

Since the first issue of CSE was published on line, thousands of visitors to the website have been recorded. We are proud of such success: it encourages us to invest time in making continuous improvements to the journal.

The interest generated by the editorial philosophy of CSE is reflected by the large number of submissions for issue no. 2, which covers different topics in the general subjects converging towards an integrated vision in the environmental sector.

Issue no. 2 presents the following articles:

Planning and Land Safety

Earthquake, urban form and city planning: research perspectives (by Cappuccitti) presents an overview of the main points of the research lines about the seismic vulnerability of cities and urban fabrics, briefly discussing their respective content and specific features. The seismic vulnerability study is conducted simultaneously with a study regarding the appropriate integration of urban-planning and regional tools.

With the article *Feeding the City. Foodsheds and Urban Agriculture in San Diego*, Ricci, Mattogno, Monardo, Palazzo and Valentino explore the most recent general policies in the United States, recounting an experience within the distressed neighborhood of City Heights in San Diego, CA, both in research and planning practice about 'Urban Agriculture' (UA), that can give new perspectives to urban revitalization strategies, particularly for fostering social inclusion in contemporary, fragmented communities.

Smart city models and energy efficiency related to the metropolization of the city of Reggio Calabria (by Fazia) is the title of research in progress, providing a tour of the possible candidates for *Smart cities*, focusing on the prerequisites, on the spheres involved, on existing and feasible strategies required to set up a Smart Project. The possible application of smart features to metropolitan cities is explored in the case study of the forthcoming metropolitan city of Reggio Calabria.

Sustainable Urban Mobility

Innovative parking strategies through the application of variable pricing techniques (by Ferrari and Maternini) describes a methodological approach tested in San Francisco to apply variable parking pricing in medium-sized cities. A pilot project is analysed, known as "SFpark", whose final evaluation report was published in June 2014.

Environmental Design

The article *Environmental Design Criteria through Geoindicators for two Mediterranean Coastlands* (by Valente, Stamatopoulos, Donadio) aims to define environmental design criteria along the Mediterranean coasts such as beaches, cliffs and techno-coasts. Scientific methods to define critical points and appropriate instruments are applied. The results indicate how the adaptive approach and the non-imposing solutions contribute to reduce anthropogenic impacts in regions with a high

degree of environmental hazard.

Towards Sustainability Assessment: A Case Study of International Indicators and Trial Assessments of Kashiwa-no-ha Plans in Japan (by Miyawaki et al.) is the title of the research report concerning sustainability indicators that should be applied in the planning process. After comparing the international indicators of sustainable development, the Eco City and the Smart City, the authors consider a Japanese case study by verifying the sustainability characteristics of the two main plans.

In the report *Bioclimatic simulation, environmental based urban design and architectural redevelopment in the Mediterranean Area* Calcerano et al. present a synthesis of the research "Bioclimatic simulation, environmental based urban design and architectural redevelopment in the Mediterranean area", focusing on the case study of a district in Rome, which deals with the theme of the self-reliant city, of mitigating the heat island effect and of the energy and environmental efficiency of building.

Building Technologies

The article *Parametric planning for the restoration and rehabilitation of architectural heritage* (by D'Auria, De Feo and Di Ruocco) shows the efficiency of BIM (Building Information Modeling) in projects regarding the rehabilitation of historical buildings. However, BIM protocols for existing buildings are not available at the moment as they are only used in designing new civil and industrial buildings.

Materials Engineering

Advances in nanoscale science and engineering are providing unprecedented opportunities to develop more efficient and cost-effective materials. In *Recent advances in the field of nanoporous materials for energy and environmental applications* (by Caputo, Gargiulo and Aprea) a brief overview is shown on current and prospective uses of nanoporous materials in environmentally friendly processes.

The *Durability and mechanical properties of a composite fibre reinforced concrete* are investigated by Coppola, Scarfato, Incarnato and Di Maio. Water absorption, freeze/thaw cycles and the sulphate attack test demonstrate that concrete durability increases with the volume of the fiber fraction.

