



PARLIAMENTARY ASSEMBLY OF THE MEDITERRANEAN
ASSEMBLEE PARLEMENTAIRE DE LA MEDITERRANEE
الجمعية البرلمانية للبحر الأبيض المتوسط

**2nd Standing Committee on Economic, Social and
Environmental Cooperation**

***Ad Hoc* Committee on Energy**

The Energy-Securing Strategy in the Mediterranean

Rapporteur: Hon. Mohamed Abou El Enein (Egypt)

***Report unanimously adopted during the IVth Plenary Session
On 24 October 2009 in Istanbul***

Introduction

The Mediterranean region has unique advantages. It is situated at a crossroad between three continents and civilizations; it is one of the richest regions in the world in terms of biodiversity, habitats, and landscapes, along with history, culture and vast resources.

In spite of its unique natural resources, this region is threatened by climatic change. We are now entering a New Energy Era, when energy security and the relation between energy development and climate change are under consideration. During this new era, the growing demand for energy exceeds the available sources, including fossil fuels. This has driven many nations to adopt policies and strategies for securing future energy supplies.

Furthermore, the global financial crisis has hit every country in the world and resulted in serious political, economic, social repercussions, the depth and range of which are unpredictable. The crisis impact moved from the cash to the real side of the economy, represented in the slowdown of global economic growth, world high unemployment rates, and global direct investment decline, in addition to a global decrease in energy demand and lower oil and gas prices. Though market conditions have begun to respond to the actions taken by the countries, the

extent of this crisis is still not known; thus it will affect the energy sector in the Mediterranean region.

The Mediterranean region has enormous potential for both conventional and renewable energy. Therefore, we have to think of the Mediterranean as a region of prosperity. The issue of energy, is not only a challenge, but also an opportunity and engine for development and cooperation, for promoting peace, environmental protection and for bringing together the people of the Mediterranean. To realize these objectives we have to work together, unite our efforts, and share our experiences. We have to coordinate between our markets and our strategies in order to build a Mediterranean Energy strategy, which is strong, effective and sustainable.

No doubt, continuous cooperation with regards to energy between Mediterranean countries will have positive long-term results. Cooperation for developing renewable energy in the Mediterranean should be intensified, either through financing, or optimally exploring the enormous potential for hydropower. The objective is to produce energy for export to Europe, which offers promising investment opportunities in the energy sector. A Mediterranean strategy for securing energy projects, including transportation and the storage of energy, is also required. Oil support services related to gas exploration and delivery should be considered. In addition, a series of research programs for wind, solar and biomass energies should be adopted to promote energy security in the Mediterranean region.

In this context, we present this report on “Securing Energy Strategy In the Mediterranean”:

First: The most important challenges facing energy security in the Mediterranean

- I. Energy and Global Financial Crisis
- II. Energy and Climate Change
- III. Securing Energy Sources and Sustainable Development

Second: Scenario for Present Mediterranean Energy Cooperation: Potential and Opportunities

- 1) Nordic Countries Win
- 2) Southern Mediterranean Countries Win
- 3) Supporting Elements for this Scenario
- 4) Converting the global financial crisis into an opportunity for Euro-Mediterranean cooperation in the fields of energy

Third: Proposed Energy Cooperation Strategy between the Two Sides of the Mediterranean

- 1) New Policies for the Regional Energy Market
- 2) Promoting Reliance on Renewable Energies
- 3) Cooperation in Solar Energy
- 4) Cooperation in the Field of Local Manufacturing of conventional and Renewable Energy Projects Equipment.
- 5) Creating a Balance between New Energy Production and Food Security
- 6) Legal Frameworks for Rationalizing Conventional Energy and Promoting Renewable
- 7) Non-traditional Mechanism Funds for Energy Enterprises
- 8) Efficient Energy Use
- 9) Nuclear Energy Cooperation

First: The most important challenges facing energy security in the Mediterranean

The World is witnessing a new era in energy. Countries are competing to secure energy sources, and concerns are growing about energy security, the relation between energy development, and climate change.

I. Energy and Global Financial Crisis

The oil and gas sectors were strongly impacted by the financial crisis. After the oil prices have soared up to record unprecedented levels in the summer of 2008, amounting to more than \$ 140 a barrel, we have witnessed a sharp decline at the same speed to below than 60 dollars a barrel. This had a number of consequences, which represent a major challenge for the energy sector in the Mediterranean region.

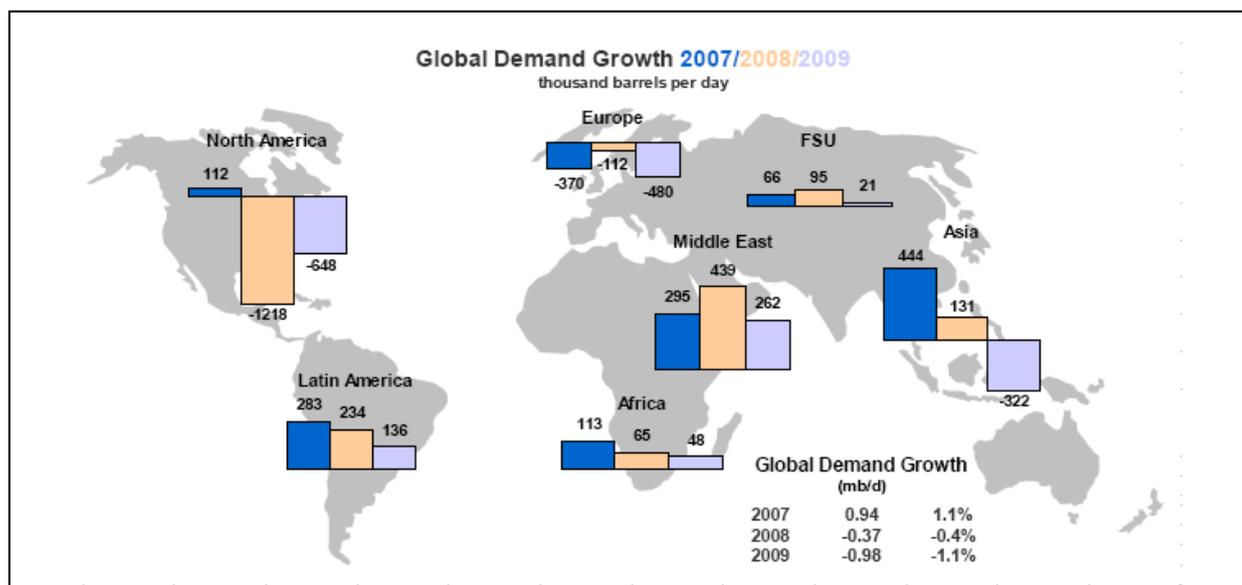
Following is a summary of the most significant expected impacts of the crisis on the oil sector regionally and globally:

a) Oil demand

Data indicate a decline in demand for oil compared to July and August 2008. It is expected that the global demand for oil will be 84.4 million barrels per day in 2009, down by 1.5% or 1.2-million barrels per day compared to 2008. In 2008, the average demand for oil was 85.7 million barrels per day. Meanwhile demand for oil in 2008 was lower by 0.4% or 0.4 million barrels/day compared to 2007. This represents an unprecedented drop since the early eighties. Moreover, the decline in the volume of demand forecasts in 2009, which had not been recorded since 1982, will have an impact roughly equivalent to the impact of the first oil shock in the early seventies.

Figure(1) clarifies the expected oil demand in 2009 compared with 2008 and 2007 in the world

Figure (1)



OECD demand is estimated at 47.5 mb/d in 2008 (-3.4% or -1.7 mb/day) versus 2007. In 2009, it is expected to reach 46 million mb/d with an average decline of -3.2% or - 1.5 mb/d.

On the other hand, it expected that emerging countries would witness slowdown growth, which may be reflected on their demand for oil.

Table (1) indicates demand for oil during 2007-2009

Global Oil Demand (2007-2009)

(million barrels per day)

	1Q07	2Q07	3Q07	4Q07	2007	1Q08	2Q08	3Q08	4Q08	2008	1Q09	2Q09	3Q09	4Q09	2009
Africa	3.1	3.1	3.0	3.1	3.1	3.1	3.2	3.0	3.2	3.1	3.2	3.2	3.1	3.2	3.2
Americas	31.1	31.0	31.3	31.2	31.1	30.5	30.4	29.7	30.0	30.2	29.5	29.6	29.8	29.7	29.7
Asia/Pacific	25.5	24.9	24.5	25.7	25.1	26.3	25.4	24.7	24.7	25.3	25.5	25.0	24.4	24.9	25.0
Europe	16.0	15.7	16.1	16.4	16.0	16.0	15.7	16.1	16.0	15.9	15.4	15.1	15.6	15.6	15.5
FSU	4.1	3.9	4.2	4.3	4.1	4.1	4.1	4.3	4.3	4.2	4.1	4.1	4.3	4.3	4.2
Middle East	6.4	6.5	6.7	6.4	6.5	6.7	7.0	7.3	6.8	7.0	7.0	7.2	7.6	7.1	7.2
World	86.2	85.1	85.7	87.2	86.0	86.8	85.7	85.2	85.0	85.7	84.8	84.2	84.9	84.9	84.7
Annual Chg (%)	0.4	1.5	1.1	1.5	1.1	0.8	0.7	-0.6	-2.5	-0.4	-2.4	-1.7	-0.4	-0.1	-1.1
Annual Chg (mb/d)	0.3	1.2	0.9	1.3	0.9	0.7	0.6	-0.5	-2.2	-0.4	-2.1	-1.5	-0.4	-0.1	-1.0
Changes from last OMR (mb/d)	0.00	0.00	0.00	0.01	0.00	-0.02	-0.02	-0.03	-0.29	-0.09	-0.60	-0.68	-0.64	-0.35	-0.57

