



Solutions hinge on energy efficiency and renewable forms of energy

The Mediterranean, especially its southern and eastern banks, will be particularly affected by climate change during the 21st century. The impact of higher temperatures, less rainfall, an increase in the number and intensity of extreme events and the possible rise in sea-levels are adding up and intensifying the pressures being exerted on the natural environment as a result of human activity.

Energy lies at the very heart of the climate change issue. On the one hand, it is the sector with the highest greenhouse gas emissions, and in the future CO₂ emissions could rise much faster than the global average. On the other hand, hydro-electric production, which is of quite some importance in certain countries (13% of electricity generation in the SEMCs), is climate-constrained, as is the power station cooling process. Finally, energy demand- for electricity in particular- is surging in the region and could increase even further as a result of the additional demands stemming from the need to adapt to the effects of climate change such as water desalination, air conditioning in buildings...etc.

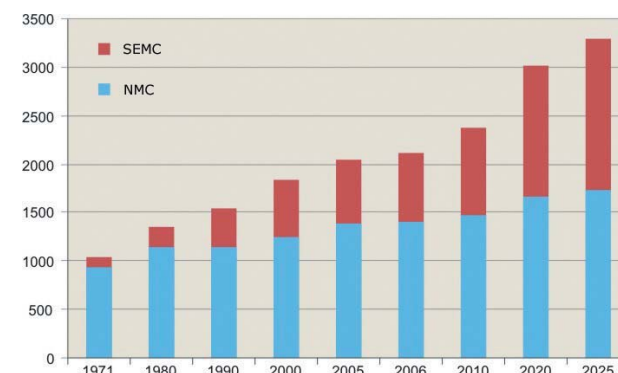
Energy efficiency and renewables can provide a response to these constraints by diversifying the energy mix in favour of low carbon emission technologies.

Marked increase in CO₂ emissions and an energy system under pressure

72% of the greenhouse gas emissions (GHG) produced by all the Mediterranean countries put together are made up of CO₂ from energy use. If current trends persist, in 2025 CO₂ emissions will be twice what they were in 1990 (OME). The SEMCs' share in total Mediterranean emissions could be pushing 50% in 2025, whereas in 2006 it stands at around 1/3 (figure 1), because growth in CO₂ emissions in the SEMCs is already outstripping that of the NMCs. Electricity generation and heating are the sectors showing the biggest rise in emissions in the SEMCs, whilst in the NMCs it is transport (figure 2). These CO₂ emission trends are the direct result of the region's energy growth.

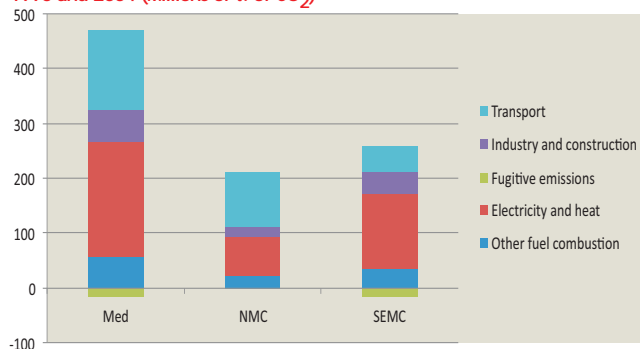
If the trends observed over the past 30 years are confirmed, between 2006 and 2025 primary energy demand throughout the Mediterranean basin could well have multiplied by 1.5, and by 2.2 in the SEMCs (figure 3). As far as the SEMCs are concerned, this surge in demand stems from economic development-related needs, population growth and lifestyle changes. Per capita primary energy consumption to date is 3.3 times less in the SEMCs than in the NMCs.

