



Energy efficiency, building and climate change in the Mediterranean

The Southern and Eastern Mediterranean Countries (SEMCs) are undergoing rapid urbanisation, which is reflected in massive demand for housing. It is estimated that by 2030 a further 42 million housing will be needed. Under the combined effect of demographic pressure and economic growth, demand for energy and electricity is set to increase 1.5-fold by the same date. In the SEMCs this demand is expected to grow 4 to 5 times faster than in the countries on the Northern shores, driving ever-increasing CO₂ emissions.

The building industry, which ranks first in terms of electricity consumption and second- after transport- for fossil fuels, is a key sector, since it allows influence to be brought to bear on both demand (energy efficiency measures) and supply (integration of renewables). Globally speaking, it is estimated that potential energy savings in the construction sector amount to some 40%, largely through economically viable measures. Accounting as it does for one third of total energy consumption in the Mediterranean countries, the building sector could provide for energy savings of up to 60%.

The building sector, the key to controlling energy demand

The Mediterranean basin is home to some 450 million people, who consume almost 1000 million tons of oil equivalent (Mtoe) of energy each year, i.e. around 8.2% of global demand. Cities constitute the hub of energy consumption, particularly in the SEMCs, where « fossil dependency » is in excess of 90%. The building industry accounts for about 38% of final consumed energy, with the residential sector consuming between 21% and 51% of national electricity production, depending on the country.

New housing: unprecedented needs

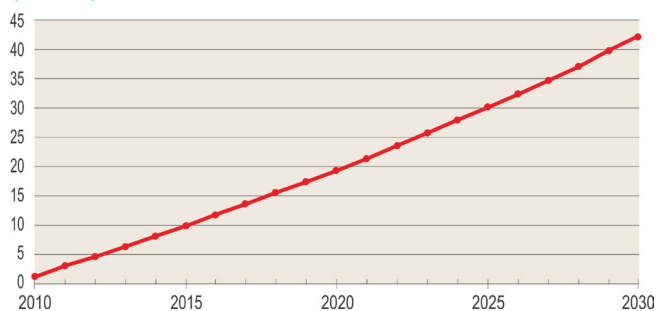
According to Plan Bleu estimates, the population in the SEMCs could grow to over 360 million by 2030 from its current 280 million.

The rate of urbanisation is also on a clear upward trend: 2/3 of all Mediterraneans are town-dwellers, a proportion expected to reach over ¾ by 2030. Almost half the urban population is concentrated in 3000 cities of less than 300 000 inhabitants. Despite the progress made over the past 20 years and more, major imbalances persist in the SEMCs between large and small cities, central urban and outlying areas and privileged and rundown neighbourhoods. Urban expansion often takes the form of unregulated, shanty-type housing. The lack of

statutory controls over such housing, its unclear legal status and the low income levels amongst its occupants make this a particularly impervious sector to energy efficiency (EE) measures.

The dual thrust of urbanisation and population boom is set to fuel considerable housing demand. According to the Blue Plan's most recent studies, almost 42 million new housing would need to be built in the SEMCs by 2030, rising from 66 million in 2007 to almost 108 million. Such prospects point to a major increase in energy and electricity consumption in the residential sector, hence the crucial and pressing need to develop the energy efficiency market in the Mediterranean.

Fig 1: Estimate of the number of new housing in the SEMCs (H. 2030) (millions)



Source: Plan Bleu

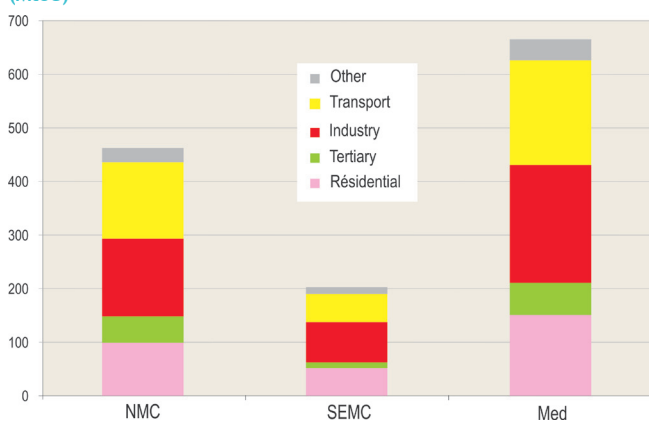
Implementation of energy management policies

In view of the demand for housing, public policy in the NMCs (Northern Mediterranean Countries) is focused on encouraging the redevelopment of existing stock, whilst vast construction programmes are being rolled out in the SEMCs.

