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SUSTAIN**what's?**

The Ambiguity of Sustainable Architecture

Dedicated to... Maddalena, Lorenzo and Antonio... And to my mother.

"Always design a thing by considering it in its next larger context - a chair in a room, a room in a house, a house in an environment, an environment in a city plan."

Eliel Saarinen

In the end… Light, materials and shapes dance again…

SUSTAINwhat's?

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Preface
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Contributions
Kenneth Frampton, *critic historian*
Khaled Awad, *Chairman of Masdar*
Gerard Evenden, *Senior Partners of Foster+Partners (designer of Masdar)*
Peter Sharratt, *Sustainability Designer - WSP*
Mathias Schuler, *Sustainability Designer - Trans Solar*
Federico Parolotto, *Mobility Planner - MIC*
Joao Ferreira Nunes, *Landscape Designer - PROAP*
Aldo Cibic, *Architect and Industrial Designer - Cibic & Partners*

Afterword
Gianluca Peluffo

Edited by
Matteo Falcone

Preface
LUIGI PRESTINENZA PUGLISI

There is a great talking about sustainability among architects and designers for two simple reasons: first of all, the term has substituted the old well-worn word "function". To be sustainable, an object must be useful, affordable, environment-friendly, energy saving, ergonomic etc. Who would not agree? Nobody Moreover, things have always been this way ever since the very first buildings were made, including the Egyptian and Sumerian ones. However, in everyday life it is hard to meet all these expectations and so a little wooden hand made house could be, and rightly so, as sustainable as a Norman Foster's skyscraper or as the pyramids themselves, which, among other things, were spaceships, designed with natural materials to guide souls in the afterlife.

The second reason is formal, since architecture lacked a slogan as powerful as Sullivan's "form follows function". However, now it has one: "form follows sustainability" or "sustainability is the new form". Each object must display ecological awareness. Whether high tech or low tech, vernacular or post industrial, traditional or experimental, what counts isn't how ecological its performance is, but the fact that its image must suggest it is. The French call these lucky words portmanteau, highlighting their ambiguity and inclusiveness. Some French philosopher paid tribute to these words: God prevent us from too precise words one cannot shape with original creativity.

I believe the main credit of the book you are about to read is that it makes fun of the word, thus demystifying it and highlighting its importance at the same time. Moreover, it offers a few tangible and significant examples to consider: sustainability surely is a subjective concept, but some do it better: some copy, others create. That's all. Sorry if that isn't much.
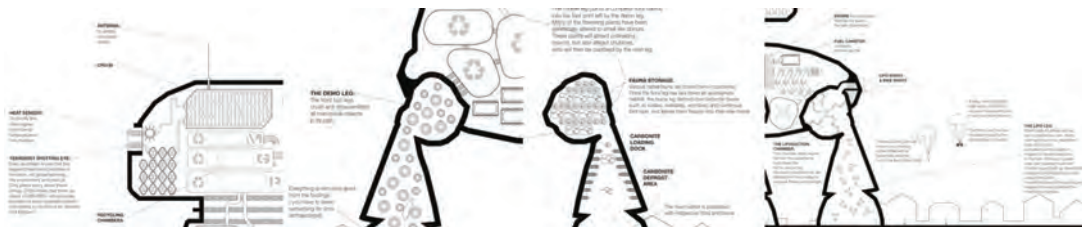
Eco-Aesthetics... Green appeal... Green shapes... Space

A few years ago, my plumber abandoned me. He disappeared out of the blue to do something more socially useful – he said! I saw him after a while: dressed in Indiana Jones gear, he was trying to make it by selling prefabricated environmentally friendly timber houses. He even had a hatchet hanging from his waist belt, which of course gave him a genuine appeal... Almost as if he were able to cut down a tree in front of you and build a house right there on the spot.

The houses he sold were ugly, bulky and odd but made of timber and, moreover, were reassuringly "green-looking"... I asked him why and he answered: "These houses are eco-friendly...This is the business now!".

I found an unauthorized blue billboard inside my unsustainable construction site. It popped up with the weeds (also unauthorized) that, in time, had overgrown architecture that, in turn, had stopped growing due to an unsustainable controversy. It advertised eco friendly houses. They were ugly and odd but not timber made, this time: their "eco-friendliness" was only guaranteed by the non carcinogenic (more or less) materials used in construction and, of course by the reassuring pastoral environment in which they were displayed. Actually, it seems that –according to the facile culture talk-, an eco-friendly house ought to be "gracious", as gracious is less aggressive than beautiful! Their graciousness is guaranteed by the pitched roof with acute hipped angle, the geraniums on the window sills, some reassuring ISO something certification (alike in boxe qualifications, when you achieve one, they just set up an other association to sort you out) and, dulcis in fundo, by a marvellous solar or photovoltaic panel on the roof.

On the front cover of a well known and reliable company catalogue (manufacturer of concrete products to add a personal touch to prefab buildings), I saw a concrete facade with the realistic image relief of an American grapevine in its natural colour... Green... Chemically reproduced. A real example of vertical green: to go green without maintenance.

Misunderstanding! Architecture of the "sustainable kind".

I saw a farmer who was happy for having replaced corn with solar panels. Happy to see the sun breaking its back instead of him. I have heard he now has a guaranteed income that still isn't enough to buy what he used to produce.

I saw a building with a roof made in dark glassy panels with weird screen-printings that looked just like the silicon solar panels, but were not. They were made like that to look aesthetically "green".

They say high quality milk comes from safe breeding and that its safety and genuineness are certified. This is why it is sold in genuine-looking bottles (like the ones in grandpa's tales). There is always a grandpa behind a genuine product. He usually reckons that, before him, milk was crap.

… In the middle: the distance between concept and project…

I once saw two people, who eventually became six, talking to each other in front of a building site. One asked. "Here it says 'Sustainable architecture', why?'" and the other answered "... Well...! Guess it means it's cheap"... "No!" said a third person. "Sustainable means everybody can do it". Then came the fourth who, having heard them talking, added "Sustainable means eco-friendly". So then along came a fifth person who from distance said "Yes, eco, green, whatever! It can be as eco-friendly as you want but I'd like to know if the price is just as friendly". So, now comes the sixth person, the wise guy, who spoke in such a way that his assumption added an international aura to it "Sustainable means sustainability my dear... In all respects!" At this point, the others broke out altogether "sustainwhat's?"

Sustain… what's?

"Sustainability" as an answer, to its greatest extent. The project breaks down –due to an implicit risk– under the gush of many requests and the designer vanishes behind his lost identity. The media create the concept and meaning of Urban Sustainability or Ecologic Ability, which could eventually merge into the Ability to Urban Eco Sustainability. A new professional association would be needed (but, hopefully, all associations will disappear one day). The matter is that in the end it all comes down to that simple little wooden house, that seems reassuring thanks to its eco-friendly look: what a truism.

Basically, the architectural transposition of Candy Candy. While some naively believe they are the perfect new inhabitant of the planet, others build unsustainable complexes with very little sustainability in them. It is like accepting death penalty as long as the condemned smiles. Draw your own conclusion!

It is true. The word sustainability is trendy. Hence, easy to use. "I can't stand sustainability any longer" is the key reaction. What's that all about? After a catastrophic start, the whole matter is only at its second edition and everybody is already sick and tired! Or simply scared?

Concluding that it all comes down to a premature mass sickness and boredom is just not the option. Even after a bad first kiss, teenagers will say they are sick and tired of love. If they only knew what the whole thing is about. It won't take them long to find out. When it comes to sustainability, its complexity and different aspects, we are like teenagers too.

We either offer ridiculous false and insufficient solutions or equally stupid refusals. Many of us will never really get what sustainability exactly is and could be. You don't have to be a professional: just carefully read the inevitable "green" magazine at the hairdresser's while you are waiting for your turn listening to the radio or chatting. Apparently, even a successful image can be sustainable. All you need is a specific and suitable outfit to skip the long and winding road to success, thus saving time and money and rendering your image more sustainable.

There you go: all it takes are three easy timesaving steps and like magic you are turned into a cultured gentleman. So, this could also be considered a sort of deviated sustainability

We should all face sustainability sooner or later. But it is extremely difficult to get out of the illusion of being good while causing damage even though in an educated manner. At the moment it's difficult to prevent any issue of social interest from being spoiled and, often, twisted by the media. Still, giving up the issue to avoid being caught up in the fashion trend could be extremely harmful for the environment. The Life Gate Prize, Sustainable Communication, would be awarded to the best TV advert for its originality, creativity and for raising the audience's awareness as regards environmental topics. The environment could dangerously become a brand exported at global level. We live in the media democracy era where everyone is entitled to everything: the right to information is not an exception. Everybody is informed and has an opinion about everything.

As a result, it is hard to tell the difference between a concept and its image. Thus, apparently important topics are actually being inflated to attract the audience while important topics capitulate to the confusion surrounding their definition. In this case, both situations occur. Declarations about the end of the world attract audiences, while the public is generally unaware of what really happens or what could be done to prevent it from happening.

Sometimes, even the experts hide away to protect the purity of their task; other times they do it to hide their inability to carry it out. Environmental topics are high on company, people and mass media 's agendas. Everyday we are made aware of 'something'. But how efficient is this communication? Probably very little: alarmism and its exploitation are just as dangerous as ignorance and disregard.

The most serious environmental problem to be tackled is human conscience that exploits the issue far too often. Institutions and mass media are not carrying out their duty. Often, the ruling class is not up to the task and is only concerned about the mood of the day and too often their action are driven by the need to hold on to power. This is of course an enormous limit for the future of a community or country. The same goes for the media: always searching for sensationalism, they tend not to take the "best practices", or the successful innovation cases into the right consideration. Great challenges, like waste and water management, are looming on the present day. Failing to fulfil the European obligations is not difficult at all, for a number of reasons. Does the infraction make us more or less sustainable?

Possible because we don't have purifiers, for example. But the media would not be interested in this because it's everybody's business. On the contrary, when the problem is unique (I am thinking about the waste crisis in Naples) news hits us like a bomb and, strange as it may seem, a non-solution pays better than a solution.

Therefore, a less demagogic approach is needed. Problems have to be tackled, raising citizens' awareness and providing them with correct information. Unfortunately, it's a matter of culture that then becomes an attitude.

The sustainability of a project is a requirement, it has always been. But things change. What used to be Diotallevi and Marescotti's logical starting point for a manual has become something more today. It has become a sort of "democratization" of Architecture in environmental terms.

The characteristics of Architecture ought to be re-funded to tackle the rapid effects of climate change. But Architecture lacks immediate answers. It is firmly set in its ways with one foot in the future.

The various attempts caused a sort of "Frankenstein effect". The same thing happened with TV aerials, boilers, parabolic antennas, air conditioners and now it's happening to solar panels. Diotallevi and Marescotti's manual opened with the construction principles relating to the materials and the building orientation. If we read it today it seems to suggest that "A good architecture follows a good project". It might seem useless to the sceptical that don't understand why people make such a fuss and think that knowing the rules at the basis of a good project and work is enough. But things aren't as easy as they seem. Architecture has had to face much more important issues than the mere "house", having to replace the unidirectional concern regarding the ancient manufacture with the multi layer approach, typical of complex systems.

Exponential increase of construction, multi-purpose buildings, changes in the end use of locations throughout the last 50 years to conclude with the brand new urban agriculture and the largely misunderstood concept of social housing. The single building in particular has become a complex system, meaning that even the mere residential building has to carry out more than one task at a time.

Its section does not resemble the architectural sequences in the history books one bit. Who is not acquainted with contemporary building sites will be extremely surprised, like Sam Lowry was in Terry Gilliam's Brazil.

Technical matters along with the need for operating programs render the section of a building the hardware of an architecture, the rules of which vary and are multifaceted, requiring a contemporary approach, similar to the multi tasking systems. A grey space between the inner and the outer space. What questions does architecture answer? What do we teach our students? Rhetorically, the issue is denied, reduced to mere craft. Therefore, who intends to learn craft for a sustainable future has to work even harder. This books sets out to make a few constructive remarks about the unsustainability of sustainability – as the media picture it nowadays – to conclude with a professional respect for an issue that, arising from social sponta-

neity, requires tangible answers to be, first of all, reversed and eventually qualified. Just like math rule is at the basis of beauty, according to Nietzsche in Human all Too Human, the same goes for the rising of sustainability that was caused by a logical process. For this reason, the word "sustainability" is meaningless without its ever-changing (according to the subject and the case they relate to) varieties. Let us deal with all that.

Any technological innovation
needs a long incubation
before architecture finds its answers.

In its most honourable meaning, sustainability mines hypocrisy and mendacity in architecture as it spots the unfit and puts them where they can not hide, namely where evolution, and the knowledge of it, force you to give tangible answers. This way, limits and inadequacies are dismantled and highlighted, when dealing with future contemporary history.

It had to happen. At a cultural level, we are not used to expect different results from the ones planned in the project. However, its imperfection is increasingly annoying. It occurred during the modern era. The revolution that was supposed to bring all architectural products, from the Bauhaus to the CIAM, to be democratic products accessible to all led to the rising of the schools which repeated the models and, consequently, their history. The revolution was of paramount importance, as were many of its failures. I would say premature ageing rather than failures. Being it the reason why modern ideas are unable to answer to the needs of the present. First, it happened to cars, then to the industry, distances, social degradation and then to the environment, that everybody had forgotten about.