We are therefore most pleased to share the contents of the second issue n. 2 with our readers.

The Scientific panel of CSE

EDITORIAL

The global climate change challenge

by Loreto Colombo

The world heading towards a single objective

The damage from catastrophes produced by climate change in recent decades is calculated to amount to US\$ 500 billion. While for the first time over one million people recently demonstrated to demand economic, energy and social policies that safeguard the future of planet Earth, the Climate Summit 2014 opened in September on the occasion of the 69th UN General Assembly.

As long as a quarter of a century ago, the peoples of the world started along the road of global cooperation against atmospheric warming and to save the planet. However, the many international conferences and summits of Heads of State and Governments, from that of Rio de Janeiro (1992) to those of Lisbon (1996), Kyoto (1997), Hanover (2000) and Johannesburg (2002), to Aalborg+10 (2004), have produced inadequate results, showing difficulty in overcoming vested interests and national egoisms.

In June 2012 the Rio+20 World Conference concluded with the statement *The future we want*, which invites States to define sustainable development objectives and draw up suitable measures to manage environmental resources at the global level, to improve food security, enhance protection of the oceans and promote the "green economy". However, the statement contains no concrete indications for launching the necessary policies: there are no deadlines and it may be concluded that for the umpteenth time the opportunity to achieve ambitious objectives has been lost.

Yet in 1987 the UN Commission on Environment and Development, with the *Brundtland Report*, had defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". That "future" began some time ago, but not even the Rio+20 Conference has taken significant steps forward compared with the 1992 Earth Summit, which first launched the concept of sustainable development, shared at the international level, with its three distinct component parts, namely economic, social and environmental.

Twenty-two years ago, in 1992, the precautionary principles and the "polluter pays" policy were integrated with the

principles of the right to development and equity, as "common but differentiated responsibility". Moreover, on that occasion the Heads of State and Government from the industrialised countries undertook to fund and effect technology transfer to developing countries. Two binding international agreements were signed: the UN Convention on Biodiversity and the UN Framework Convention on Climate Change.

In December 2009 the 15th UN Conference on Climate Change was held in Copenhagen, with the aim of negotiating a new treaty under which the international community would undertake to take measures to stop global warming. The agreement was to replace the Kyoto Protocol, whose first commitment period ended 2012, extending its effects in 2020 or 2050, with the binding commitment of those nations which had not ratified the Kyoto Protocol or which had been exempted from the cuts in greenhouse gas emissions so as not to curb their growth (such as China, India and Brazil). However, also the Copenhagen summit concluded with a minimal agreement which left all parties dissatisfied. The final agreement contains no quantified undertaking on cuts in CO₂ emissions.

The Intergovernmental Panel on Climate Change (IPCC) has shown that, to eliminate the most serious effects of climate change, by the year 2020 the industrialised countries will have to reduce their emissions by 25 to 40% with respect to 1990 levels, and will have to halve global emissions by 2050.

The negotiations that could have led to a more ambitious declaration at the end of the Rio+20 summit in 2012 were blocked on four key questions: the *green economy*, *sustainable development objectives*, the *institutional framework for sustainable development* and *policy implementation instruments*. The meaning of *green economy* was not sufficiently agreed upon and was still obscure for many developing countries. It was thus first necessary to define it: the green economy was recognised as *one of the instruments available to States to achieve sustainable development [...] which should contribute both to eliminate poverty and to promote sustained economic growth*.

The G77¹ group and China stressed that all States must make undertakings for the environment, but it is the industrialised countries, given their higher economic capacity and pollution production, which should be the first to make commitments in environmental protection, but also in funding and technology transfer to developing countries. The Conference drew up a plan to define **sustainable development objectives**. Unfortunately the list of objectives was not defined, and this task was delegated to a working group of 30 countries, agreeing that by 2015 the **sustainable development objectives** would be tied to the Millennium Development Objectives.²

As regards the **institutional framework for sustainable development**, the lack of strong international institutions devoted to sustainable development led the Conference to strengthen the role of the Commission on Sustainable Development. However, the European Union, Norway and Switzerland proposed the institution of a Council for Sustainable Development which would have adequate financial resources and would meet periodically. Yet, as mentioned above, at the Earth Summit in 1992 the developing countries had sought and obtained recognition of the principle that to be able to pursue environmentally compatible development concretely, they would need funding and technology transfer from the industrialised countries.