Whilst a patchwork of energy policies exists in the SEMCs, things look different on the Northern shores. Accounting for 40% of the EU's energy consumption and 36% of its greenhouse gas (GHG) emissions, the building and construction sector has long been the focus of community concerns.

Table 1 presents the most salient information regarding the two key European directives on reducing energy consumption. In December 2008, the EU adopted the Climate and Energy Package, which establishes three objectives by 2020 for combating climate change: curbing GHG emissions by 20% compared with their 1990 levels; increasing the share of renewables to 20% of final consumption; reducing energy

Fig 2: Energy consumption by sector in the Mediterranean for 2007 (Mtoe)



Source: Plan Bleu (based on the IEA Energy Balances, 2009)

consumption by 20%. The European Energy Performance of Buildings Directive (EPBD) is also the main community legal instrument which foresees a global approach to the efficient use of energy in the building sector.

These two directives can provide a pointer for the SEMCs—the Arab League, which includes 11 SEMCs, is currently defining its own strategy for drafting an Arab EE Directive based on the European ESD « 2006/32/CE ».

The need for a rupture scenario in the SEMCs

This would comprise a pro-active energy management scenario based on integration and the implementation of EE measures alongside the development of the most technically, economically and politically mature renewable forms of energy:

- Widespread use of efficient envelopes for new buildings (application of periodically revised thermal regulations);
- Progressive elimination of filament bulbs;
- Thermal renovation of buildings (insulation, windows);
- Distribution of efficient domestic, heating and air conditioning appliances;
- Distribution of solar water heaters.

Priority measures have been defined by climate zone according to their energy saving potential and economic viability. This scenario therefore involves the widespread roll-out of elements which already exist rather than a « technological clean break ».

Impacts of the scenario on the SEMCs

Roll-out of this scenario in the SEMCs points to potential energy savings of about 40 Mtoe by 2030 (Fig 3). In parallel with a 4 Mtoe increase in renewables, estimated energy savings amount to almost 1 Mtoe for coal, 9 Mtoe for oil-based products, 17 Mtoe for natural gas and 14 Mtoe for electricity. The biggest reductions by usage are to be seen in heating and air conditioning at around 60%, followed by

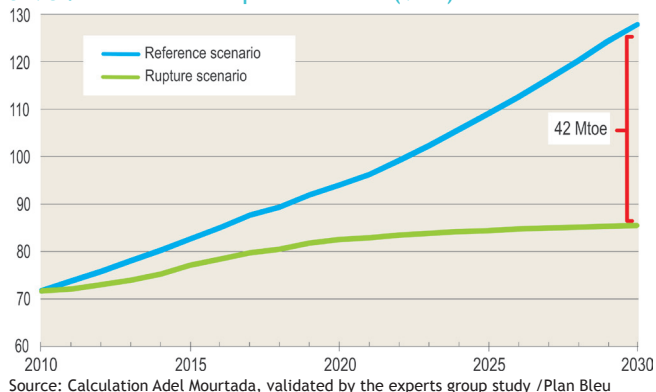
Tab 1: The two key European directives towards reducing energy consumption

European regulatory framework	Objectives and targets	Transposition by Member States
EPBD Directive « 2002/91/CE » <i>Energy performances of buildings</i>	Objective: To reduce energy consumption by imposing measures: thermal regulation, energy performance assessment, certification and checks. According to the European Commission, if correctly implemented the directive will lead to an 11% reduction in the EU's final energy consumption by 2020. Target: New and existing buildings in the residential and tertiary sectors (offices, public buildings, etc.)	Role of States: Member States are responsible for drawing up minimum standards. They are required to ensure that certification and checks on buildings are conducted by qualified and independent inspectors. State of progress: Transposition by Member States is deemed to be inadequate given the range of issues in the building sector. A redrafting of the directive was proposed in 2008 in order to extend its scope of application whilst clarifying and strengthening certain provisions, particularly towards ensuring a driving role for the public sector.
ESD Directive « 2006/32/CE » <i>Energy End Use Efficiency and Energy Services</i>	Objective: The directive requires Member States to set a minimum 9% objective for reducing final energy use in 2016 and to introduce the institutional and legal frameworks and measures needed to remove obstacles to efficient final energy use. Target: varied and intersectoral. Concerns moveable equipment such as « domestic appliances » in particular. No requirements are imposed regarding energy efficiency in buildings, although Member States are free to propose measures for this sector.	Role of States: In mid-2007 each Member State was expected to submit to the European Commission the improving for its national energy efficiency action plan (NEEAP), revisable every three years. State of progress: In 2008 the European Commission assessed the initial versions of several NEEAPs, with rather mixed results: although the proposed strategies would probably make for savings beyond the stipulated 9%, these plans were not particularly ambitious and often simply picked up on planned or already existing measures. Member States are required to submit a more ambitious version of their NEEAPs by 30th June 2011.

