Energy Efficiency in Office Buildings: Low Cost - High Impact Interventions

by Nikos Tourlis *, March 2006

The integration of the effort of establishing operational, efficient and environmental friendly European market intersects necessarily with the need to define a common policy regarding the efficiency of the end-use of energy. The improvement of energy efficiency in buildings is described as a high-priority issue for the Community, since building facilities amount up to 40% of the total energy consumption within the EU. This consideration is the motivation for the obligatory for the Member States Directive 2002/96/EC, which demands the introduction of particular measures aiming at the rational use of energy, the utilization of renewable energy sources and the mitigation of environmental impacts of building energy use.

Energy certification of buildings, as indicated by the Directive, has been actually forwarded during the last decade by means of performing energy audits. Still though, defined standards are now to be established, combined with a certified auditor's body for the materialisation of the actual process. Even though there is notable delay in Greece regarding the harmonisation of the domestic legislation with the 2002/91/EC Directive, there are still certain factors promoting a change in the consuming culture; the continuous increase in the price of conventional fuels; the restructuring of the internal electricity market; the activity of alternative energy suppliers and eligible customers in the market. Consumers seek ways to minimise the energy cost, either by introducing energy saving measures or by exploring the exact distribution/profile of their energy consumption in order to determine the most profitable pricing.

In office buildings, which are considered of representing a significant portion of the energy consumption in the tertiary sector; energy management based on the previous mentioned directions can reduce the annual energy costs significantly. Especially in Greece, it has been concluded by numerous studies that the energy saving potential is remarkably high since the percentage of buildings using new energy technologies is in its turn relatively low. This fact is particularly valid in the domain of HVAC, which account for over 50% of the total building energy consumption (consuming a least of 100 kWh/m^2).

Still though, energy saving measures for office buildings have to be considered in detail for each case. Every building is described by its particular energy consumption profiles, which can ideally a result out of a detailed energy audit. The cost of such audits and respective reports is then compensated by the resulting energy saving profits.

Energy audits are the only means for an accurate definition of energy saving interventions, either low or medium and high cost. Low cost actions are usually direct and applied immediately, whereas their impact usually makes up for the energy audit cost. Medium and high cost interventions require special techno-economic evaluation so as to select the most promising aspects and available funding opportunities. A recent energy audit for a new office building in the centre of Athens depicted the lavish energy consuming state of

most buildings in Greece, as well as the imminent need for improvement. The relevant building space spread in two floors and utilised almost exclusively electricity for all its energy needs, including heating and cooling. Furthermore, it consists of data centres utilising electricity on a 24-hour basis, consuming a monthly average of 30 to 35 MWh, or otherwise a 70% of the total building energy consumption.

The analysis of the energy audit indicated that a simple change of the medium voltage electricity tariff, due to high and constant utilisation factor would result to the reduction of electricity costs by almost 20%. Additionally, zero-cost measures regarding energy saving, such as interventions in respect to lighting, office facilities and ventilation during non-working hours can increase the energy saving potential significantly with out the need of investing capital and thus in the absence of risk.

In general, energy saving practical actions are not considered in the Greek everyday life. Still though, zero- and low-cost interventions are widely applicable in most office buildings, whereas most medium- and high cost methods are also depicted as financially viable in most cases. Simple interventions, such as the use of low consumption lamps, utilisation of natural gas, integrated and automated energy management and energy monitoring systems, along with the liberalised market choice of selecting an alternative supplier, can be considered as indicative solutions for thousands of consumers, promoting energy saving and improving the quality of energy utilisation in Greece.

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