

EDITORIAL

Synergies and vision for a global sustainability of lands

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Every year, worldwide, parts of the territory are interested, on time, by enormous damages, as a result of floods or related to the hydrogeological instability of large parts of the inhabited sites. Really, the role played by the nature is quite secondary compared to the human responsibility that caused an unstable equilibrium of our towns and, more in general, a delicate urban situation characterized by a lack of sustainability. Our responsibilities are evident and undebatable, testified by a poor care in constructions and building activity, filling and obstructions of the channels of drainage from highlands and hills, daredevil deforestations. These are only few examples. Indeed, if and how much the increase in frequency of extreme events is connected to the phenomena of global pollution, urban heat islands, human activity and alteration in the cycle of seasons is a complex and debated matter, that requires a careful attention, mindful words and prudence in ratings.

By neglecting uncontrollable phenomena, and thus, for instance hurricanes and cyclones that affect specific areas near the equatorial regions (Caribbean and Mexican Gulf) or the devastating rains and monsoon floods of some Asi-

where in Europe.

What is sure is that our territories are fragile. Interventions for security are increasingly necessary. About it, rather than expansionary policies and further use of land, the focus should be placed in the livability and sustainability of the already built environment.

A new target of widespread sustainability, starting from today and constant in the coming years, is no longer negotiable nor postponable. Only in the last five years, many European regions as, for instance, Russia during the 2012, Germany and Austria and central European areas (2013), Balkans (2014), have been strongly damaged by heavy rains, with hundreds of fatalities. Focusing on Italy, in the same years, the Sannio, the Lunigiana, Cinque Terre, Calabria, Sicily, the Veneto and Friuli Venezia Giulia have suffered indelible catastrophes, moral and material. This is due, above all, to an unsustainable way of life, which has no care of the land, which repairs the damages without solving the risks. It is enough to think that, in the same area of Sicily, during the October 2009, the Province of Messina (Sicily) was destroyed by a flood that killed more than 30 persons. This is not a question of specific



Figure 1 – Flash floods: left, northern-Bosnia (Elvis Barukcic / AFP - Getty Images),source: <http://www.nbcnews.com/> | right, northern Italy (AP Photo/Tano Pecoraro), source: <http://i.telegraph.co.uk/>

atic regions, here we want focus merely on ordinary facts. Indeed, every year, mainly in autumn and spring, significant damages of our towns, Historical centers, cultural Goods are caused by ordinary events of few days of intensive rains. A simple check can testify the billions of euro of damages that, every year, are caused by humble alluvial episodes, every-

countries. No one can give lessons. Everyone can give good examples, from the southern Europe (Zaragoza, Spain) to the northern countries (e.g., Aalborg, Denmark).

The issue is absolutely clear. From the merely-energetic point of view, just the building activity and the living of our cities impact for more than 40% [1] on the energy balance of the Euro-

pean Union Countries. A lot of valuable work has been done in recent years. On the other hand, an even greater job remains to be done. Environmental issues are more and more pressing. We are now at a stage where an intervention is necessary, not because it is motivated by an economic profitability (and therefore energy efficiency seen like a strategy for reducing the costs of utility bills), but for the necessity of ensuring a future for the planet and to our next generations.

With reference to a sustainable use of energy, since the enactment of the EPBD European Directive 2002/91/EC [1], revised during the spring 2010 by Directive 2010/31/EC and related documents [2,3], for the first time in world history, 27 countries have decided to establish a common journey toward a better future world. This is a common path of efficiency and not a mere declaration of intents, in relation to the sector that, at the EU level, is the one that most affects energy demand and pollution so closely connected to it.

The goal to reach, for a future rather close, is a building activity and construction that are not only sustainable (i.e., “nearly zero-” or “zero-energy buildings”), but suitable for sustain and support the energy balance of the territory (i.e., “plus-energy buildings”). In detail, in accordance with the national

their real estate, at least equal to 3% per year. Furthermore, the public sector has to define large investments to be programmed in the medium term (until 2020).

These are, obviously, ambitious goals, that require, first of all, a front of attack to the issue that is not the traditional approach. All knowledges should be systematized. It is a cultural rather than technical matter. The finding of synergies adds value to different skills. The integration amplifies the competences.