Figure 1 - CO₂ emissions from energy use and forecasts (Millions of t. of CO₂), 1971-2025, trend scenario



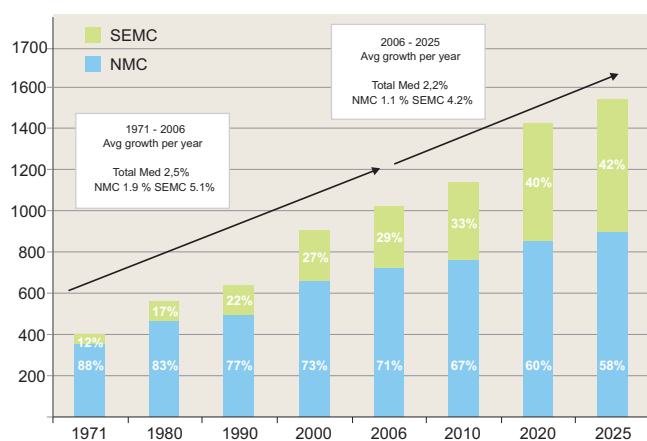
Source : OME

Figure 2 - Variation in CO₂ emissions from energy use per sector between 1990 and 2004 (Millions of t. of CO₂)



Source : Calculs Plan Bleu d'après données WRI.

Figure 2: Primary energy demand in the Mediterranean: Trend evolutions (in MToe)



Source: OME (Mediterranean Energy Observatory), 2006

The increase in CO₂ emissions is also directly related to the structure of energy supply. In 2006, fossil energy (oil, gas and coal) dominates supply to the tune of 80% for the Mediterranean countries as a whole, and 94% for the SEMCs alone. In 2025, the share of fossil energy is likely to be about the same. The share of coal, which is a major CO₂ emitter but relatively cheap and available in some SEMCs, could thus hold its place within the energy mix.

Water is essential for electricity generation. It is the "fuel" used to drive the hydro-electrical plants (13% of electricity production in the SEMCs) and the cooling source for power stations. However, as a result of climate change, water resources in the SEMCs are expected to shrink by between 10 and 30% by 2050. Moreover, the rise in river temperatures could trigger a major drop in electricity generation because of the limit values to be respected when rejecting water used for power plant cooling. For example, for 20 years, average hydro-electrical production in Morocco has only amounted to half what could have been expected. In 2003, the heat-wave which hit Europe triggered some towering peaks in consumption, whilst at the same time electricity production was reduced due to cooling constraints. Had the heat-wave continued, 30% of production in France would have been threatened¹.

Thus, if demographic and economic growth in the SEMCs and the investment and development options of the last thirty years are taken into account, a marked intensification of already existing tensions is to be foreseen: (i) a huge increase in CO₂ emissions and local air pollution, (ii) increased energy dependency on the part of importing countries, more marked for importing SEMCs, where the rate of dependency is likely to rise from 77% in 2006 to 88% in 2025, than for the NMCs (from 68% to 73% over the same

period), (iii) more serious social and economic risks linked to the impact of a rise in supply costs on the energy bills of countries, households and businesses and finally (iv) increased vulnerability on the part of the energy system to climate change with, on the one hand, electricity production being constrained by water resources and, on the other, a rise in energy demand to adapt to climate change.

Energy efficiency and renewable forms of energy: real economic advantages

The most important economic benefits lie in improving energy efficiency (EE) and in the development- albeit modest- of renewable forms of energy (RE). If measures enabling energy intensity to be improved by 10% in 10 years and increasing the share of "solar, wind and geothermal" sources in primary energy to just over 1.1% were to be added together, as of 2015 this would produce an annual benefit for all the countries on the southern and eastern banks of some 30 billion dollars, taking 120\$² as the price of a barrel of oil. Some 36 million tonnes of oil equivalent (toe) would be saved compared with current trends and a drop in the order of 130 million tonnes of CO₂ discharge observed.

This "cost of non-action" for the countries on the southern and eastern banks is comparable with Tunisia's GNP for 2005, which amounted to 28.7 billion dollars. That same year, CO₂ emissions in Tunisia related to energy use stood at around 20 million tonnes.

This "cost of non-action" should also be compared with the "cost of the action" required if EE improvement and RE development objectives are to be met. Whilst it is not possible to directly compare the results, the various cost- of- action components have been calculated for Egypt for 2015 and for Tunisia for 2011. In both cases, the cost of saving the equivalent of one toe through better energy control is estimated at around 40 euros on average. The additional cost related to the necessary RE and EE investment is estimated for Egypt at 10% and for Tunisia at 13% of investments planned for the energy sector. As a reminder, on 15 May 2008 the price of Algerian gas at the Tunisian border was 257 euros per toe³.