And finally to the sustainability of the projects. Cities and blocks made for cars are compared to development models such as the Malmö example in Sweden, where citizens no longer need to use their cars. Not because of severe laws restricting or taxing their use, but thanks to an urban planning which simply makes it unnecessary to use a car. Cars go back to being an exceptional object people use out of pleasure rather than necessity. Bo01, city of the future, is an ambitious example of sustainable community planning and building design. The general plan for the rehabilitation of the south neighbourhood of Malmö, developed by the Swedish architect Klas Tham, can be seen in two ways. The first leads to the conclusion that Bo01 is an extremely modern idea; the second – due to its delicate scale and the attention paid to whole development of the urban project– leads to the conclusion that Bo01 is a pedestrian area with a well established perimeter, a sort of modern walled city. Powered by renewables, therefore totally independent from Malmö, Bo01 (from the Swedish "bonollet", which means to live) was built according to the rules of sustainable construction.

The idea of building a green neighbourhood dates back to 2001, when the Swedish government allocated funds for a 20-year plan for the rehabilitation of former industrial area and shipyards. Thanks to these funds, the administration of Malmö decided to restore the port area, apparently hopelessly compromised after decades of intensive industrial activity, to build a residential area. Bo01 is an example and a reaffirmation of Sweden's' well known care for the environment and attention to resources and energy savings.

Bo01 counts approximately 1400 buildings of medium-low height, except for the Turning, a 140 metres high tower by Santiago Calatrava. Given the cold weather, the southbound facades -entirely made of glass- capture the sunlight helping to reduce artificial heating. The buildings are surrounded by green areas and are well connected both with public transport and with a large network of cycle paths.

The project has a great potential…
Beyond urban planning and numbers…
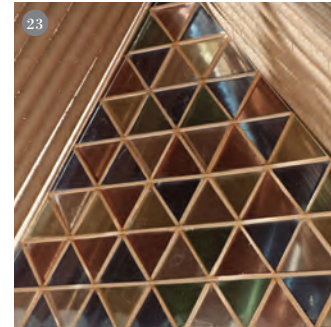
… Beyond architectural styles.

Sustainable transport plays an important role in the neighbourhood. Thanks to a Car Sharing service offered by the municipality of Malmö, citizens can book and share green vehicles (electric, hybrid and natural gas vehicles) by booking them on the Internet.

Renewable energies, such as wind turbines and photovoltaic systems, gas recovery biomass systems, use of the seawater heat, are largely employed, making apartments independent from an energetic point of view. Apartments gain all the energy they consume from renewable sources. A laudable philosophy that ought to be exported to other European neighbourhoods for the sake of sustainability. Not by chance, Bo01 has been chosen by the European Union and the European Department of Energy as one of the best examples for the use of renewable energies in Europe. In one word, sustainability summarizes the concept of respect. It contrasts the uncontrolled deterioration of the environment. It is all about ecological footprint. The modern era has operated a total reset, in order to socially "democratize" architecture. The new and important instances created throughout the evolution of architecture are due to the "cultural reset" forced by natural events and their force. The already saturated modern era has already used all the existing forms of expression (exhibiting themselves to be noticed) because it has exhausted the path of research through the meaning of its own sense. Sustainability, as the paradox of the artifice, raises new questions: the need for democracy towards the planet (it will rapidly become the Universe) is directly linked to the environmental issue.

The environmental issue is advertised by political slogans but tackled by experts. Being brought about by the multitude of realities we live in, it will consequently be tackled by the multiple contributions of the multi-disciplinary approach.

In the Oxford English Dictionary, Jan Smuts (1870-1950), a South African politician and philosopher, defined holism as "the tendency in nature to form wholes, that are greater than the sum of its parts, through creative evolution".

One plus one is two. Essentially, union is strength. Jan Smuts contributed to the establishment of a new International organization for peace: the UN.

He wrote the first draft of the charter. An holistic approach to the study of things and phenomena is needed to reach the unique goal of coexisting Bo with the same environment we use. This is the basis to start over again, opening to new realities, to new architects in this case, giving a new meaning to their work. A new variable is added (containing thousands of other variables). There is a rare occasion to step backwards and grab a unique chance. The chance to think about everything and consider how inappropriate this all is. Outworn.

Sustainability is a need, first of all, and then an opportunity. Everybody is unprepared when having to invent solutions, especially because answers can not have double meanings. They have to lead to tangible projects first and then to the realization of real goals. Getting rid of ideologies, of ideas, of demagogic attitudes, of cultural anchors is imperative to acquire a fresh new vision able to modify the present reality and to establish a projectual path as opposed to inability as the

different works of Mario Cucinella, Shigeru Ban, Foster and Arup for example. One of the main goals of whoever deals with these matters is to recycle (wholly or almost wholly) the products of architecture. Whereas the building materials of the past (such as stone brick and timber) were widely reused in construction, modern materials are more complicated to reuse. Let's just consider a synthetic floor combined with an irrecoverable foundation: it has to be entirely demolished. The same thing occurs when different materials are used together, arising the problem of source separation before recycling.

Concrete demolition itself involves a huge investment. "Disassemblable" buildings ought to be constructed with materials of which the recovery, reuse, recycle and disposal does not cause further pollution. Lately, global recycling (according to which the material we use is borrowed from nature and must be returned to nature) is target of great attention.

Planning disassemblable buildings which could be adapted to new uses with reusable and recyclable materials is a valid and fundamental criteria, given the huge amount of waste otherwise produced.

The cardboard cathedral by Shigeru Ban is an example as it innovatively replaces the Christchurch Victorian Cathedral, severely damaged by the earthquake which struck New Zealand in February 2011. It is innovative inasmuch it is entirely made from cardboard, an eco-friendly recycled material which is recyclable too. Therefore, it responds to the need for a cost efficient solution based on the idea of build-

ing recycling. Such an unusual material (already chosen by Shigeru Ban in 1995 in Japan with his Paper Church) does not jeopardize the construction and the fruition of the building in any way: it will host up to 700 people and will be 24 metres high. This innovative project paves the way for a new era in architectural planning. It could even have effects at a global level given the recent widespread ambitions regarding building sustainability but, most of all, the attention paid to the recycling of material that can be used for new ideas and in different ways.

Shigeru Ban's experimental architecture is a great challenge, finding its collocation in the realm of new technologies. It isn't easy to imitate it but sensible architects must consider using reusable materials when projecting small buildings/dwellings also considering the dangers caused by tons of waste and its disposal. Therefore, the recycling and reuse of material ought to be taken into consideration during the initial project stage when designing a building ex novo. Some considerations must also be done regarding demolitions, so that various materials can be recycled and reused. On a larger scale, sustainable living is also a matter of combining urban projects and behavioural culture. C_life, City as a Living Factory of Ecology, will be ready in approximately 14 years time with a neutral impact on the environment. The environmentally sustainable neighbourhood will be located in Jätkäsaari, an island and quarter of Helsinki (Finland). Many designers have worked on this project winning the international contest: Sauerbruch Hutton, Arup, Experientia and Galley Eco Capital. The reason of its success does not simply lie in its architectural

eco-friendly choices, but also in the **definition of the behavioural patterns** that **citizens** must respect for a sustainable lifestyle not only in the neighbourhood but also in the whole city of Helsinki.

The amount of CO_2 emissions produced by c_life citizens will be 43% lower than those of the other citizens of Helsinki. But there is more! It is expected that in a short time the **amount of CO_2 produced by the neighbourhood will be negative!** Therefore, not only the neighbourhood's impact will be neutral but **it will also help the environment to dispose of the exceeding pollutants**. The materials only account for a decrease of 550 kg of CO_2 per square metre.

The estate will host houses, offices and, given its flexibility, it can be adapted to **various uses**. Recycled and **recyclable** materials have been used and great emphasis was placed on building orientation, on illumination and ventilation.

In Harare, Zimbabwe, the South African architect Mick Pearce designed a building, in collaboration with the firm Arup, that takes inspiration directly from nature. In fact, it thermoregulates itself so it maintains a constant temperature regardless of the variations outside that can go from 42 to 3°C.

The building is called Eastgate Building and it hosts businesses and offices. The whole idea was stolen from termites!! Termite nests are in fact complex and intricate structures made of mounds in which termites grow a fungus, which must be maintained at a stable inner temperature and degree of humidity (31°C.) regardless of external environmental factors. To ensure a stable temperature inside, termites design their mound so it can catch a breeze. As the wind blows, hot air is drawn from the main chambers under ground out of the structure, with termites opening or blocking tunnels to control air flow.

The Water Cube has a catchy design and cutting-edge technology. It comes from Beijing and was built on the occasion of the 2008 Olympics. ARUP and studio PTW worked hard to design the innovative pool with eco-friendly materials and technologies. Like a bubble of soap, it looks like it is about to fly away any minute. Ethylene tetrafluoroethylene, ETFE, a fluorine based plastic, free from chlorine and solvents. As transparent as glass, but weighing 1/100 of glass; plus it is a better conductor of heat and lighting, thus allowing energy savings of almost 30% and electricity savings of about 55%. Moreover, it is recyclable and self-cleaning! The water cube is the largest ETFE clad structure in the world. The scarcity of water resources in the area led its designers to develop a system for the recovery and recycling of rainwaters, resulting in the reuse of 80% of the rainwaters collected.

Mario Cucinella's self-sufficient school in Gaza is based on principles that recall termite mounds. The project consists of a self-sufficient school building that produces the energy it needs relying on renewable energies only (solar and geothermal). The project promotes the use of locally sourced materials and simple construction systems to minimize costs. It is called "Gaza Green School", built with the "earthbag" technique, an inexpensive method to create structures, which are both strong and can be quickly built.

The structure is in **timber** whereas the walls are made from sandbags. Local labour force (even low-skilled) was employed given the building's simple construction method. From a technological point of view, the school is equipped with wet parks and a photovoltaic system. The solar panels on the roof convert the sun's energy directly into the electricity needed by the building.

Two energy converters, each producing 5 kW, provide for the electricity supply. The nearby mosque uses the same technology that guarantees electricity 24 hours a day. The school only relies on the constant and large supply of solar energy.

"**The Colonization of the new world**" is a clear example of the end of our cities in the last fifty years. Pakistan, India, Kazakhstan, Azerbaijan, China, the United Arab Emirates (perhaps the latter are already a model) and Africa mirror the failures of our evolution. We may be reassured by our Euro 5 standards but we do not realize that to take around seventy kilos of flesh, we actually mobilize two tons of iron.

In the "new world", millions of Euro 0 cars travel around at the same time in un-inhabitable traffic jams, clogged with humans who assert their right to cause the same damage we did, just more rapidly. So far, the few who live in North America and Western Europe have consumed more than the rest of the whole world.

It is exactly for this reason that the new world, which used to be ancient but firm, is where architecture can come to terms with sustainability, watching its evolution as if it were a film in fast motion.
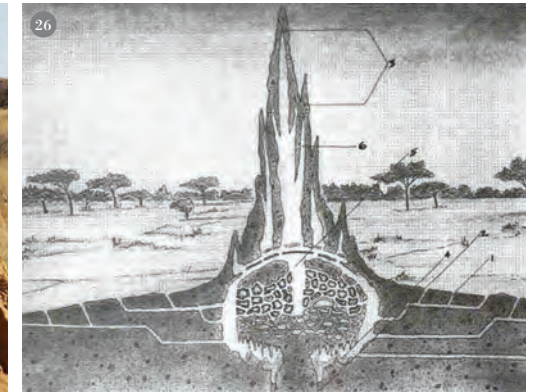
… All social systems reflect the evolution of nature, to which humanity always referred.

... The distance between things, people and services in a city forces citizens to use

transportation means: distances increase accordingly.

Ecological footprint...?!

... I once heard somebody saying he always believed ecological footprint was a homeopathic product for foot care!... More than somebody... Very many people! While the indicator systems normally used by various countries present the evolutions registered in several areas of sustainable development (MONET system's key indicators measure the progress of sustainable development in Switzerland from a social, economic and ecological point of view; the road to sustainable development is based on several postulates), the ecological footprint provides highly aggregated, absolute statistical figures indicating just how large human demand is compared to the regenerative capacity of nature.

It relates the human consumption of natural resources with the regenerative capacity of the earth. It measures the biologically productive land and water that is necessary for the recovery of the natural resources consumed by mankind and to absorb waste materials mainly generated by technology. The issue is particularly urgent nowadays, due to increasing difficulties in the management of urban traffic control in developed countries (Italy is an example) and to a consumption surge in developing countries with a rapidly growing population (China and India for example). Ecological footprint mainly serves the purpose of raising awareness on environmental issues, since it can tell us the number of "earths" that would theoretically be required if everyone on the planet lived according to the same lifestyle. By comparing the footprint measure of an individual (a region, a country etc.) with the actual bio productive capacity per person (the hectares of productive land on the planet divided by the number of people alive) it is possible to determine if that individual's consumption is sustainable or not. Ecological footprint refers to the use of **goods** or services, including **energy**. The amount of each good is related to a constant rate of return (kilos/hectare) to figure out the amount of land being consumed. As for energy consumption, it is converted into CO_2 tons to calculate the amount of forestland required to absorb it.

The concept of ecological footprint was first introduced in 1996. It was adopted in 1999 by the WWF, which updates it regularly in the Living Planet Report. WWF studies highlight how current consumption is exceeding the **planet's regeneration capacity**. The following chart, from the Living Planet Report, shows an estimate of the ecological overshoot, based on three different scenarios. A study published in 2007 calculated Switzerland's ecological footprint and compared it to other countries'. It also compared Global Footprint Network data (based primarily on international sources) with official Swiss statistics. **Swiss ecological footprint is four times higher than its bio capacity**. Currently, it measures 5,6 global hectares per person, while the country's bio capacity amounts to only 1,3 global hectares per person. Fossil fuel emissions account for 64% of the Ecological Footprint. Moreover, this Footprint has also grown more rapidly over the last few decades than any other factor. Use of cropland, forests and pastures are another major factor, accounting for 32% of the total Footprint. (Swiss Federal Statistical Office). **We live at the expense of other regions in the world and of future generations**.