This explains the expectations of lower GDP growth rates in different regions of the world where many of them enter at the stage of stagnation, which is illustrated in table No. (2)

Real GDP Growth (IMF WEO, October 2008), % change		
	2008	2009
WORLD	3.81	2.94
OECD	1.56	0.56
OECD, North America	1.55	0.28
OECD, Europe	1.59	0.57
OECD, Pacific	1.55	1.28
Non-OECD	7.00	6.14
Africa	5.83	5.70
Latin America	5.32	3.61
China (excl. Hong Kong)	9.74	9.25
Other Asia	6.27	5.37
Non-OECD Europe	6.33	4.39
FSU	6.87	5.40
Middle East	5.70	5.28
Current vs. Previous (April 2008 & July 2008 Update)		
WORLD	(0.14)	(0.87)
OECD	(0.22)	(0.94)
OECD, North America	0.18	(0.73)
OECD, Europe	(0.46)	(1.14)
OECD, Pacific	(0.67)	(1.00)
Non-OECD	(0.02)	(0.79)
Africa	(0.29)	(0.58)
Latin America	0.25	(0.53)
China (excl. Hong Kong)	0.04	(0.55)
Other Asia	(0.18)	(1.20)
Non-OECD Europe	1.49	(0.07)
FSU	(0.58)	(1.63)
Middle East	0.41	0.00

b) World oil production: Demand and Production Map

Global oil supply has fallen by 1.82 million barrels in January 2008 compared to August 2007 to reach 85.2 million barrels per day. It is expected to offer some further decline, for the OPEC states, it has decreased production by 0.4 million barrels per day, which is less than the level achieved in August, which is 29 million barrels per day. This explains the strategic decisions taken by some countries to reduce production, as can be seen from Figure (2), Table (3).

Table (2)

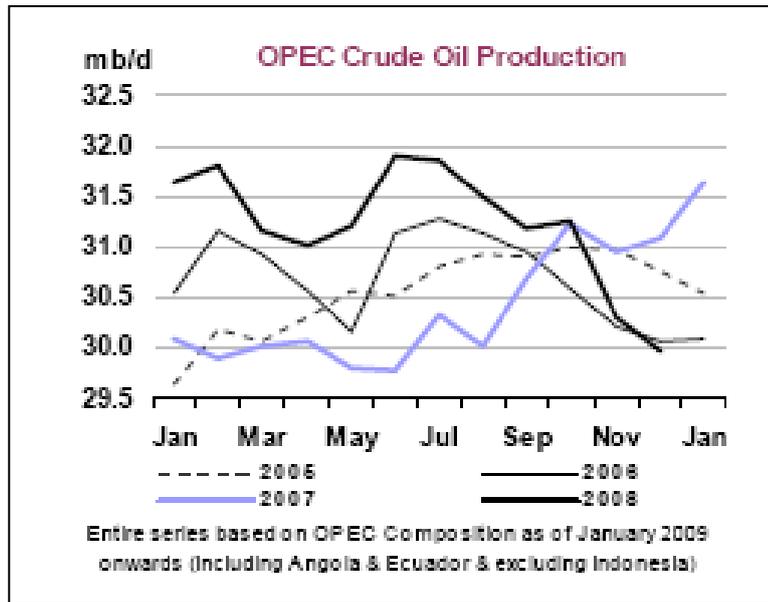


Table 3

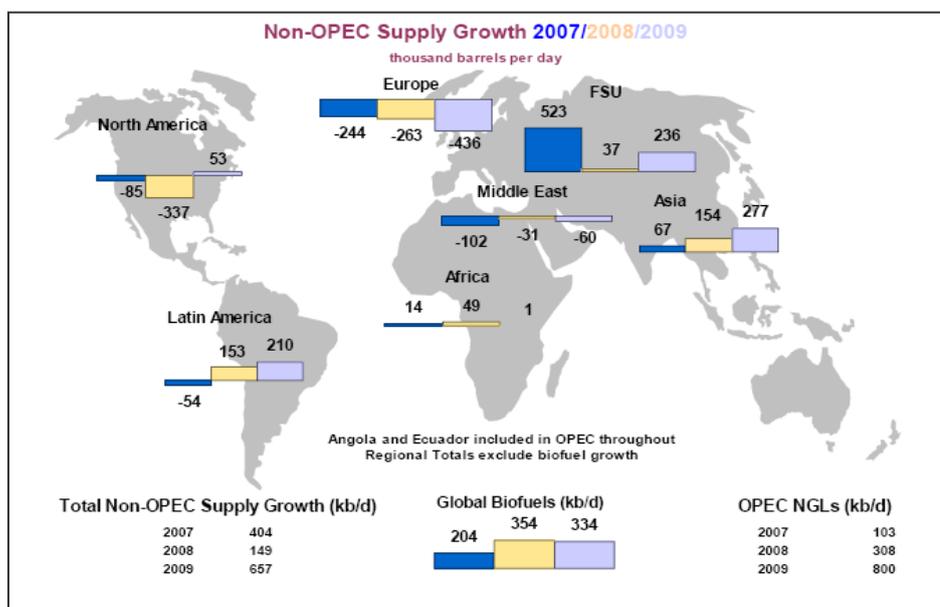
OPEC Crude Production ¹ (million barrels per day)							
	Jul 2008 Supply	Aug 2008 Supply	Sep 2008 Supply	Sustainable Production Capacity ²	Spare Capacity vs Sep 2008 Supply	Capacity end- 2008	Current Target
Algeria	1.37	1.37	1.37	1.40	0.02	1.46	1.36
Angola ¹	1.92	1.85	1.75	2.00	0.25	2.05	1.90
Ecuador ¹	0.50	0.50	0.50	0.50	0.00	0.50	0.52
Iran	3.95	4.10	3.97	4.10	0.14	4.00	3.82
Kuwait ³	2.63	2.61	2.60	2.64	0.04	2.65	2.53
Libya	1.73	1.65	1.70	1.80	0.10	1.81	1.71
Nigeria ⁴	1.87	1.98	1.98	2.55	0.57	2.65	2.16
Qatar	0.88	0.88	0.87	0.88	0.01	0.90	0.83
Saudi Arabia ³	9.50	9.50	9.45	10.80	1.35	11.00	8.94
UAE	2.69	2.66	2.66	2.85	0.20	2.87	2.57
Venezuela ⁵	2.39	2.31	2.37	2.60	0.23	2.60	2.47
OPEC-11	29.42	29.39	29.20	32.11	2.90	32.49	28.81
Indonesia	0.86	0.87	0.86	0.87	0.01	0.84	
Iraq	2.51	2.33	2.19	2.50	0.31	2.50	
Total OPEC	32.79	32.58	32.25	35.47	3.22	35.83	
<i>(excluding Indonesia, Iraq, Nigeria, Venezuela</i>					<i>2.10)</i>		

¹ Angola joins OPEC effective 1 January 2007, Ecuador from December 2007.
² Capacity levels can be reached within 30 days and sustained for 90 days.
³ Includes half of Neutral Zone Production.
⁴ Nigeria excludes some 0.5 mb/d of shut-in capacity.
⁵ Includes Orinoco extra-heavy oil assumed at 530 kb/d in September.

As For the other countries, they are expected to decrease production in the fourth quarter of 2008 and 2009 to about 500 thousand barrels per day, and 245 thousand barrels per day, respectively.

Figure (No. 3) shows the expectations of lower supply of oil in various regions of the world as follows:

Figure (3)



c) Development of world oil and derivatives prices.

- Oil prices fell from \$ 143.6/ barrel to below \$ 60 /barrel. This may affect the operations of research and exploration, thus may have an impact on the capital commitments of for research and production.
- The fall of prices of all kinds of petrochemical products in the global market varied from 40 to 67%. It is sufficient to recall:

	August 2008	November
PROPYLENE	\$1353	\$463 (65%)
Gasoline	\$1150	379 (%67)

This may affect the industry and its future expansion

d) Investment flow to renewable energy

In the light of the high cost of investment needed compared for the production of renewable energy in comparison to conventional energy, fears are raised that renewable energy projects would slowdown:

Wind power	\$1000/kW
PV Solar	\$5000/kW
Gas turbines with a single rotation	\$350/kW
High-efficiency dual rotation	\$550/kW
Conventional coal plants	\$1200/KW

This may affect the pace of implementation of these projects.

e) The Impact on Energy Rationalization

Slower economic growth may lead to the rationalized use of energy to achieve energy efficiency, in order to raise productivity and to reduce costs.

f) Euro-Mediterranean cooperation projects

There are several initiatives for cooperation between the north and south of the Mediterranean in the field of energy currently being implemented such as cooperation between EU and Mashreq countries in the gas sector, and the integration of electricity markets in Morocco.

To implement the projects set up by the Union for the Mediterranean presented in the Paris Declaration, a group of Euro-Mediterranean experts met on 7 October 2008 to present their reports to the Euro-Mediterranean Forum of Energy. First expected achievements were implemented. Future activities responding to Paris Summit of the Union, regarding the launch of solar Mediterranean plan has been developed. This plan foresees the marketing of all alternative energy sources together with the necessary Research and Development. An expert's workshop was organized in Berlin on 28 and 29 October 2008, by Germany in cooperation with France. The purpose was to study the potential and the costs associated with the various technologies related to renewable energy sources as well as the expected benefits of the future guiding plan.

The Ministerial Conference of the Union for the Mediterranean in its Marseilles Declaration of 3 and 4 November 2008, confirmed what had been agreed upon by the participants in the last

Euro-Med ministerial meeting on energy (which was held in Cyprus December 17, 2007) i.e. a five-year action plan, which includes three main points:

- 1) Improve coordination between energy markets and legislations and their integration into the Euro-Mediterranean region.
- 2) Promote sustainable development in the energy sector.
- 3) Developing initiatives of common interest in the main fields of infrastructure, investment transformation, research and development.

