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THE USE OF RENEWABLE SOURCES IN CITY CENTRES

The Machu Pichu Charter of 1977 launched the idea of “cities and regions” being interdependent entities that tend to become one, “multifunctionality” rather than “zoning”, “communication” as the key to human life, “architecture” as socially functional spaces to live in. However, above all it introduced the concept of “the quality of life and its integration with the natural environment... The impact of technological and mechanical developments have led to architecture often using artificial conditioning systems created to work with unnatural lighting and climates...” In other words, the basic principles of bio-climatic architecture are also used for work in city centres, whereby the architects who design the houses are expected to pay more attention to the microclimate and use local materials, rather than create identical buildings for all climates and latitudes using artificial conditioning/heating systems that cause pollution to ensure the comfort of indoor environments. The most cost-effective technological options for the civil sector to help reduce CO₂ emissions between now and 2020 in accordance with the Kyoto Protocol are passive solar systems, thermal insulation for buildings, high-efficiency heating systems, etc. A large number of “historical” buildings comprise materials with a high level of thermal inertia, internal courtyards and staircases that provide natural ventilation, windows orientated in accordance with the direction of winds that prevail in that particular microclimate and comfortable outdoor spaces such as porticos, etc. A large number of buildings lead to teleheating which consequently leads to large savings in primary energy, especially when combined with the co-generation of heat and electricity. The need to use traditional materials, to be aware of the techniques used to create “historical” buildings and to respect historical and artistic materials requires particular expertise and training courses to create the specialists.

Even if the quality of life in large cities is not the best, cities still remain centres of cultural, social and economic activities.

1. REDUCTION OF URBAN POLLUTION

During the last few years the energy consumed by the building sector in Italy and in Europe was about one third of the final consumption and was responsible for about

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30–40% of the CO₂ emissions. The demand of this sector is just below that of transportation and higher than that of the industrial sector.

The major contributions to energy consumption and pollution come from heating (in colder climates) and air conditioning (in warmer ones), or by a combination of both of them. Electrical appliances are expensive to run, because along with illumination they make up 23% of electrical consumption.

Italy is a convinced supporter of the Kyoto Protocol and, within the European Union and according to the principles of Agenda 21, is committed to substantially reducing the emission of greenhouse gases: a reduction of 7% in the period of 2008–2012 compared to the 1990 values, which corresponds to a reduction of at least 20% from the trend values, bearing in mind the expected growth of energy demand in the absence of specific provisions.

There is great interest today in the sustainable aspects of the buildings. The international congress “HABITAT” held in 1996 in Istanbul and then organized in New York (2001) by the United Nations gave rise to a series of recommendations contained in the declaration “Sustainable human settlements development in an urbanizing world”. Article 4 of this declaration deals specifically with energy uses: “Current dependence in most urban centres on non-renewable energy sources can lead to climate change, air pollution and consequent environmental and human health problems, and may represent a serious threat to sustainable development. Sustainable energy production and use can be enhanced by encouraging energy efficiency, by such means as pricing policies, fuel switching, alternative energy, mass transit and public awareness. Human settlements and energy policies should be actively coordinated.”

2. THE HISTORICAL CITY CENTRES

The Machu Picchu Charter of 1977, follow-up to the 1975 Amsterdam Declaration regarding City Centres and the previous Athens and Italian Charters on Restoration, launched the idea of “cities and regions” being interdependent entities that tend to become one, “multifunctionality” rather than “zoning”, “communication” as the key to human life, “architecture” as socially functional spaces to live in. However, above all it introduced the concept of “the quality of life and its integration with the natural environment (as) ... the essential objective in the creation of liveable spaces. Town and city planning policies must include measures to avoid intensifying environmental degradation and to encourage building restorations in accordance with laws on hygiene and the general well-being of human beings... The impact of technological and mechanical developments have led to architecture often using artificial conditioning systems created to work with unnatural lighting and climates...”

In other words, the basic principles of bio-climatic architecture are also used for work in city centres, whereby the architects who design the houses are expected to pay

more attention to the microclimate and use local materials rather than create identical buildings for all climates and latitudes using artificial conditioning/heating systems that cause pollution to ensure the comfort of indoor environments.

Urban conglomerations throughout Italy and most of Europe usually comprise “old” buildings, in other words buildings erected before the fifties. Building in subsequent years was badly influenced by an economic “boom” and consequent property speculation, at least as far as Italy is concerned, therefore leading to a situation whereby the overall quality of new buildings – though there are of course exceptions – was rather poor. This is an important subject for us as bioclimatic architecture above all means quality architecture.

