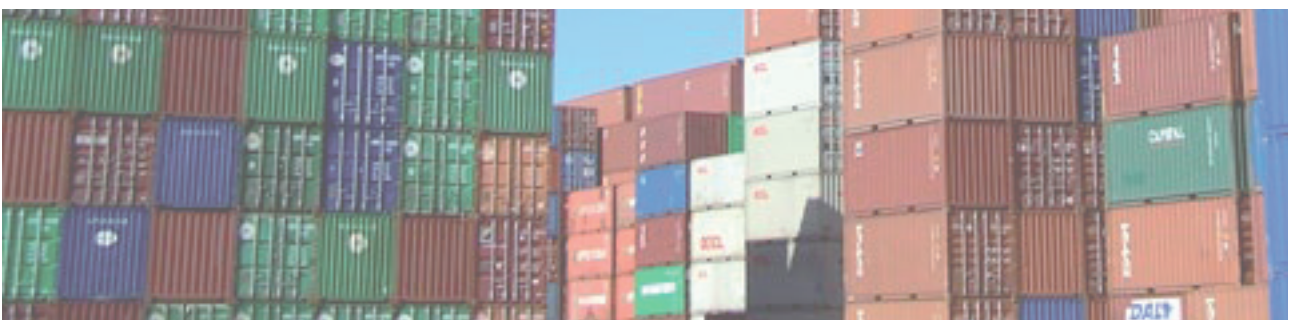
Three other overcapacity risk factors may be identified. They are:

- Economic slowdown: With the crisis, the International Transport Forum already notes a 4.8% decline of container traffic in Hong Kong in 2008.
- Avoidance of the Mediterranean: Intense competition between transport operators leads several ships to opt for a transit via the Cape of Good Hope, the transit cost via the Suez Canal being higher than the marginal cost of the extra distance.
- Infrastructure gigantism: The race to have infrastructures likely to receive super container ships requires physical port characteristics (deep water port), as well as equipment and handling concentrations that exceed the needs of the SEMCs. Besides, the logic of hubs implies significant additional handling that impacts the sizing of the installations. Such transshipments would account for 43%¹² of the total container handling operations in 2015.

The foreseeable impacts of a port over-capacity could prove to be significant: flows and organisations would be maintained at an activity level that justifies the initial investments by reducing prices to marginal cost. This marginal cost would then generate a traffic

¹² Study entitled “European and Mediterranean Containerport Markets to 2015”, by Ocean Shipping Consultants limited

that would not exist if prices were applied based on average cost. This also would contribute towards the use of transport for goods that could be produced locally. This transport dumping situation reduces the possibility of internalising external costs. Companies would tend to practice prices that ensure “minor balance” with a minimal integration of depreciation. In this context, the motorways of the sea could provide a solution, though a partial one, by helping towards a better distribution of loading/unloading sites and a reduction of the land portion of the route, that is, limit the use of highways.



Box 3 Motorway of the Sea

The European Union has used the term “Motorways of the Sea” to designate the maritime connections whose purpose was to shift part of the heavy goods traffic from the road to the sea. Its objective was to relieve congestion on major European trunk roads—chief among which is mountain transit—, as well as reduce pollution and promote sustainable development. This consists in loading full trucks or their trailers aboard Ro-Ro ships in order to cover part of the route which they previously covered by road.

These motorways are in keeping with the will of the European Union to facilitate—as from the 1980s—free exchange between its members, and this by harmonising transit documents for heavy trucks and goods crossing its internal borders, starting with a reduction of administrative formalities to a single form before a full lifting of controls. This policy belongs under such a project as TEN-T (Trans-European Transport Networks) which allows inter-connection between the various national networks and the creation of trans-European connections for the various transport modes (road, rail, air, sea, inland navigation...).

This concept was used formally for the first time in 2001 in the official report of the European Commission on its transport policy for the time frame 2010. In 2004, the addition of Article 12b to the TEN-T programme showed the formal incorporation of the “Motorways of the Sea” project in the European transport policy.

The European Union has subsidised, and continues to subsidise, maritime connections likely to achieve economic sustainability via such programmes as Marco Polo, MoS (Motorway of the Sea) and, quite recently, Medamos II. Two connections between France and Spain have recently been inaugurated.

While this “Motorways of the Sea” concept has not aroused a strong enthusiasm among ship-owners or logistics operators, there is a much utilised connection between Trieste and Istanbul which attests to the return likely to obtain from such a type of service.

The recent report by Senator Henri de RICHEMONT, submitted to the French State Secretary in charge of Transport, helps take stock of this type of service and outlines the conditions for the success of such future “Motorways of the Sea”.

Indeed, this report points out that this type of service requires government intervention at project launch and during the early years of operation, which gives enough time to private players to appreciate the extent of its relevance and incorporate it in their logistic organisation. It is also important to penalise the road user according to its external costs in order to ease the supremacy of the road.

The “Motorways of the Sea” concept remains still flexible. As part of its adaptation to the Mediterranean context, it would not consist necessarily in shifting road traffic to maritime transport, but rather in facilitating exchanges between the two rims of the Mediterranean via daily and efficient connections where formalities would be extremely reduced.

Lessons learnt

Three major conclusions may be derived from this prospective work:

1. the marked predominance of maritime traffic with Asia is not likely to change in any significant manner, unless the large-scale port infrastructure policy were to be revised;
2. transport-related measures promoting the railway mode will help ease the congestion of the road network in the event of a economic recovery, sustained in this regard by high energy and CO₂ costs;
3. the increase in energy and CO₂ costs should check the increase in energy consumption, without, however, affecting maritime traffic.

Two levels of intervention are likely to help reduce transit traffic and mitigate its impacts.

Upstream of the transport sector

This would consist, on the one hand, in control over energy demand and, on the other hand, in a consolidation of the Mediterranean productive system:

- **To reduce fossil energy consumption, promote the production of renewable energy and optimise the energy supply**, especially, of the more consuming countries and of the importing countries. The Mediterranean occupies a central position in energy transport; accordingly, any measure allowing a reduction of the consumption of energy products—be it in the USA, for instance—would directly translate into a reduction of transport in the Mediterranean. Any energy production that taps local potential would also contribute in reducing importation. Finally, any energy transport via a fixed connection (oil pipeline, gas pipeline, electric cable) would help reduce the number and size of liquefaction and re-gasification plants in the ports. The Plan Bleu report entitled “Infrastructures et développement énergétique en Méditerranée : perspectives 2025/ Infrastructures and Energy Development in the Mediterranean: Outlook 2025” outlines in detail the measures to be taken.
- **To consolidate a productive system closer to the consumption sites:** With a very low transport cost—made possible by massification—, investors would seek the lower production costs in India and in Asia. Bringing consumption and production closer can be effected on two levels: make transport more expensive according to distance, such as—for instance—by an internalisation of

environmental and social externalities, and—more broadly—by the build-up of a competitive Mediterranean productive system, based on the complementary nature of each country’s potential.

At the level of the transport sector

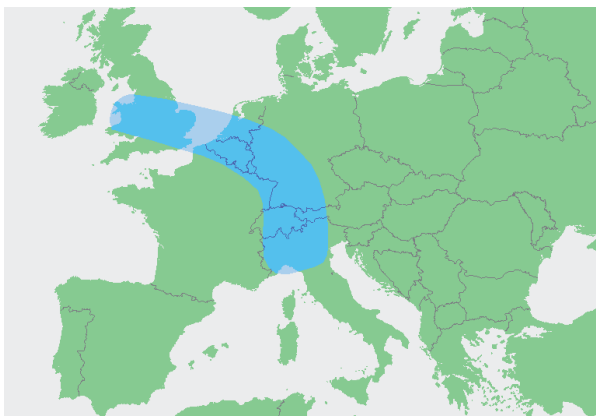
The measures related more directly to non bulk transport can be implemented not only on regional level but also on national level.

Regional level

- **Set out a Mediterranean transport plan** which would assess the real need for new hubs and deep water ports. The massification claimed mainly by Asia calls for equipments likely to receive increasingly larger sizes. This size of the equipments admittedly allows for economies of scale when the distances are significant (Europe-Asia). It becomes less judicious in a more integrated scenario where origin/destination distances are shorter and require better distributed access points. Hub logic leads to a concentration of this system in the hands of a few ship-owners and port operators, leaving less opportunity for domestic enterprises (*Box 2*). Besides, there is a great risk that the SEMCs would be led to invest in equipments exceeding their needs and which might, in the long term, be under-utilised. All this contributes in exacerbating the phenomenon of massification which it will be difficult to regulate in future. The plan may consider that the growth of transport is not an end in itself and that it might as well be possible to head for a stabilization of exchanges. This plan must integrate the concern that distance will be more costly with an internalisation of the externalities. The RTAP of the European Commission constitutes a first support for reflection that could be enriched with these elements by the Union for the Mediterranean (UfM).
- **Sustain the development of the “motorways of the sea”** which should improve their efficiency and their environmental impact based on a system integrating Ro-Ro service with medium-sized container ships providing fixed, direct and regular connections between the countries of the Mediterranean basin. Ro-Ro ships do not present as yet the same progress in terms of consumption as container-ships, but there is a significant scope for progress that the European Neighbourhood Policy seeks to stimulate and that the Union for the Mediterranean (UfM) could consolidate.