Human activities have been in an overshoot position for decades. Such unsustainable lifestyle relies only on the import of natural resources unless we decide to overexploit our natural capital. Human consumption of natural resources is much more rapid than Earth's regenerative capacity. The world's per-capita bio capacity is 0.8 gha less than its per-capita Footprint. Switzerland's per capita Footprint is about the same as the Western Europe average. North America and some European countries consume up to 5 times more than the planet's bio capacity of 1.8 gha per person. Many countries of Southeast Asia and Africa, in contrast, use less than the bio capacity per capita that is globally available.

The ecological footprint is a kind of "resource accounting". It determines to what extent humans reduce the Earth's regenerative capacity (bio capacity). The method takes into account the intensity of consumption and the depletion of natural resources caused by activities such as agriculture, carbon absorption and wood consumption, to calculate exactly how much physical space is required to ensure sustainability. This physical space requirement, expressed in gha, is referred to as the Ecological Footprint and covers all forms of consumption. The Ecological Footprint shows the extent to which the consumption of natural resources exceeds the bio capacity of a given region. Use of natural resources can be sustainable to a limit point defined as the point at which Ecological Footprint exceeds bio capacity. The study of Switzerland's ecological footprint was published by the Federal Office for Spatial Development (ARE), the Swiss Federal Statistical Office (FSO), the

Gas flaring?... Entire cities could be conceived, live and support themselves thanks to gas extraction... Paradoxically though, they actually die from it.

Federal Office for the Environment (FOEN), the Agency for Development and Cooperation (SDC) and the "Global Footprint Network", whose data (based primarily on United Nations sources) were compared with official Swiss statistics. The findings from the study demonstrated that the data matched very closely.

Not to mention the results of certain human action that has nothing to do with differences in customs or ways of life. These activities, concentrated in specific parts of the world, are highly damaging and at the hand of whom I would call "environment poachers". Gas flare and oil extraction are just an example.

In Nigeria the most "affordable" way for oil companies to operate is to burn the 40% of the gas they extract. It constitutes a hazard to the health of the inhabitants of the area: causes chronic breathing diseases, cancer and sterility.

There is a ban on flaring but it does not prevent oil companies from burning off gas from the oil production in the Niger Delta, which is extremely risky for the environment and the people who live close to the wells. This is why the government had set a deadline for oil companies to end gas flaring.

Nigeria produces 7 tons of CO_2, just like Norway, Sweden and Portugal, without the corresponding industrial and transportation systems, nor all those houses to heat. According to Friends of the Earth estimates, the total amount of gas flared, is equivalent to 30% of gas consumption in Europe. The oil companies blame the Nigerian government that has not yet built the distribution network needed to make gas available for people. Moreover, they reproach the government for failing to guarantee safety for workers, who are often kidnapped. Usually, the kidnappers do not ask for money but for better living conditions and less pollution. It is possible to actually see the huge flares burning from the Google Earth satellite...

Currently, African green areas are being exploited for the production of bio fuels which prevents farmers from being able to produce the agricultural products the population needs and that they already have difficulty in satisfying. It is not easy to understand what is good and what is bad in the intricate labyrinth of sustainability. I firmly believe that it is a matter of taking a cultural step forward. It may take time, but it is interdisciplinary and fundamental. As for architecture, experience taught me that clarity and knowledge are of paramount importance. We can and must risk at an empirical stage to establish progressive processes able to keep objectives under control to then obtain new results that critics will look at in a different way.

CONVERSATION 1
A brief chat with Kenneth Frampton

One day I wrote an e-mail to Kenneth Frampton. Yes, him, indeed. Some asked me what the amazing author of some holy reviews to the history of modern architecture had to do with this topic. Well, nothing but perhaps for this precise reason he could have, I thought, very few but clear ideas in this field.

So I e-mailed him. He promptly answered, incredibly polite and kind saying that he only had a few remarks. I thought that his "few remarks" would have been like little oases in a desert. And I was right.

In my reply, I thanked him for his politeness and, feeling a little bit nervous, I introduced him to my sort of "thought-question": "At this time in history, the former "Third World" is willing, and rightly so, to play its own part in the global economy. As a result, this is causing and will cause significant imbalances that will catch us by surprise. The continuous evolution of phenomena and facts also involves new and old cities and their evolution is unpredictable. Don't you reckon that architecture ought to adapt to it and that we should see the results?"

The day after, he replied: "All pre-industrial building culture arising out of conditions of relative scarcity was sustainable by definition, since it was largely based on renewable and/or durable resources with low embodied energy such as wood, brick and stone. An architecture predicated primarily on these materials would necessarily have a somewhat limited range of expressivity. It seems that as of now China is not responding too well to this challenge and India rather than responding to this 'new future' has regressed with the single exception of Rahul Mehrotra.

The taste for the spectacular (Guy Debord) is as prevalent in the East as in the West. Architecture alone cannot possibly solve the problem of climate change. Building culture of an enduring quality has always been sustainable. Urban planning realized sustainable places from both an ecological and political point of view (hence, socially sustainable too) only wherever people live close to each other and around the main public places. As stated Hannah Arendt: "The only indispensable material factor in the generation of power is the living together of people. Only where men Jive so close together that the potentialities of action are always present can power remain with them, and the foundation of cities, which as city-states have remained paradigmatic for all Western political organization, is therefore indeed the most important material pre- requisite for power. What keeps people together after the fleeting moment of action has passed (what we today call "organization") and what, at the same time, they keep alive through remaining together is power. Power preserves the public realm and the space of appearance, and as such it is also the lifeblood of the human artifice, which, unless it is the scene of action and speech, of the web of human affairs and relationships and the stories engendered by them, lacks its ultimate raison d'etre.

... The polis, properly speaking, is not the city-state in its physical location; it is the organization of the people as it arises out of acting and speaking together, and its true space lies between people living together for this purpose, no matter where they happen to be. (Hanna Arendt, The Human Condition).

Certain technical innovations will obviously have an impact on the expressivity of architecture; just as the development of the fire proof steel frame and reinforced concrete construction had an impact on building in the 20th century. Certain devices, such as the recycling of warm air, double glazing, and geothermal heating, have already changed the nature of the building surface.

If by the former Third World one is referring to the currently booming 'consumer' economies of China and India, these stand to be no more sustainable than the primary (late imperialist) consumer economy of the US. Escalating rates of world wide industrial production and consumption run the risk of depleting non-renewable resources such as fertile land and potable water.

Hence, the threat posed by desertification in China and by water pollution in general. Architecture per se is unable by itself to respond to such challenges.

Architecture cannot solve the problems caused by the ever-escalating economic development.

The destruction of the environment by the voracious processes of late capitalism cannot be checked by architecture, since its values are completely different. Naturally, traditional building culture of quality was always sustainable by definition. As far as I am concerned, the last word on the issue of sustainability has been said by Martin J. O'Connor when he wrote: "Two sources of contradictions are inherent... commodity production.

In traditional Marxism, the contradiction between the production and circulation of capital is "internal" to capitalism because capitalist production is not only commodity production but also production of surplus value (i.e., exploitation of labour)."

Yours,
Kenneth Frampton

It happened with "Al Diwan"

Hannah Arendt "The Human Condition"
" ... The only indispensable material factor in the generation of power is the living together
of people. Only where men live so close together that the potentialities of action are always
present can power remain with them, and the foundation of cities, which as city-states have
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... The polis, properly speaking, is not the city-state in its physical location; it is the organization
of the people as it arises out of acting and speaking together, and its true space lies between
people living together for this purpose [emphasis added], no matter where they happen to be.

Al Diwan was drafted in 2005 by kei_en.enzocalabresedesignstudio © in an international team for private customers which would have developed it further for the Government of Abu Dhabi. The project set out to draft a plan considering the rules and strategies for the management of complex projects such as an Experimental City the underlying philosophy of which is sustainability in every respect.
The low impact and low emission settlement measured 100 million square meters. A few years later, Foster & Partners tried to show its feasibility with Masdar: the largest investment ever for a project, a lab-city, a "living reality" on the state of the art of what "zero emissions" means, no matter whether in a good or bad way. But how expensive is it, in terms of emissions, to produce something with no emissions at all? While I was writing this book Masdar became unsustainable... The project was "resized"... Robert and Sandro came into my studio with a huge file. They used to feel nervous before every meeting, when they had to make an unreal occasion seem real (once again). That time they were unbelievably excited.
The name had to be Al-Diwan which in Arabic, among other things, means sitting in circles. A 100 million square meter area, a city in water where there is no water. A low emission city?!? The first thing that seemed strange was that they asked my studio. Not that this annoyed me, not at all, but in practical terms I was not prepared to deal with such a colossal project.
The explanation came after a while, and it had a logic to it. At the time one had to act quickly and without making too much of a fuss, so no "awkward" starchitects

were needed (I do not feel offended that they don't consider me a starchitect, much less that they don't think I'm awkward). Somebody resolved and intelligent enough to develop a concept with the help of very skilled advisers was needed instead.

The next stage would have required a team of planners and experts in various fields. I kept believing that it was a sort of weird trick. I had just started to work in the UAE and travelled from Pescara to Rome and from Rome to Dubai even once a week sometimes. Cooperating with Sandro and Robert allowed me and my studio to strengthen new relations and to grasp important opportunities as regards planning that we couldn't even imagine before.

Sandro has awesome great personality, his ability and managerial creativity are simply brilliant. He is "explosive" in all respects, with all the pros and cons of explosion, his ability to translate his fantasy into reality is unbelievable. Al Diwan was one of these occasions.

Soon, the concerned and serious attitude (typical of who has a deadline and does not know where to begin) replaced the ironic mood we started off with.

Therefore, our first remarks led us to realize we had absolutely no reference points. The studies that the great Urban planners had carried out on Modern Cities, Le Corbusier and his schemes for a contemporary city for two million inhabitants, his observations on architecture and urban planning, "la Ville Radieuse", were the most recent – but ambiguous – contributions I could rely on. Modern cities could give us no answers. We risked making the same mistakes and misunderstand-ings of the last seventy years in the history of cities. First of all, we were resolved to clear automobiles from public spaces and from the structural organization of Cities. This was enough to reverse the concepts and ideas that followed the industrial revolution, allowing to shift from the "merchant era" to the "automobile era" thanks to the acceleration of times and consequent re-interpretation of the idea of distance.

In just one century, 2000 years of evolution were wiped out and the city centres were no longer appropriate for the purpose.

Consequently, new ones were designed based on the management of traffic flow. But what about its connections with mankind? New concepts and considerations of sustainable mobility would have taken all this into consideration reinventing a different architecture that would have considered traffic flows as a vital prerequisite of the project as a whole.

Al Diwan became the simple implementation of free considerations that, if you wish, are summarized in the requirements for the LEED certifications that we had already taken into account before.

The U.S. Green Building Council (USGBC) was established in 1993 in the US. It set the standards for green buildings as regards energy efficiency and environmental impacts. Such standard is called LEED (Leadership in Energy and Environmental Design). To earn LEED certification, a project must satisfy 6 LEED prerequisites and achieve a minimum of 69 points divided into six credit categories:

They may sound crazy,
but some projects are full of surprises.
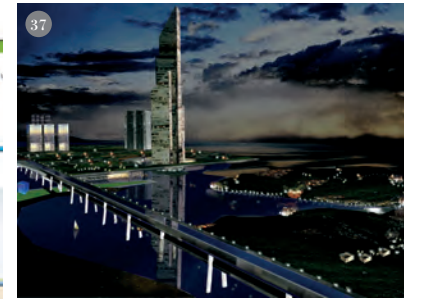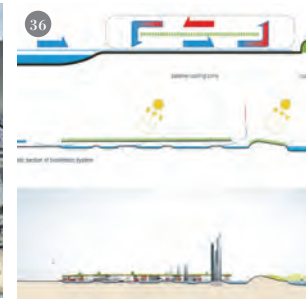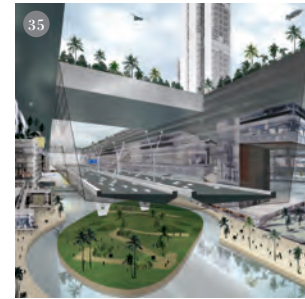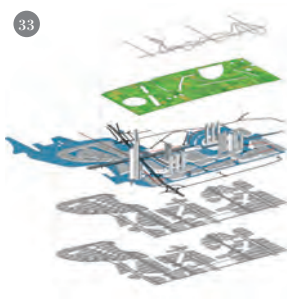
We designed Al Diwan for
the near present… It allowed us
to experiment and understand.

1. Website sustainability (14)
2. Energy & atmosphere (17)
3. Water efficiency (5)
4. Materials & resources (13)
5. Indoor environmental quality 15)
6. Neighbourhood pattern & design (5).

What Al Diwan sets out to do is translate the inspiring principles of the prerequisites into architecture; the possible meaning of each prerequisite lies in the quality of the project itself and in the sensitivity of who drafts it.

Surprisingly, our partners naturally translated the environmental requirements into economic considerations, with great interest. They expressed them in the form of key words: mobility, functionality, energy, landscape, aesthetic.

The business plan figures were scary, as was the absolute naturalness they showed when discussing the issue. Al Diwan was and is based on a simple idea: a start investment called Canal City, start and core of Al Diwan, as wide as the first inner ring of Milan, a large Oasis towards the desert, a 40 million square meter artificial lake, a Hotel District, a School and University District and a Luxury District. Some artificial islands in the lake host the villas of few and boats at sea can reach the lake through a network of locks and waterways, similar to viaducts.

Hills surrounding the artificial lake are made with its backfill and host a system of golf courses. One year after the first meeting, huge quantities of seawater were being channelled to the desert. The start up of the whole system is Canal City. The urban layout is characterized by a dense network of canals that area meant to be pleasant to see, to function as infrastructures for low impact boats and to allow important environmental actions characterized by a significant degree of electronic control. In the three-storey basement under the canals there are parking lots and underground links suitable for motor vehicles.