The issue of **implementation tools** was one of the most controversial at the Rio+20 Summit. The developing countries requested a fund of \$30 billion a year for the transition to more sustainable forms of production. However, the European financial crisis did not permit the industrialised countries to go beyond a generic undertaking to increase fund allocations. At the end of the day, also the Rio+20 Summit disappointed citizens and scientists, and some spoke of a “failure of epic proportions”.

Some concrete results were achieved outside the assembly halls, with agreements being concluded on investment in public transport, “green accounting” and the reduction in environmental impact on the part of local government representatives with firms supplying services.

The last day of the Summit, at the same time as the adoption of the final declaration yet independent of this, the “civil society” approved the *People’s Sustainability Manifesto*, containing an autonomous and collective programme for

1. The group of 77 arose in 15 June 1964, formed by 77 developing countries, signatories to the “Joint Declaration of the 77 States”, signed at the first session of UNCTAD in Geneva.

2. With the Millennium Declaration of the United Nations, signed in September 2000, all the 191 Member States of the UN undertook to achieve for the year 2015 the following eight *Millennium Development Goals* (MDGs): 1. halve the number of undernourished people; 2. make primary education universal; 3. promote gender parity and empower women; 4. reduce infant mortality; 5. improve maternal health; 6. combat HIV/AIDS, malaria and other diseases; 7. ensure environmental sustainability; 8. develop a global partnership for development. Each of the objectives has specific stated targets and precise dates to achieve them.

the sustainable future. The manifesto hoped for a system of concrete actions that might help *move simultaneously toward a more localized socio-economic structure and toward a supra-national mindset that helps us transcend the parochial concerns of a corporate-capitalistic globalization to activate a global citizens movement*.³

Much hope is placed in the upcoming CoP21 (2015 Paris Climate Conference), which will have to constitute a decisive stage in the negotiations for the future international agreement on the climate after 2020, on the basis of what was decided in Durban, on the part of the major greenhouse gas-producing countries. France is aiming towards a significant binding agreement thanks to which, amongst other things, the old objective of a 2°C reduction in mean air temperature may be reached. The agreement will have to be positioned half way between the Kyoto approach – commitment to an arithmetic split of the reduction in emissions, starting from a common maximum limit permitted – and that of Copenhagen – a set of national commitments which are non-binding and differentiated. It is then hoped to bring about a paradigm change, considering the climate challenge not as a necessary sharing of inevitable emissions, but as an opportunity to create jobs and to innovate in production and consumption. The question of global warming now calls for urgent responses and is a priority issue for humankind. While international politics pursues formalised agreements with uncertain results, it has become indispensable for everyone to play his or her part responsibly, from citizens to experts in science and culture, each in relation to personal status and possibilities.

To establish an acceptable equilibrium between the natural environment and the human environment in the respect of the carrying capacity of natural ecosystems, a joint effort needs to be made in three directions:

- geographical spread, since all continents are called upon to make an effort;
- different intensity: countries which place resources under greater pressure due to their greater economic weight must make a greater commitment than others;
- integration of different knowledge and technologies, in a context of information and action that ranges from planning to technology design, to new materials, but especially to scientific and professional training.

The keyword in the task awaiting us in the next few years is *precisely* integration: comparing different skills and stimulating dialogue, and interaction between actors with different roles to play, namely States, institutions and public administrations, researchers and enterprises, to overcome the serious delay in reforming residential and production systems with an improvement in their energy efficiency. Knowledge and

3. Cited from the *People’s Sustainability Manifesto* at the Rio+20 Summit at <http://sustainabilitytreaties.org/>

technological progress are now up to the challenge: they need to be employed continuously and extensively, also rediscovering teachings and events from the past.