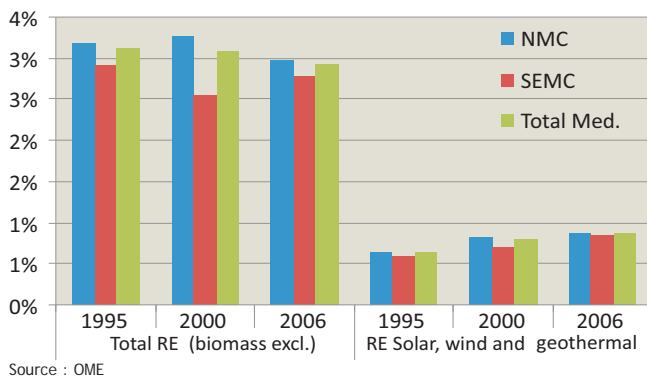
Apart from the purely economic and financial benefits, there are further potential gains in terms of jobs and the development of industry and services, as well as for the health of the local population.

Awareness is growing, but headway in terms of energy efficiency and renewables is still limited

There is growing awareness of the importance and interest of better controlling energy and of the links between the environment and development in the Mediterranean. This is illustrated on the northern rim, in the European Union, by the adoption of drastic measures to develop energy efficiency and renewables and to reduce greenhouse gas emissions. At national level, several SEMCs are also starting to show more restraint in their use of energy.

At political level throughout the region, the adoption in November 2005 of the "Mediterranean Strategy for Sustainable Development" (MSSD) by all of the Mediterranean riparian states and the European Community is a real signal of political will.

Figure 4- Share of renewables in primary energy supply (% of TPES)



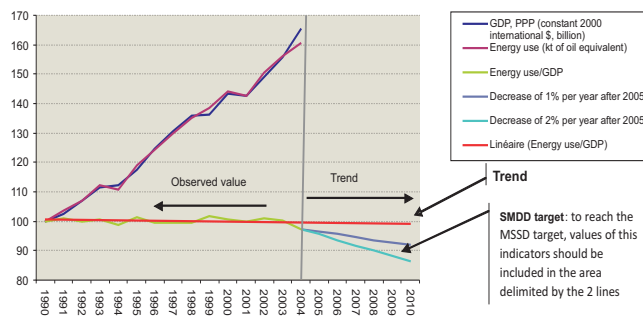
The amount of renewable energy produced is growing in absolute terms but, given the simultaneous growth in demand, the share of renewables (hydraulic, wind, solar and geothermal) in primary energy supply is progressing at snail's pace from 2.5% in 2000 to 2.8% in 2006 (figure 4), which is way off the MSSD's target of 7% by 2015.

As far as energy intensity is concerned, virtually no progress has been observed for the SEMCs as a whole since 1990 (figure 5) ; if this trend is confirmed, it is not compatible with the MSSD's declared aim of an annual 1-2% reduction.

These global changes- hardly to be seen as positive-mask other successes which prove that progress is indeed possible. Examples, among others, are: wind energy in Egypt and solar water heaters in Israel or Turkey; In Morocco for solar PV in rural area; Tunisia has brought about a marked improvement in EE, and is already reaping substantial benefits. From 2005-2007, 140 million euros were invested, allowing energy efficiency to be improved by 2.8% per year. The

subsidies for energy products avoided by the state over the same period are estimated to amount to 260 million Euros.

Figure 5 - Total energy intensity in the SEMCs, 1990=100



Source: Blue Plan calculations using WDI data.

An institutional and regulatory framework awaiting completion, economic and financial barriers to be removed

The handful of success stories show that, besides political will at national level, a suitable legal, administrative and economic framework is of the essence. An analysis of the political and legal measures and incentives adopted on RE and EE shows that headway has been made in all countries, albeit at highly varied rates. Tunisia and Morocco are well ahead, whilst the energy producing countries such as Libya, Algeria or Egypt are less so. However, despite the progress⁴, the institutional and legal frameworks needed for the development of a real market for controlled energy use are still often incomplete, not very visible, sometimes unstable and lacking in efficiency.