The whole commercial area measures 40 metres at the most. Shops and offices are on level 0 which is completely covered and climate controlled.

A large plate (having a thickness of approximately 12 metres and sustained by both large towers serving different purposes: commercial for 40 metres and residential for the remaining height, and by a series of hollow structures. These ducts/bio-climatic chimneys bring natural light under the plate) serves as a cover and has a park on the top. All dwellings lie above the plate; on the top of the towers they are exposed to the sea breeze and to the wind, which is useful to control the natural ventilation of the "modern wind towers". The Sheikh Zayed motorway connecting Dubai and Abu Dhabi crosses the whole project area. The motorway is therefore the scene of the project which does not deviate its path. On the contrary, it will cross Canal City with a strong scenographic appeal.

A key element of the project is the possibility to control the climate in the whole area by lowering its temperature by a few degrees. Various strategies, inherent in the nature of the general architecture of the project, cooperate to this aim.

First of all, low temperature air captured at a high temperature from the towers, is circulated at ground level while the hot air is expelled; the climate is also controlled however by water, present in large quantities, and by the use of geothermics that cool the effect of water's percolation. Not only; by spraying from the waterways/viaducts, it is possible to create a steam barrier allowing an exchange of heat with the seawater thus lowering the temperature by a few degrees. The hills in the background are made with backfill and help air to circulate in a sort of enormous convective loop once it is cooled...

I wouldn't know if Al Diwan would have been emission-free once built. What I am positive about is that it paves the way and tests out extreme conceptions. Even a small part of the results delivered would be sufficient to change the attitude of many. What is particularly interesting though is that the whole project turned everything upside down to respect a certain need and forced architecture to invent answers to this demand.

Sustainability in five words: mobility, functionality, energy, landscape and aesthetics

Global economic crisis, trends, sustainability, research, new markets: where does the project have to head to give the right answers? The word sustainability, by itself, is meaningless. However, I believe that a correct interpretation would be able to answer all the questions it raises. Finding ways to define it is interesting. It's not sustainability in itself that is interesting, but the rediscovery of a new way of approaching and doing things as a way to respect one's own intelligence. Consequently, we will not mention a generic form of sustainability, but a sustainable economy, a sustainable mobility, a sustainable functionality, a sustainable energy, a sustainable landscape and eventually, since everything is seen through an image, we will mention a sustainable aesthetic!

The different concepts produced in the research lead to the mingling of various types of sustainability So, if you want an affordable product or building but you do not want to poison the world, if you want an Indian, a Pakistani or a Nigerian to like it, you want it to mirror his culture and traditions, eventually turning it into a successful brand and you want people to say "Gosh, it is beautiful!", then the project should be taken out from its architectural context bringing it to embody what Khan defined "a stage of the creative conscience which always evolves upwards".

Delirious Mobility
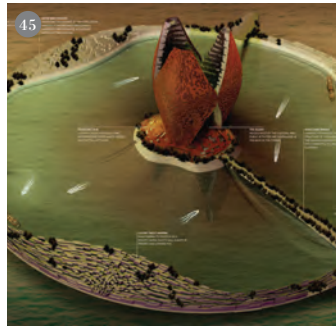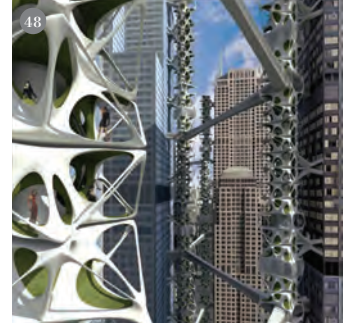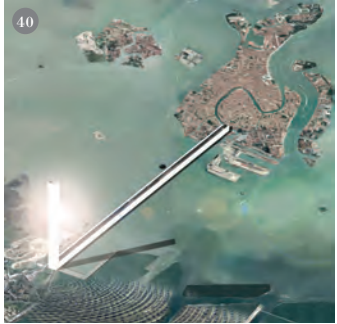
"Mobility" is the architecture of flows and represents the definition itself of "doing architecture". Events and people move in space just like information in a software. The ergonomics of flows is, with poetic license, the image of fluid space in which architecture organizes and composes itself, avoiding conflicts. Complex architectures, just like large urban settlements in which various functions coexist to give meaning to places, would not even exist without "mobility architecture". What lies beneath this concept is the idea of holistically being a complementary part (namely, where complementary means fundamental) of the great architectural alchemy. E. C.

Mobility has always been misunderstood by designers of the last seventy years. More in general, flows have been "mistreated" by the engineering culture, that always tended to solve problems with a level and a meter: banal calculations to solve single variable equations. Flows are not something easy to deal with and require experts able to monitor and organize operations that could have devastating consequences on Cities once they occur...

Various studios deal with this issue and I have been lucky enough to work with one of them. I was able to have a chat with Federico Parolotto, an architect who works in the field of the architecture of flows. He and others founded studio MIC Mobility in Chain, specialized in Mobility Planning. Parolotto successfully strives for the sustainable mobility and I asked him if...

THE YOKOHAMA PROJECT FOREIGN OFFICE ARCHITECTS
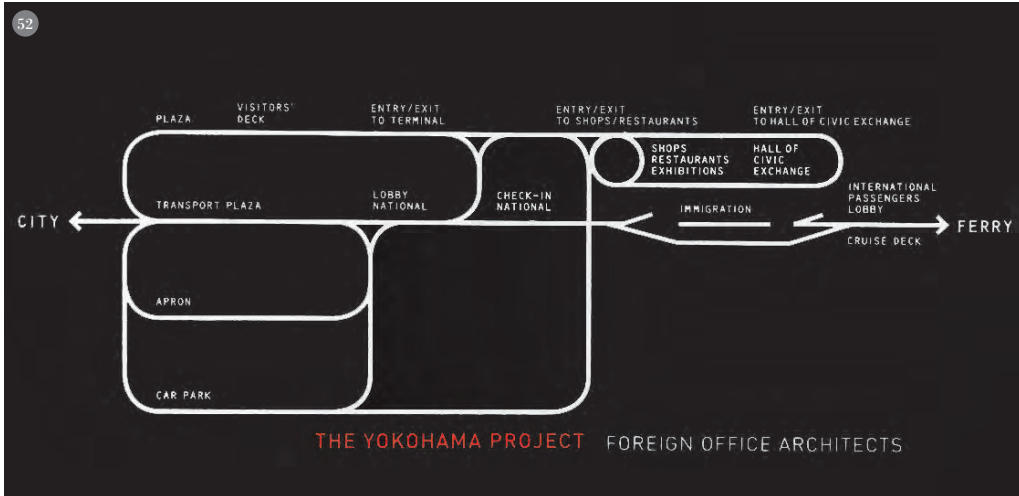
The Architecture of flows is the prerequisite for any strategy focusing on sustainability and turns into the conditio sine qua non for its creation.

CONVERSATION 2
The revolution of residual spaces
How to change cities starting from urban residual spaces
FEDERICO PAROLOTTO

All cities and megacities (with very few exceptions) in the world have in common the presence of cars that are the only link among very different and distant urban developments. Since the 60's in Europe, private transport has gradually increased becoming a mass phenomenon in the 70's and developing ever more until today. The extensive accessibility of vehicles brought about the urban sprawl in Europe and, more notably, in the US too. Citizens gradually left the historically established urban centres preferring residential areas, often accessible only with a private vehicle. The significant rise in circulating cars meant increasingly dense traffic flows in urban areas.

To handle the growing number of vehicles, cities had to rearrange the road network and ensure maximum capacity in terms of traffic flows, which caused the gradual erosion of public spaces, sacrificing pedestrian zones. Urban spaces were reorganized to guarantee vehicular traffic: roads and squares were turned into movement channels that were entirely managed by traffic engineers only.

Contemporary urban areas in cities of the Western part of the world are still characterized by the street layouts established in the 70's to deal with the exponential growth of private transport. We believe that today these can be looked into again to generate a new city: a modern city that may have a lot of traffic but will be organized in such a way to give importance to social life.

All cities in the Western world are planning a strategy to gradually reduce urban traffic because they must cut energy consumption and emissions caused by private

transport as well as rehabilitate the urban areas. The gradual change from private to public transport will be slow and complex but it will have to take place to make sure our cities have a future.

Enhancing public transport, penalising and changing the use of vehicles (that have become very easy to access over the last fifty years) will show some results in the medium to long term. The change is already on the way but reducing private transport is a feasible, yet not immediate goal.

Once achieved however, urban spaces will have to necessarily take into account gentle ways of moving around.

The quality of the microenvironment, hence the quality of lighting (both natural and artificial), the concentration of emissions and eventually acoustic quality will become key elements for the development of sustainable mobility characterized by public transport, mobility on demand, pedestrian and cycle areas. All these means of transport are directly linked to micro environmental quality since our bodies are directly exposed to external weather conditions for a good deal of the journey. It is now a matter of establishing how this new micro environmental quality can be achieved.

The role of open air designers has to change. Usually, the changes they make are shallow efforts to reorganize places, streets and junctions that have already been approved by the municipality in the name of traffic engineering, too often accepted as the ideal solution.

Nowadays an integrated approach to urban planning is needed: designers ought to analyse the flows of our cities to give a tangible contribution to the rehabilitation of social activities.

The extraordinary development of simulation planning tools led to a new generation of buildings whose thermal mass, natural ventilation, artificial and natural lighting are analysed with extreme precision in every detail by sophisticated simulation tools. Perhaps, since social activities in cities have gradually decreased also due to scarce economic benefits (open areas do not imply immediate earnings), the planning of public spaces has also suffered the endemic lack of an integrated approach and has been characterized by the uncritical acceptance of many specific constraints. Paradoxically, the only simulations applied to urban spaces, all sorts of different urban spaces in the world, only focused on traffic for years, ignoring other means of transport like cycling and walking. We reckon that the recent development of new simulation tools introduces the need for an holistic approach to urban planning: not only urban space but also flows will be taken into consideration when planning. The specific constraints of the project have to be revised and a "performance based" planning must be introduced so to put people, and not vehicles, at the centre of attention.

Milan is one of the clearest examples in Europe of the pervasive presence of vehicles leading to the reorganization of urban spaces, from squares to traffic junctions that inhibit any pedestrian connectivity.

Roads and squares in Milan are the most blatant example of the community's lack of commitment to public areas and the consequent abandonment of open areas to vehicles. Milan does not have squares where people can meet: they stopped existing in the 70's when they were reorganized to favour vehicular traffic. Nothing has changed until now. Very few squares have been designed in the last 20 years and Piazzale Cadorna is an example that explains it all. The sculpture that stands in the square and reproduces the needle and thread of Claes Oldenburg and Coosje van Bruggen seems more like an ironic attempt to mend a space crossed by numberless roads more than a reference to the fashion industry that finds its hub in Milan... In many European cities, the streets are oversized compared to the amount of traffic; the same goes for the hydraulic systems, the canals and the junctions that are out of proportion for the flows that cross them. Streets and squares in Milan are also often built in an incongruous way for traffic flow.

We think a significant number of streets and squares in Milan can be reorganized by modifying street sections and the intersections without reducing traffic flow. A new city can be created by reorganizing its flows, reducing the space dedicated to traffic and obtaining areas for new strategies of urban use, removing tarmac and thus leading to a gradual "demineralization" of the city.

The "flowdesign" strategy can change public areas in Milan, with an incremental approach starting from discreet interventions that could gradually be standardized, thus creating a new city.

Piazzale Loreto is one of the major high traffic junctions in Milan and the central part of the square is totally off-limits for pedestrians: a no man's land. Piazzale Loreto was the scene of one of the most painful occurrences in the recent history of Italy: the 10th of August 1944 15 Italian partisans were shot by the German army and only nine months after the dead body of Mussolini was hanged there to be exposed to public scorn. Maybe this is one of the reasons why Piazzale Loreto seems to only be suitable for traffic.

It is destined to no urban use whatsoever. After the steady growth of car traffic and the realization of the underground red line in the mid 60's, Piazzale Loreto lost any possible pedestrian use, at street level.

Its designers had therefore decided to avoid pedestrian crossings, favouring maximum vehicle traffic capacity instead. Pedestrians can only cross the square using the underpasses. This decision literally split the city in two. Currently, Piazzale Loreto divides Corso Buenos Aires, the most important commercial road in Milan, from Viale Padova (located on the same axis as corso Buenos Aires), one of Milan's most controversial places where several interracial riots took place in the last few years.

The current arrangement of piazzale Loreto contributes to making Viale Padova an urban ghetto splitting the city in two. Simply consider that an apartment in Viale Padova is worth about half the price of an apartment in Corso Buenos Aires, only 100 metres away (the length of Piazzale Loreto).

Thanks to micro simulation softwares it is possible to rearrange Piazzale Loreto, widening and joining the central residual spaces thus reducing the excessive size of the road and ensuring zebra crossings with the introduction of traffic lights. We believe a radically different space should be imagined, able to give voice to new urban strategies. It is about time that areas in Milan focused on people instead of cars. Piazzale Loreto can be reorganized by maintain the same volume of traffic but at the same time creating new urban strategies for people. A bottom up approach is possible, as is a better future for the city of Milan.