Utopia and reality

Utopia stems from humankind's tendency to go beyond its limits, imagining perfection as the destination of a liberating pathway which originates in the awareness of imperfection. Some urban and urban-rural settlements show the periodical return to principles of faith and ideology, re-proposing the close relationship between a new social order and the urban form for organised co-existence.

The European utopians of the early 1800s imagined people living together on the basis of ethical principles, of equality and emancipation from exploitation. The Garden City movement in England led to the creation of low-density suburbs as an alternative to the congestion of the industrial city. The movement transmigrated abroad. Le Corbusier structured his *ville radieuse*, the archetypal functionalist town, an artificial geometric universe, according to space specialised for functions: high environmental quality was expressed by the wealth of green areas and the separation of motorised traffic and pedestrian routes. *Broadacre City* is the organic Wrightian utopia, based on town-country integration without limits of space. Arcosanti, developed by Paolo Soleri and his young co-workers, is not only a town based on the use of solar energy and on low-cost farm produce, but the embodiment of the idea of living together, namely Arcology (architecture/ecology). Through a foundation set up to spread its concepts, the town plays host to young participants from all over the world, participating in workshops and then working on priority projects.

In India, Auroville, "the universal city in its making" upon the initiative of a group of volunteers inspired since the 1960s in Sri Aurobindo's principle of universal harmony with the support of UNESCO and the Indian government, gathers citizens of various provenance according to the principles of "friendly" ecology of harmony and is organised for rural neighbourhoods for sustainable agriculture. In New Zealand, Waitakere (200,000 inhab.), founded in 1989 to integrate four pre-existing entities (Waitemata and three of its suburbs), arose with the aim of fusing the principles of Agenda 21 with the traditional values of the Maori culture. In the US, Green Village Philadelphia, an example of an Urban Ecovillage conceived in 2008, was imagined to fill, with only retrofitting, the gap between the more affluent parts of the city and the poor, degraded areas.

In many cases, satisfying the principles of ecological sustainability led to the rediscovery of the simplicity of ancient construction techniques which respected the natural

hydrological cycle; they used solar energy for heating and natural ventilation for cooling; they inserted with discretion and harmony every building into the natural landscape.

Several of the cited projects remained on paper, others were only partly carried out. However, each of them left a trace. Without the dream of visionaries, reason on its own would lose its thrust to go beyond its limits, to aim towards ambitious goals with all its force.

In the late 1960s the new concept of "environmental planning" reformed the traditional urban + land use plan which faced growing needs, without ever satisfying them, with ever more buildings, overlooking the most complex variables such as the hydrological regime and hydrogeological and seismic risk, soil use, and the environmental impacts of new interventions; finally, all those factors that affect the dynamism of equilibria and which must be known and interpreted to control the exchanges between artificial and natural ecosystems to mitigate their conflict.

Nowadays, strategic assessment of the impacts not only of works, but also of objectives and action plans, integrates the approval procedures obligatorily. This route must be pursued, conceiving protection plans and standards regulating urban transformations, albeit shortening the time required to draw them up and approve them.

Research

Various pathways have been mapped out to disseminate research and innovative practices with a view to going beyond the consumption of fossil fuels and hence CO₂ emissions. Equally diverse are the uses of energy from renewable sources for residential buildings and the methods of rationalisation of systems to extract and treat water. Likewise, there are many criteria for greater and more purposeful distribution of green spaces.

At times, basic principles, linked to an inadequate formulation of how to achieve them, assume the connotation of real ideology. In other words, they are not restricted to methodologies and instruments, but together constitute a philosophy of life, based on equity, on the protection of rights and at times on a sort of enlightened determinism, reproducing the strict relationship between the social order and its spatial embodiment which resurfaces cyclically in urban planning.