France and Egypt, in cooperation with Germany and Spain, organized a conference in Paris on 22 November 2008 in order to study and implement the financing of the solar plan. With the current global crisis and in light of the high cost of investment compared to conventional energy, fears were raised of a slowdown in renewable energy projects in the Mediterranean region.

II. Energy and Climate Change:

Energy and the environment are two sides of the same coin. It is well documented that the oil industry plays a serious role in greenhouse gas emissions and air pollution with gases that raise climatic temperatures.

Climate change is not only an environmental problem but also a threat to world peace, security and development.

Reports of the Intergovernmental Panel on Climate Change (IPCC) suggest that the expected climate change will lead to serious consequences, including global warming, sea level rising, and an increase in extreme weather events such as heat waves, floods and drought.

It is expected that 100 million people around the world will suffer from the threat of flooding by 2030. In Africa, 75 to 250 million people are subject to increasing pressure in water supply as a result of climate change.

In 2030, 47% of the world population will live in areas under high water pressure. River deltas and islands will also be affected by the sea-level rise; the Nile Delta is one of the most affected regions of the world together with the Mediterranean basin.

It is expected that earth temperature could potentially rise from 5 to 6 degrees, which is a real possibility in the next century, will lead to economic losses equivalent to 5 to 10 of the world's GDP, while developing countries will lose more than 10% of their GDP.

The Mediterranean region enjoys considerable attention with regards to the challenges of climate change. It will experience more climatic change with serious consequences than any other place in the world. Rising temperatures will lead to waves of storms, drought and erratic rainfall, and rising sea levels, all with devastating effects on the environment and human beings.

Investment in renewable energy and energy efficiency technologies is one of the best ways to address the long-term challenge of global climate change and they will contribute to reducing greenhouse gas emissions. For every 1 GW of electricity generated from renewable sources, rather than fossil fuel sources, we can expect a reduction in carbon dioxide emissions between 0.7 - 1.5 million tons of carbon

III. Securing Energy Sources and Sustainable Development

This aspect covers the development needs of economic, safe, sustainable and clean energy sources. It is particularly important because it is linked to the following variables and challenges.

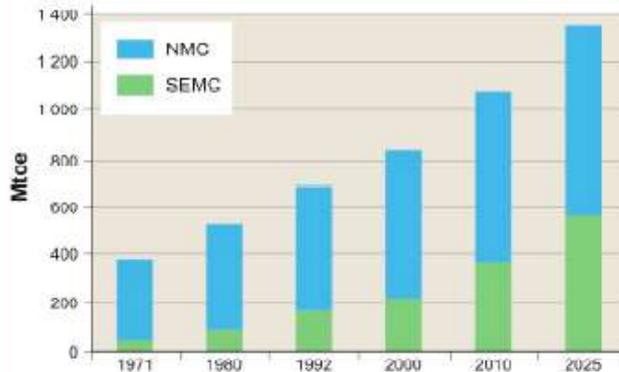
1. Rapid growth in energy demand in the Mediterranean

Demand for energy in the Mediterranean region has more than doubled during the last thirty years (820 ton of oil equivalent¹). It is estimated (by the Blue Plan, 2006) that energy consumption will increase by 65% in 2025, when the expected consumption will be 1365 million tons of oil (Blue Plan 2006). By comparison, the estimated average of global demand will grow by about 52% between 2000 and 2030. China and India alone will consume roughly 45% (World Energy Outlook Report 2007). Fossil fuels will continue to supply 84% of the world's needs. Oil (32%) will remain the primary source of energy by 2030; the contribution of coal will increase from 23% to 28%, especially in China and India, as the contribution of natural gas will increase from 21% to 22%. Dependence on the Middle East and Russia will also increase to meet the needs of the world's energy. Investments amounting to 22 trillion dollars will be required to secure global energy demand by 2030. The following chart shows the expected increase in demand for energy in the Mediterranean region by 2025.

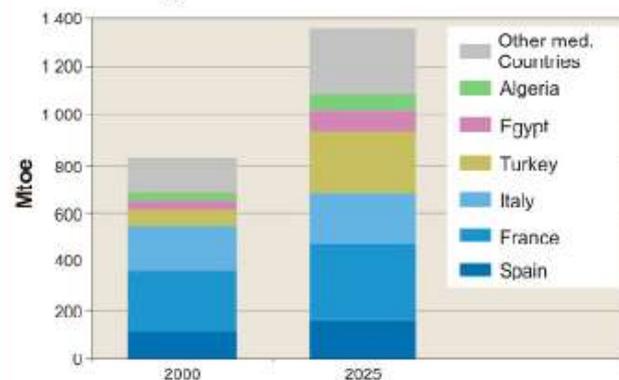
¹ It is calculated on the basis of 1kg oil equivalent/year per @1000 of a country's GDP

Figure 10 Primary energy demand: baseline scenario to 2025

Primary energy demand, trends and projections to 2025 (trend scenario)



The six main energy consumers in the Mediterranean



Source: OME (Observatoire méditerranéen de l'énergie)

2. Sharp Competition for access to energy sources

The global market is witnessing an increase in energy imports. 'Energy Diplomacy' is being implemented as a way of dealing with this increase. By using energy diplomacy a country develops close ties with another energy producer by investing and limiting trading in energy to this partner. However, excessive deployment of this method will have an impact on the stability of global energy markets; where energy demands will continue to rise.

3. Decline of available energy supply

Statistics indicate that the major oil countries have reached a peak output capacity, accompanied by a decline in new oil reserves. The production of oil has decreased in 33 of the 48

largest oil-producing countries. This reflects the low efficiency, (referred to by energy intensity index), which rises to 0.73 in some countries of the south, while it declines in EU countries to between 0.15 0.17(*). If such trends persist they will increase greenhouse gases in Mediterranean countries by between 7% and 9%.

In the EU, as oil and gas reserves decline, a dependence on imports will increase. Thus energy demand will rise, and oil prices soar.

4. Increasing restrictions on developing energy resources

Developing energy resources is threatened by the unprecedented high costs of extraction and production of oil and gas because of the acute shortage and the significantly rising prices of rigs and equipment. In addition, prices of raw materials, particularly iron, have risen globally. World oil contractors are now scarce. The manufacturing of tankers also requires energy. In addition, equipment, safety supplies, and skilled manpower are difficult to obtain. There is a need for huge investments; however, there are doubts about availability, scale and time frames.

The future pattern of energy supply and demand points to a growing mismatch between the regions in which energy is needed and those in which natural resources are located. As a result we expect to see increasing trade in fossil fuels, between regions of the world.

According to the IEA World Energy Outlook 2006, required energy investments worldwide shall amount to over \$8 trillion ahead of 2030, most of them in developing countries.

A number of risks have the potential to defer or to restrict the level of energy investments such as political instability in some regions and a trend toward an increase in nationalization of oil source in some countries.

5. The link between energy and the financial markets

World energy and the financial markets are interconnected due to the strong flow of investment funds in world markets. Energy markets are attracting for investment (for speculators, investors, etc.)

Several new phenomena in the global financial markets; such as the decline of sub-prime mortgage, a weakened dollar, and deferred contracts, have led to instability of the energy market

(*) Calculated on the basis of kg of oil equivalent / year for each \$ 1000 of the GDP of the State

and price volatility, thus preventing an increase in energy investments in terms of duration and nature.

6. Fostering Links between Agricultural commodity and Energy Markets

Bio-fuel markets have led to an increased demand for some agricultural commodities, such as sugar cane, maize and palm oil. These commodities are mainly used as food or feed. Now they are used as raw materials to produce various types of bio-fuels. With the rise of oil prices, bio-fuels have become important alternatives to oil, and the demand for these crops has increased. As a result, food supplies have reduced and their prices have risen.

Some studies estimate that ethanol produced from American corn is considered a rival when the price of a barrel of crude oil reaches \$58. This has prompted some countries, particularly the OECD member countries to subsidize bio-ethanol and bio-diesel products. Subsidies ranged between \$11 - 12 billion in 2006, including credits, investment and import tax incentives, and research funds. They did not include agricultural raw material subsidies.

Table (4) shows the subsidies provided by some countries for each liter produced. Ethanol subsidies range between 29 cents and 1 \$ per liter, compared to 20 cents and 1 \$ per liter for bio-diesel.

Table (4)

Subsidy Average of bio-fuel (Liter/\$)

Country	Ethanol	Bio-Diesel
USA	0.36 – 0.29	0.67 – 0.54
EU	1.00	0.70
Canada	0.40	0.20
Australia	0.40	0.40
Switzerland	0.60	1.00

Source: FAO, 2008.

A major concern lays not just with the use of food crops in producing biofuel. The use of cultivated lands to grow agricultural raw materials for extracting such fuels, consequently pushing up the future price of food commodities is also problematic. It is necessary to search for other plants, which could produce bio-fuels, such as Hohopa, Jatropha and grass. Such plants require more Research & Development investment.

However, the lavish use of biofuels would have an impact on water supply. It is estimated that 2500 liters of water are needed to produce one-day food for one person. The same quantity of water could produce 1 liter of biofuel.