Delirious Functionality
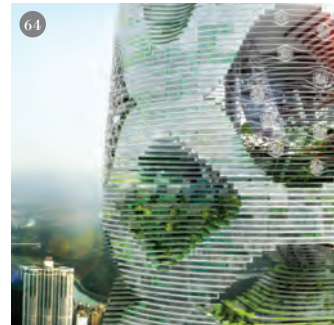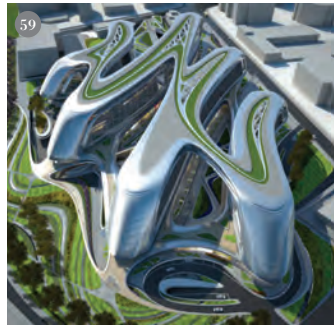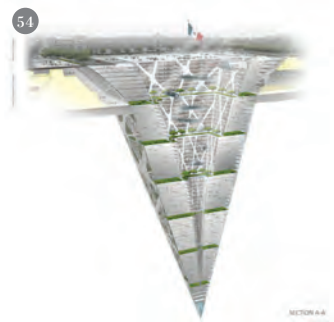
"Functionality", intended as the complex program of the differences in use is based on the idea that architecture hides within itself the complex structure of its being subjected to overlaps, owing to its simplicity in terms of representation, its being a craftwork that eventually will appear as image. It is not a matter of scale but of attitude. Interestingly, architecture also has to deal with its sustainability, to keep being architecture at the same time. Any lurch would change it. So, a building or craftwork in general is likely to be sustainable even before being made. Functional programming (of uses and management) takes into account the utility and the way the object is likely to be used. Space is architecture, even before being shaped in functional programming' ergonomics. E. C.

The title of this text is ironical about the meaning of the English word "sustainability". Actually, it highlights the real problem with a smile: the lack of proper information with regard to the topic. From banally speculative activities to everything that risks failing but contributes significantly to stepping forward in the debate and consideration of the topic. In this respect I find it important to mention Masdar, which had to be the most ambitious project ever, totally emission-free. Its aims and, above all, its limits were grasped through the involvement of Gerard Evenden, a Senior Partner of the Foster + Partners studio, because he developed the project while Khaled Awad was CEO of the Masdar site for most of the time. With the help of Federico Parolotto, who often cooperates with Foster & Partners for the mobility planning aspect, I contacted Gerard Evenden and Khaled Awad and was able to have an interesting talk about sustainability. I often refer to them in the book as the actors of a new kind of planning process in architecture. Some interesting considerations were made that I will discuss in the following pages.

A Sustainable City in the Desert

Promoters of Masdar, a city under construction near Abu Dhabi, say that it will be the world's first carbon-neutral city. It will be home to a research institute focused on renewable energy and sustainability, and eventually, if all goes as planned, to various clean-technology companies, and to a projected 45,000 residents and another 45,000 commuters.

☐ Complete this fall   ☐ Under construction

Neighborhoods will have distinct buildings and design elements. Masdar Plaza, for example, will have 54 sunshades that open and close automatically at dawn and dusk.

Up to 98.5 feet in diameter

Photovoltaic cells

Streets are laid out at angles that optimize shading. Long, narrow parks catch and cool the prevailing winds, and assist in ventilating the city.

MASDAR HEADQUARTERS   MASDAR PLAZA

The surrounding trees will help mitigate windblown dust and sand.

APPROX. 1 MILE

MASDAR

SOLAR FARM

MASDAR INSTITUTE

Computer rendering of the planned city

Phase 1 MASDAR INSTITUTE
The area being completed this fall has some design features common to the entire project.

The wind tower funnels wind to ventilate a public square at its base. The air is cooled with water sprays.

Narrow streets allow for some sunlight, but overhangs create shade.

Photovoltaic panels power the buildings and provide shade to keep roofs cooler.

The city is surrounded by recreation areas, power generation facilities, parking garages and food production areas.

A light rail line will pass through the center of Masdar, linking it to downtown Abu Dhabi and providing transport within the new city.

COURTYARD

STREET

Masdar Headquarters
Photovoltaic panels on Masdar Headquarters, the city's biggest office building, are expected to produce more energy than the building consumes. It is scheduled to be finished in 2013.

Wind cones will provide natural ventilation and soft daylight to the building's interior.

Automated transportation
Masdar will be using an automated system of electric vehicles, including passenger cars and freight trucks. The city's ground level was elevated 23 feet, and the vehicles will operate underneath.

Control panel

6.4 feet

Max. speed 25 m.p.h.

12.5 feet

Automated cars with room for four adults.

CONVERSATION 3
Masdar – The project
GERARD EVENDEN

Question "In practical terms, new parts of the world have been colonized, new areas of the planet have been occupied by people: sustainability has got very much to do with this. Before exploring new territories, a possible sustainable approach to their support ought to be explored. Moreover, it is of paramount importance to understand how to face the issue at stake, how to deal with it and to stop saying "energy savings" or "reduction of consumptions" to favour a more understandable language as regards sustainability. The meaning of the word is conceived as action: producing sustainability. Five key words have been identified throughout the text and it is interesting to figure out how they have been approached by those who worked on a project like Masdar. The first key word is about flows: mobility, and about how the new "sustainable" planning ought to face such an important and complex issue, linked to the management of the city's connections and development.

The second regards complex functionality programmes: how, according to sustainability, the different uses and aims of the city are to be organized and whether flexibility in the use of buildings could be introduced: in one day, one week or even a lifetime a building may be employed for different aims. The third concerns energy saving and how it could be associated to architecture and its integrations. The fourth key word is landscape, considered both as the rehabilitation of a degraded landscape as well as the intervention on a new landscape and how it ought to be related to the people. And eventually aesthetic, namely how the first four words have to be implemented. After all, it is a matter of imagining how all these things should appear, how the aesthetic of buildings relates to everything else.

G.E. "I would like to start from one of the main topics related to sustainability. Masdar was designed in the middle of the desert, which does not immediately suggest something necessarily sustainable.

However, I believe it is fundamental that when we face projects that are linked to sustainability, when we design entire "sustainable" cities – the communities of the future –, the prerequisites for sustainability, the key elements and their implementation are the same, no matter where we are in the world, be it in the desert or in a temperate area.

Everybody knows that in Abu Dhabi it is too hot to stay outside; if we focus on Chicago, though, we realize that even here, for four months a year, it is too cold to go outside.

This suggests how it is pointless to think that there is a place in the world for which talking about sustainability is actually worth something. It is not the place that matters since no matter where we are we can always rely on three key factors: firstly, in terms of architecture planning, one key factor is building orientation; the second is what we call passage-system, the transmission system required in all buildings and which depends on their location; the third is the active system, the amount of energy supplied.

To reduce energy consumption, the key lies in the combination of these three factors; not being able to decrease energy consumption in buildings by 40 to 60% means that a sustainable world is not going to happen.

1. *MOBILITY*
As regards mobility, the first key word, we cannot discuss architecture without considering the transport system that accounts for 70% of the global energy consumption alone. Mobility therefore turns into a key element both in terms of how a city is to be conceived as well as how the different buildings relate to each other. In this view, public transport acquires even more importance. I would like to focus on the USA for a little while: given that the whole system depends on cars, we will have to focus on where people live, where they work and the relation between these two "communities".

Here, Masdar is a field test, which attempted a different approach. For the first time, both aspects were taken into consideration: the community, the relation between various groups of people, how to create new communities. Most of all, one of the considerations was that to build "traffic-free" areas (not depending on vehicles) people should live maximum 70-150 metres away from each other. Ways to get people to work and simply move around were also explored. At the beginning, the transport system was considered a "driveless network", an automatic network. At the same time, the way a community relates to such system (providing the human dynamics do not come into contact with a vehicle system to avoid its inefficiency) was also studied.

In Masdar, to cater for this need, the vehicle free zone was lifted above the public transport system zone with light rail passing through the centre of Masdar City.

Vertically dividing these two zones is obviously one of the possible solutions for the future. Historically, the infrastructures entering the nerve centre of the city always split it creating a south and a north zone, or a west and an east zone, thus dividing the city in two separate communities. Planning a sustainable society for the future means, first of all, a clear separation of mobility, which renders the pedestrian centred zone increasingly significant and decisive.

2. *COMPLEX FUNCTIONAL PROGRAM*
In terms of complex buildings' planning, the influence of mobility is due to the need for people to have the workplace close to their home, which acquires even more importance if we focus on energy savings.
The issue of density cannot be ignored because when it increases, then the community can grasp the opportunity to add new functions. In fact, the community must be of a certain dimension to support, for example, a small local shop, and when it grows other services are needed. Density is, therefore, increasingly important in terms of global community.
In the future, various variables will have to be taken into account: the use of buildings, the relation between the uses and the communities, density in terms of number of people. This already occurred in the past: in London, large areas like Kensington, Chelsea or Notting Hill were the most populated communities and, as a consequence, the most valuable in the city because they offered everything people needed. The USA model, on the contrary, is based on communities being "pushed" out of the city, which causes various problems since the communities are cut off from the services they need at local level. The only way to reach the city is by car and that isn't sustainable at all.

3. *ENERGY SAVING*
If energy consumption for buildings and transport system is not reduced, energy supply will have to come from renewables. Energy consumption must be reduced by 40 to 60%.
Masdar City minimises energy consumption by setting simple building efficiency guidelines regarding insulation and materials.
Moreover, the building is always related to the surrounding environment; obviously the building itself, its shape, will vary depending on whether the climate is European or typical of the United Arab Emirates.
The building fabric and the passage systems are useful tools to deal with energetic consumption and, at the same time, with the relation between buildings. In the Middle East, for example, the southern side of buildings has to be protected against direct sunlight while in northern Europe daylight has to enter the buildings and interact with them. In this way the interiors of the building are directly heated by the sunlight (canalized and stocked). Again, the way buildings relate to each other, as for the facade design and the "building fabric", depends on where we are.

Question Interestingly, as you said about energy, people should also change their lifestyle and you have to plan how that will take place.

G.E. It is important not to forget that this whole system of methods, elements and technologies does not deliver results if the communities that created them are not in a better condition compared to the ones already existing.

A sustainable approach is resolved to give the community a choice; whereas in the past architects and engineers unilaterally established living and working rules and methods, nowadays sustainable architecture helps understand that it was a mistake to keep the community away from the most simple choices, like opening and closing a window. The possibility to choose, in terms of building planning, should be reintroduced because it makes people's everyday life more pleasant.

4. *LANDSCAPE*
As regards landscape, the way it is produced is fundamental. In the Middle East, for example, the European landscape is often transplanted following the idea of allowing water to flow and then plant seeds. However, approaching indigenous landscapes requires a deep understanding of the spontaneous local vegetation and, therefore, how it could be part in the landscape and the lifestyle.

Further attentions must be paid to the soil monitoring, the use of fertilizers and their effects, the amount and level of humidity required by the soil. The initial analysis of Masdar's soil promptly revealed its lack, or abundance, of salts, which entailed that water had to be infiltrated before anything could grow there. A few simple steps must be followed to adequately plan a sustainable landscape: firstly, areas to monitor the soil and its quality have to be identified, then the amount needed for vegetation has to be calculated. It all depends on where we are, once again: planting trees and bushes in dry soil, like in the Middle East, does not contribute to reduce water consumption.

Question when talking about landscape, I would like to ask you what you think about landscape as a natural artifice.

G.E. I find it interesting, as far as landscape related to the city is concerned, that production and consumption are beginning to influence the variety of vegetation planted. If we look at the past, at the history of Islam for example, it is interesting to note how people planted fruit trees for everyone to pick. In a world that likes to give the impression of being sustainable, where production costs are constantly increasing, this aspect should be taken into consideration when planning a landscape.

5. *AESTHETIC*
I believe that aesthetic derives from function, from the introduction of certain choices and thoughts in a building. It becomes the product of such thought. I believe that, for too long, aesthetic dictated the shape of buildings instead of the environment and the cultural context in which it is rooted. The climate and the culture of the area the

buildings belongs to influence its design. I believe, therefore, that aesthetic is totally dictated by culture and function, which is what characterizes cities. Therefore, I am convinced that aesthetic is totally driven by function and culture.

Question I would like to further explore your opinion about Masdar: looking at the future is it just an experience or does it set the standard, as a lab for the experimentation of new possibilities in sustainability?
G.E. I believe Masdar is probably the most important plan at global level today; people are starting to be aware and to speak about what is occurring in the world as regards sustainable cities, but Masdar makes the difference as it is a tangible plan: it has been built. Masdar will trigger changes in the way architects and engineers develop new buildings. I believe that its popularity will lead to face the problem of how to turn the existing cities into sustainable cities for the future.
Equally interesting is that Masdar will be an opportunity for creating a "Silicon Valley" of renewable energy.
The government of Abu Dhabi banks on research, focuses on what has not yet been obtained in terms of sustainable planning and renewable energy, it figures out what is missing. It can also be a place in the world where people can be involved in one big topic, just like what happened for the Silicon Valley. I think that one of the main buildings of the city can influence future plans, provided it includes all the principles of sustainability and renewable energy.

It triggers a marvellous cocktail of changes and I believe Masdar paved the way for a further expanding experience. It is a starting point. The city is part of an initiative, and this is the vital part of the entire project.

Question what is your position regarding the renewal and rehabilitation of the existing cities?
G.E. I think it will be the next step; Masdar is the starting point, an experiment that gave both positive and negative results, but it has been fundamental inasmuch we learned that when planning is based on sustainability, it could influence our lifestyle and new buildings. The first logical step is to use this knowledge for the existing cities, starting to study the possible effects of these principle if implemented in the "old" cities."
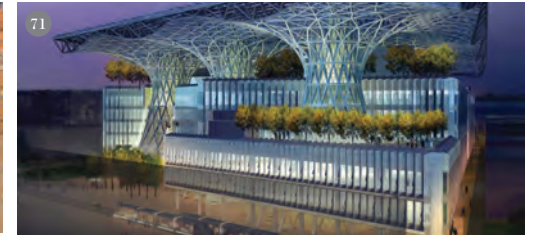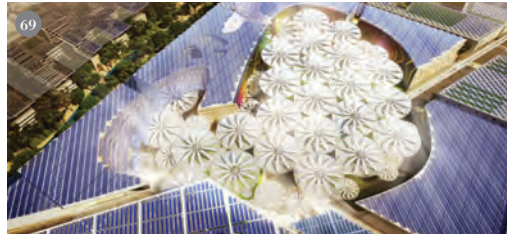
Masdar was an historic possibility to test

boundaries and limits of architecture.