The initiatives of academia and research institutes, of NGOs and of several social movements do not always manage to blend to bring about tangible results. Such initiatives range from ambitious, faith-based, totalising visions to minimal programmes, which reflect more than anything else the business interests of producers of technologies and materials, whose diffusion, albeit beneficial, is not enough on

its own to achieve systematic results. Further, at the linguistic level, there is the current plethora of terms beginning with the prefix *eco*, all belonging conceptually to a single family referring to respect for the environment.

In the USA it was a milestone when the *2009 Stanford University study ranked energy systems according to their impacts on global warming, pollution, water supply, land use, wildlife and other concerns*.⁴ This study opened the way to a research strand which proceeds and spreads under the assumption that “wind, water and solar technologies can provide 100 percent of the world’s energy, eliminating all fossil fuels. The plan includes only technologies that work or are close to working today on a large scale, rather than those that may exist 20 or 30 years from now. The plan calls for 3.8 million large wind turbines, 90,000 solar plants, and numerous geothermal, tidal and rooftop photovoltaic installations worldwide; the cost of generating and transmitting power would be less than the projected cost per kilowatt-hour for fossil-fuel and nuclear power; shortages of a few specialty materials, along with lack of political will, loom as the greatest obstacles.”

“The very best options were wind, solar, geothermal, tidal and hydroelectric power, all of which are driven by wind, water or sunlight (referred to as WWS). Nuclear power, coal with carbon capture and ethanol were all poorer options, as were oil and natural gas. The study also found that battery-electric vehicles and hydrogen fuel-cell vehicles recharged by WWS options would largely eliminate pollution from the transportation sector.

Renewable energy comes from enticing sources: wind, which also produces waves; water, which includes hydroelectric, tidal and geothermal energy (water heated by hot underground rock); and sun, which includes photovoltaics and solar power plants that focus sunlight to heat a fluid that drives a turbine to generate electricity”.⁵

In Europe, the principles of sustainability and criteria for intervention in cities have been the subject of research and cooperative agreements in various institutional contexts and elsewhere. Of the organisations and research institutes in the sector, mention should be made of the *School of Environment and Development at the University of Manchester*, which coordinates *The Bruntwood Initiative for Sustainable Cities*; AESOP (the *Association of European Schools of Planning*), which formulated at the Congress of Vienna (2005) the *Objectives for a Transit Oriented Ecocity Development*; the *International*

4. M. Z. Jacobson, M. A. Delucchi: *A Path to Sustainable Energy by 2030*, research abstract in “*American Scientific*”, November 2009.

5. Society, say the authors, has achieved massive transformations before. During World War II, the US retooled automobile factories to produce 300,000 aircraft, and other countries produced 486,000 more. In 1956 the US began building the Interstate Highway System, which after 35 years extended for 47,000 miles, changing commerce and society.

Association for Urban Climate of Stuttgart for the study and adaptation of cities to the effects of climate change; the *Wessex Institute of Technology*, which held the *2012 Sustainable City International Conference* in Ancona (Italy).

In Italy, research and programming need to be boosted. The following activities are currently under way: the Association of Disused Urban Areas (AUDIS), with the GBC (Green Building Council) Italy and Legambiente, promoted in May 2011 the project *Ecological quarters in Italy: a pact for urban regeneration* to contribute to establishing urban and environmental regeneration as the strategic key for development on the basis of the principles laid down in the Urban Regeneration Charter;⁶ the *EERA Smart City* network (ENEA, CNR, various universities).

In general, knowledge and research on these subjects are still being consolidated: Master’s and Doctoral courses in environmentally sustainable building development have been established, blending general aspects of planning and design with those regarding technology, energy use, plant and materials.

Project executions

Initiatives to design and create ecological cities are multiplying worldwide. However, they clearly present great variability in their environmental, economic and social sustainability elements, distinguished by ambition, user profile and stakeholders.