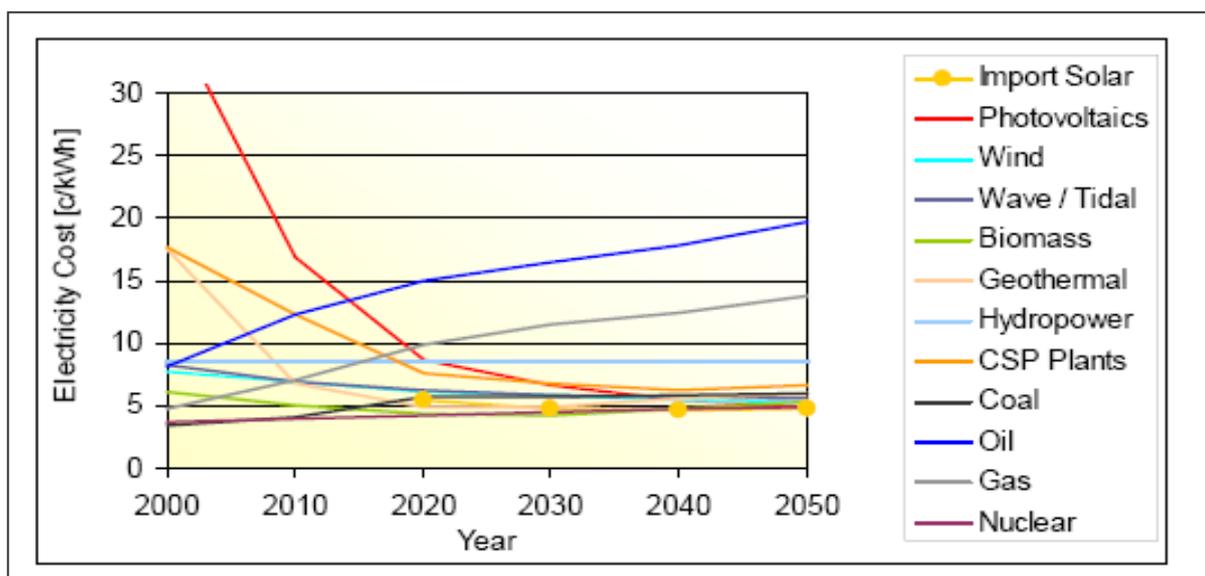
7. Current rise in the cost of energy extraction from renewable sources compared to traditional sources

Compared to conventional energy, the costs of electricity generated from renewable sources are still high. However costs are expected to fall gradually, due to the technological development of production equipment and tools.

Projections indicate that over the next 25 years, prices of conventional energy will continue to rise, while the current cost for producing renewable energies will fall significantly, provided government policies to encourage and stimulate renewable energies continue.

Figure (5) below shows the current status and future prospects of electricity generation costs from renewable sources compared to traditional sources. Looking ahead, renewable sources will be the least expensive. This requires further work and cooperation in the Mediterranean region to eliminate problems of renewable energy technology transfer.

Electricity generation cost of new power plants, in the medium term, is the least cost option for power. The curve “Import Solar” starts in 2020.



Source: German Aerospace Center (DLR), (June 2006), Trans-Mediterranean Interconnection for Concentrating Solar Power (TRANS-CSP) Report.

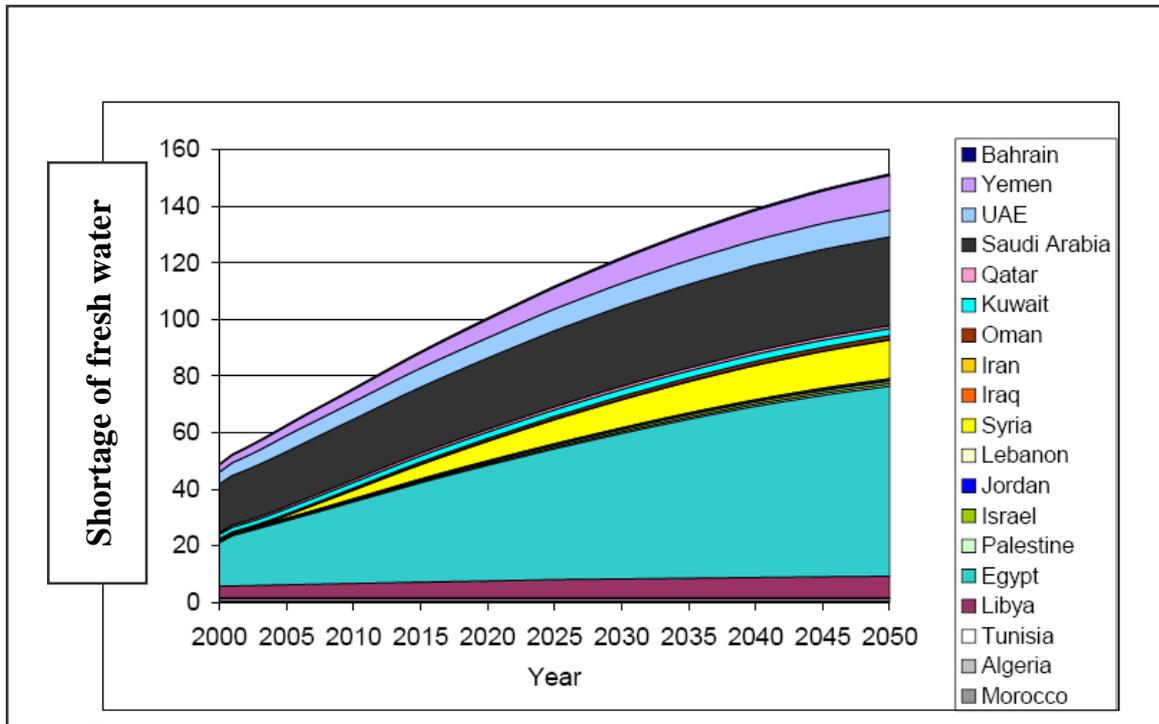
8. Water poverty in some countries of the region, particularly in the South

Linked to food security, the issue of water is viewed as a time bomb. Unless a water supply is provided with the required quantities, national security in the Mediterranean region could be threatened on many levels. The Center for Environment and Development for the Arab Region and Europe (CEDARE) emphasizes that most Arab countries are suffering from water scarcity. It indicates that 65% of Arab countries depend on imported water resources. The Center predicted that the number of Arab countries falling under the water poverty line from 2006 would increase to 19 countries. Per capita water quantity will be lower than 1000 cubic meters, (UN index to measure water poverty level).

Projections point out that the number of Mediterranean countries suffering from water poverty will increase. To address this problem, desalination - using renewable energy - could be considered.

Figure (6) shows the projected water shortage in some countries

Figure (6)

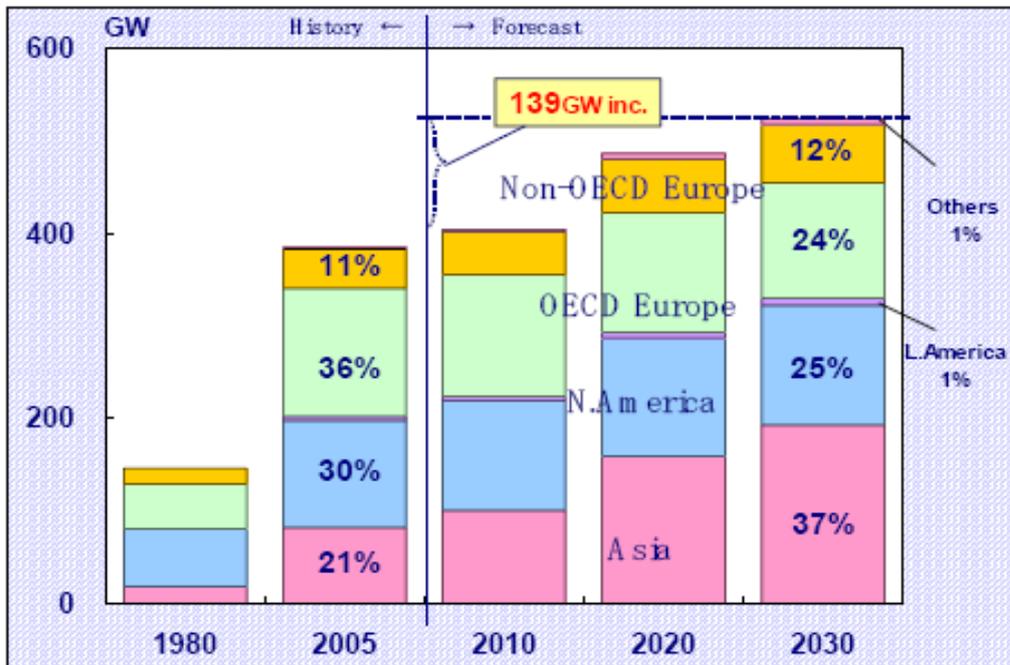


9. Challenges Before Nuclear Energy

Global markets are increasingly talking about the peaceful uses of nuclear energy; which indicates that there is something called a "Nuclear Renaissance". But there are still many challenges in promoting nuclear energy; for example, the issue of nuclear safety, its competitiveness in the market, waste disposal, and the emerging threat of terrorism. There is a need to draw international attention to this by initiating discussions about nuclear non-proliferation. The nuclear fuel cycle should also be controlled to ensure a working nuclear energy scheme.

Figure (7) shows the projected increase in the production of nuclear energy by 2030

Outlook for Nuclear Energy Capabilities



Source: IEEJ (Asia/World Energy Outlook 2007).

Second: Current Possibilities and Opportunities of Euro-Mediterranean Cooperation in Energy

Energy security has become a central issue for sustainable economic growth, and stability not only in the Mediterranean but also in the world. The Mediterranean region has enormous potentials for generating renewable energy. We have to think of the Mediterranean as a region of prosperity by building a Mediterranean energy strategy, which is strong, effective and sustainable.

A Mediterranean energy strategy has to be based on the integration of both sides in order to realize a win-win scenario, based on the following:

1. Benefits for the Nordic Countries

EUROPEAN OBJECTIVES FOR 2020 (ENERGETIC PACKAGE 20-20-20):

- To reduce a 20% GHG emissions
- To decrease a 20% the consume of energy
- To increase a 20% renewal energies

Partnership with the countries of southern and eastern Mediterranean will help achieve these goals

- Nordic countries will secure their energy requirements, when needed, through multiple sources. The energy they obtain should be clean, sustainable, guaranteed and economically viable. They also will be protected against the risks (political risk and price volatility) related to importing conventional energy fuels, whether uranium, gas, or oil.
- Reduce carbon dioxide emissions. Electricity generated from renewable sources should contribute to the reduction of emissions from burning traditional fuels by 70%. Meanwhile nuclear power plants shall be disposed of (1).
- Attenuate the growing pressure on fossil fuel resources (oil, gas and coal), used in electrical generation, and saving them for other uses.