Within the principles of Agenda 21 and the previous Aalborg Charter an initiative has been developed in Italy since 1998 regarding, in particular, the construction sector. This initiative is based on an “Agreed Code of Recommendations for the Energy and Environment Quality of Buildings and Open Spaces” for the introduction of energy-environment criteria in construction regulations and other related initiatives. This was directed at local authorities which play an essential role in the promotion of sustainable development also through voluntary agreements with private entities.

The Code sets forth principles of a “high energy-environment quality” directed to those who are responsible for preparing plans, defining standards and who design the urban planning instruments and specific transformation activities, those who implement these plans and, finally, those who utilize them.

Moreover, the municipalities will encourage and promote: a) utilization of renewable energy sources and eco-compatible products in the construction and upgrading of public buildings and control of energy consumption, water cycles, emissions and waste products; b) introduction of elements that favour new constructions or bioclimatic rehabilitation into the Building Regulations; c) complete the urban-planning instruments with climatic charts that contain elements relative to temperature, rainfall, humidity, solar radiation, winds; d) considering external areas as an integral part of the buildings design.

The innovative characteristics of this instrument, adhered at present by 100 townships, are essentially two: first the simplicity, since it does not create new rules but clarifies principles for stimulating reflection, promoting innovative initiatives by regulators and urban planners; second, it is the product of a bottom-up process, with the involvement and participation – in agreement with the Ministries of Public Works, of the Environment, of Industry and of Cultural Heritage – of the major stakeholders: national townships associations, architects, engineers, urban planners, builders, technicians from the local boards, many provinces and regions. In this way, they created a network.

As far as ENEA is concerned, the most cost-effective technological options for the civil sector, in other words cost-free, to help reduce CO₂ emissions in Italy between now and 2020 in accordance with the Kyoto Protocol and its foreseeable extension are pas-

sive solar systems, thermal insulation for buildings, high-efficiency heating systems, electric heat pumps rather than irreversible summer air conditioning systems and water-heating systems which work at night only. Let us look at the first of these options.

The simplest and “oldest” passive solar system is directly capturing heat from the sun via west- or east-facing glass surfaces, such as the interesting example provided by the “heliocaminus” at the Roman Thermal Baths in Ostia and Raffaello’s Vatican Lodges. A large number of “historical” buildings comprise materials with a high level of thermal inertia, internal courtyards and staircases that provide natural ventilation, windows orientated in accordance with the direction of winds that prevail in that particular microclimate and comfortable outdoor spaces such as porticos, etc. Suitable development of these characteristics leads to largely improved urban environments. Most buildings in town and city centres comprise thick brick or stone walls, therefore ensuring isolation for the indoor environment and low-heating consumption. This low-energy consumption can be made even lower by improving door and window frames. However the most important factor is the thermal insulation provided by the outer walls which ensure more stable temperatures and therefore better comfort in hotter months compared to modern buildings.

Let us look at some other typical features of buildings in town and city centres. The high density of buildings is favourable to district heating which may lead to important savings in primary energy when combined with the co-generation of heat and electricity. District heating is often considered as difficult to apply in town and city centres due to the difficulties posed by digging the necessary holes for laying network heat distribution cables. However, nearly the same amount of digging is required for natural gas pipes.

Work in town and city centres requires know-how, which most building and service companies used to standardized modern technology do not usually have. The need to use traditional materials, to be aware of the techniques used to create “historical” buildings and to respect historical and artistic materials requires particular expertise. A programme for large-scale intervention in town and city centres should comprise training courses to create the specialists needed and this specialist training should also comprise the subjects of energy and the environment without ignoring the other essential aspect involved, i.e. “indoor air quality”.

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WYKORZYSTANIE ODNAWIALNYCH ŹRÓDEŁ ENERGII W CENTRACH MIEJSKICH

Podstawowe zasady, na jakich opiera się architektura bioklimatyczna, mogą być wykorzystane do projektowania miejsc pracy w centrach miejskich. Od architektów oczekuje się działań zmierzających do zapewnieniu odpowiedniego mikroklimatu oraz wykorzystania lokalnych materiałów. Nie należy projektować budynków, które niczym by się nie różniły w różnych strefach klimatycznych i przy różnym położeniu i byłyby wyposażone w klimatyzację lub sztuczne systemy grzewcze, zapewniające komfort w ich wnętrzu. Takie urządzenia przyczyniają się do zwiększenia zanieczyszczenia środowiska. Najtańszym rozwiązaniem technologicznym, pozwalającym zmniejszyć emisję dwutlenku węgla w ciągu najbliższych dwudziestu lat, jest pasywny system słoneczny: „historyczne” budynki są zbudowane z materiałów o dużym stopniu bezwładności termicznej, mają wewnętrzne dziedzińce itp.