In the last fifteen years, the level of energy efficiency of buildings has moved forward. Thousands of edifices, districts, neighborhoods, have been energy-refurbished or are under energy-retrofit. An intervention that looks to the single building is, in facts, not completely effective. It is quite enough to say that the energy balance of a building concerns a time-period equal to one year and this implies that, if the goal is to have zero energy buildings, in this period, the incoming flows of energy are balanced with the energy supplied by the buildings into the urban grids. Evidently, it is not required that energy demand and energy supply from in-situ renewable sources are contemporary, and this is within the concept of “net” zero-energy building. The goal is to ensure that a building connected to regional energy nets, and therefore typi-

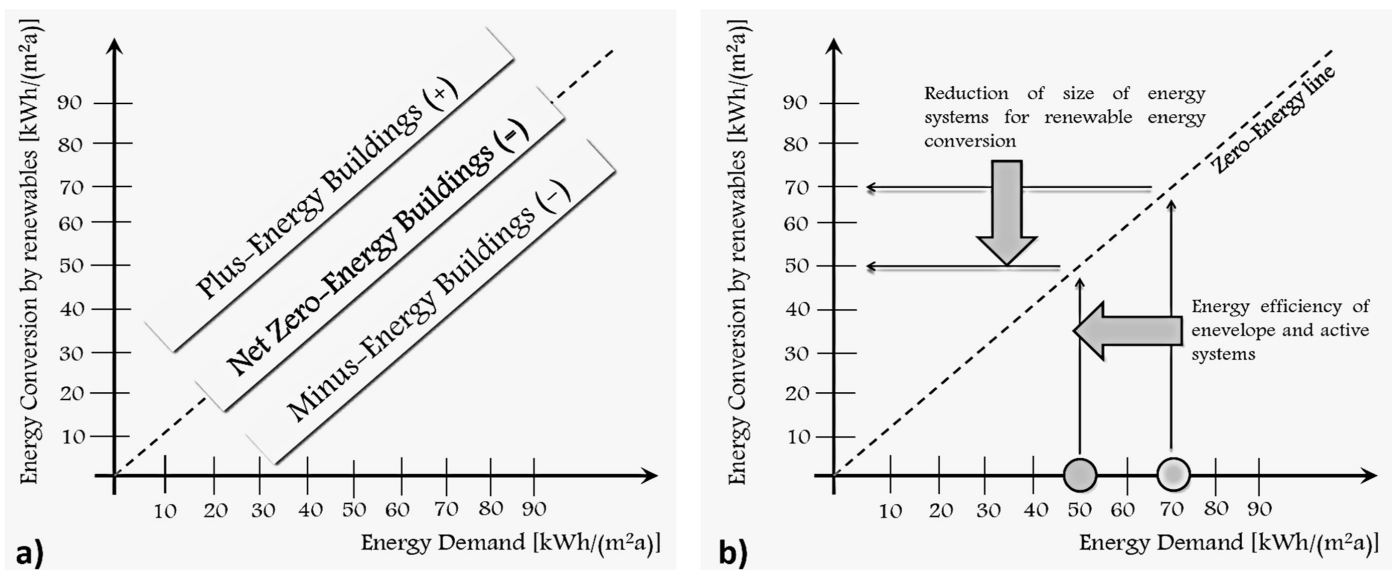


Figure 2 – Building envelope, active energy systems and renewable energy sources for net zero-energy buildings.

laws that receive the European Guidelines, starting from January 2021, all buildings should induce a yearly energy balance close to zero, by taking into account also targets of technical and economic feasibility, according to the principles of the cost-optimal solution in terms of investment costs and operational needs. Moreover, it is established that the date is two-years earlier (i.e., January 1, 2019) for public buildings and buildings used for public scopes.

A further document, and thus the Directive 2012/27/EC [4], establishes that public institutions should assume a role that must be exemplary, and thus it is required that they refurbish, according to criteria of energy savings, a portion of

cally natural gas and electricity, turns into these networks, on an annual basis, the same energy that it takes from the same grids in other seasons. This is an important goal, which can be effective as a starting point. Conversely, absolutely it cannot be a point of arrival.

The reasons are quite simple, and it is time that the scientific community firstly and the public administrators secondly consider this permanently. When, in the coming years, zero energy-buildings will be a significant number, there will be an imbalance in the regional energy flows. In our climatic regions, at the building scale, renewable energy systems based on the conversion of solar energy are the ones with the largest diffu-

sion: solar thermal and solar photovoltaic systems. These do not give the same energy all around the year, so that a larger overview is required for balancing the urban supply of energy. This means that the net zero-energy buildings presently under construction compensate, given the characteristics of such systems, during summer period (when the energy conversion from solar renewable sources is high), the winter energy deficit, so that, on an annual basis, a complete balancing of energy flows can be achieved. It is clear that, the city energy grids today are fully capable in receiving energy from the few zero-energy buildings that, in summer, convert and supply more energy compared to the self-need. At the same way, it is quite obvious that, tomorrow, when a large part of buildings will have a surplus of energy in summer, this will cause an imbalance in the urban system.