CONVERSATION 4
Inventing a Process
KHALED AWAD

Question: Do you think that, given the recent economic crisis and the various occurrences at global level, it is feasible to realize complex sustainable projects? These are generally more expensive and complex, investors are not willing to take risks: given the situation, carrying out complex projects seems very difficult. How do you reckon a building system, even less affordable nowadays, could be realized in the sustainable market, where construction costs are even higher?

K.A. "... Perhaps the main feature of sustainability is its implications for life: social, economic and environmental benefits. Therefore, on my reckonings, the very idea of sustainability should be the core of the whole project: how to carry it out, which is the right way, which the standard, which the economic social and environmental aspects and how to organize the decision-making process during the project's development to ensure its sustainability. From developmental point of view, the project does not have to be the result of the various certifications, such as LEED, Green Star or BREAM, which is like collecting points: five points for natural ventilation, more points for the recycling of materials and so on.

The main issue is: which is the road to sustainable building? To ensure a constant balance between the social, economic and environmental process?

I watched an old Walt Disney video in which they imagined the future city of thirty-forty years ago. There was not a standard for Disney's building. Certainly, there are engineering standards for buildings, but not for what we are willing to realize. Standard is what will be accepted by the public. Vice versa, what the public will not accept, is not going to become a standard. Sticking to this principle, if the public accepts it (social aspect), if your partners accept it (economic aspect) and if you respect the environment (sustainability), then I reckon you can proceed to build all the rest.

Therefore, the process is the first important aspect, regardless of technology or of the amount of capital involved. Actually, according to the most recent studies carried out by Michael Green, some green buildings were less expensive than ordinary buildings. There is an on-going change: at the beginning, things are always more expensive but now the costs are no longer too high. On the contrary, the costs of sustainable construction are becoming increasingly competitive.

And it is exactly in this moment of crisis that it will be even more competitive since its management is significantly more affordable. In three or five years time, when the economic crisis will be over, people will have the chance to choose between a green building or a non green one, and it is more affordable to build green now than it will be in five years time or than it was two years ago.

Right now, green buildings have the chance to become more popular: in three, four, five or six years, when the crisis will be over, people will say: "Well, this is an environment friendly building, its price is affordable because now that the crisis is over and it is cheaper to build than the high quality buildings that were built over the last three, four, five years, entailing a significant expenditure" in China, Middle East and USA for example. Therefore, to be honest, the crisis is a good chance for

sustainability and Abu Dhabi's market is an example. One year ago (2010) if you tried to discuss the matter with any entrepreneur, producer or provider of materials the answer would always be the same: "It is difficult, I am not interested". Now, in this moment of crisis, even architects would say "Wow, being more sustainable is what we have to do, sustainability can be the standard: we change our method because we are willing to work". Until a while ago, things were different. I am not saying that there is no crisis and that everything is fine, but, from an optimistic point of view, there are advantages for sustainability today and the crisis is also an opportunity since green is not going to stop. We have to tackle climate change, this is what they say: are we able to deny the problems caused by carbon dioxide emissions to the atmosphere and that different building systems (as regards cities and buildings) are needed? The crisis is not an excuse to say: "Well, since it is not inexpensive given the crisis, I cannot stop emitting carbon dioxide". The costs of the emissions of carbon dioxide are much higher: we do not know how much future buildings will cost compared to green ones". Optimizing today's situation means allowing green to be the standard instead of the exception.

Question The key to the concept of sustainability is that, normally, buildings are practically more expensive. The integrated technology sustainable buildings are a more complex method to deal with: they are not much more expensive than average buildings but, is the public ready to choose them?

K.A. I believe that what we are talking about ought to be referred to Masdar City, namely: the first Masdar-like project will be more expensive than the second, the second will be more expensive than the third and so on. But it shall set the example, and Abu Dhabi did. As I said before, the last studies carried out by Michael Green showed that a building or a complex are less expensive to build compared to the average ones, even before the crisis, not to mention further advantages regarding productivity and health etc. This is to say that building green, even without even mentioning further advantages, beyond the construction costs, is much better since it is turning into a more competitive widespread business.

And if you ask me the price of the first green building (eight, maybe ten years ago), well it was certainly higher. The same goes for Masdar city: it is more expensive but perhaps, in ten years time, building zero emission cities will be a matter of daily practice. So, yes, it is actually more expensive today but it will be cheaper in the future. Today, considering the price we pay for carbon dioxide emissions, cities account for 40% of emissions. Building green today is expensive because it cannot rely on large volumes, there is no economy of scale. The percentage of environment friendly implementations is still very low. Another important aspect is the perception: ecology is perceived as being too expensive.

Such perception is already in the designers' minds, the **Life-Cycle Costing** is not adequately determined nor directed. The current model is not helpful for a correct control of the costs. Let's take aluminium as an example.

At the beginning, it was ruled out by the MasdarCity master plan, because it is the least energy efficient material there is: it captures heat and dissipates it. Then, two aluminium providers told us they were ready to change and to get their material from 80% recycled aluminium, which means it would have been significantly more affordable than any other material.

In this way, material becomes more affordable and we are ready to make the change. What I mean is that sometimes, finding sustainable ways can be a skilful but easy task. I am not saying this is business as usual, but there are particular cases. As I said at the beginning: the process is more important than the product. If you have the right process, then the product is competitive.

On the contrary, if the result is expensive, then people will not buy and costs will rise. Only by following the proper process and making accurate calculations can you succeed in something.

Question As for the process again, one of the reasons Masdar was awarded is that it presented a precise range of companies that produced an integrated process. In a way, this is the new way of doing things, since dealing with sustainability means dealing with a complexity that cannot be faced in a traditional manner. Could you explain the process, starting from the planning to the final development stage – which you are working on now –? Could you tell us something more about the organization of a sustainable process from the first to the final stages?

K.A. Right from the start we adopted a comprehensive approach to the project: transport, engineering, microclimate, landscape, costs administration: it was all included in the master plan. We focussed on every single part with a view on how to integrate parts with each other. In conclusion, the first step is the integrated approach to the process, which is extremely important in every aspect. If a building in construction lacks in **management** and doesn't have an **operator** dealing with it then many other important things are also missing.

The engineering company designing the project is insufficient without dialogue with the construction operators: as regards building and road construction, operators and entrepreneurs all have to take part in the planning process. Adrian Smith + Gordon Gill is carrying out an interesting study at Masdar.

For that building not only do we rely on the **facility management** and on all the actors involved from the beginning. We are also realizing that it is fundamental for all the people who work on the building to take part in the project from the start. 24 advisers and entrepreneurs are part of the planning team.

The main contractor is a large construction company from the US, Wallbridge, that has a consultancy contract with the architects. There are also large international companies, advice team and entrepreneurs, not only design companies working on the implementation of the project. Integrated project, integrated planning and integrated construction are obviously fundamental for a future sustainable design. If the contractors are called at the end, once the project has already been ideated

and designed, then it will just be a big mess. This traditional method is not suitable for sustainability. Facility management is needed to involve contractors, planners and engineers from the start. As for Masdar City, this process was implemented from the very start; it may be unfeasible to go through the very first stage with the whole lot of operators but the need to involve technical and practical operators is gradually and increasingly felt.

As a matter of fact, a successful project needs good architects and operators as well to translate theory into practice: in this way, costs are curbed from the start. An integrated approach to planning is fundamental to reduce the costs of a sustainable project.

Question Million – dollar question: Masdar and the idea that lies beneath it, generated two different reactions: on one hand, some believe that Masdar is an unique, fascinating avant garde experiment, a "lab" for the future of sustainability. On the other hand, others (perhaps sceptical about new technologies) find Masdar interesting but "weird" as the costs of its sustainability are unsustainable, so they are not sure this is the best way to pursue sustainability. In other words, there are two levels of criticism: first of all, Masdar is unlikely to succeed as it is too innovative and expensive to be accepted by the public; secondly, the project cannot be considered a zero emissions city due to the amount of carbon dioxide employed during the construction stage, thus being making it unsustainable.

You are the one who knows the real idea and process behind this huge project; I would therefore like to know your point of view regarding the two standings I just mentioned.

K.A. Ever since the very start of Masdar, we calculated the whole production of carbon dioxide (including cars, bulldozers, handling machinery) that will be compensated with "clean" energy production, which will be transferred to the electricity grid of Abu Dhabi. Many people believe this is impossible to do and have the right to believe so, in fact if it were easy many would have done it before us. But the truth is that every single ton of emitted carbon dioxide is registered. We rely on a system that calculates and selects the Carbon Dioxide used by all people who work at Masdar, including people using a bulldozer or people using other machines and even every single light switched on. For example, our 10 MW plant is going to supply energy to the grid of Abu Dhabi before the city needs it, since it will be terminated ahead of time. In this way, the entire amount of carbon dioxide produced from the start will be compensated. Moreover, the materials used are low in carbon dioxide: the emitted carbon dioxide is thus compensated by the **Carbon Credit** that is willingly bought by the producers. All the material and all the vehicles used on this site are registered and will eventually result in less carbon dioxide production than any other traditional site. Moreover, the carbon dioxide employed for the city's construction will be compensated through the energy sup-

plied from Masdar to the urban grid and through green areas and the three plant nurseries. 50% of the city's space is non-built: this green area is a huge opportunity to compensate carbon dioxide.

Now, as goes for the costs. We are not building an expensive environment, the situation has changed due to the crisis and I foresee the project will be extremely competitive in the next two or three years. We will show the project's affordability and competitiveness, which is what it was designed for, to those who don't agree with it. On the contrary, it is going to be a great success in economic terms, which is also a notably sustainable feature. We will prove that our zero emissions project includes materials, movements and the means we use to build the city too. To conclude, of course whenever something is done for the first time it is more expensive, but what will be the price to pay in ten years time if we don't carry out such a project? How much does it cost not to implement it? My answer is: "Do nothing, sit and wait". If nothing is done, what will happen? On the contrary, action gives a chance to improve. I believe that in ten years' time similar projects will be more competitive, thanks to Masdar City's experience.

Question Does a city like Masdar adopt a traditional system as regards traffic code and rules? How did you manage the introduction of a completely new city inside a traditional city from the legislative point of view and with respect to the mindset of local people?

K.A. We have to be clear: today Abu Dhabi has the highest carbon dioxide emission, water desalination, energy and concrete consumption rate per capita. Forty years ago oil transformed it into a very beautiful city, boasting modern infrastructures, quality and a beautiful landscape.

But then the issue of carbon dioxide popped up. Abu Dhabi has still more resources. What will happen in thirty years' time if Abu Dhabi has the highest rate of carbon dioxide emissions per capita? What will it look like in thirty years' time? How can it be a model for the world if it is the main pollutant?

Masdar develops from two assumptions: firstly, that Abu Dhabi is characterized by a high degree of awareness of the situation and resolve to change; secondly, Masdar City mirrors the cultural tradition of old Arab cites': narrow roads, shadowed, compact. Desert cities with these characteristics have survived for so long, like San'a in Yemen or Marrakech among others. If you know their history, you know that these cities were not equipped with air conditioners, nor with the energy supply we are used to today, nor did they have vehicles. But they were notably sophisticated. San'a, for example, was called the Invisible City and its atmosphere was truly enchanting. So, Masdar is not a mere high technological settlement: it is also a product of the roots, place history and local culture. Moreover, Abu Dhabi is aware that a continuous construction like in the other Arab settlements (Saudi Arabia or Qatar, for example) is no longer possible, without considering carbon dioxide emissions.

Business as usual (just like thirty years ago) is no longer the option. Over the last fifty years, the whole world, has been using technology to build unconventional cities as regards vehicles and energy. The buildings and means of transport of these cities produce carbon dioxide emissions. Abu Dhabi was the model of the modern city, but it was not sustainable. For this reason, Abu Dhabi is setting the example and is changing.

Question Could you tell me something about the history of Masdar? How does such a revolutionary idea generate? Where was it born? What role did you play in it?
K.A. It all started with the leadership of Abu Dhabi, when **Sheikh Zayed** died in 2004. Sheikh Zayed, founder and president of the United Arab Emirates was known for his sensitivity to environmental matters.
In 1975 Sheikh Zayed opposed the **gas flaring** policy for oil extraction (oil companies do it in many parts of the word, like Nigeria, although they brag about how eco-friendly they are on their websites. Gas that is too expensive for the final markets is flared thus causing serious risks for the environment and the people who live close to the wells. The flares can be seen from satellite. The problem is that these occurrences are rarely in the spotlight. Who knows, turn the other way and does not like to talk about it). At that time, gas flaring for oil extraction was business as usual, thus increasing Abu Dhabi's oil costs but he decided oil would not be left in the environment.

In the 70's he claimed wanting to create more green areas in Abu Dhabi but people did not believe him because they thought it was impossible to turn a desert into a green area. When he died, his son **Sheikh Khalifa bin Zayed Al Nahyan** continued his father's activity to raise Abu Dhabi's awareness about the environment and turn it into the eco-friendly leader in the area. How can an energy producer be environmentally sustainable? Significantly, Abu Dhabi is one of the major oil exporters, it has a huge oil reserve, but the global energy market is changing, thus turning Abu Dhabi into an energy, instead of oil, producer developing new forms of energy Following these ideas, Abu Dhabi's leadership decided to implement the Abu Dhabi Energy Vision that was later called Masdar, meaning "spring": source of knowledge, of clean energy, of accountability and new ideas, all very good things Abu Dhabi is planning to achieve.
Moreover, it will enhance economic diversification instead of relying on oil exclusively. This country has a deep knowledge of energy matters, due to the presence of oil, which ought to be further capitalized.
This idea popped up and the Mubadala Development Company was in charge of its development and implementation. Initially, I was part of the consultancy team working on this initiative in Abu Dhabi.

