

▣ A WORLD OF IDEAS

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Another kind of sustainable intervention in Europe was the reconversion of entire districts, such as those car-less in Vienna and Amsterdam or the new urban areas in Stockholm or Bolzano.

London, Berlin, Barcellona, Munich provided themselves with integrated plans for sustainability, becoming pioneers in the experimentation of groundbreaking solutions. What is occurring in the rest of the world? Many sustainable policies are developed in non-European cities and in countries regarded as emerging. In China, in the Emirates, South Korea where the cities face great pollution and environmental problems, they are pondering the future and even talking about New Towns, cities planned to be totally environmentally friendly and carbon neutral.

In Latin America too there are extremely interesting pilot strategies, like Santiago, where solar energy is produced in order to light the bus stops all day and night through. Both Santiago and Buenos Aires opened the first public building, centres of public institutions, self-producing the energy they consume. It is spreading, in the emerging cities as well, the practice of energy certification for public and private buildings, as in Shanghai, that obtained the first pre-certification LEED (Leadership in Energy and Environmental Design Program) for the Shanghai International Centre. Other substantial topic on which many cities are now targeting at is the reuse of rainwater and of rooftop farming.

Singapore is working on the systems of rainwater purification in order to reuse it both indoors both outdoors in green areas and activated the prototypes of rooftop farming by DJ Engineering and by Agri & Food Veterinary Authority (AVA). In Chennai too, in India, rooftops and terraces are cultivated thanks to the impulse given by the Urban Horticulture Development Centre. In Dubai the effects of the realization of artificial water basins in the city are studied, while in Beijing, by 2015, a huge hub for financial and high tech companies will be built, with a complex underground space on four floors to save land surface.

What do cities today need to become more sustainable? The reported examples have to be considered an important signal for the contributions that cities can give to sustainability. The problems are different but the solutions are often shared and we would like to summarize them here, to create a "guide" for Italian realities too (especially Tuscan): integrated sustainable policies with a synergy between public and private, experimentation of innovative solutions, attention to the real needs of the population, incentives for sustainable behaviours that would lead to a deep cultural change. It is necessary to think about integrated and coordinated policies to direct the city at a energy saving future, with environmental protection and a on-the-front-line commitment of public administrations and citizens. Culture and the way a city is lived are key points as well, and they have to be addressed with informative campaigns and targeted communication, together with motivating systems, rewarding sustainable attitudes and actions.

▣ GEOTHERMAL ENERGY

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When we are thinking about geothermal science, we often recall the borax fumaroles in Larderello. But how does a power station work? The water vapour, coming from the depth of the earth, rises toward the surface at a high pressure and starts a turbine, releasing its heat and transforming itself into a liquid, then injected again into the subsoil. An alternator, connected with the turbine, produces electric energy to be sent in the network.

On a worldwide scale, electric production from geothermal energy contributes only for the 0,3%. In Italy such quota reaches 1,9%, while in Tuscany even 25%. The geothermal energy can be used, depending on its temperature, for food processes too, for the heating of hothouses and thermal spas. Yet there is "another" geothermal energy, the one applied to air-conditioning. The energy used in this case comes from the subsoil, possessing it naturally and everywhere.

During winter, a part of the heat is taken from the soil, in order to warm the building, while in summer, the excessive heat pours again into the soil, in order to cool down, thanks to devices called "heat pumps" that transfer thermic energy from a low temperature body to another with a higher temperature, reversing a natural process.

A heat pump provides more thermic energy than the electric one used for its operation: this is the case because a great part of the outbound thermic energy returned by the pump does not only originate from the conversion of the input electric energy provided, but it is also taken from the outside.

The mostly used system for the extraction of the heat from the ground is a geo-exchanger, that is a unit of pipes forming a closed loop, that can be vertical or horizontal. The first are pipes, mainly in polyethylene, that are laid underground at relatively low depths (from 1 to 2,5 metres); the second, conversely, capture the heat stored in the deepest layers of the ground, where the temperature is virtually uniform all year through.

In conclusion of this brief lesson, we would like to touch on the future scenarios, drawn at European level, remembering that the directive 2009/28/CE set up, for Italy, the 17% of the coverage of the gross final consumption of energy from renewable resources. Tuscany could contribute, from a geothermal point of view, for the 6,15%, corresponding to 372.000 MWh per year. An immense strain, but we are in Tuscany and we can even manage this.

▣ YOUNG ENERGY

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How can one consciously save energy if we do not even know what it is? And power, isn't it similar to energy? Fair questions to which the Province of Florence decided to answer with an awareness campaign in high schools where the real protagonists of this idea are the students, who will have to remedy mistakes done in a past when they were not already born. For this reason, the project "The school toward a new solar age" was

conceived, an educational and operational activity. The fundamentals of energy, of the various "energies" and more in general of the alternative ones are in fact addressed; everything with an interactive display from which the students choose what to talk about. Then it is the turn of the details, explaining how a thermic plant is made and even about the electric one in the school. Since nobody knows better than them the positive and negative aspects of the building where they spend so much time every day, that's how the second feature of the project come up, the operational one, acquiring a leading role. The School Energy Master is identified, chosen by the headmaster, acting as an interface between the school and the province as for the project. Then teams are formed, with students, teachers, caretakers and some parents, with specific aims: the reading of energy consumptions, organization and implementation of the saving stage, evaluation of the results and proposals and divulgation of results.

The project consists also of the collaboration of the provincial administration with the Osservatorio Ximeniano, the CNR Ibimet and the LaMMA Consortium. The latter understood ideas, attitudes and knowledges of the students about energy and renewable resources through an analysis. In the guise of a questionnaire, it involved 200 students, 16-18 years old, of different high schools of the Provinces of Prato and Florence, and produces some interesting results. Even if the interest in environmental topics is medium-high, there is not a wide knowledge of it.

Less than the half knows what the renewable resources are and where the electric energy we use comes from, biomass finds it hard to be considered renewable, the solar is overestimated, so is the nuclear, put at the first and / or second place in the composition of the electric national mix. Even the awareness on the possible safety energy problems is common ground, and a wide majority of students do not give for granted the energy supply. There is more judgement and disunion on the concrete possibility to cover the needs of electric energy with renewables. Those with a deeper knowledge are much more optimistic both about the feasibility, both on the required period of time when to realize the change of paradigm. About the obstacles to the diffusion of renewable sources, more than the half thinks that the impediments are political and economic, more than technical. The unsightliness of the plants on the other hand does not worry much, even though the possible damages to the landscape are generally perceived as a significant disadvantage. The major benefits of the renewable sources are those related to the reduction of environmental impacts to the improvement of life quality. Predictably, after the Fukushima disaster, more than the half would not accept the nuclear, while it is less uniform the willingness to live near a photovoltaic field. More unexpected is the low readiness to drive electric cars. If the awareness and knowledge affect opinions significantly, it is not so for the willingness to accept changes, where the factors at stake are different. We strongly hope that the project would represent an occasion to change while learning and to learn while changing.