Source: From <http://www.buildup.eu/>

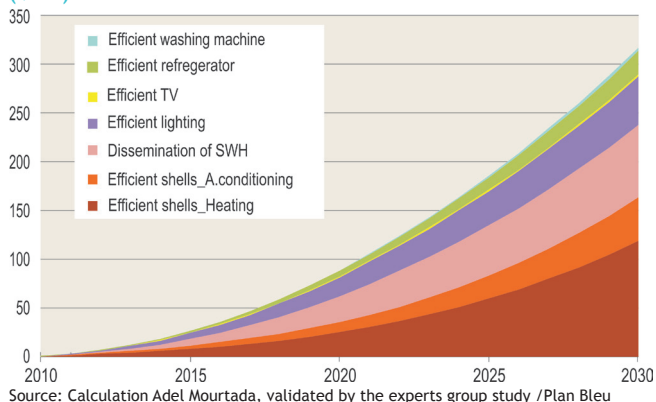
lighting at around 50% and electrical appliances at around 33%. Cumulative potential final energy savings for the period from 2010-2030 are estimated at over 320 Mtoe as shown in the figure below.

Fig 3: Final energy consumption in the residential sector in the SEMCs. Reference and rupture scenarios (Mtoe)



By 2030 and taking account of changes to the energy mix and an 11% or so penetration of renewables, according to this scenario the annual reduction in CO₂ emissions in the SEMCs would be around 179 MtCO₂. Thus the cumulative reduction of CO₂ emissions for the period from 2007-2030 would amount to some 2 GtCO₂.

Fig 4: Cumulative final energy savings for the residential sector in the SEMCs- rupture scenario compared with the reference scenario (Mtoe)



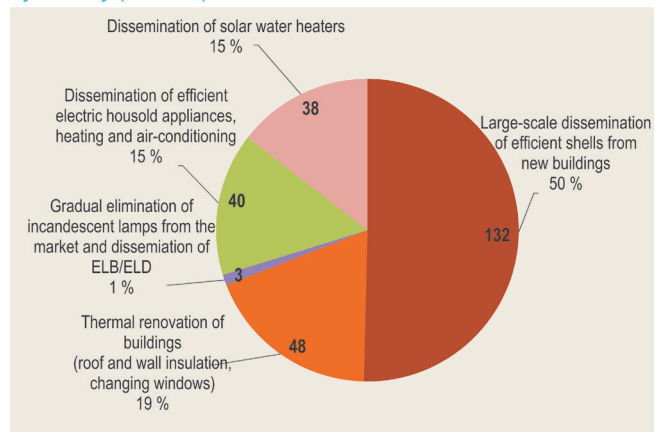
Investment needs

It is estimated that the total investment required to implement this scenario would amount to 262 billion Euros in the SEMCs over the next 20 years (Fig. 5).

These figures should be considered in respect of the cost of « non action », which according to the experts would be very high. As a genuine « hot spot » for climate change, the Mediterranean region will require major investment in order to adapt to the expected rise in temperature (between 2.2 and 5.1°C). Assuming such a temperature increase, the additional primary energy needs for air conditioning would exceed 21% and decreases the heating requirements of 6%. This would be reflected in the need for additional power generation

capacity of about 12% compared with the trend scenario in the absence of climate change, and in an 8% increase in primary energy consumption in the housing sector.

Fig 5: Investment needs for EE measures under the rupture scenario, by country (billion €)



Recommendations towards developing EE in the Mediterranean

The building industry is a key sector in terms of addressing the new energy and climate order in the Mediterranean and substantially reducing GHG emissions. A poorly designed and/or badly constructed building will have inflated heating and air conditioning needs for decades. In the SEMCs, where the building industry basically needs to be shaped from scratch, only concerted action between the various stakeholders will lead to the emergence of a permanent sustainable construction market. It is therefore imperative that the building industry be overhauled in its entirety and within its territorial context.