The lack of information to companies and households about the substantial economic and financial gains to be expected from energy efficiency measures is hampering any increase in awareness amongst decision takers regarding the scale and ease of benefits to be expected in this field.

Finally, the fossil energy subsidies which exist in many SEMCs are reflected in a relatively low price for the final consumer, discouraging the development of EE and REs (conversely, a high Kwh price in the housing sector has driven a major increase in solar water heaters in Israel and Cyprus); this context also often explains the ineffectiveness of economic and financial incentives on renewables and EE.

Thus, even for the most advanced countries, the challenge which still remains is to bring about a massive generalisation of the success stories, the creation of a Mediterranean RE and EE market and the systematic channelling of investments towards renewables and EE.

Regional and international cooperation has undeniably an important role to play, particularly in acting as a lever and allowing the transfer of technology and know-how between the northern rim, where technology is available and the southern rim, which enjoys the most favourable natural conditions for renewables and major energy efficiency reserves. In the future, and providing the legal frameworks between the states in the region converge, the exportation of "green" electricity from the southern to the northern banks, and more broadly speaking towards the European Union, could well become a reality, particularly through the development of the solar branch. The clean development mechanism (CDM) is also an instrument which should be better used in the region.

The building trade and water management: key sectors for the future of the region

In the SEMCs, which are undergoing full-on development, there are numerous look-ahead possibilities for the coming 7 to 10 years to control the rise in consumption and the increase in CO₂ emissions, whilst at the same time reducing the energy sector's vulnerability for the next century. Two areas- the building trade and water- offer exceptional look-ahead possibilities.

The SEMCs are currently undergoing rapid urbanisation. By 2025, the number of city-dwellers could well rise to 243 million, in other words 100 million more than in 2000. New buildings and new towns are sprouting up in all the countries. In Morocco, for example, additional housing needs are estimated to stand at between 100 and 125 000 per year. In 2005, the housing and tertiary sectors in the SEMCs accounted for some 30% of final energy demand.

The demand for water in Mediterranean countries doubled over the second half of the 20th century. In 2025, it will reach 330 km³-a level which is incompatible with the renewable resources available. Moreover, these resources could well decrease within the context of climate change. Depending on the choices made to pre-empt crises and water shortages, the energy needed for water production could well become one of the main determining factors in total

energy demand. In the SEMCs and according to current trends, by 2025 20% of total electricity demand could come from the energy needed to produce water, compared with 10% in 2005⁵.

Since investment in these sectors is of a long term nature, the choice to include RE and EE in policies related to construction, building and water resource management and to what extent will largely determine the sustainability of the energy system on the one hand, and the area's resilience in the face of climate change on the other.

Faster natural gas penetration and/or the renovation of the oldest power plants are also solutions for reducing CO₂ emissions and local air pollution. Further options, such as carbon capture and storage or the development of nuclear energy are being discussed and are unlikely to see any large-scale roll-out in the SEMCs by 2020-2025. Thus to date, given the climate, energy and even economy-related constraints and uncertainties, particularly in the SEMCs, boosting the role of renewables and EE in all sectors is no longer a choice- it has become a necessity.

Notes:

¹ IPCC, 2007.

² Extrapolation to all MEDA countries (including Turkey) of the cumulated results for 3 countries: Morocco, Tunisia, Egypt.

³ Source : European Gas Markets, www.heren.com.

⁴ Virtually all the SEMCs have institutions which are responsible for promoting renewables, many countries have renewable objectives per industry or sector, legislation is in the pipeline, and financial or economic incentives are also emerging.

Toe: tonnes of oil equivalent

NMC: Northern Mediterranean country

SEMC: Southern or Eastern Mediterranean country

TPES : Total primary energy supply

⁵ Blue Plan Notes N°9 "Strategies for integrated water and MAP energy resources management to address climate change"

Sources:

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Blue Plan Notes



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