- **Enhance the efficiency of the various Mediterranean ports**, instead of considering new hubs. The task consists in stepping up port reforms in order to avoid concentration on the more efficient ports which would, then, be led to envision extensions. The European REG-MED programme¹³ has incepted a dynamics of facilitation of the procedures which it is important to consolidate.
- **Identify one or two major entry ports in southern Europe** among the existing ports: The Mediterranean does not really offer a southern entry to its demographic and economic concentration zone represented by the “blue banana”. Yet, this zone originates in northern Italy, where an intersection of the north-south and east-west European corridors is envisioned, which would allow an optimised distribution at the centre of Europe. This would spare Mediterranean transit and result in a large number of Asian products circumventing Europe. It does not seem to be logical that the main port for Mediterranean products should be Hamburg. Given the strategic stake of such ports, the Union for the Mediterranean (UfM) could bring in its contribution to a Europe that is initiating its reflection on an integrated maritime policy.

Map 11 Map of the demographic and economic “Blue Banana” concentration zone



Source: techno science.net

- **Instate a transit fee** that might constitute the financial component of the mechanisms to be put in place and help finance the services (waste management, etc ...), as well as the controls, in a Mediterranean that is considered as a vulnerable crossroads. The recent decision taken by France to create a Exclusive Economic Zone (EEZ) could be

¹³ REG-MED is a research work under the 5th European Union Research Framework Programme, in cooperation with the Western Mediterranean Transport Ministers' Group (GTMO), intended to facilitate flows in the West Mediterranean.

a first step in this direction. If the Mediterranean countries were to create such zones over 200 miles off the coasts, such as allowed by this mechanism, the whole Mediterranean would be covered. By devolving certain competencies of the EEZ targeted at ensuring the protection of marine natural resources in matter of exploitation and exploration, it would be relevant to consider the instatement of a “transit fee” intended to internalise the costs incurred by the pollution due to maritime traffic, or of a fuel tax, and generate incomes for consolidating environment protection. (*Annexe 5*)

National level

- **Develop logistic platforms and inter-modality** of the ports with the railway network: this would allow servicing the country's inland areas marked by an accelerated urbanisation trend, especially on the coastline. The third scenario (S3), helps avoid a road thrombosis which would impede the development of exchanges. The countries have a decisive role in the positioning and development of such platforms which would help enhance significantly the efficiency of the ports and avoid large sizing of the installations.
- **Consolidate the environmental standards of land transport:** This would help not only reduce local pollution, but also accelerate the modernisation of the fleet based on EURO standards. The few subsidies still granted to fuel should rapidly be transferred to the railway and to inter-modality. For the countries that are more engaged in a shift from road to rail, river and sea, the introduction of a carbon tax would induce an acceleration of this transfer while generating the necessary means.

The development of hubs and seep sea ports contributes in increasing exchanges with Asia at the expense of inter-Mediterranean exchanges, and leads to the risk of a costly overcapacity. The conditions for a contribution by transport to Mediterranean integration are, therefore, to be sought via a strengthening of proximity exchanges. The size of the equipments, as well as the volume of the port investments, should adapt to distances compatible with the Mediterranean. This involves an improvement of the operation of the existing installations. In matter of public policy in the transport sector, priority should be granted to the development of North-South relations via regular and rapid connections, with the densification of the port network allowing a better distribution of intra-Mediterranean flows, themselves becoming more competitive and safer than exchanges with Asia.

References

- AFD (2008). *Cadre D'intervention sectoriel transport, projet 1*.
- EIB, EuroMed (2008). *Développement d'un réseau de plates formes en Méditerranée*.
- EuroMed Transport (2005). *Blue Paper: towards an integrated Euro-Mediterranean transport system*.
- EuroMed Transport (2007). *Regional Transport Action Plan (RTAP)*.
- International Transport Forum, ECMT (2009). *Trends in the Transport Sector 1970-2007*.
- ISTED (2008). *Transport and sustainable development*.
- Lloyd's Marine Intelligence Unit (2008). *Study of Maritime Traffic Flows in the Mediterranean Sea*. Study implemented for REMPEC.
- NESTEAR (2001-2007). Researches and studies:
- CORRIMED : projet européen sur une première approche par corridors en Méditerranée
 - RETRAMED : projet européen sur des programmes de recherche en Méditerranée
 - REDWEG : projet européen sur les corridors prioritaires dans la zone du processus de paix (Jordanie, Egypte, Israël, Territoires Palestiniens)
 - INFRAMED : identification de projets prioritaires dans la Méditerranée Occidentale, travail réalisé dans le cadre du GTMO (Groupe Transport en Méditerranée Occidentale) et financé par l'UE
 - DESTIN : planification des infrastructures dans la Méditerranée Occidentale
 - REGMED : facilitation et réglementation dans la Méditerranée
 - MEDATEN-T : développement de corridors et évaluation de projets en Méditerranée, projet européen
 - INTEGRATION de l'UE : intégration des chaînes logistiques de transport RoRo et conteneurs
 - Projet TINA Turquie : développement de réseaux de transport en Turquie
 - MEDIGATE : développement de plates formes logistiques dans le sud de l'Europe et les PSEM
- Ocean Shipping Consultants (2006). *European and Mediterranean Container Port Markets to 2015*.
- Plan Bleu, Reynaud C. et al. (1996). *Transport et environnement en Méditerranée : enjeux et prospective*. Paris, Economica. (Les Fascicules du Plan Bleu n°9).
- Plan Bleu (2010). *Infrastructures and sustainable energy development in the Mediterranean : Outlook 2025*. (Blue Plan Papers 6)
- Richemont, Henri de (2009). *Rapport Autoroutes de la Mer à Monsieur Dominique Bussereau, secrétaire d'Etat chargé des transports*.
- Rodrigues-Malta Rachel (dir.) (2008). *Méditerranée, n°111 : Villes portuaires, horizon 2020*.
- UNCTAD (2008). *Review of Maritime Transport*.
- UNEP/MAP-Plan Bleu (2009). *State of the environment and development in the Mediterranean - 2009*. Athens, UNEP/MAP-Plan Bleu.

Annexes

Annex 1 Statistical annexes

Geographical frame

Commercial exchanges

Vessel traffic

Quantity of non-bulk exchanges (baseline year and trends)

Land transport traffic in ton/kilometer (baseline year and trends)

Annex 2 Socio-economic hypotheses

Annex 3 Non-bulk transport simulation method + Estimate of exchanges matrices in tonnage

Annex 4 The Regional Transport Action Plan for the Mediterranean (RTAP) and other regional undertakings

Annex 5 The Exclusive Economic Zones : A frame for a transit fee in the Mediterranean?

Annexe 1: Statistical annex

Geographical frame

Regions / Groups of countries

EU	European Union countries : Austria, Belgium, Bulgaria, Cyprus, Czech republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United kingdom
EU Med	Cyprus, France, Greece, Italy, Malta, Slovenia, Spain
EU non Med	EU without EU Med countries
Europe	UE+ Andorra, Gibraltar, Iceland, Liechtenstein, Norway, Switzerland
Balkans	Albania, Bosnia Herzegovina, Croatia, Macedonia, Montenegro, Serbia
NMC	North Mediterranean Countries: Balkans, Cyprus, France, Greece, Italy, Malta, Slovenia, Spain
SEMC	South and East Mediterranean Countries: Algeria, Egypt, Israel, Lebanon, Libya, Morocco, Palestinian Territories, Syria, Tunisia, Turkey
MED	Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestinian Territories, Syria, Tunisia
Middle East	United arab emirates, Bahrain, Iraq, Iran, Kuwait, Oman, Qatar, Saudi arabia, Yemen
Africa	African countries except Algeria, Egypt, Libya, Morocco, Tunisia
CIS	Commonwealth of Independent States: Armenia, Azerbaijan, Belarus, Kazakhstan, Kirghizstan, Moldavia, Mongolia, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
America	American countries
Asia26	Afghanistan, Bangladesh, Brunei, Bhutan, Cambodia, China, Hong-Kong, Indonesia, India, Japan, North Korea, South Korea, Laos, Macao, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Philippines, Pakistan, Singapore, Sri Lanka, Thailand, Taiwan, Viet Nam
Asia	Asia26 + Middle East+ Oceania

Commercial exchanges

EU27 trade with the rest of the world

EU27 imports in billion €										
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Africa (non Med)	30,28	40,12	44,81	42,6	41,08	41,15	48,49	53,63	57,63	68,84
America	223,1	282,19	280,42	256,3	230,95	240,19	254,55	282,68	298,56	314,89
Asia	280,76	375,45	353,77	346,97	362,52	410,85	472,34	542,71	584,4	613,63
CIS	44,11	76,51	79,95	80,53	86,71	105,89	140,23	177,92	185,59	230,02
SEMCs+Balkans	59,33	84,11	87,2	84,99	87,56	99,47	120,57	140,12	147,92	165,04
Other countries	105,72	134,32	132,99	125,58	126,45	129,97	143,39	155,73	159,91	172,61
Extra-EU27	743,3	992,7	979,14	936,97	935,27	1027,52	1179,57	1352,79	1434,01	1565,03

EU27 exports in billion €										
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Africa (non Med)	29,23	35,16	37,79	36,77	37,73	39,64	44,83	50,87	56,31	61,91
America	256,72	323,3	334,2	329,83	300,89	313,07	339,51	367,82	366,55	363,27
Asia	175,52	225,33	237,2	239,92	241,43	270,1	296,38	324,63	350,52	368,05
CIS	25,57	33,83	45,26	49,12	53,78	66,68	81,58	105,81	128,64	149,6
SEMCs+Balkans	81,9	102,81	95,63	101,65	103,27	120,85	133,48	144,21	157,74	174
Other countries	114,14	129,31	134,63	134,61	132,14	142,61	156,94	166,76	181,74	189,72
Extra-EU27	683,08	849,74	884,71	891,9	869,24	952,95	1052,72	1160,1	1241,5	1306,55