Efforts should mainly focus on new buildings, for which technical solutions suitable for the Mediterranean context have been identified:

- Taking greater account of the architecture « of yore », in line with bioclimatic principles, which leverages the potential of natural factors before those relating to building envelopes: passive solar input, natural ventilation, aspect of the building, etc.

- Measures with a good cost/benefit ratio: roof and external wall insulation, solar protection on the most exposed facades, double glazing, low consumption bulbs and apparatus, solar thermal for the production of domestic hot water... The additional cost of all the measures used in the disruptive scenario is estimated at 3300 € for the construction of an average 100 m² housing.

The spread of these solutions and the development of a large scale energy management market in the building sector are being hampered by obstacles of an informational, economic, organisational and technical nature. There is a particular need for capacity building and support programmes for the construction industry through the training of designers and craftsmen (setting up of a company authorisation system).

Fig 5: Representation of the number of cooling degree days (CDD)

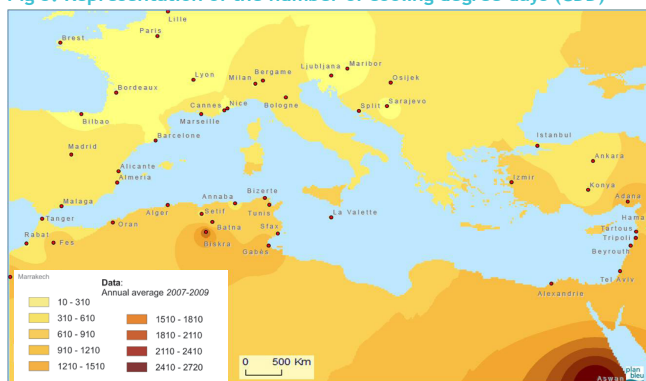
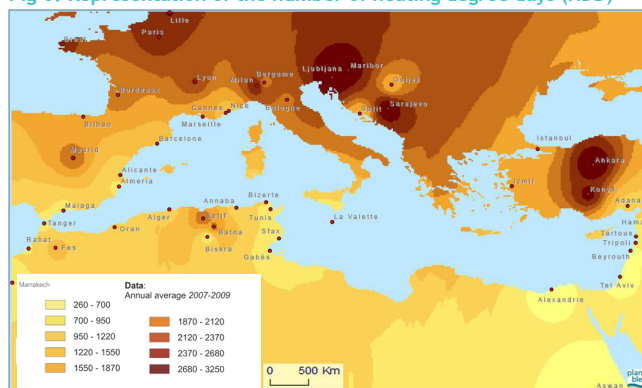


Fig 6: Representation of the number of heating degree days (HDD)



Source: Elaboration Plan Bleu, June 2010 (based on mean data over 3 years from www.degreedays.net)

As such, a sustainable building market can only emerge if driven by the clear will of the States. A proactive approach is needed. It is therefore imperative that a building should be considered from the moment of its design through to its completion and its operational impact factored in for its entire life span.

In specific terms, the sustainable development of this type of market involves the implementation of measures intended to organise the industry, to finance it and to provide it with long term support. The steps to be taken can be classified within the following three categories.

Creating a sustainable building industry

- Designing a binding, cross-cutting regulatory framework and monitoring its implementation.
- Creating appropriate and lasting institutional back-up.
- Overhauling energy policy.

Electricity subsidies which encourage its use for heating water and buildings must be shelved- the funds released thereby could be partly ploughed back in support of EE.

Financing sustainable building

- Applying appropriate pricing and offering price incentives.
- Bringing the banks on board and adapting loans.
- Developing « public-private partnerships ».
- Facilitating access to international financing.

Establishing the sustainable building market on a permanent basis

- The State should set the example and take the lead.
- The quality of equipment and performance should be monitored and professionals trained.

As has been done in the NMCs, the SEMCs also need to develop labels and certification for buildings and domestic appliances. It may seem relatively difficult and expensive to introduce such « labelling » and « training », but they are essential to the building of a permanent EE market in the SEMCs- these two factors are, after all, what will guarantee the quality of the methods and technology deployed.

Basically, the Mediterranean countries are being called upon to take decisive steps in support of the building sector. The renovation programmes being conducted to the North of the Mediterranean and the construction programmes to the South are opening up a wealth of possible futures for the region. It is up to the players involved to select those options which consume the least energy and produce the lowest emissions.

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