There are three phases in the process: several initiatives are being designed, others are under construction, and others have been executed. There are three approaches to urban “ecologicity”: that of technological innovation; that of a joint vision/planning of sustainability; that of citizen participation. The designs and executions under way substantially differ between developing and industrialised -chiefly Western - countries. The former, in which there are evident social and economic inequalities, feature urban areas largely consisting of slums and *favelas*, with poor or inadequate infrastructures; these contrast starkly with privileged areas, in which modern business buildings represent the symbols of acquired power. Such cities often have important old towns, although conditions of degradation and inefficiency are such as to require large urban renewal programmes. Such large-scale

6. The objectives of the *Ecological Quarters* project focus on cities and their surroundings, assuming as a priority the re-design of public and private residential quarters built in the 1950s-1970s, today experiencing a structural crisis, and the restoration of disused areas (industrial, services, military, state-owned). The project intends to work on two fronts: identification of a model of a “pact for urban regeneration” as the basis to define systems of responsibilities, rights and duties, guarantees and benefits for all the contracting parties; definition of a support tool to accompany an *ecological quarter* project from the initial decision-making phase to the design and execution of interventions, through integrated and participatory design and including guarantees for all those involved.

difficulties have made countries like China and India opt to build new towns and cities as well as renovate quarters or entire urban areas, while other Asian countries, such as Japan or Indonesia, prefer to upgrade their existing cities.

However, the construction of new towns (under way chiefly in China, India and South Korea) is both costly and challenging, and may be useful in areas which are unable to cope with great urbanisation caused by rapid economic growth and a poor urban infrastructure. These countries are thus forced to divert towards unbuilt areas (albeit close to existing cities) the creation of infrastructures, services and residences suited to the needs of emerging (and evolved) classes which are both the effect and further cause of economic growth.

The case of Western countries is different: they have a more solid urban structure, albeit in need of environmental renewal. In the old Europe, for example, the construction of new cities in the absence of space and at the cost of sacrificing farmland and natural areas and the failure to modernise its thousands of old towns or more recently built but inefficient quarters would be a suicidal path to take, leading in the opposite direction to the path of energy efficiency.

The projects and their execution have increased from 79 in 2009 to 174 in 2011⁷ and are still increasing. Three main categories of eco-city may be distinguished: ecological cities “of foundation”; expansion of existing cities; cities undergoing urban renewal in keeping with the principles and technologies of sustainability (so-called *retrofit*).⁸

For Europe, Germany is the undisputed historical leader of environmental town planning. A notable example is Freiburg (the 1970s), which earned the city the title of the country's environmental capital. In the early 1970s the decision to build 30 km from Freiburg a nuclear power station was strenuously opposed, and the city became the centre for experimenting with alternative energy, attracting researchers and experts in this field and a high concentration of institutions, industrial initiatives and designers who supported what has become the mayor's famous plan based on four main choices.⁹

7. Source: *Eco-Cities – A Global Survey*, Univ. of Manchester, 2011.

8. In 2010/2011 alone, the following were launched: 3 eco-cities in Europe - at Paphos (Cyprus), in Norway (a district of the city of Trondheim) and in Glasgow; 6 in Asia, comprising 4 in China (one involves three ecological quarters), 1 in India and 1 in Japan; 3 in North America (Living City – Washington, Living City – Denver – and in Seattle). Of the 174 main projects actually executed, there are 27 foundation cities: 15 in Asia and Australia; 2 in Europe; 4 in the Middle East and Africa; 6 in the Americas. There are 72 expansions of existing cities: 17 in Asia/Australia; 45 in Europe; 4 in the Middle East and Africa; 6 in the Americas. There are 75 examples of urban restoration: 37 in Asia/Australia; 23 in Europe; 2 in the Middle East and Africa; 13 in the Americas (source: op.cit. note 5).

9. **For traffic**, the reduction in private car traffic; improvement in public transport extending to a regional area of 50 km²; creation of 400 km of cycle paths (one third of trips currently use bicycles, involving a sizeable reduction in emissions); **for energy and climate**, limitation of consumption for new buildings (passive solar energy by window design and building exposure). The cost of consumption has been reduced by 30%. State and regional subsidies for the produc-

In European countries, although there is widespread sampling of both newly built and “ecologically adapted” ecological quarters, overall expansion prevails over technological modernisation. The number and extent of the interventions clearly depend on the economic capacity of the various countries. Of the former Eastern block only the Czech and Slovak Republics and Bulgaria have initiatives under way, while most of the interventions are concentrated in France, Germany, the UK, Sweden and Spain. Ecovillages are in construction here and there, at times constructed by initiative of the local communities as a shared venture.