Source: Eurostat

SEMCs trade share with EU27

% of imports from EU	2000	2001	2002	2003	2004	2005	2006	2007	2008
Algeria	5,817	7,427	7,046	8,065	8,705	9,364	10,464		
Egypt	5,000	3,516	2,502	2,587	3,418	3,819	4,519		
Morocco	7,349	7,217	7,525	8,039	8,832	9,705	11,986		
Tunisia	6,656	72,510	7,024	7,197	7,381	7,847	9,044		
Israel	17,066	14,704	12,823	13,636	14,153	14,363	15,079		
Lebanon	3,105	3,403	3,113	3,307	3,017	2,821	2,543		
Palestinian territories	289	188	142	172	202	180	183		
Syria	1,359	1,419	922	912	930	1,793	2,716		
Turkey	31,125	27,108	30,430	38,746	42,202	47,282	49,993	48,469	37
% exports to EU	2000	2001	2002	2003	2004	2005	2006	2007	2008
Algeria	15,051	12,885	12,924	13,928	20,559	22,835	19,140		
Egypt	1,726	1,193	1,642	1,856	2,489	3,714	3,419		
Morocco	6,057	6,136	5,919	5,925	6,637	7,295	7,716		
Tunisia	5,082	5,743	5,753	6,494	6,759	7,190	8,775		
Israel	9,963	8,333	8,007	8,756	10,039	10,397	11,683		
Lebanon	178	207	170	161	171	218	293		
Palestinian territories	2	9	6	6	8	2	13		
Syria	3,427	4,292	3,095	2,332	2,842	3,540	3,664		
Turkey	17,008	17,071	17,512	17,475	17,032	16,920	16,998	14,460	48

Source: Euromediterranean statistics, 2009 edition and Eurostat (Turkey)

Vessel traffic

Evolution trends of traffic and vessel size per type of vessel, 1997-2006

Vessel type	Mediterranean Port Calls				Mediterranean Transits			
	Number of Med Port Calls	Increase 1997-2006 (%)	Average DWT (T)	Increase 1997-2006 (%)	Number of Med Transits	Increase 1997-2006 (%)	Average DWT (T)	Increase 1997-2006 (%)
Chemical Tanker	20,038	65	15,643	107	745	98	28,179	15
Container	34,666	71	27,604	55	2,522	85	69,135	34
Crude Oil Tanker	6,045	41	125,618	26	508	147	160,050	-31
Dry Cargo	89,645	1	10,842	16	4,534	-8	38,860	31
Lng Tanker	1,199	33	59,713	61	55	1,733	72,382	27
LPG Tanker	6,291	-4	11,291	33	197	9	30,037	2
Other	5,694	30	1,501	-35	252	70	5,028	-25
Other Tanker	3,011	-63	6,924	-79	35	-81	36,796	-65
Passengers/Pass. RoRo	75,350	23	5,677	31	592	-5	15,078	9
Product Tanker	10,599	-24	20,197	51	372	102	48,585	69

Source: © Lloyd's MIU

10-year forecasts

The traffic forecasts conducted by Lloyd's concern the traffic volumes of Mediterranean ports, as well as the transit vessel passages, and apply to the various types of goods within a closer time frame: 2016. They derive from an empirical observation of the trends over a 10-year period, taking into consideration national and international economic variables, the size of the vessels and their utilisation, inter-port competition and the adaptability of the vessels to adopt different routes.

It thus emerges that the number of port calls in Mediterranean ports would increase by 18%, with a high growth for chemical tankers (+45%), containers (+42%), LNG (+35%), Ro-Ro services (+33%) and oil (+27%). For the transport of dry loose goods (dry cargo), the growth rate (+16%) would be connected with the increase in vessel size. As regards transit, the forecasts predict a more steady increase by 23% for the whole types of vessel, with high growth for oil (+70%) and chemical tankers (+54%).

Mediterranean port calls and transits forecasts, 2006-2016

Vessel Type	Mediterranean Port Calls			Mediterranean Transits		
	2006	2016	% Increase	2006	2016	% Increase
Chemical Tanker	20,038	29,018	45	745	1,149	54
Container	34,666	49,109	42	2,522	3,467	37
Crude Oil Tanker	6,045	7,061*	27	508	863	70
Dry Cargo	89,645	86,685	-3	4,534	4,758	5
Lng Tanker	1,199	1,613	35	55	73	33
LPG Tanker	6,291	6,050	-4	197	212	7
Other	5,694	7,682	35	252	436	73
Other Tanker	3,011	3,000	0	35	15	-57
Passengers/Pass. RoRo	75,350	100,423	33	592	389	-34
Product Tanker	10,599	8,000	-25	372	724	95
TOTAL	252,538	299,251	18	9,812	12,087	23

* Excludes approx. 2500 potential transits resulting from extra capacity required to ship Balck Sea and Caspian oil

Source: ©Lloyd's MIU

Quantity of non-bulk exchanges (baseline year and trends)

"Non-bulk" traffic (1000 tons/year)

Baseline 2005

Origin/Destination	EU (non Med)	EU (Med)	SEMCs	MIDDLE EAST	ASIA-26	OTHER	Total
EU (non Med)			34,586	11,783	42,431		88,800
EU (Med)		96,550	22,524	6,316	11,897	23,869	161,155
SEMCs	12,370	14,730	6,967	6,710	3,351	7,703	51,831
MIDDLE EAST	2,034	1,687	1,844				5,564
ASIA-26	62,100	30,015	8,126				100,241
OTHER		111,457	44,605				156,062
Total	76,505	254,439	118,651	24,808	57,679	31,572	563,654

Sources : Comext, Comtrade

Projection into 2025 of "Non-bulk" traffic (1000 tons/year)

Scenario S1

OID	EU (non Med)	EU (Med)	SEMCs	MIDDLE EAST	ASIA-26	OTHER	Total
EU (non Med)			65,185	21,753	86,839		173,777
EU (Med)		128,559	39,583	11,207	15,599	37,852	232,800
SEMCs	23,604	25,802	25,146	12,857	6,341	14,705	108,455
MIDDLE EAST	3,638	2,963	3,419				10,020
ASIA-26	192,731	93,725	15,169				301,625
OTHER		198,757	82,157				280,914
Total	219,973	449,806	230,658	45,817	108,780	52,557	1,107,591

Sources: EuroMED Transport Project; NESTEAR

Projection into 2025 of "Non-bulk" traffic (1000 tons/year)
Scenario S2

OID	EU (non Med)	EU (Med)	SEMCs	MIDDLE EAST	ASIA-26	OTHER	Total
EU (non Med)	825,149	294,208	75,599	25,553	104,234	138,600	205,385
EU (Med)	219,343	143,715	46,066	13,057	16,789	43,079	262,706
SEMCs	27,362	29,816	30,765	15,027	7,437	17,206	127,614
MIDDLE EAST	4,213	3,421	4,006				11,640
ASIA-26	253,378	125,457	17,748				396,583
OTHER	399,009	231,041	95,972				327,013
Total	284,953	533,450	270,155	53,637	128,460	60,285	1,330,941

Sources: EuroMED Transport Project; NESTEAR

Projection into 2025 of "Non-bulk" traffic (1000 tons/year)
Scenario S3

OID	EU (non Med)	EU (Med)	SEMCs	MIDDLE EAST	ASIA-26	OTHER	Total
EU (non Med)	984,115	349,985	104,592	29,811	124,428	165,492	258,830
EU (Med)	255,979	160,672	63,224	15,136	18,037	49,085	306,154
SEMCs	37,921	40,529	53,706	17,463	8,674	20,016	178,308
MIDDLE EAST	4,849	3,931	4,466				13,246
ASIA-26	329,521	166,043	19,757				515,321
OTHER	449,518	267,380	106,773				374,153
Total	372,292	638,554	352,518	62,409	151,138	69,101	1,646,013

Sources: EuroMED Transport Project; NESTEAR

Synthesis of results

Ton/year	baseline	S1	S2	S3	Factor	baseline	S1	S2	S3
SEMCs-SEMCs	6,967	25,146	30,765	53,706	SEMCs-SEMCs	1.0	3.6	4.4	7.7
Export SEMCs	44,864	83,309	96,849	124,602	Export SEMCs	1.0	1.9	2.2	2.8
Import SEMCs	111,684	205,512	239,390	298,812	Import SEMCs	1.0	1.8	2.1	2.7
Total non-oil product	163,515	313,967	367,004	477,120	Total non-oil product	1.0	1.9	2.2	2.9

Source: Nestear

Land transport traffic in ton/kilometer (baseline year and trends)
Results of land traffic

Country	tk "National road (>70km)" in million ton-kilometre				tk "National railway " in million ton-kilometre			
	2005/2006	2025	2025	2025	2005/2006	2025	2025	2025
	estimated	S1	S2	S3	observed	S1	S2	S3
Algeria	41,101	75,058	80,919	81,974	1,471	1,471	1,471	6,703
Egypt	83,567	160,163	172,670	176,782	3,917	3,917	3,917	13,221
Israel	9,940	18,819	20,274	21,834	1,149	1,149	1,149	1,149
Jordan	4,058	10,219	11,009	11,856	1,024	1,024	1,024	1,024
Lebanon	3,439	6,539	7,045	7,587				
Libya	6,164	14,078	15,173	12,751				3,596
Morocco	30,464	55,716	60,067	60,202	5,919	5,919	5,919	10,450
Syria	15,928	34,190	36,833	38,476	2,256	2,256	2,256	3,446
Tunisia	8,456	18,154	19,557	21,062	2,067	2,067	2,067	2,067
Turkey	138,693	333,994	359,634	290,330	9,078	9,078	9,078	105,855
Total	341,812	726,931	783,182	722,854	26,881	26,881	26,881	147,512

Source: Nestear

Annex 2: Socio-economic hypotheses

Demographic and economic growth, trend scenario 2006-2025

Trend scenario 2006-2025		
	Annual demographic growth rate (%)	Annual DGP growth rate (%)
Spain	0.2	1.9
France	0.3	1.7
Italy	0.0	1.7
Greece	0.1	2.3
Cyprus	0.5	2.6
Malta	0.2	3.1
Slovenia	-0.1	2.0
Croatia	0.2	2.0
Bosnia-Herzegovina	0.5	2.0
Serbia & Montenegro	0.7	2.0
Albania	0.8	2.7
NMCs	0.2	1.8
Turkey	1.0	4.7
Syria	1.6	4.0
Lebanon	0.3	4.0
Palestinian territories	1.9	3.3
Israel	0.8	4.0
Egypt	1.4	3.0
Libya	1.8	4.0
Tunisia	1.2	4.0
Algeria	1.0	3.0
Morocco	1.1	3.0
SEMCs	1.2	4.0
TOTAL	0.8	2.2

Sources: IEA 2007 from 1971 to 2005 ; and OME (MEO) estimates & questionnaires for 2010-2020; World Bank

Population

On average, population would increase by 1.2%/year in the SEMCs and by 0.2%/year in the NMCs. Urban concentration—a modelling component—would increase by 2%/year in the SEMCs.