Question Masdar was further developed as a single entity. When did you decide to carry on with this innovative and extremely bold sustainable project?

K.A. Towards the end of 2004, in November, **Sheikh Zayed** died and in 2005 Mubadala started this mission and contacted the consultancy team. The preliminary studies began in April 2006 and after having analysed the situation we became aware that there was a great change taking place at a global level. In April 2006 the government of Abu Dhabi officially launched Masdar.

Question now that you are about to take off, the level is rising, you are setting a new standard: how do you reckon the Masdar model could be exported? What part of Masdar can be exported? I would not say its design, in a way. Maybe the process?
K.A. Masdar is profoundly affected by the specificity of the Abu Dhabi context. For example, the **Personal Rapid Transit PRT** ensures both a sense of privacy and a capillary distribution system in the city's fabric; at the same time we wanted to avoid excessively long walkways due to the weather conditions. Geometry, position, measures, and street network: everything is affected by the weather conditions. The PRT is a sustainable, energy efficient product which does not produce carbon dioxide emissions but it is much more too. For example, any city has to face the matter of vehicles and the problems it causes: difficulties in parking, avoiding traffic jams and car crashes. Nothing of all this is sustainable: Milan, Beirut or Abu Dhabi are just a few cities where traffic congestion has become customary. Not to mention the damage in terms of productivity, stress, rapidity and efficiency of

people's movements. The PRT, therefore, is not just a sustainable solution, in terms of energy and transport, but also in terms of a more productive **business community**. Furthermore, any urban sustainable complex ought to include an innovative part, since innovation is fruitful for generating new ideas: this is why we included the **Innovation House** in the master plan. A part of the development is **innovation**. The only way to produce **avant-garde** cities, or complexes, is by including innovation in the strategy: it has to be a must for any new development. Now, I would like to dwell on the model's export. As I said at the beginning, it is all about the process. For a developer Masdar means understanding the right process behind the development of such a masterplan, it means being backed by the right partnership, as far as technical and social aspects are concerned, not to mention the importance of research. The whole operational team developed for Masdar will be able to co-operate with governments of other cities and with other developers to change the traditional urban development and planning. Finally, the whole experiment translates into knowledge, information technology, intellectual property and **knowledge capture**. Just think that during the process we registered 16 new patents, mostly related to the northwest side of the city.

Question after having made all these remarks, having talked about the process, the thought, the energy, the good environment, the importance of the context, the environmental quality, the city has to be attractive from an aesthetic point of view.

Masdar's aesthetic aspect is unique. What will the new sustainable complexes look like in the future? What is the relation between the aesthetic appearance of Masdar and its functioning? How do you figure it out?

K.A. When this project started, the prevailing idea, in the Arabian Peninsula at least, was that a sustainable building was an ugly building. This was what people thought: a good building, highly technological, energy efficient but basically ugly, as I have seen in various countries. This problem was immediately discussed when we started working with Foster+Partner: how to build a sustainable building which is attractive from the architectural point of view? I believe that the Masdar Institute and the Masdar Headquarters, for example (the two projects were very different one from another) are two notable buildings from an aesthetic point of view. It is important for aesthetic to be a goal of sustainability as customers, designers and developers search for iconic and meaningful buildings linking their name and brand. Moreover, a sustainable complex must be able to compete with other complexes. Aesthetic relates to the local cultural context. Were it built somewhere else in the world, where the climate is different, where history is different, where cities are built in a completely different way and people's reactions are different too, Masdar City would certainly look like something else. However, the same principle would be applied anywhere: the importance of being independent in transport for people may be different, just like the public transport system, the zero carbon dioxide principle, social acceptation and everything else.

Attention to the general principles would be the same though. Aesthetic is part of the principle, it means enhancing a location making it less banal. Venice and Manhattan or Notting Hill in London are just a few examples. Foster himself gave this example several times, because the buildings are rather high, highly populated and consistent. The people who live there, however, feel as if they live in a pleasant place with a cosy atmosphere. Moreover, both Manhattan and Notting Hill boast a significant amount of green areas. Central Park in Manhattan is a completely different concept of green area, while in Notting Hill there are sparse green meadows. Again, as it is understood, the consequence is that part of the aesthetic side of a project is bound to the green areas. People in Masdar City can never be at more than one minute away from a green area, which enhances the place's attractiveness. It is not just a matter of how the building looks or the state of the road, but also the people who walk around it, who like to go for a walk. People are part of the aesthetic and style. Eventually, given the nature of our cities, technology can trigger innovation. We cooperated closely with the light consultants who tried to enhance the beauty of some key points of the city through the lighting system without provoking light pollution.

Thanks to technology, aesthetic can be much more than a simply unusual architecture. There are various ways to implement technologies and regenerate a place: a different lighting, a pleasant architecture, people who love to be in that place, pedestrians, the style of the city itself.

Delirious Energy
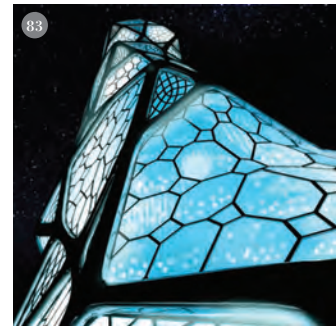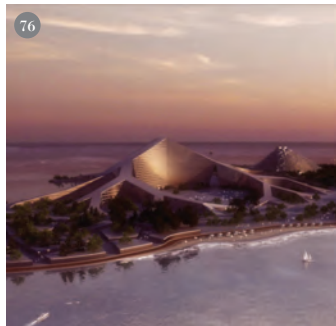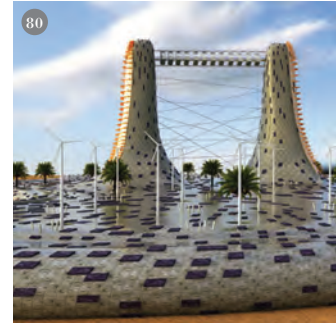
"Energy saving" seen as compatibility with the world through a possible intimate integration between construction technology and architectural thought. The willing to think, ideate, organize and design in a compatible way. Not the victory of technology. On the contrary: it is about establishing the multidisciplinary role of the project in Architecture as the union of various fields and subjects to ensure that the Architecture of saved Kilowatts remains Architecture after all. Being aware that everyone has a primary role to play if everyone is able to work for the Architectural idea. E. C.

I asked Mattias Shuller a few questions. For years he dedicated time to spreading the idea, I would say, of clever plant building for architecture, through an intensive work of project research. His studio, Transsolar, cooperated with the most important architects for a great number of projects and took part in many debates at his university course at Harvard.

Since he is committed on the field, I asked him the meaning of energy sustainability in complex projects. Then I did the same with Peter Sharrat: I asked him to share his and his company's (WPS) experience with planners from all over the world. Inevitably, among other things, they happened to talk about Masdar. Firstly, because they took part in the project; secondly because they were aware of the effects such initiative will be likely to have, either good or bad, on the project culture.

... Buildings will feel and regulate their climate through their own skin... Mathematical algorithms will convey anthropomorphic shapes, able to establish a balance inside the architectural system.

DIALOGO 5
### Energy Saving e Progettazione Integrata
MATTHIAS SCHULER

Question You work side by side with design but you also provide it with new stimulus. Firstly, I would like to know more about your relationship with architecture and how you contribute to the design phase.

M.S. As regards our role, I think it is interesting to notice that when Transsolar was founded in 1992 we were working at University and participated in an international research project promoted by IEA (International Energy Agency). It was about cooperation among 15 countries, all of which were represented by an architect and an engineer.

During these 5 research years, I learned two fundamental things. First, that the integration of sustainability into a project needs to be carried out from the very first planning stages; it cannot be added afterwards. The second lesson I learned is that communication between architects and engineers is difficult because, normally, engineers think in numbers and architects in images: this is why they do not understand each other when they speak. I learned to listen to architects, to appreciate their images, to think about how engineering could be a support for the implementation of architectural projects. Since there was no such consulting firm on the market, we had the idea to found one.

After sixteen years, our consultancy approach to architecture projects affects the shape of buildings and cities too (in the last few years, we worked mainly on urban planning). The project with Zaha Hadid for Aachen University in Germany is an example. It is a sculptural building, in Zaha Hadid's style, but what I told her
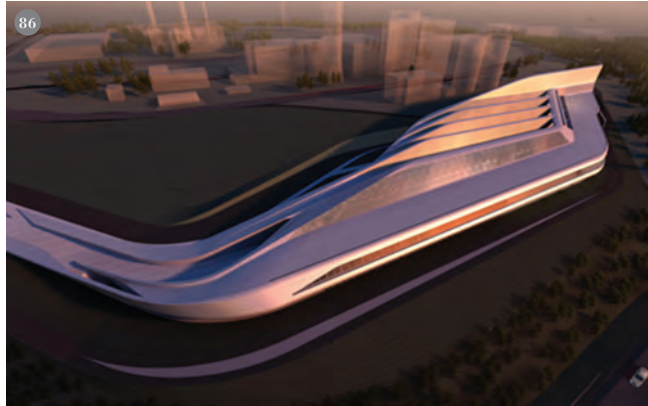
… The meaning of architecture products passes through the certainty that they react to the stimulus of their environment… Thus expressing the concept of setting.

when we met is that I wanted her "sculpture" to be meaningful in that particular place and those particular weather conditions. So it was, and people appreciate it because the "sculpture" is even stronger and meaningful.

Question what is your idea of sustainability?
M.S. Personally, I would not link the concept of sustainability to buildings but to our being on a planet with limited resources and a frail environmental balance. In a certain sense, sustainability allows us to stop doing what we have been doing for the past hundred years: upset the ancient balance of a system.
Let us just consider our daily life: the impact of buildings, traffic and lighting on the ecological footprint ranges from 30 to 50%. As planners, we can change this percentage by designing low impact buildings, which does not mean we have to go back to living in trees. The interesting difference between the European and the North American approach is now involved. While Europe strives to reduce the request, the US policy is to employ a technology which allows us to meet our needs lowering the ecological footprint as much as possible. This means to minimise the impact on the environment.

Question: Which standpoint do you agree with?
M.S. I share the European point of view, and think we should learn to be less demanding in life. Our resources and energy consumption have gradually increased

and I wonder if we are any happier than when our ecological footprint was lower. This topic was addressed in the competition "Grand Paris", in which architects had to offer their vision of Paris in 2030. Today, any Parisian needs a 45 square metre living space while, going backwards, 30 years ago they were happy with only 15. In 2030 we expect this measurement to rise to 65. This is not the right way to reach a sustainable approach. People must be asked to reduce their ecological footprint, for example, to 25 square metres. It would result in a more liveable urban space, thus recovering some of the functions that have been lost. Moreover, with less space available to store goods, people will automatically buy less.

Question in the Western world today, many talk about sustainability but not so many actually know what it is all about. In Italy, for example, much associate sustainability with luxurious villas for the rich. There are architects and engineers who do not know the relation between sustainability and green building or social housing. In other parts of the world, like Pakistan, India or China, sustainability is completely unknown; nobody cares about lowering energy consumption. Personally, I describe sustainability with five key words: mobility, landscape, functionality, energy saving and aesthetic. I would like to know your opinion about my point of view and the five key words.

M.S. First of all, I would like to say that Italy is not the only country where sustainability is normally associated with luxurious housing for the rich. Of course, people living in the poor areas of the world do not give importance to environmental matters. Sustainability is somehow associated to the rich countries, where financial wellbeing is the prerequisite to emphasise eco-friendly activities. As regards other countries you mentioned, like Pakistan, or Bangladesh, people live with a very low ecological footprint and live a sustainable (so to say) life as carbon dioxide emissions and the resource consumption are well balanced in a way. These people consume even less than what they actually could.

On the contrary, the rich countries consume much more than they could, which penalises the poor countries. Three, perhaps two, generations ago Europe too led a sustainable life when the main objective was not to be increasingly rich but to live in harmony with nature. It is true, we invented the concept of sustainability but we must admit that it already existed as a lifestyle in some past societies. The American Indians, for example, knew how to live according to the cycle of nature, which is exactly what we now call sustainability.

As regards the key words, I would start from mobility. Considering the current society's ecological footprint, mobility accounts for 30% of the total energy consumption and carbon dioxide emissions. In a densely populated area like New York, carbon dioxide emissions due to traffic account for 15% of the total carbon dioxide footprint. A smaller percentage, approximately 10%, comes from industrial production and the rest from construction. And this is why the public transport system is very popular in New York. Vehicle traffic footprint of a typical European

city accounts for 30-40% of the total energy consumption and carbon dioxide emissions. Our way of travelling has changed, we often travel by plane and we live far away from our workplace, which means we have to travel long daily distances. Mobility therefore plays a fundamental role in the organization of a sustainable life and it is significantly bound to architectural design. As regards functionality, I think it is connected to the limitation of mobility. I don't think it is a good idea to build areas with only offices or only houses. Instead of dividing spaces according to their function, they ought to be united: the quality of life would be enhanced reducing mobility.