(1) Trans-Mediterranean Renewable Energy Cooperation (TREC)

- Reduce the price of electricity. Conventionally sourced electricity pricing is based on the fuel cost, while rates of electricity from renewable sources are related to investment costs. Given the newness of the renewable technology, the size and learning variables have a significant impact on the steady reduction of costs. It is expected that by 2020 the cost of electricity produced from renewable sources will be less expensive and more stable than that of conventional sources. The introduction of electricity powered by renewable sources will raise the cost of electricity production in the short term, but in the long term prices will decrease (1).

2. Benefits for the Mediterranean countries:

- Exploring the potential for renewable energy sources, particularly solar and wind power, in generating electricity. Satellite studies by German Aerospace Center (DLR) indicate that less than 0.3% of desert area in the Middle East and North Africa could generate enough electricity to meet growing needs. There are indications that there will be additional energy for export to Europe. Electrical generating plants powered by solar thermal energy could make this viable. Wind power from Egypt's Suez Gulf and from South Morocco could also generate electricity.
- Estimates⁽²⁾ indicate that solar radiation in each square kilometer of hot desert in the southern Mediterranean could produce 5 KWh of electricity. This is one of the highest levels in the world. Sunshine in this region ranges between 2650-3400 hours annually, while wind speeds are between 6-11 meters per second. The potential for producing electricity from wind power in Egypt's Suez Gulf, amounts to 20 thousand MW, 6 thousand MW in Morocco, and 12 MW in Turkey. These possibilities have not yet been explored because of many institutional, regulatory, and financial barriers, etc.
- Meeting their energy needs. It is expected that the Middle East consumption of electricity in 2050 will be equivalent to the consumption of Europe; that is about 3500 TWh/y compared with 1500 TWh/y now. It is expected that the consumption of countries, such as Egypt and Turkey, will exceed that of some European countries such as Italy.

(1) German Aerospace Center (DLR)

(2) The Observatoire Méditerranéen de l'Energie (OME), Energy in the Mediterranean: Current Status and Prospects.

- Secure their needs for water. This can be done through the desalination of seawater, using an available, sustainable economically feasible source of energy, especially solar energy. Fossil and nuclear energies cannot meet these demands.
- Reducing emissions of carbon dioxide. Using renewable energy sources in cooperation with the European Union would reduce these emissions.
- The flow of substantial investment. This could provide many new job opportunities in the renewable energy industry.
- Exporting electricity from renewable sources at a reasonable rate is an important source of income.
- The possibility of producing adequate quantities of hydrogen through clean electrical power. In the long-term this will motivate the transport sector to shift away from oil fuel.
- Transfer of solar energy technology. This will promote the industrial economy in the southern Mediterranean countries and assist their transition to a knowledge-based economy.

3. Supporting Elements for this Scenario

(1) New partnership in the field of renewable energy, particularly for solar energy.

Based on an abundance of renewable energy resources (solar, wind, hydropower, biomass, and geothermal), the north and south Mediterranean have great potential for energy, enough to exceeding their present and future demand.

Intensive cooperation between both sides is required to optimally exploit this potential. For example, Europe has plenty of renewable energy sources for power generation. Their total economic potential amounts to about 145% of the expected future electricity demand. However, 60% of this potential comes from wind and solar energy. Both are fluctuating resources that can provide electricity, but they provide no firm power capacity on demand. MENA can provide Europe with a low rate electricity, ranging between 4-5 €-cent/kWh.

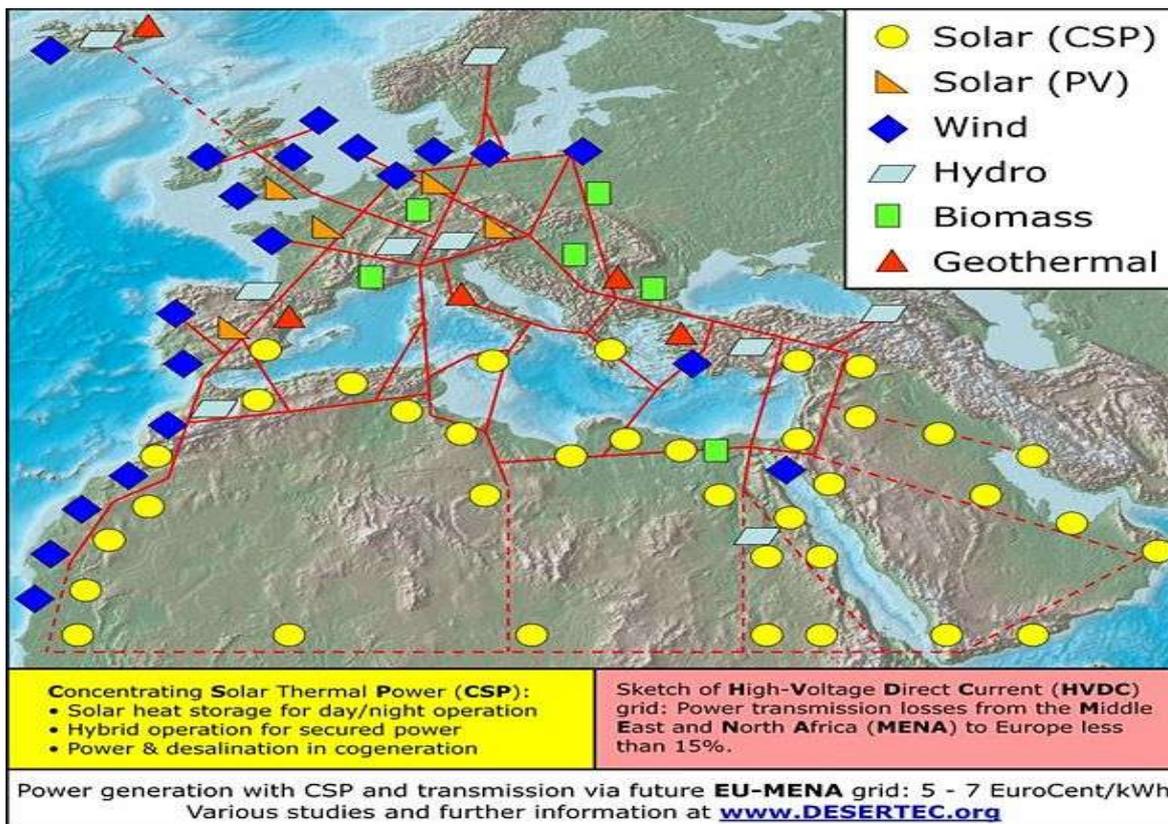
Studies indicate that European imports of solar thermal electricity from Middle Eastern countries, via high voltage direct current transmission, may reach 60 TWh/y hours between 2020 and 2025, with low transmission losses of 10-15%. Imports could be subsequently extended to 700 TWh/y hours in 2050⁽¹⁾.

(1) German Aerospace Center (DLR)

This proposal will create a well-balanced mix of energy sources, (with 80% renewable electricity in 2050), backed by fossil fuels. The mix can provide capacity on demand by quickly reacting through the rapid response of thermal plants to meet peak demand, and by an efficient grid infrastructure to distribute renewable electricity from the best centers of production to the main centers of demand. By 2050 this proposal will provide Europe with about 15% of its needs from electric power, with a low cost of around 5 €-cent/kWh (not accounting for further cost reduction by carbon credits) and their high flexibility for base- intermediate- and peak load operation⁽¹⁾.

Figure (8) envisages basic electrical grid in the Middle East, North Africa, and Europe using the technology of high-power continuous effort. It is clear that there is great potential for the exporting electric power from the south to the north.

Figure (8)



(1) *ibid.*

New technology of renewable energy with potential to ensure adequate economic feasibility of renewable energy projects, especially solar energy:

- Estimates indicate that between 2010 and 2020 the cost of renewable electricity in Europe will be less than that of traditional sources. This is because costs are continually declining and markets are growing by more than 25% annually. By contrast, nuclear and fossil energy will have depleted; providing no room for further cost reduction. Prices will continue to rise due to the reliance on depleted and rare fuels. Furthermore, the cost in MENA will be less than in Europe because of the solar radiation intensity. There will therefore be a market for importing guaranteed electricity from MENA to supplement the needs of European sources at an affordable price.
- This partnership will help to implement the goals set by the North and the South Mediterranean, to increase the share of renewable energy and reduce emissions of carbon dioxide. The EU aims to increase power generated from renewable sources up to 20% in 2020. Egypt has a similar goal, as do some of the southern Mediterranean countries. By 2020, the EU aims to reduce the emission of greenhouse gases by 20%, compared to the levels in 1990.
- To achieve this partnership, there should be intensive cooperation between the north and south of the Mediterranean. The renewable energy sources in the Mediterranean countries should work hand-in-hand with the European expertise, capital and technology:
 - a) Use cooperation funds to finance renewable electricity projects, especially with regards to solar thermal energy. Incentives and financial assistance from governments, particularly through Feed-in -Tariffs law or Renewable Portfolio Standards (RPS) could help attract private investment. Such standards require consumers or electricity suppliers to purchase, on their behalf, a given annual percentage of renewable shares, which increase annually. Other mechanisms include establishing renewable energy funds to be used to directly finance new investments, to provide low-interest loans, and to strengthen research, development, and training. The Clean Development Mechanism under the Kyoto Protocol allows the sale of carbon certificates. Today, the price of CO₂ certificates is around 25 €/ton, and is expected to rise in the future to up to 70 €/ton in 2020. This will increase the profitability of these projects. Estimates indicate that the export of solar energy electricity from the southern Mediterranean countries to Europe will replace the burning of coal and gas for producing electricity. It is therefore possible that the sale of carbon certificates, which ranges from between 1.5 - 3 €-cents /KWh, could contribute to

the reduction of the cost of solar electricity and compensate the cost of transmission, (about 1.5 €-cents). Consequently, the cost of electricity in the European market would offset the cost of production in the MENA countries.