The Map 12, derived from the urban growth rates table, gives the situation projected into 2030 which reveals a high concentration in the East Mediterranean and in the Maghreb.

GDP for NMCs and for SEMCs

Country GDP growth data are derived from World Bank estimates; they make up the hypotheses of scenario 2 which are identical to those of Euromed transport and of the study's energy component.

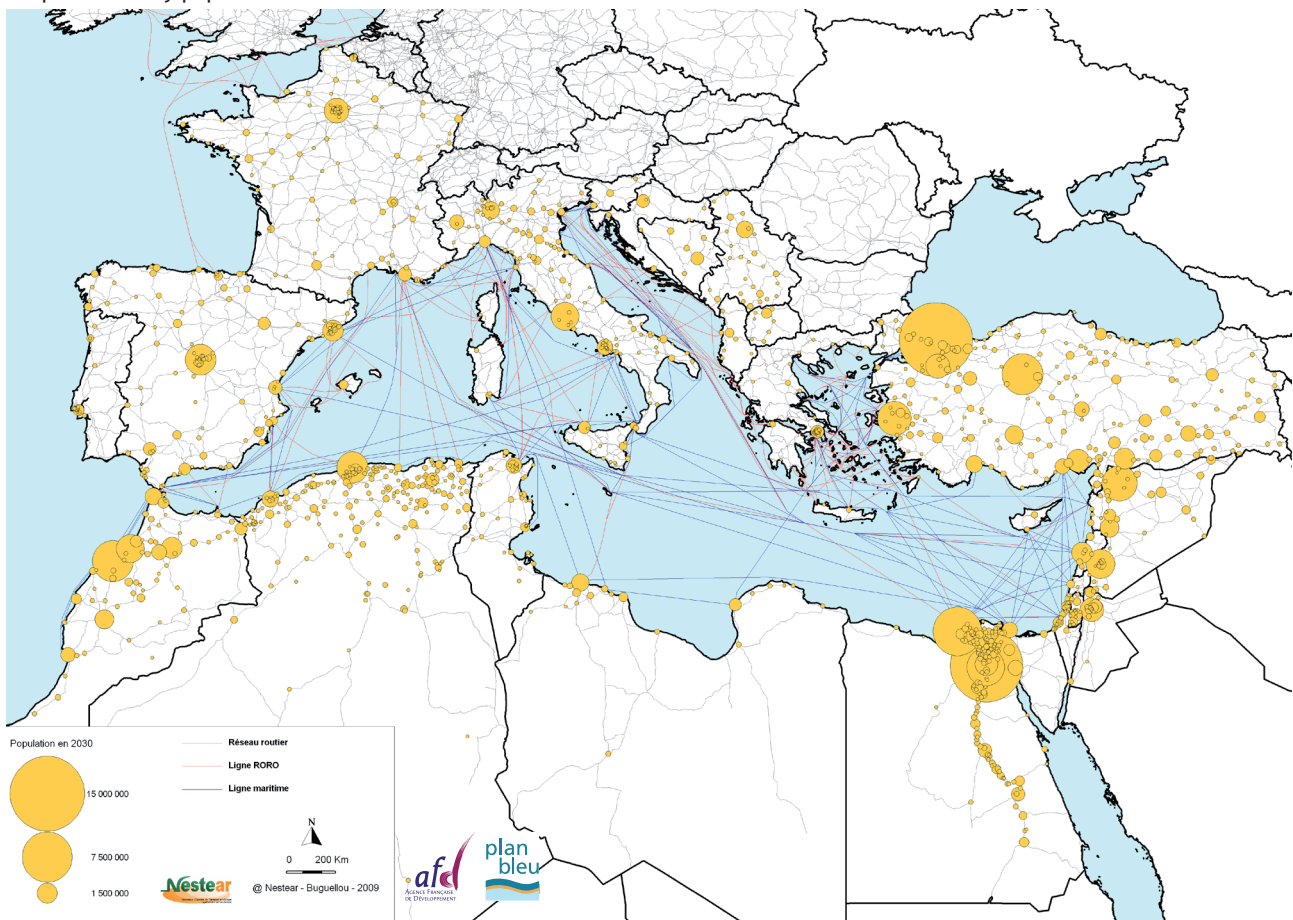
Thus, the average GDP growth of scenario 2 stands at +1.8% for the NMCs and at 4% for the SEMCs.

Scenario 1 has retained the hypotheses of scenario 2, with a reduction by 0.3% of GDP for the northern Mediterranean countries and by 1% for the southern Mediterranean countries. As for scenario 3, it has been assumed that regionalisation would stimulate the economies and would increase GDP by 0.3% for the northern countries and by 1% for the southern countries.

Energy and CO₂

As energy and climate change become key concerns within the framework of a sustainable development of human activities, transport naturally finds itself at grips with these concerns, it being fundamentally dependent on oil. Accordingly, the role likely to be played by a rise in the barrel of oil and the introduction of a carbon tax has been brought on board in the reflection. The scenarios have, therefore, been designed based on a price of the oil barrel reaching 50\$, 100\$ and 150\$, respectively, as well as on a measure that would entail the payment of 100€ for the emission of a ton of CO₂ in scenario 3.

Map 12 City population in 2030



Source: Nestear mapping, from DCW source

Urban growth

	Demographic growth rate 2005 to 2030 (%)	Growth of urban population 2005 to 2030 (%)	Percentage of urban population in 2005 (%)	Percentage of urban population in 2030 (%)
Algeria	36,1	64,8	60,0	72,6
Cyprus	25,9	38,6	69,5	76,5
Egypt	44,6	85,0	42,3	54,1
Jordan	52,1	62,2	79,3	84,6
Lebanon	23,8	29,4	88,0	92,0
Malta	8,0	11,4	92,0	94,9
Morocco	33,5	64,7	58,8	72,5
Syria	57,4	87,2	50,3	59,8
Tunisia	22,5	41,7	64,4	74,4
Turkey	28,3	48,1	67,3	77,7
Palestinian territories	93,7	116,9	71,9	80,5
Total	38,0	63,8	57,3	68,0

Source: Nestear

Annex 3: Non-bulk transport simulation method + Estimate of exchanges matrices in tonnage

Non bulk transport simulation method

This method has been developed in the process of various research and studies works conducted by NESTEAR on the Mediterranean, and more particularly under the MEDA TEN T project.

The variables considered involve, on the one hand, the socio-economic variables and those exogenous to the transport system, corresponding to the hypotheses given upstream and, on the other hand, the transport variables.

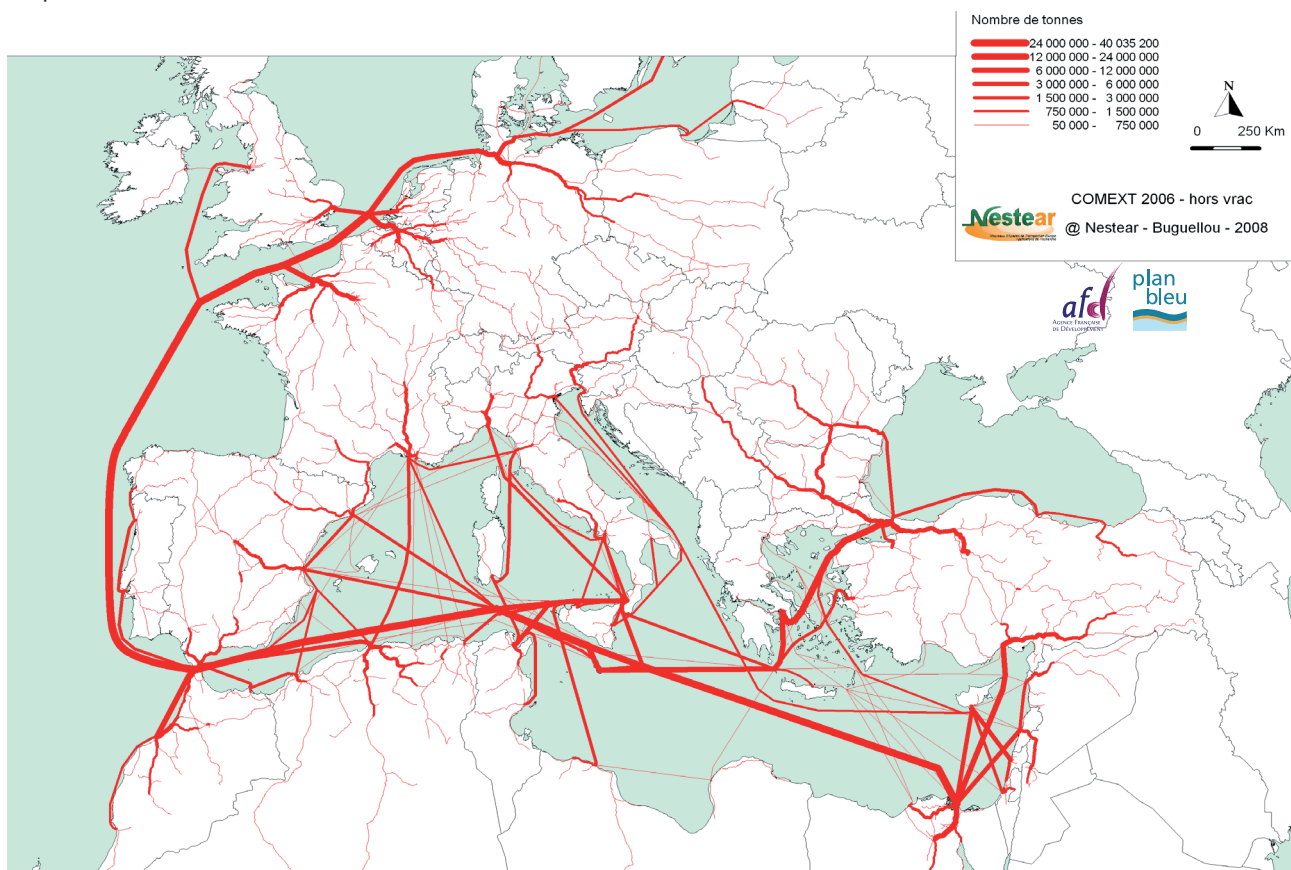
The socio-economic variables involve:

- Demography, with data on immigration, metropolisation, coastline settlement;
- GDP;
- Foreign trade, with a distribution into EU, Mediterranean, Asia, rest of the world;
- Extent of openness of foreign trade, differentiated by zone.

The transport variables involve the following four levels:

- The infrastructure, taking into consideration the pre- and post- port forwarding, and incorporating the infrastructure projects envisioned in the RTAP (Regional Transport Action Plan) of Euromed transport;
- Operation of the networks and equipment which determines the efficiency of transport and the competitiveness of the solutions. Technological advances are significant, improving both technical efficiency and environmental impact. The way the loads are massified also has a significant bearing on operating costs. Thus, between the “globalisation scenario” (S2) and the “regionalisation scenario” (S3), a distinction is made between Ro-Ro system and containerisation;
- Commercialisation, or players’ interaction, supplying a more or less efficient and integrated service, mainly via major operators, together with professionalisation which becomes a decisive

Map 13 EU-MED traffic in 2006



Source: Nestear, NEST-MED simulation

factor in the context of competition, liberalization and opening up to private capital;

- The regulation, or rules, concerning exchanges, including taxation, pricing, customs clearance and market access.

These variables help provide a transport organisation model which takes into account the players' actions.

These variables are, then, used in two models integrating maritime and land modes.

The generation/ distribution model is a gravity model applied to inter-country relations, for international exchanges, and to relations between population "poles", for domestic exchanges.

The allocation/ contribution model which, in view of the maritime services and the land interconnections, distributes the flows according to a minimal transport cost comprising a kilometric component and a productivity component. The following map illustrates the status in 2006 of the exchanges and their penetration in the land environment.

Transport cost

The generalised cost (taking into consideration the operational cost and time) is currently highly determined by the dwell time related to the operation of the ports and their procedures. It might be expected that, with the reforms concerning the ports and the opening up of economies, this time would be reduced and that the operational cost, related to distance, would give more importance to the energy item of the operating costs.

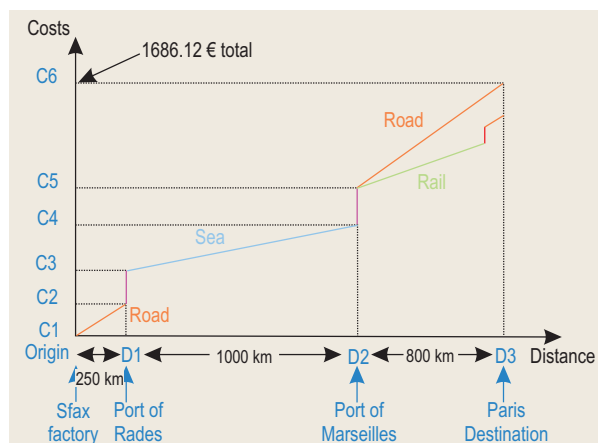
It appears that the immobilisation of ships for technical and/or administrative reasons exceeds the crossing time. The other factor relates to reliability in the forwarding of goods and in their handling which often represents such a high cost as to cause ship-owners to prefer more remote, but more reliable, ports. It is this first difficulty which the Euromed REGMED transport report has sought to ease.

In the model used by Nestear, the cost function is identified for each transport operation that includes time and the various items of toll, equipment productivity and energy price. This function is used for allocation to the Mediterranean inter-modal network.

The whole chain cost is illustrated in the following graph for a shipment from Sfax (Tunisia) to Paris.

One observes that the cost of land transport increases rapidly with the distance, notably for the road, and

Figure 7 Chain cost



Source: Nestear (based on information transmission Factory in Sfax)

that railway transport is competitive when the offer exists and the land transport distance is sufficient. Thus, the main conditions for a shift from road to rail relate to distance and traffic volume to justify frequency and sufficient train fill.

As regards the maritime portion, total transport time is a key component of the cost. It appears that voyage time is not the most limiting factor and often accounts for less than a quarter (1/4) of the total, if not less (6 % Tunis –southern European port, and 5 % Algiers –southern European port), as illustrated by the following two tables which give a breakdown of the transport stages of containers from northern and southern European ports to the main ports of the SEMCs.

Energy cost is a component of transport operational cost that varies according to the modes:

- Road: 25%
- Rail: 7,5% electricity powered (15% diesel powered)
- Sea: between 30 and 60%, but quite sensitive to speed: if speed drops from 22.5 to 18 knots, the energy cost item falls by 30% (and it increases by 50%, if the speed rises to 25 knots).

Port trans-shipments are fairly independent from energy price. A doubling up of the energy price will, thus, have—on the whole maritime and road chain—an impact ranging between +20 % and +25 %. Nevertheless, it should be remembered that, with simple measures of speed reduction, especially in maritime transport, a doubling up of the energy price would cause the transport cost to rise by 10 to 15 %.

Container transport time, north-west EU origin (in days)

	Cairo	Algiers	Amman	Beirut	Rabat	Istanbul	Jerusalem	Damascus	Tunis
Stuff Container	1	1	1	1	1	1	1	1	1
Transport to Port	1	1	1	1	1	1	1	1	1
Await vessel	3	3	3	3	3	3	3	3	3
Load vessel	1	1	1	1	1	1	1	1	1
Voyage time	8.3	4.5	9.6	9	3.2	8.3	9	10.5	5.5
Discharge vessel	1	1	1	1	1	1	1	1	1
Dwell time	10	20	23	20	9	12	10	20	14
Transport to receiver	1	1	1	1	1	1	1	1	1
Unstuff container	1	1	1	1	1	1	1	1	1
Suez Canal			2						
TOTAL	27.3	33.5	43.6	38	21.2	29.3	28	39.5	28.5

Source: Euromed transport

Container transport time, south EU origin (in days)

	Cairo	Algiers	Amman	Beirut	Rabat	Istanbul	Jerusalem	Damascus	Tunis
Stuff Container	1	1	1	1	1	1	1	1	1
Transport to Port	1	1	1	1	1	1	1	1	1
Await vessel	3	3	3	3	3	3	3	3	3
Load vessel	1	1	1	1	1	1	1	1	1
Voyage time	4.2	1.5	5.1	4.2	3.4	4.3	4.2	4.8	15
Discharge vessel	1	1	1	1	1	1	1	1	1
Dwell time	10	20	23	20	9	12	10	20	14
Transport to receiver	1	1	1	1	1	1	1	1	1
Unstuff container	1	1	1	1	1	1	1	1	1
Suez Canal			2						
TOTAL	23.2	30.5	39.1	33.2	21.4	25.3	23.2	33,8	24,5

Source: Euromed transport

Estimate of exchanges matrices in tonnage

For transport, it is convenient to formulate the exchanges matrices in “tonnage”, based on data that are generally formulated in “value” in such international data bases as Comtrade.

The method used by NESTEAR is the following, conducted in 3 steps:

- Reckon the value per ton of products via a disaggregation of the exchanges in value, for around a hundred product clusters.

A fine disaggregation allows, in fact, the obtaining of fairly homogeneous products clusters for which a value per ton can be assigned.

- Seek out the value per ton in the COMEXT base. The COMEXT base is focused on EU exchanges, but it provides data in terms of value and of tonnage which can, then, be crosschecked.

Again, working on a detailed nomenclature that is the same for COMEXT and Comtrade helps avoid too significant a skew that would be due to the specificity of European trade in global trade.

- Reconstruct a tonnage-based matrix. For this matrix, the breakdown per product is maintained. However, synthesis work is conducted by clustering the products into 3 categories which fairly correspond to the forms of transport logistic organisation: transport of loose goods (with identification of oil products), transport of products that are carried mainly in “load unit” (container) and transport of other products, called “general cargo” which are quite often also carried in load unit in maritime transport.