Since the year 2000 the European Union has launched two programmes, to be renewed or extended, on the initiative of the Commission, which comprised both expansions (new quarters) and retrofit interventions.¹⁰ The programmes were as follows:

- *Ecocity, Urban Development towards Appropriate Structures for Sustainable Transport* (2002–2005), which involved for two years 30 partners from seven European countries. In Italy the project proponents were PRAU and the Agency for Energy and the Environment of Perugia Province for the pilot *comune* of Umbertide; the other cities were Bad Ischl (Austria), Barcelona Trinitat Nova (Spain), Győr (Hungary), Tampere (Finland), Trnava (Slovak Republic) and Tübingen (Germany). The programme envisages specific interventions according to individual cases, ranging from

tion of active solar energy have resulted in economies of scale, with a drop in prices. Freiburg is still the German city which uses most solar energy. Methane from household waste produces electricity for 10,000 inhabitants, achieving a 30% reduction in emissions. On its own, Freiburg produces 50% of the energy which it consumes; **for waste**, separation into four types, one of which, the organic fraction, is collected in public *bio-bins* (paper containers); waste has been reduced from 140,000 tons in 1988 to the current 50,000. From 2005 heat treatment was in use to make the organic components inert and reduce gases, then switching to low-emission waste incineration; **for soil use and protection of natural resources**, zoning protects 42% of the Freiburg area from urbanisation (with a ban on building both houses and roads).

10. By this term we mean all operations, whether technological or managerial, aiming at a new (if non-existent) or better (if inadequate) performance of existing buildings in terms of energy efficiency, that is, rationalisation of energy flows between the building system (casing and plant) and the external environment to: improve the comfort of internal environments; contain energy consumption; reduce emissions of pollutants and their impact on the environment; use resources rationally (renewable energy sources) as a replacement for fossil fuels; and optimise the management of energy services.

The main interventions able to ensure a beneficial *retrofit* concern both the building's technological system and the energy management, namely: improvement in performance (increase in heat insulation, replacement of fixtures, installation of suitable systems of solar screening); replacement of obsolete components of the heating and lighting plants with other more energy-efficient components with less environmental impact in terms of emissions produced; use of solar energy to generate electricity (photovoltaic panels) and heating (solar collectors); natural ventilation and passive cooling with a view to limiting the diffusion of air conditioning plants which involve the increase in electricity consumption; revision of the contract for energy services (mechanisms of financial incentives/disincentives); introduction of individual energy accounting systems to enhance awareness of consumption reduction.

transport to energy and socio-economic development;

- *EU CONCERTO Eco-City Programme* (2005–2010), which involved the cities of Helsingør-Helsingborg (Sweden), Trondheim (Norway), Tudela (Spain) and Zilina (Slovak Republic). Also in this case, there were mixed interventions, ranging from transport to the hydrological cycle to solar energy, biomass and sensitisation of the citizenry.

Conclusions

In the world, the climatic future and the compatible use of natural resources depend on the integration between research and action and between formal international agreements and the coordinated activities of authorities, institutions and businesses. However, this universe of

research and intervention must be sustained by the participatory responsibility of citizens, based on recognition of the ethical importance of behaviour. There is no longer any space for initiatives which pursue individual or group interests conflicting with the principle of responsibility.

In the world of production there is space only for initiatives of the Green Economy, the only one able to combine fair profits and increased employment with the ultimate goal of protecting humankind's living environment. The peoples of the Earth have their destiny in their hands: there is now a considerable level of awareness of what must be done, although such awareness must be better distributed between industrialised countries and less developed countries, between countries which are democratic and those which are not. We need to act while there is still time. Further postponement could lead to irreversible consequences.