- b) Establish a legal framework for a Euro-Mediterranean renewable energy free-trade area. This allows MENA's solar or wind energy electricity to benefit from the EU's Feed-in Tariff law. Under the legal framework, renewable energy (like power and hydrogen) and technology can cross any border, duty-free and without administrative restrictions. There will be cooperation on creating the infrastructure. In addition investments can be procured during the initial phases.
- c) Complete existing infrastructure in order to extend electricity across the Mediterranean, since the electricity transmission lines around the Mediterranean are almost completed. Studies suggest that solar energy electricity could be transferred from the southern Mediterranean through three lines:
 - **First Line:** Algeria desert-Morocco-Spain, France-Belgium-Germany, length 3099km
 - **Second Line:** Libyan desert-Tunisia-Italy-France, length 2735km
 - **Third Line:** Egypt-Jordan, Syria-Turkey, Bulgaria-Romania-Hungary-Austria-Slovenia- Czech- Poland, length 5123km
- d) Strengthen legal and regulatory frameworks for stimulating renewable energy projects through several mechanisms and systems in developed countries.
- e) Launch a campaign to educate consumers about the use of renewable energy, particularly in the domestic sector.
- f) Promote regional centers such as the Regional Center of Excellence for Renewable Energies and Energy Efficiency in Cairo to train managers in the field of renewable energy.
- g) Create funding mechanisms to finance specialized energy projects, particularly new energy. This calls for accelerating the establishment of the Euro-Mediterranean Investment Bank.
- h) Mediterranean partnership countries should participate in EU related programs, especially those programs devoted to exchanging and disseminating information on technologies

and clean and effective energy policies, such as Intelligent Energy – Europe II, and the Seventh Framework Program for research and technological development.

(2) Cooperation for the sustainable use of oil and gas

Conventional energy sources are available in some of the southern Mediterranean countries, where there are 5% of the global reserves of oil and natural gas in the Mediterranean region, particularly in Algeria, Egypt, Libya and Syria. On the other hand, annual production of the EU's oil and natural gas has declined since 2000 by 25% and 10% respectively. Annual imports of oil and gas have increased by 10 and 30% respectively. The gas imports are responsible for meeting the 80% growth in consumption since 2000. Russia supplies the European Union with about 60% of its gas imports (which cover a quarter of the consumption), followed by Algeria (25%), Libya (3%), Iran (2.2%), and Egypt (1.7%)⁽¹⁾. Some of the southern Mediterranean countries have the potential to export gas to the European Union, especially with the availability of infrastructure for both export pipelines and liquefaction plants.

Areas of cooperation for conventional energy include:

- A. The Export of gas from the Mediterranean to Europe: lines for gas transportation are the bases for creating a common market for energy in the Mediterranean basin. The most important lines are:
- **MEG** pipeline, which transmit the Algerian gas to Spain and Portugal via Morocco (under construction).
 - **MedGaz** pipeline: between Algeria and Spain
 - **Transmed**: (underwater) interconnects Algeria-Sicily-Slovenia via Tunisia
 - **Green Stream**: between Libya and Sicily
 - **Galsi**: Arab pipeline, extending between Egypt, Jordan, and Syria (in future it will be extended to Turkey then Europe).
 - **The Arab Gas Pipeline**, which runs between Egypt, Jordan, Syria and Turkey and then to Europe. Iraq can be linked to this line in future

(1) **European Gas and Power Markets: *Quest for supply Diversity and Security*, 2007**

- B. Cooperation to use non-conventional sources of oil, particularly oily clay, with European expertise.
- C. Setting up joint projects for refining and petrochemicals, fertilizers and strategic industries, relying on conventional energy sources in the southern Mediterranean countries.
- D. Promoting the establishment of an effective network. Setting up partnerships with similar EU systems and energy agencies with the Mediterranean partners in the fields of information and best practices. Building on the achievements and activities developed by the Mediterranean Energy Agency Network. Maximizing national plans for promoting exchanges in best practices and technological innovation (including the use of low sulfur fuels and clean combustion technology for the prevention and / or to reduce emissions of nitrogen oxides particles through regional and international initiatives such as the EU Energy Agency, the Blue Plan, the Regional Center for Excellence In Renewable Energy and Energy Efficiency in Cairo, Partnership of Renewable Energy and Energy efficiency, Renewable Energy Policy Network for the 21st Century, Global Village Energy Partnership. Conferences of MENA on renewable energy. The latter should be given more encouragement and support.
- E. Setting up regional funds for carbon in Middle Eastern countries to finance the projects of clean energy development and to reduce greenhouse gases.

Taking measures to rationalize the use of energy

Measures should be taken to rationalize energy use to meet the growing cost of supplies. The EU has an ambitious target to save 20% of the total primary energy consumption before 2020. There must be intensified cooperation in this area to review the experience gained under the MED-ENEC program related to energy efficiency in the construction sector of the Mediterranean region. A group of energy experts from the Euro-Med energy forum should also be assigned to present new regional and/or sub-regional initiatives, focusing mainly on aspects such as:

- Improving energy performance in buildings, including the procedures for energy efficiency and the use of renewable energy, especially for the purposes of heating and cooling
- Standing transport policies especially clean urban transport networks.

- Improving efficiency in energy conversion, transmission and distribution networks.
- A network widely linked to the production of renewable energy and/or associated with desalination of seawater.

Euro-Med-African Energy Triangle

Waterfalls off the Nile River and other African rivers are an important source of hydroelectric energy. Exploring the potential of these waterfalls could generate electricity of up to 230 thousand MW, about 40% of similar sources of energy in other places around the world.

In Africa, there are seven major rivers: the Nile, Niger, Congo, Senegal, Orange, Limbo, and Zambezi. So far these rivers have not been used to their full potential. While they have 10% of the world's hydroelectric capacity, Africa has the least per capita consumption of electricity.

Egypt could be the bridge through which energy exports can be transmitted to Europe. This can be done via an electric grid linking Egypt and other surrounding countries. In the future this grid could be extended to some Nile basin countries and Europe. By directing investments to this source, transmission of energy to Europe and other consumer markets can be facilitated.

Studies indicate that surplus electricity could be exported from Africa to Europe via three axes; two of them are located in Egypt.

- Congo and Central Africa, Sudan, Egypt, Jordan, Syria and Turkey.
- Congo and Central Africa, Sudan, Egypt, Libya, Tunisia and Italy.
- Congo, Gabon, Cameroon, Nigeria, Niger and Mali, Algeria, Morocco then Spain.

Global financial crisis would be turned into an opportunity to enhance Euro-Mediterranean cooperation in the field of energy.

Global financial crisis requires to develop a plan for Mediterranean cooperation in the field of energy. It is necessary, for the future growth in the Mediterranean region, to secure all kinds of energy, whether conventional or renewable. This plan has to be built on stable policies, supportive elements, and the mutual benefits for both sides of the Mediterranean. Thus, the global financial crisis would be an opportunity to reconsider the development of real Mediterranean cooperation in the field of energy.

The said plan would be based on :

a) European plan for economic recovery

EU recovery plan is based on several essential elements:

(1) **Efficient use of energy**

- Through their work together, the EU Member States and institutions agreed to take urgent measures to improve the use of energy efficiently in housing and public buildings. They also agreed to adopt green products as a matter of urgency.
- Member States agreed on setting the required targets to ensure that public buildings, private housing, and social housing meet the highest European standards in energy efficiency, and make them subject to energy certification on a regular basis. To facilitate access to their national objectives, they agreed that member states should consider reducing property tax for buildings implementing energy efficiency. The Commission has put forward some proposals to enhance energy efficient use in buildings, and invited the European Council and European Parliament to give priority to their adoption.

(2) **Speed use of “green products”**

- The Commission will propose to reduce VAT rates on green products and services aimed at improving the efficient use of energy, particularly in buildings, and encourages Member States to provide more incentives to consumers to stimulate demand for environmentally friendly products

(3) **Developing clean technologies for vehicles and construction**

- Supporting innovation in the manufacturing industry, particularly in the construction industry and the automotive sector, which has recently undergone a rapid decline in demand as a result of the crisis. These industries are facing major challenges in the transition to a green economy. The Commission proposes to launch a major partnership between the public and private sectors:
 - **In the automotive sector:** "the European Initiative for green cars," involves research in a wide range of smart technologies and infrastructure in the area of energy required to achieve a breakthrough in the use of renewable sources of energy, non-polluting, safety and traffic fluidity. This partnership will be financed by the European Community, the

European Investment Bank, the contributions of industry and Member States in an amount no less than 5 billion euros.

- In this context, the European Investment Bank will provide loans to car producers on the basis of cost and innovation financiers, especially in the techniques of improving the safety of the environmental performance of vehicles, for example: electric cars.
- **In the construction sector:** "European initiative for the efficient use energy in buildings" has been designed to promote green technologies. It aims at developing systems and materials, for the efficient use of energy in new and restored buildings in order to reduce energy consumption and carbon dioxide emissions dramatically. This initiative must have an organizational and standard component, which involves a procurement network for the use of regional and local authorities.

B. Developing a vision for the future of the energy sector until 2050

The EU agenda in 2020 has established the first basic steps of the process of transition to high efficiency and low carbon energy system. The European Union needs to develop a vision for 2050, an agenda to its policies in 2030, which include basic technological transformations in the European Union in order to make carbon-free electricity, to end dependence on oil in the transport sector, and to reduce building energy. The network of interconnected smart electricity will only occur with a plan for coordination, research and technological development, infrastructure development, and investment. In addition, the transition to high-efficiency, and low-carbon energy system needs to be promoted not only in Europe but also all over the world.