Annex 4: The Regional Transport Action Plan for the Mediterranean (RTAP) and other regional undertakings

RTAP

The Barcelona process, in 1995, led to the identification of the EuroMed Transport project. Steered by the European Commission, the latter helped draw up a Blue Book, as well as a Regional Transport Action Plan for the Mediterranean Region 2007-2013 (RTAP). This Action Plan includes priorities for the establishment of an integrated transport system likely to harmonise the procedures, reform the entities in charge of the various transport systems and enhance the safety and monitoring of the flows. The approach is in line with the mechanism of the Neighbourhood Policy of the European Union.

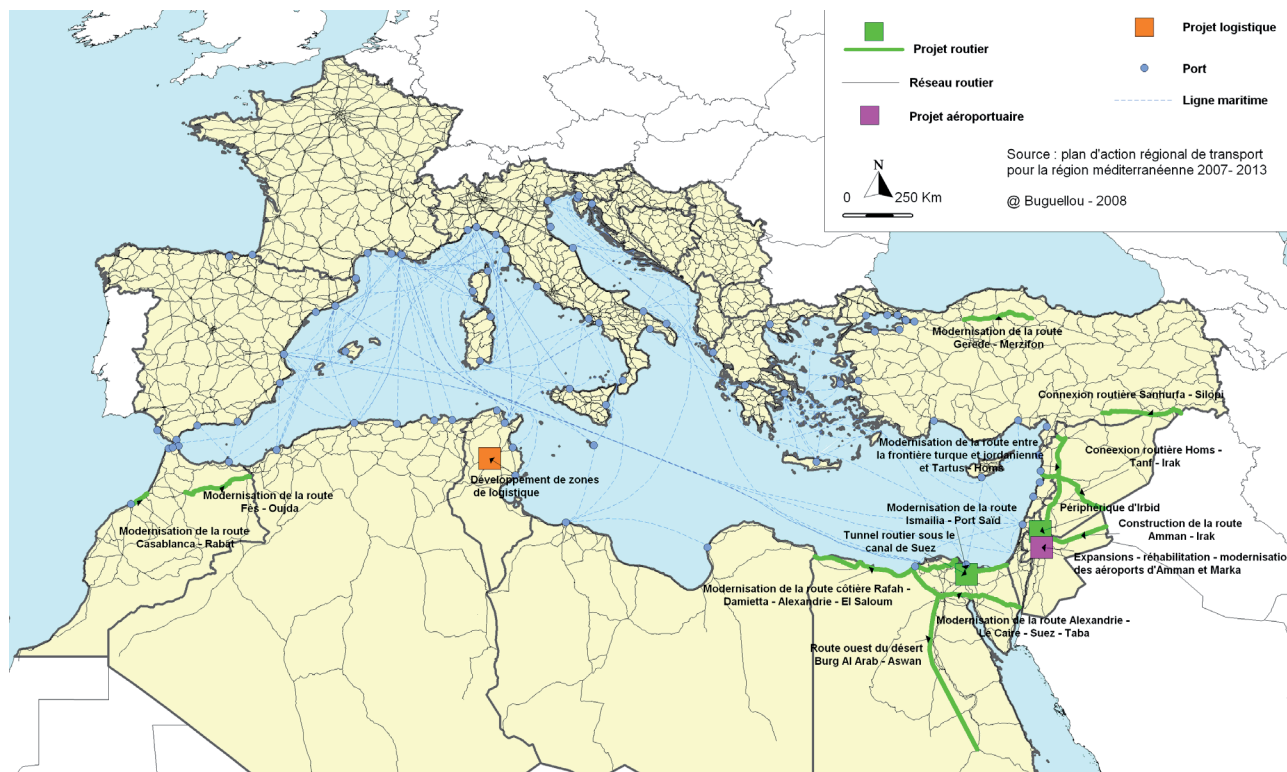
In matter of infrastructure, a preliminary design of transport corridors and a pipeline of projects due for 2010 and 2013 (extract from the Regional Transport

Action Plan for the Mediterranean Region 2007-2013) were proposed, based on which pre-feasibility studies have been conducted. The annex of the RTAP gives a detailed overview of the status of the projects and their cost estimate per type of infrastructure and per country. In this preliminary estimate, where not all structures are evaluated, the sum of road investments (2 billion €) for the time frame 2010 would already account for a third of the total.

In order to better identify these projects that have been retained by all participants from both south and north (Transport Ministries), Plan Bleu has drawn up the following maps locating the infrastructure projects.

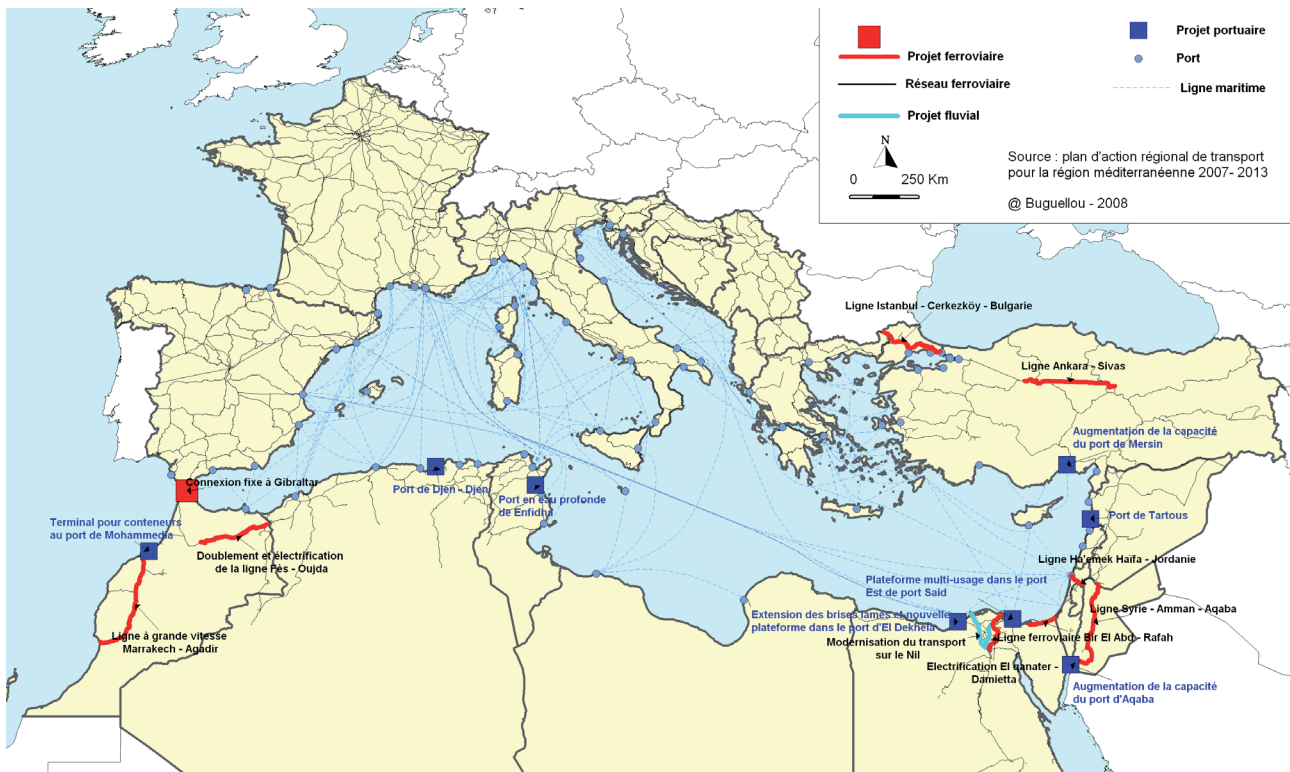
This RTAP mechanism is complemented by Europe’s will to create the “motorways of the sea” via the Neighbourhood Investment Facility (FIV).

Map 14 Location of the RTAP road and airport infrastructures



Sources: Nestear and Plan Bleu, based on Regional Transport Action Plan for the Mediterranean Region 2007-2013

Map 15 Location of the RTAP railway, port and river infrastructures



Sources : Nestear and Plan Bleu, based on Regional Transport Action Plan for the Mediterranean Region 2007-2013

Other undertakings

The RTAP port infrastructures map shows but a few large-scale infrastructures, while several scale-ups are envisioned in most ports and, more particularly, extensions planned in the short term and which will have significant impacts.

Among the containerisation infrastructures, one may mention the following :

- A container terminal in Mohamedia for purposes of shifting there the container transport that saturates the port of Casablanca;
- Development of the port of Djen Djen in Algeria with a view to making of it the country's grain hub, as well as a container split terminal via the construction of a transshipment quay extending over an area of 65 hectares;
- The deep water port of Enfidha in Tunisia which forms an integral part of a mega-project of industrial zone and which is set to ensure the deployment of new-generation container ships. The transshipment potential of this port will range, according to the study, between 1.2 million TEU and 3.9 million TEU by 2020 (and 5 million by 2030), according to competition in the Mediterranean region. It

aspires to capture 15 to 25% of the transshipment market in the Mediterranean;

- Extension of Port Said in Egypt which had a handling capacity of 2.5 million TEU in 2006/2007 and is set to handle 5.1 million as from 2011. This hub allows a split to the west towards Gibraltar and the Bosphorus. More generally, Egypt envisions to pass from 4.25 million TEU in 2006 to 11.3 million in 2015, according to a government study;
- Port Tartous in Syria will scale-up its capacity from 30 000 to around 500 000 TEU;
- Extension of the port of Mersin which will pass from 400 000 TEU to 4.4 million TEU: This port is envisioned to be part of the future "motorways of the sea"; but other projects exist in Turkey outside of the PART list, such as the construction of the container port of Candali (2 million TEU) which will serve as a hub and ease the pressure on the port of Izmir. More generally, Turkey envisions to pass from 3.1 million TEU in 2004 to 12.5 million TEU in 2015;
- Pursuing the extension of TangerMed which is likely to reach 8 million containers by 2015, while traffic stood at 1 million TEU in 2008.