This is not a close horizon. Net zero-energy buildings are, today, not the next target, so that we have enough time. On the other hand, we have to start the plan of the future, especially by establishing principles. To date, the emergency was, and still is, the lack of efficiency of our architectures. Tomorrow, the goal must be the city, the territory. You have to look at a larger control volume. All poles of energy absorption and all those able to convert it have to interact in smooth and intelligent energy networks. We are thinking to smart energy grids, in which the surplus energy converted from a sector of buildings can fuel clean industrial processes, sustainable electric mobility, for the individual citizen (e.g., bike sharing, electric vehicles for public use) or even to the collective public transport. Similarly, in the opposite direction, the industrial processes, that cause waste heat, should be connected with district heating networks of the neighborhood, even powered by an ample mix of thermal power generations (e.g., bio-gas plants), biomass, combined generation of heat and power, wind turbines, combined cycles and so on. These are just few examples. There are not unique recipes. First of all, a new awareness - not only of the technical community and politics, but also of all citizens - is needed.

The time of autonomous systems is ended. The interaction begins. Equalization and mutual mechanisms that allow the full exploitation of the energy used and converted have to be thought. Everyone is part of a system. This approach has to be applied to the single plant from renewable sources as well as for citizens. A global vision is now required, in the largest meaning, at the community scale. Even without citing Sallustio Prisco ("Concordia parvae res crescunt, discordia maximae dilabuntur") and Philip II of Macedon ("Divide et Impera"), if we think as a system, the system becomes harmony, common Good, "Res Publica" in the noblest sense that this word must have.

It can be applied to everything: rebuilding thinking to the future. Everyone has to leave something in order to make the system more efficient. It applies to citizens, it applies to all skills and involved professions.

By translating the same concept, cities, districts, territories have to be "rethought" together: urban planners, engineers, architects, administrators, citizens. It is matter of a cultural approach, like the ones of Freiburg (Germany) or Stockholm (Sweden), where a future of clean, renewable, sustainable future has been established since many years. Today, Hamburg and Copenhagen decided to become, within twenty years, totally "carbon-free" cities, Berlin has a thermo-electric power station just few meters away from Potsdamer Platz, which also supplies the district heating network of Mitte. These should be next targets for all European cities. This is also our idea of Europe: sharing best practices, looking ahead by means of mutual acquisition of the best examples. It is the moment to stop the logic of "Not in My Backyard".

Specific projects, presently under definition, are obviously welcome. These are, for instance, the substitutions of all public lighting systems with LED in Naples, Milan and in other big European cities. Of course, these are good practices, but concerning specific issues. Otherwise, is not a good practice to excavate under the urban streets, several times, channels, sub-services and traces because each service provider (e.g., telephone, electricity suppliers, waterworks and sewers) operates independently, without thinking that a unique work that allows everything could be much more rational, livable, functional.

Just looking at the whole issue, together we can win the challenge of the future. A challenge that, today, is not only an opportunity but, unfortunately or fortunately, is a necessity. We are providing these few comments just some hours after the ending of the 2015 United Nations Climate Change Conference [6], the so-called COP21, hosted in Paris in December 2015.

After eleven days of negotiations, the Conference ended with the signature of a satisfactory agreement. More than 195 worldwide countries have subscribed an historical document, although some - even justified - skeptical comments about the chance "to do more". Always everyone can do more, can do better, can do something else. On the other hand, sometimes this kind of approach paralyzes and it is a kind of declassification to failure of even small, but important steps for a change. Kyoto has established a formidable impetus to the development of renewable energy sources. The objectives of Paris - and these are something more than intentions, but, really, these seem a kind of program - may be defined as the end of the Era of fossil fuels. It's true, the agreement does not provide clarity on sanctions to oblige countries non respectful, with strength and consistency, of the direction of the set targets. On the other hand, this is the first global agreement that sets a "threshold of salvation". For years, we have listen that, to maintain the life in the Earth, without epochal upheavals, the average temperature increase compared to pre-industrial levels should be kept below 2 °C. Well, Paris marks a more ambitious target, by fixing the increase in 2020 by 1.5 °C. Furthermore, the COP21 identified significant funding meas-



Figure 3 – 2015 Conference of the Parties (COP21): United Nations Climate Change Conference, December 2015.

ures, takes a path, which includes the required balance between greenhouse gas emissions and storage of this, the revision of targets every five years, mandatory INDCs (Intended Nationally Determined Contributions) that give a measure of the effort assumed by each country. For the first time in the history of a Conference, the most widespread comments are positive or even enthusiastic, from “left” to “right”, from “laical” or “religious” point of views. Inside the agreement, indeed, also an important and unanimous consensus - without colors and flags - concerning funding and support for developing countries has been set, in order to improve universal values,

and thus food supply and security, poverty alleviation, basic human rights, peace. This is the right direction, and it seems fair to conclude, for once, by subscribing the words of a political leader, the French prime minister, Francois Hollande: “In Paris, there have been many revolutions over the centuries. Today, it is the most beautiful and the most peaceful revolution that has just been accomplished - a revolution for climate change”. Now, from all point of views, all citizens, politicians, leaders and common people have a new responsibility: everyone has to do its own task. The premises are satisfactory, we hope that also the outcomes will be the same.

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