C. The outlook for oil prices after the Crisis:

Global energy price decline has generated a set of factors that will play a major role in rising prices again. These include obstructing investments in the oil sector, halting the growth in alternative energy sector, and stopping research and exploration in new regions, particularly in the highly expensive marine areas. Such factors will inevitably lead to rising oil prices in the medium and long term.

Following are some indicators of oil price rising

(1) China and India lead the loco to higher oil prices

Soaring rates of oil demand in emerging markets, particularly China and India, is the most important factor of the shift occurring in world oil markets. China will overtake the United States of America as the first oil consumer in the world during the next five years. Ninety percent of the rise of oil demand will be in Asia and Latin America. The global demand for oil is continuously increasing due to the reasons mentioned above. In addition there are other factors such as the high demand of the middle class to buy cars and the increasing number of industries that depend on oil as a raw material for various products.

According to IEA report, “World Energy Outlook 2008-2030”, China and India will account for more than 70% of global demand for oil. Their oil imports are increasing from 5.4 million bpd in 2006 to 20 million bpd in 2030.

India is also expected to double its oil demand by 2030 with a percentage of 3.6% per year. Thus, India and China together will represent more than 45% of the global increase of demand for oil.

The large numbers of cars and trucks in China, India and other developing countries is also one of the key factors, which has led to increasing global demand of oil. It is expected that world use of vehicle will rise by 1.7% annually during the period from 2005 to 2030. Currently, there are 900 million cars, with an expectation to reach to 2.1 billion cars. In China alone, vehicle sales increased by more than 37% annually from 2000 to 2006. China has surpassed Japan to become the second largest market for cars in the world after the United States of America. It is projected that China will overtake the United States in 2015 to be the first market in the world.

(2) High demand among oil-producing countries:

Another phenomenon in the world oil market is the very high demand and consumption of oil within the oil-producing countries. This is due to the great industrial expansion, increasing population, and governmental support for energy prices in the domestic market.

Most oil producing countries are supporting domestic energy prices, which causes an increase of energy consumption. It also causes the isolation of domestic market from the world market, a lack of stability in energy prices, significant distortions in the market, and inefficient use of energy. Morgan Stanley estimates indicate that about half of the world's population have access to fuel subsidies, and that 25% of the world's gasoline is sold at less than market prices.

According to the IEA report the Gulf region is ranked second after China and India in oil demand during the period from 1999 to 2007. Consumption rose by 3.9% per year, compared

with only 0.4% of the OCED. World Bank estimates that the rate of economic growth in the Middle East, North Africa, and Russia has doubled since 1997, which could be translated into a decrease in the quantities of oil exported.

In addition, many of the oil fields, in the oil-exporting country are suffering from aging. Many countries have turned from oil exporting to importing countries, such as Indonesia and Britain. There are other countries that are now on the way to become also oil importers, such as Malaysia, Algeria, Mexico and Iran.

IEA report forecasts that global energy consumption will rise by 30 million barrels a day to reach 116 million barrels per day in 2030.

D. New opportunities in the field of energy: Green Gold

It is proven that the increasing demand for biofuels and the potential success of this renewable source to fill the gap in the energy sources will have more than one positive significant result.

Firstly, energy will dress itself in green color instead of the black one. This means, on the other hand, the fading out of many economic countries and kingdoms, which their economies and budgets have been based on oil Secondly, the value of agricultural land will increase, leading to a new comprehensive global agricultural renaissance.

This trend will contribute to the reclamation of many deserts and arid lands to advance agricultural production throughout the world and to expand agriculture horizontally and vertically. On the other hand it will lead to a surge in the quality of agricultural machinery, methods of agriculture and the agricultural land areas used.

The widespread use of biofuels will create millions of new jobs, and increase the farmers and peasants' profitability. Bio-fuel crops can increase their profits by four or five times their current profitability. It will also support and promote many industries associated with agriculture, including fertilizers and pesticides, and mechanisms for the transporting and storing of grain, genetic modification of seeds, and other related areas.

Biofuels can contribute to the support of sustainable development plans under the Euro-Mediterranean framework. It can reduce poverty and hunger. It can provide energy sources, especially electricity, which nearly 2 billion people in the world today are in need of it. It can

also contribute to supporting the economic and social positions in many of the Mediterranean region countries.

However, we should make reference to those scientific voices which raise concerns on the potential economic costs (higher food prices etc) as well as environmental costs (deforestation, extensive use of agro-chemicals etc) of the extensive use of biofuels. To this end, the International Community should support the sustainable use of biofuels, as part of a country's RES mix.

Third: Proposed Energy Cooperation Strategy between the Two Sides of the Mediterranean

The global energy market turmoil, the rapid consumption increase, the various uses for energy sources and the depletion of conventional sources, have created a global concern about how to secure the present and future energy needs.

The consumption of Mediterranean Energy has doubled in the past 30 years. According to the Blue Plan estimates, the demand for energy in the Mediterranean region will increase by 65% before 2025. This is largely due to population growth and economic development. A major concern is how to secure energy sources.

An integrated strategy for energy in the Mediterranean region, which secures our present and future energy needs, the diversity of energy sources and the adoption of necessary policies to maximize the utilization of new and renewable energy sources, needs to be adopted.

The most important factors in support of this strategy are:

- The Mediterranean countries, particularly in the south, have huge potential for renewable energy estimated by more than double the energy demand in the south and north of the Mediterranean until 2050.
- Modern energy initiatives in the European Union, which focuses on climate-friendly solutions designed to reduce desertification, floods, and similar effects that result from the increasing use of hydrocarbons in the transport and electricity production, as well as European initiatives to reduce emissions of carbon dioxide by targeting the introduction of renewable energy and energy efficiency.
- The potential and needs of northern and southern Mediterranean countries are integrated. This provides opportunities for gains for all through joint cooperation.
- The challenge is how to complete networks and create a legal framework and policies that encourage investment in the production of electricity from renewable energy.
- The importance of renewable energy in facing the water poverty in some Mediterranean countries through its use in water desalination.

- The establishment of a solar energy station equal in size to Lake Nasser in Egypt can produce an energy equal to the total production of Middle Eastern oil. Furthermore, the solar energy found in the southern Mediterranean can generate electric energy that exceeds the world consumption many thousands of times.
- Through its geographical location, infrastructure and linking lines with the EU and other surrounding countries, Egypt could be a central point for the circulation of energy in the Mediterranean basin. In addition, Egypt has The Arab Gas Pipeline, which transports gas to neighboring Arab countries and which will later export to the EU. Egypt is also considering the electric link with Africa and the Nile basin countries, where the African continent has enormous hydropower sources that account for 40% of the need for this kind of energy worldwide.

The main proposed axes of energy security strategy in the Mediterranean region:

1) New policies to create a regional energy market

The establishment of a regional energy market requires action in two main areas:

a. Proposing a number of supportive policies for the establishment of a regional energy market, including:

- PAM fully supports the Hellenic proposal to create a Euro-Mediterranean Energy Community previously adopted at the IVth Plenary session of EMPA (Athens, 38/03/08) and endorsed by the European parliament (Brussels, 19/02/2009).
- Policies that expand the integration of energy markets in the Mediterranean region and the completion of infrastructure projects for Mediterranean energy aimed at creating an energy market.
- The provision of legal and advisory frameworks to support the conclusion of an energy agreement at a regional level between Mediterranean countries.
- The provision of supportive policies for mechanisms for financing infrastructure projects.
- Maintain close relations with the countries of the southern Mediterranean region shall drive to establishing the great solar and wind energy, where Europe will be ready for

importing green electricity. For that to happen, the southern Mediterranean countries have to amend their policies and legislation to ensure the production of green power.

- Intensifying the cooperation with the Nile Basin countries and Africa to exploit rivers and watersheds, which could generate electricity of up to 230 thousand megawatts.

b. Interpreting the supportive policies of a Mediterranean Cooperation Agreement for the production of renewable energy

The challenges witnessed by the energy sector at a global level emphasize the need to move toward renewable energy to provide for the needs of future generations. This requires a strategic plan for cooperation between Mediterranean countries. This plan needs to be translated into a Mediterranean Cooperation Agreement for the production of renewable energy, focusing on the following points:

- Identifying strategic goals until 2050.
- Distributing the roles between various parties in light of the potential for Mediterranean countries in terms of technological capabilities, funding and natural renewable sources.
- Determining the capital costs of the proposed projects in the area of renewable energies.
- Identifying the most appropriate funding mechanisms necessary to finance the proposed projects.
- Setting a timetable for the implementation of the proposed plan in accordance with the implementation priorities.
- Developing appropriate frameworks for regional cooperation in the fields of scientific research, technical and technological support, training, rehabilitation and raising awareness among Mediterranean countries.
- Providing political support from governments at a regional level through a joint cooperation agreement, where governments are committed to the obligations that would be agreed upon, in accordance with an implementation timetable.

2) Strengthening the trend towards new and renewable energies

- Calling on the EU to grant incentives to new energy projects abroad, so long as they are allocated for export to European markets.