Extract from Regional Transport Action Plan for the Mediterranean Region 2007-2013

Source: Euromed transport

Annex A: Infrastructure priorities in HLG Report

Project No.	Title	Country / Entity	Project Status	Length (km)	Estimated Cost (EUR million, 2004 prices) unless indicated	EIRR	Comment
Short-term (to start prior to 2010)							
PORTS							
TR-B4	Capacity increase (phase I) of port of Mersin	Turkey	(PS)	-	350		
EG-10	Multipurpose platform East Port Said Port	Egypt		-	60		Will be studied within the "Port Said East Master Plan" study. The study is tendered and anticipated to start shortly
	Port of Tartus	Syria	(FS)	-	250		Private company to invest EUR 39 million. The capacity of the port will increase from 30.000 containers to 477.000 containers over the next ten years
	Capacity increase (phase I) of port of Aqaba	Jordan	FS	-	100		
	Deep water port in Enfidha	Tunisia	FS	-	1400		
DZ-1-sea	Port of Djen-Djen	Algeria		-	Unknown		BOT scheme under negotiation
MA-6-ge	Container terminal at Mohamedia port	Morocco	PS	-	224 (2006 prices)	14.1%	
RAILWAYS							
TR-B3	Railway line Istanbul-Cerkezköy-Bulgaria border	Turkey		250	484		
TR-B2	Railway line Ankara-Sivas	Turkey		475	968		
	Ha'emek railway (from Haifa to Jordanian border)	Israel	(PS)	75	362 (2007 prices)		
MA-5-ra	High-speed railway line Casablanca-Marrakech (phase I)	Morocco		250	Unknown		
ROADS							
TR-A2	Road upgrading Gerede-Merzifon	Turkey		300	300		
	Road upgrading Turkey border-Jordan border, including branch Tartus-Homs	Syria	(FS)	900	756		Three alternatives have been proposed with lengths between 429 and 464 km and with initial cost of EUR 730 million After completing the feasibility study, a tender for a PPP project will be launched.

Project No.	Title	Country / Entity	Project Status	Length (km)	Estimated Cost (EUR million, 2004 prices) unless indicated	EIRR	Comment	
	Irdib ring road	Jordan		<100	Unknown			
	Road upgrading Alexandria-Cairo-Suez-Taba	Egypt	See below					
EG-1-ro	* Alexandria-Cairo		(PS)	200	129		Under study Implementation is planned for 2007-2012 using BOT scheme	
	* Cairo-Suez			150	Unknown		To start implementation 2007/2008 from public budget	
EG-5-ro	* Suez-Taba			250	Unknown		Not economical	
	* Road upgrading Ismailia-East Port Said	Egypt		75	71		To start implementation 2007/2008 from public budget	
MA-r-ro	Upgrading of road Casablanca-Rabat	Morocco	(PS)	75	72 (2006 prices)			
MA-2	Upgrading of road Fes-Oujda	Morocco		320	696			
Long-term (to start after 2010)								
PORTS								
	Capacity increase (phase II) of port of Mersin	Turkey		-	Unknown			
	Capacity increase (phase II) of port of Aqaba	Jordan		-	Unknown			
	Extension of existing breakwater and new platform of El Dekhela Port	Egypt		-	30		To be studied with "Alexandria Middle Port" master plan	
INLAND WATERWAYS								
	Upgrading transportation through the river Nile (up to Cairo)	Egypt		200	25		Implementation ongoing	
RAILWAYS								
	Construction of railway line Syria border to Amman and Aqaba	Jordan	See below					
	* Amman-Syrian border			75	81			
	* Amman-Aqaba			300	832			
	Signalling system and station infrastructure Beni Suef-El Minya-Asyout	Egypt		250	252		Implementation to start 2007/2008	
	Fixed Gibraltar connection	Morocco		40	4500			
	High-speed railway line Marrakech-Agadir	Morocco		200	Unknown			
MA-3-ra	Doubling and electrification of the railway line Fes-Oujda	Morocco		300	80			
ROADS								
TR-A3	Road connection Sanhurfa-Silopi	Turkey		351	365			

Project No.	Title	Country / Entity	Project Status	Length (km)	Estimated Cost (EUR million, 2004 prices) unless indicated	EIRR	Comment
	Road connection Homs-Tanf-Iraq border	Syria	(FS)	370	560		Three alternatives have been proposed with lengths between 351 and 375 km and with initial cost of EUR 440 million After completing the feasibility study, a tender for a PPP project will be launched.
	Road construction Amman-Iraq border	Jordan		300	50		
Other projects of regional or national interest							
RAILWAYS							
	Electrification of Shebin El Qanater-Damietta railway line	Egypt	PS	179	104	8.0%	Implementation to start 2007/2008
EG-8-ra	Railway line Bir El Abd-Rafah	Egypt		125	101		Not economical
ROADS							
EG-3-ro	Upgrading of coastal road Rafah-Damietta-Alexandria-El Saloum	Egypt		1000	340		Implementation is planned for 2007-2012 using BOT scheme
	Road tunnel under Suez Canal	Egypt		<10	161		Not economical
	Burg Al Arab-Aswan western desert road	Egypt		900	400		Implementation is planned for 2007-2012 using BOT scheme
AIRPORTS							
	Airport – supporting air cargo	Jordan	PS	-	(100) Capacity sufficient until 2024		
	Airport – expansions, rehabilitation and modernization	Jordan		See below			
	* Amman passenger terminal			-	400		
	* Marka arrival terminal			-	Unknown		
	* Marka cargo facilities			-	100		
INTERMODAL							
	Development of logistics zones	Tunisia		6 zones	150		

TR = Terms of Reference issued
 (PS) = Pre-feasibility study in progress
 PS = Pre-feasibility study completed
 (FS) = Feasibility study in progress
 FS = Feasibility study completed
 CD = Completed design

Other regional cooperation initiatives in the field of transport

Besides the Barcelona Process, other institutions are engaged in opening up markets, creation of free trade zones and conclusion of transport agreements. The Mediterranean thus seems to be divided into sub-regions:

- The western Mediterranean, where the countries of southern Europe and the UMA countries have been meeting to cooperate in the field of transport within—for some ten years now—the initiative called GTMO (Transport Group in the Western Mediterranean);
- The eastern Mediterranean, which is rather more complex as it presents several influence zones:
 - influence of the Black Sea riparian countries which meet within the B.S.E.C (Black Sea Economic Cooperation),
 - influence of the Gulf countries and the Arab world which have a large investment capacity in the field of transport, as attested by their recent initiatives in the field of ports and airports,
 - influence of Turkey, which develops its exchanges not only with the EU but also with the entire Mediterranean countries, and which stands like a hub in its own right with regard to Central Asian and Caspian countries.

At UN level, and apart from the works of Plan Bleu, several regional bodies are acting towards the promotion of a long term transport development perspective:

- the “Economic Commission for Europe” of Geneva focuses on setting out policies for the development of trunk roads connecting Central Europe to Central Asia and, in particular, Turkey: first TEM (Trans European Motorways) initiative engaged back in the 1960s, then TER (Trans European Railways) initiative, back in the 1990s;
- ESCWA (Economic and Social Commission for Western Asia), which is based in Beirut, grouping the middle Eastern countries, and seeks to identify long term infrastructures plans for the various modes, as well as transport modernisation actions;
- ECA (Economic Commission for Africa) whose actions have been more limited, knowing that the Maghreb countries are granting increasingly greater attention to this cooperation with African countries, both with regard to land transport (development of transport trunk roads) or air transport (role of hubs vis-à-vis African countries).

Annex 5: The Exclusive Economic Zones : A frame for a transit fee in the Mediterranean?

Pollution of the marine environment is a major problem in the Mediterranean. The pollution induced by maritime traffic is partly responsible for this situation, even though the main sources are land-based. It is possible to better manage maritime traffic and, hence, the pollution generated thereby, by extending the scope of jurisdiction to the high sea, a scarcely regulated zone. Indeed, the Montego Bay Convention on the Law of the Sea authorises coastal States to extend their jurisdiction beyond their territorial waters by creating a Exclusive Economic Zone (EEZ)¹⁴ likely to extend to up to 200 miles off the coast. This zone is aimed at ensuring the protection of marine natural resources with regard to exploitation and exploration. In such a zone, it is possible to instate a “transit fee” intended to internalise the costs incurred by the pollution due to maritime traffic.

In view of the size of the Mediterranean, the establishment of their respective EEZ by the riparian States would be tantamount to submitting the whole maritime area to the jurisdiction of the riparian States. As the EEZ is not primarily targeted at environmental protection, it is possible, for the States, to relinquish certain rights due to the EEZ status, thus allowing for the creation of “special zones” clearly dedicated to the protection of the marine environment. As already provided by France¹⁵, the splitting of the EEZ would withhold only part of the rights of the EEZ of which principally: the conservation and management of natural resources (Art. 56 §1.2) and the protection and preservation of the marine environment (Art. 56 §1.b.iii), together with such other provisions of the Convention as cooperation among States bordering a semi-enclosed sea (Art. 123). Besides, States “*have the duty to protect and preserve the marine environment*”¹⁶ and are called upon to take measures aimed at protecting and preserving rare or fragile ecosystems, as well as the habitat of depleted, threatened or endangered species and other forms of marine life (Art. 194 §5).