- Enhancing Research and Development cooperation in new and renewable energy, carbon capture and sequestration.
- Boosting investment in renewable energy, developing promising education and training programs in this vital sector, adopting encouraging policies and legislation and working to drive the private sector to invest in renewable energies.
- Assisting in completing and developing technical standard specifications for new and renewable energies equipment, and establishing modern specialized laboratories to conduct necessary performance tests and issuing equipment certification.
- Assisting in the issuing of special legislation exempting the equipment used in the production of new energy supplies from taxes and customs duties, in addition to giving customs and tax advantages to users of renewable energy equipment.
- The expansion in wind and solar energy projects to benefit from the sale of certificates of thermal emission reductions under the Kyoto Protocol, where they are sold to the world market at good prices (25 Euros per ton of carbon dioxide), and can therefore benefit from the revenues in establishing clean energy projects.
- Facilitating the integration of renewable energy sources, linking them to regional unified networks and providing them with infrastructure.
- Investing in growing energy generating plants, such as Jetropha and Hohopa, which can be cultivated in the vast deserts of the south.
- Concluding joint venture agreements with the manufacturers of equipment for power stations to produce this equipment in the South. Training and appointing skilled staff to work at these stations.
- Promoting solar thermal energy technology of high temperature in desert areas in the Mediterranean region. This requires financial assistance from the EU to establish a pilot project, facilitate access to networks and the possible link between transport networks with Europe to integrate this energy in the European energy markets.
- Promoting thermal solar energy techniques in the Mediterranean desert region. This requires financial assistance from the EU to establish a pilot project, facilitate access across networks and the possible link between transport networks with Europe so that this energy can be integrated in European energy markets.

- Putting forward a vision of trilateral cooperation between Egypt, the EU and African countries to optimize the exploitation of the enormous capabilities of renewable energies in African countries as available, clean and environmentally friendly energies.

3) **The Cooperation in the Field of Solar Energy.**

Solar energy plays a key role in fighting the climate change, diversifying energy sources, strengthening economies and upgrading qualified labor markets. This is an issue of international and regional dimension that will affect the stability, security, and social vitality of all communities. The main reason for the real increase in demand for renewable energy in the Euro-Mediterranean region is to ensure access to pure water through desalination plants and the use of clean sources of energy for millions of people, who lack such potentialities. The role of solar energy could be strengthened by:

- Euro-Mediterranean solar power plan is to be integrated the in all national action plans related to European Neighborhood Policy, Potential expectations should be promoted, and better finance should be encouraged. This could be implemented through the EU and European Investment Bank recovery plan, as well as the EU expected future financial procedures.
- Directing the commitment to the mechanism of clean energy sources of the Kyoto Protocol towards the projects of renewable energy sources, especially solar energy projects in the Euro-Mediterranean partner countries, in order to promote a healthy and clean social environment and to ensure the clean transport of energy.
- Promoting solar energy and other energy sources through supportive plans, and renewable energy tariffs in many countries, both in Europe and North Africa. Production is to be encouraged in order to ensure that renewable energy can be relied upon in a larger part of the total energy consumption, according to the capabilities of each country; Calling European Commission and the private sector to cooperate with other countries to provide technical assistance for the promotion of solar energy small and large projects,
- Motivating the establishment of a cooling market, which depends on renewable energy sources. Using solar energy in this field is very effective, inexpensive and can significantly save electricity consumption, especially in light of the increasing demand for cooling. In some Mediterranean countries, maximum electricity consumption today occurs in summer and not in winter.

- Calling upon the European Commission and Governments of the Mediterranean countries to integrate solar energy projects as a key element for economic recovery plans that are being implemented to face the current economic crisis.

4) Cooperation in the Field of Local Manufacturing of conventional and Renewable Energy Projects Equipment.

- a) Being a significant industry, studies for producing large electric generators for conventional thermal power stations and nuclear power plants should start. Some countries such as India has preceded us and achieved a success in this area. We must bear in mind that the demand for these generators will continue for a long period of time.
- b) Annexed to, and may precede this industry, is to start manufacturing inductance generators, which are widely used in electrical generation from wind power. These generators are much simpler in design and manufacturing, and smaller in size and capacity than conventional generators
- c) There should be an expansion in manufacturing electrical transformers of medium and low voltages, especially that expertise in manufacturing them are available in southern countries whether in national and joint-venture companies.
- d) Manufacturing of electrical conductors and insulators for transmission lines and distribution of electric power should be expanded. These industries can attain a world level and compete with many of the countries producing these elements.
- e) We have to surpass in producing transformer stations equipment, current and voltage transformers, circuit breakers and various kinds of switches. There is a considerable experience in the south in that area.

5) Achieving a balance between the production of new energy and food security

- Adopting a global initiative to coordinate efforts to deal with rising prices. It is important to initiate international dialogue between producers and importers of food and energy from developed and developing countries strategy - in the short, medium and long terms - to deal with development, agricultural production and the production of biofuels.
- Stressing the importance of using agricultural crops for food for human beings and not as fuel for engines. The production of biofuels should be limited to agricultural residues and special

crops like the *Jatropha* plant. An urgent and serious dialogue should be initiated to reconsider the current support for producers of ethanol and biodiesel. Such support should be a subject to world trade rules.

- The importance of supporting the trend towards the joint exploration of the riches available in the Mediterranean region such as the Sahara, which can play an important role in the production of alternative energy sources. These can help maintain a balance between the need for alternative energy production and achieving food security.

6) Setting up legislative frameworks to guide the development of conventional energy and encourage the use of renewable energy

After monitoring some countries' experiments, it is clear that the legislative tools are used to reduce the thermal emission resulting from the use of conventional energy. Therefore, Some southern Mediterranean countries need to apply a law to control the use of energy for the benefit of consumers, the economy and the environment. It should include all measures and actions to rationalize the use of energy, develop renewable energy, minimize bad effects on the environment and encourage investment in the rationalization of energy.

7) Non-traditional mechanisms for financing energy projects

- The need for a new perspective to deal with renewable energy, focusing on the sustainability and expansion of markets, the increased demand for new energy products and services, the granting of credit to finance its projects, its suppliers and distributors, its regulatory framework and policies to encourage the private sector.
- Finding specialized financing mechanisms to finance energy projects, especially new energy, necessitating the need to expedite the establishment of a Mediterranean Investment Bank.
- Urging governments in the south to encourage banks to provide long-term loans with low interest rates. Investors should use these loans for renewable energy power generation.
- Supporting producers of electricity from renewable energies by granting soft loans to support construction phases. These loans will be repaid before the start operating the project. There should be a provision of direct subsidy for each kilowatt-hour of actual production of clean energy delivered to electricity networks. Long-term agreements – ten

years for example - should be concluded for the purchase of produced clean energy. This will increase investor confidence.

- The need to grant micro-financing for consumers in rural areas to purchase renewable energy products, as the funding available now is linked to income-generating activities and for a short period. This funding should not be in the form of grants because that could undermine the market. It should be in the form of some sort of Smart Subsidy for an interim period and for maintaining private sector projects, facility their functionality and obtain a profit that guarantees their continuity.
- Establishing a fund to support renewable energy development aimed at:
 - o Establishing renewable energy projects for domestic use in rural areas.
 - o Building independent renewable energy systems in remote areas and islands.
 - o Creating funding mechanisms to finance the energy projects, particularly new energy.

8) **Efficient Energy Use**

With the current situation of high oil prices, energy efficiency is the most effective way for energy consumption rationalization. This requires seeking to establish a Mediterranean partnership for cooperation in the area of energy efficiency, including regional initiatives aimed at developing a new framework to facilitate procedures of energy rationalization and the transfer of related technology, **by focusing on:**

- Seeking to establish a regional center for energy efficiency to serve the Middle East, North Africa and the rest of the Mediterranean basin.
- The cooperation in changing patterns of production and consumption by encouraging the development of techniques and systems of energy consumption rationalization and raising energy efficiency in different economic and service sectors.
- Joint cooperation between scientific research institutions to accelerate the development of techniques for producing energy and reducing emissions from its use.
- Launching a lending program for energy efficiency projects to provide concessional loans.

- Encouraging the adoption of effective national strategies to achieve the principle of energy efficiency, establish training centers for efficiency and organizing conferences and exhibitions to promote these strategies.
- Developing appropriate pricing policies in oil, gas and electricity sectors would provide incentives to increase consumption efficiency.
- Enhancing the performance of energy in buildings, including procedures for energy efficiency and the use of new and renewable energy, especially for purposes of heating and cooling.
- Standing transport policies, especially clean urban transport networks.
- Making use of finance mechanisms, globally available for restricting pollution resulting from conventional power sources. This includes the Carbon market, which amounted to 64 billion dollars in 2007. The European Union represents the main player where it is accountable for 50 billion dollars. An ambitious trade plan to surpass in this effective carbon market should be adopted. National and regional plans for emissions should be encouraged and linked together.
- Mobilizing finances for and widely investing in carbon-low energy, involving the creating of incentives for policies and organization
 - o Funds provided by some countries to reduce emissions, such as the Netherlands Fund for Clean Development Mechanism that supports projects in developing countries, the Italian Carbon Fund founded in 2003, the Danish Carbon Fund, the Spanish Carbon Fund and the European Carbon Fund.

9) **Cooperation in the field of nuclear energy**

- Strengthening Mediterranean cooperation in the area of nuclear research and technology, and building peaceful reactors through the establishment of joint centers of safety standards.
- Cooperation in protecting the environment from the risks of using nuclear fuel and waste, while preparing a plan for radiation safety and disposal of nuclear waste.
- Developing a Mediterranean program to introduce nuclear technology to the south and to establish nuclear industries. The Egyptian industry can contribute to the establishment of nuclear reactors, either in civil or construction work, with the aim that most of the plants' parts will be manufactured in Egypt.

PAM delegates met in Cairo to discuss Energy issues on 1st April 2009. During the meeting of the Ad hoc Committee on Energy, delegates also supported the use of alternative energy such as wind energy and energy produced by waves. The use of nuclear energy for peaceful purposes was also mentioned.

Participants mentioned that scientific research was key to developing clean energies and that it should be encouraged. University researchers were pioneering new ideas in the field of renewable energy and the private sector should engage with them. It was also important for each PAM country to conduct a review of existing energy policies as well as to identify whether the appropriate legislative apparatus was in place regarding alternative energies. An idea to establish a research institute for Energy issues in the Mediterranean was also mentioned. A draft resolution takes into account proposals by PAM delegates and is annexed to this report.

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