The EEZ status confers upon coastal States “sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural

resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone [and have] jurisdiction [...] with regard to: (i) the establishment and use of artificial islands, installations and structures; (ii) marine scientific research; (iii) the protection and preservation of the marine environment.”¹⁷ The EEZ “shall not extend beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured”¹⁸ and, in this zone, “all States, whether coastal or land-locked, enjoy [...] freedoms of navigation and overflight and of the laying of submarine cables and pipelines [...], and other internationally lawful uses of the sea related to these freedoms [...] such as those associated with the operation of ships, aircraft and submarine cables and pipelines.”¹⁹

Above all, “The coastal State [...] shall ensure through proper conservation and management measures that the maintenance of the living resources in the exclusive economic zone is not endangered by over-exploitation.” “The coastal State and competent international organizations, whether subregional, regional or global, shall cooperate to this end.” “Such measures shall also be designed to maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield.”²⁰

With a view to instating a tax allowing an internalisation of the costs induced by pollution due to maritime traffic, the latter provisions must be connected with Article 194 §5 of the Montego Bay Convention which stipulates that “The measures taken in accordance with this Part shall include those necessary to protect and preserve [...] the habitat of depleted, threatened or endangered species and other forms of marine life.” As marine water is considered as the environment in which the marine natural resources exist, the preservation of marine water is likely to fall within the scope of the EEZ.

14 Montego Bay Convention on the Law of the Sea, 1982, Articles 55 to 75.

15 Law 2003-346, dated 15 April 2003, on the creation of a ecological protection area off the territory of the Republic.

16 Montego Bay Convention on the Law of the Sea, 1982, Article 192.

17 Montego Bay Convention on the Law of the Sea, 1982, Article 56.

18 Montego Bay Convention on the Law of the Sea, 1982, Article 57.

19 Montego Bay Convention on the Law of the Sea, 1982, Article 58.

20 Montego Bay Convention on the Law of the Sea, 1982, Article 61.

“The coastal State may, in the exercise of its sovereign rights to explore, exploit, conserve and manage the living resources in the exclusive economic zone, take such measures, including boarding, inspection, arrest and judicial proceedings, as may be necessary to ensure compliance with the laws and regulations adopted by it in conformity with this Convention.”²¹ Accordingly, the coastal State may also adopt a legislation instating a tax to which all ships crossing the EEZ would be subjected, as well as take coercive measures.

In order to be efficient, such a mechanism must be set up collectively. The Mediterranean riparian countries would need to discuss together and jointly delimit the EEZs. The next step consists in actual establishment of the tax on regional level. The States should, therefore, join in an international organisation, for instance, in order to work out the tax base, the methods of its collection, as well as the management of this new tax resource.

The delimitation of these zones must be effected according to the regulations stipulated by the Law of the Sea, that is, “*by agreement [...] in order to achieve an equitable solution.*”²² Once these zones have been delimited, the riparian States would need to devolve the tax management of their zone to a regional organisation. Their ultimate objective would be to maintain the jurisdiction they have over their economic maritime area, but to entrust the rights related to the management of the instated tax to an international body.

The purpose of such a tax is to internalise the costs incurred by the pollution of the marine environment due to maritime traffic. This would make it possible, at the same time, to have a certain influence on the number of ships crossing the Mediterranean and to obtain a new resource that would be specifically dedicated to environment protection, whether this relates to the restoration of the marine environment or to the services provided to these ships. The Union for the Mediterranean (UpM) is a particularly relevant forum for the effecting of such a measure as it would help bring on board the EU members in the discussion, as well as to have a “multidimensional” framework by combining economic policy and environmental policy. The instatement of a tax would, thus, benefit from a more global vision of maritime traffic by involving States that have major European ports, as the latter constitute the main destination of the ships crossing

the Mediterranean. Irrespective of the body chosen to manage the tax collection, its management must be conducted in a centralised manner by a regional body dedicated to the Mediterranean. Besides, in order for the tax to have the effect expected, the riparian States need in their totality to set up a EEZ and devolve the sovereign rights to a body entrusted with the management of the tax. A centralized management is indispensable.

Concerning the tax itself, as it is intended to internalise the costs of the pollution induced by maritime traffic, it may be envisaged to base the tax on the energy consumption of the ship, even though it may be problematic to base it on a parameter that is likely to change, as with the advent of fuels composed differently, for instance. Besides, energy consumption is not the only source of pollution of the marine environment that is harmful to the harvested marine species; sonars and certain fishing methods are, among others, culprit too. A lump sum tax may also be considered, though it would be less efficient, for—if it were to be incurred indiscriminately for all ships—it would advantage larger tonnage ships. Ideally, the tax could be a lump amount, but by brackets, in accordance with the size of the ships and the danger attendant upon their activity (fishing, dangerous cargo transport, for instance). The tax amount would thus be reckoned according to the ships’ “capacity to pollute”. Irrespective of the tax base chosen, the tax should be justified vis-à-vis the EEZ. The status of EEZ is aimed at the protection of the economic resources; therefore, the reflection needs to be based on the pollution of the marine environment—considered mainly as the natural habitat of living resources—due to ship transit. Accordingly, the objective is to maintain “*the populations of harvested species at levels which can produce the maximum sustainable yield.*”²³

Author : Isabelle Ravetllat (on internship at Plan Bleu)

21 Montego Bay Convention on the Law of the Sea, 1982, Article 73.

22 Montego Bay Convention on the Law of the Sea, 1982, Article 74.

23 Montego Bay Convention related to the Law of the Sea, 1982, Article 61.

Abbreviations and Definitions

bcm: billion cubic meter

DWT: "Dead Weight Tonnage" or heavy carriage corresponding to the total load that a ship can accommodate

GAFTA: Greater Arab Free Trade Area

GIIGNL: International GNL Importers' Group

MED: Algeria, Tunisia, Egypt, Israel, Jordan, Lebanon, Morocco, Palestinian Territories, Syria

MEDA: Algeria, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, Palestinian Territories, Syria, Tunisia, Turkey

NMCs: Northern Mediterranean Countries, comprising the Balkans, Cyprus, France, Greece, Italy, Malta, Spain

North range: ports of north western Europe (Hamburg, Rotterdam, Antwerp ...)

South range: Mediterranean ports of southern Europe

SEMCs: Southern and Eastern Mediterranean Countries, comprising Morocco, Algeria, Tunisia, Libya, Egypt, Israel, Lebanon, Syria, Turkey

TEU: Twenty Equivalent Unit

tkm: ton x km

TRAP: Transport Regional Action Plan for the Mediterranean Region (under the Euromed project)

WTO: World Trade Organisation

Feeder : medium size container ship which loads on, and unloads from, larger container ships

Hinterland : inland area concerned by the port's goods exchanges

Hub : large-scale port centre where goods are transhipped between vessels

Ro-Ro (Roll on - Roll off): ship used to carry loaded vehicles, via one or several access ramps

Table of illustrations

List of figures

Figure 1	EU imports/exports, 1999-2008 (billions €).....	11
Figure 2	SEMCs imports / exports, 2003-2006 (billions \$).....	12
Figure 3	Share of EU-SEMCs Imports / Exports, 2000-2008 (millions €).....	12
Figure 4	SEMCs-SEMCs imports / exports, 2003-2007 (millions \$).....	13
Figure 5	Modal split of goods transport in the Mediterranean between EU25 and Mediterranean countries (2004).....	13
Figure 6	Volume of exchanged goods into 2025 (in thousand tons/ year).....	34
Figure 7	Chain cost.....	48

List of tables

Table 1	Breakdown of maritime transport supply in the Mediterranean, 1997-2006.....	14
Table 2	Socio-economic.....	21
Table 3	Evolution of gas volume origin (billion m ³).....	22
Table 4	Evolution of energy products exchanges.....	23
Table 5	Primary energy consumption by source in the two scenarios (in Mtoe).....	23
Table 6	Volume of goods exchanged – Baseline year 2005.....	24
Table 7	Volume of exchanged goods into 2025 Scenario 1.....	26
Table 8	Value of exchanged goods into 2025 Scenario 2.....	30
Table 9	Volume of exchanged goods into 2025 Scenario 3.....	32
Table 10	Comparison of the growth factors of goods exchanges in the Mediterranean.....	33
Table 11	Distribution of Intra-Med and Asia non-bulk maritime traffic, according to the scenarios.....	33
Table 12	Results of the simulation for 2025.....	34
Table 13	Forecasts of growth in demand and port capacity into 2015 (million TEU/year).....	35

List of maps

Map 1	Oil flows in the Mediterranean, 2006 (millions tons).....	14
Map 2	Crude oil traffic in major Mediterranean ports - 2006.....	15
Map 3	Maritime container port transport (EU – Asia-26), 2005 (thousand tons/year).....	16
Map 4	Maritime container port transport (UE – Mediterranean), 2005 (thousand tons/year).....	16
Map 5	Maritime container volume of Mediterranean ports, 2005 (TEU ⁴).....	17
Map 6	Container capacity in Mediterranean ports of interest, 2007 (million TEU ⁴).....	18
Map 7	Container capacity in Mediterranean ports of interest, 2007 (million tons).....	19
Map 8	Population access to railway infrastructure (in km of infrastructure/1000 inhabitants).....	20
Map 9	Oil flows via the Mediterranean region (Mt).....	22
Map 10	Status and projects of gas infrastructures.....	23
Map 11	Map of the demographic and economic “Blue Banana” concentration zone.....	38
Map 12	City population in 2030.....	46
Map 13	EU-MED traffic in 2006.....	47
Map 14	Location of the RTAP road and airport infrastructures.....	50
Map 15	Location of the RTAP railway, port and river infrastructures.....	51

List of boxes

Box 1	Energy transport.....	22
Box 2	Major port operators.....	35
Box 3	Motorway of the Sea.....	36



Plan Bleu pour l'Environnement et le Développement en Méditerranée
15 rue Beethoven, Sophia Antipolis, 06560 Valbonne, France
+33 (0)4 92 38 71 30 - www.planbleu.org