Question Masdar mirrors the idea of a composite functionality, in terms of programs and geometry. Is the idea of overlapping various elements, in your opinion, functional? What do you think about PRT (Personal Rapid Transport) as an underground system? What is your opinion about stratification and complexity?
M.S. I totally agree with the idea of giving roads back to pedestrians, freeing them from traffic. As for Masdar's stratification, I would say it is not a matter of underground or not: what is true is that traffic does not enhance the quality of life at all. Ideally, mobility ought to be linked to pedestrians. Walking in Abu Dhabi is difficult: we would have to walk on a 75 metre wide road, totally exposed to the sun and packed with cars only. Masdar also has business areas and residential areas but mixing them together would be good.

Question Now I will dwell on sustainable energy and your idea of technology for construction in the future. I am asking you a single remark on energy, landscape and aesthetic, just to outline your idea of new urban landscape.
M.S. energy efficiency affects the shape of buildings; many architects consider it a limit. It is important they understand that energy efficiency is not a limit to freedom in architecture; on the contrary, it leads architecture in the direction of respect for the environment. Moreover, technology is not the only solution to save energy. Indeed, new technologies can be developed for enhancing mobility and the efficiency of heating systems, but coming to terms with energy consumption is unavoidable. The buildings and the cities in which we live have to be so pleasant that the need to live in a comfortable urban environment is overshadowed. In other words, beauty and functionality of the place we live in makes up for the minor availability of ecological footprint; living in a qualitatively more attractive environment can lead us to accept a smaller space. All things considered, a sustainable lifestyle is based on a re-evaluation of our current standards, which is linked to the quality of life, which in turn is linked to architecture. A future city employing technology to reduce the demand of services but, at the same time, offering such a high quality of life that is able to compensate less mobility and space: this is my idea to avoid feeling uncomfortable about mobility and space availability (compared to the current). Being happy with less, so to say: the quality of urban space and buildings is so high that we do not feel the need to go elsewhere.

DIALOGO 6
One Planet Living
PETER SHARRATT

Question First of all, I would like to illustrate the idea behind this book. The idea was born a few years ago when I was working on an important project in the United Arab Emirates to study a zero-emission city prototype. I am aware that the idea of sustainability we have in Europe and Italy is different from what sustainability really is. In Italy, for example, many architects and engineers use it as a trendy term: they consider sustainability itself a trend, failing to grasp what it really is. I find it pointless to talk about sustainability in abstract terms. On the contrary, it is important to keep in mind that a successful project is all about sustainability and needs some key words.

When we approach a new project, we study sustainability in terms of mobility, landscape, energy and functionality and eventually – we are architects after all – all these realms should follow a common path: aesthetic sustainability. Aesthetic is architecture's final result (I am referring to the philosophical concept of aesthetic sustainability, and am not simply talking about whether something is attractive or not). I believe architects and engineers who have a significant culture about sustainability-related topics would create a sustainable product – be it a building, a vehicle, a city, whatever.

The idea behind this book is to collect the experiences of people who carry out a leading work in the field of sustainability and who are constantly concerned with the issue. We can only identify the right way to achieve sustainability by working on it and trying to solve the problems that creep up along the way. To me, the first

A complex system is the sum of simple events... A sustainable project invents their ability to coexist.

key word should be energy sustainability, but I would like you to speak about your own idea of energy and sustainability and the other key words: aesthetic, functionality, landscape and mobility.

P.S. I agree with you about sustainability meaning very little for some people. One of our main efforts is to explain the possible alternative to the current situation to reach a sustainable solution. In other words, what has to be substituted in the current processes, knowledge and understanding to obtain a sustainable final result. This is likely to be one of the most complex aspects. We can in fact study and understand technology. The real problem is human behaviour and being able to understand how things are managed and administrated, and we have come across this in many projects.

According to an old saying: "the road to hell is paved with good intentions." Then why is it so difficult to make a change even when everybody in the world keep saying they want to change and do things differently? It seems a big obstacle to sustainability to me. Before answering the question, I will step backwards to describe my involvement in projects that range from architecture to engineering and the work I do in the field of government regulations and sustainability policies. Currently, we are drafting the new sustainability regulations for Dubai; we have already worked on the environmental code for Saudi Arabia and we are organizing training programmes. We also work on strategies for adapting to climate change in cities – Johannesburg is one of them.

Question Could you explain what adapting strategies are?

P.S. Our climate is changing. Everyone is talking about carbon dioxide but this is just a part of the issue. The other part is that the planet is warming, our buildings are already affected by this and the situation is likely to worsen in the next ten or twenty years, notwithstanding the governmental actions. This is the real impact of climate on our building environment and urban shape.

Question so what you do is suggest actions aimed at adapting cities to climate change?

P.S. Yes, exactly. We develop urban cooling strategies. Dubai needs an urban cooling strategy combining a special urban planning, an architectural project, a transport system, a certain amount of plants, an area to control the effect of trees on the microclimate, a method to tackle heat released by industries and air conditioners. Currently, these plants release heat from inside the building into the atmosphere, thus making it really too hot for walking. People end up using cars and the city is "unwalkable" 24 hours a day. Thermal islands and warming are tangible problems. So, let's get back to the simple concept we used to explain sustainability: the programme called **One Planet Living**.

Everybody understands that we only have one planet with a certain amount of people populating it. In order to maintain the current lifestyle in Europe, we would need the resources of three planets. In other parts of the world, people live as if there were six, seven or even eight planets while our development economics work as if there were two or three and this is a problem. This is simply a model of the global context that everyone can understand. To get a response to our projects, we show people how our setting will look like and what will have to be done when the earth's resources will be equally distributed.

I am sure people understand this simple message but as we move forward an action programme becomes more complex. There are numberless implications in this field; I will only mention the inconsistency of the demands of contractors, organizations requesting solutions, people who manage capitals and of those who decide the specific techniques. And, in a way, the planning professionals, architects and engineers, tend to give clients what they ask for.

Therefore, if customers do not ask for sustainable building solutions, transport means and so on...then they will not be given them. Those who are in control of the supply and the contractual procedures need to be more deeply educated. Over the last three years in the UK we witnessed the birth of the so called "sustainability consultant". People are confused about what it is about. We reached the point to stop using the word "sustainability" in meetings because we were fed up with people asking us what it meant. After a while, we dropped it. However now it seems that the market has become aware of the need to be supported by a professional, a person in the team who masters the various interfaces, like sustainability and sustainable solutions and knows all about managing the interdisciplinary con-

nections between various aspects. The UK is discussing this, but an institute for sustainability planners would be needed, or something of the kind, as the guide of a single architect, engineer, economist or whoever else is insufficient. So now we reach the core of the issue: what stage are we at with the professionals? We successfully established our design institutes. Italy is different, I believe it is a model for the whole world. You have a common preparatory course in Architecture, right? Architecture is the preparatory course for those who will then study engineering, design and so on, right?

Comment well...not exactly
P.S. You do not realize how rare it is. It does not happen anywhere else. Architects are well trained as they can imagine the result as a whole, a building for example, once finalized. The more I go on in my professional life, the more surprised I am of how rare this forma mentis is. An army of people I would call "specialized generalists" today are able to employ technical knowledge for the right purpose offering creative solutions at a global level. This is what the academic and training world should focus on.
I realized this when I received a grant for attending a course organized by the Arab Foundation in the United Kingdom, known as IDBE (Interdisciplinary Design for the Built Environment). It dates back to 1992 and was the first course of that kind in the UK, as well as one of the most important courses on how professional planners

interact to provide better strategies for our built environment. This partly explains why I am in the WSP, since it does not deal with architecture and why I am in the Global Sustainability Climate Change and Energy Services being an architect, a trained planner. To me, interdisciplinarity is the future; the dividing line between engineering, technology, science, ecology, biology, sociology, architecture, transport system, infrastructures and so on should be less stressed.

Question could you briefly explain how you manage to assess the impact on the planet and therefore decide how to mitigate it?
P.S. How we assess the impact? Well, the first simple tool is **Global Footprinting**. We are part of the Global Footprint Network founded, among others, by Mathis Wackernagel, who we cooperate with.
The system sums up the total amount of soil available on the planet and divides it into various categories (oceans for fish production, proteins for carbon dioxide absorption, biologically productive soil for crops and agriculture, soil for forest areas or for timber and construction supply, urban soil and housing etc.). Beyond these categories, a piece of soil is assigned, proportionally, to the number of people on the planet. So, if the global population amounts to 2 billion people, each human being has two global hectares, corresponding to the fair piece of soil on the planet to cater for their needs. We assessed the ecological footprint of London and issued a study according to which Londoners need 6 global hectares each, three

times more than the fair piece of planet. This led us to state that if everyone lived the lifestyle of the average European we would need 3 planets. This ecological assessment is extremely simple and many international organizations, such as the World Bank, are developing national assessment systems related to their ecological footprint for a strategic planning of their cities. The **Human Development Index** (HDI) is another aspect. It combines various networks (life expectancy, health and education, medical attention, toxicity and so on).

Each country's graph links the amount of resource consumption (from the ecological footprint point of view) with the HDI. Usually, low-income countries have a low Ecological Footprint as they are less technologically advanced, and an equally low HDI. Usually, these are poor countries, like Bangladesh or some parts of South America. Naturally, following the ascending pattern of the graph, at the top right you see the developed economies (North America and the Middle East for example) with an ecological footprint just as high as the HDI.

Therefore, the goal of the strategic planning for economies aims at maintaining their HDI just as high but at lowering their ecological impact according to One Planet Living principles. Quite simply, this is an analysis of the global situation. Those at the bottom of the scale want to achieve a higher HDI and the wealth we enjoy. The way to achieve this goal would be to use the same technologies and processes we already adopt. However, this means that we will also be facing an increase in damages and deterioration of the environment.

The challenge between different economies in international negotiations on climate change in fundamental in this respect: weaker economies aspire to the level of development we currently enjoy (which is a right that cannot be denied); all the same, if they were to achieve our level of development, this would have devastating effects on the environment.

On the other hand, we are unable to change since European cities, for example, were built centuries ago and have very old infrastructures: London has the world's oldest underground and the oldest sewage network; its model of urban development was created over the centuries.

Because London has this fixed system of infrastructures, it is extremely difficult now to step backwards to turn it into a sustainable city. It is not easy to change Europe and our economies: the costs of doing so would be incredibly high.

This is what makes Masdar an interesting project; it is a huge lab where one can learn to shape to the city of the future and to build settlements that meet One Planet Living model's requirements. In **Masdar** we develop processes for implementing sustainability. However, the main problem regards the relationhip between Masdar and existing cities. Each year in Europe we build only 2% of new buildings; 98% of buildings in the United Kingdom and Northern Europe were most likely constructed more than sixty years ago.

The question is therefore: what are we to do with existing cities? So it's not just about dealing with the important though relatively limited impact of the new gen-

eration of buildings. For this reason it is difficult and expensive to implement global sustainability in pre-existing buildings. The analyses we have carried out demonstrate the tangible possibility of obtaining a reduction between 40 and 60% in the current outlay of energy in the majority of existing structures. However, once we have implemented these measures and improved the buildings we are faced with the question of what to do next, and how to save the remaining 40 to 50% of energy and realize a comprehensive sustainability.

The answer is that, most likely, we will have gone over the limits that buildings can support and we will thus have to intervene to modify the systems that support our cities. At the moment we have a product known as **Sustainable Urban Systems**, through which the buildings can interface with centralized services for the distribution of energy and waste disposal... Moreover, it establishes that it is cheaper to tackle the problem of clean energy, and of ecological heating and cooling systems, in a centralized manner, rather than make each single building self-sufficient in terms of energy resources.

At the moment we are still studying how to distribute these supplying systems in the urban fabric and above all how to render them acceptable, since no one wants to live next to a municipal waste dump or a water filtration plant. However, while our cities grow by adopting a plan for sustainable development, urban spaces, shapes and patterns should also be found to integrate these facilities within our communities.

We have developed a very interesting project with Pacific Gas and Electric, in California, which demonstrates how this kind of integration can be implemented within a local community. We also carried out a project in San Francisco that shows how to integrate these facilities in public spaces. Heidelberg presents one of the most advanced models in Europe: its energy renewal system and urban waste disposal system show a high level of integration. We are currently participating in a competition for Helsinki that deals with the same issues.

I believe that the focus on these topics is shifting from the single building to concentrate on peripheries and segments of the city. Of course the next step will be to reconsider the entire city as a system. A fundamental aspect of our analysis deals with **mobility**, which is one of the most controversial aspects of development and planning, though Masdar City's shape is based on mobility. **From the moment we decide to remove vehicles from the streets and return them to people, – Italy is home to a well-known model of medieval city, built for people and not for transport – we will gain a profound intimacy within the city, a profound civic involvement and exchange of ideas**.

As such, Masdar has automobiles running underground, so that the streets can be narrower, which enhances human interaction. After doing this we were able to return to a traditional form of architecture, the design of which depends on climate, among other things. There are narrow streets, so that buildings overshadow one another and it is possible to walk in the shade at almost any hour of the day.

This in turn allows the use of photovoltaic systems and the creation of localized microclimates, so that people can walk comfortably through the city most of the year. **All of this began as a reconsideration of mobility, of urban form and design**.

Question Could you better explain how you are structuring the regulations for Dubai? Do these regulations reflect your vision for a future city or, better yet, how would you like to see the city of the future?
P.S. As regards the rules of construction, I believe that the greatest challenge to the organization of these systems is that, in general, we tend to obtain global standards. International consultants tend to apply, indistinctly everywhere in the world, the same energy and building standards established by the American company **ASHRAE**.
An example is the **thermocomfort standard**: very often we want to control temperature and the level of humidity in the same way for almost any type of building. However, this approach does not acknowledge the contribution that human biology can offer, adapting itself to different climatic conditions. What we tend to obtain is a resemblance between buildings around the globe, as if all of them were to adopt the same standards. Today we tend to standardize the criteria designed to define sustainability, and this is why we do not achieve great results. In fact, we cannot help but acknowledge that there are profound differences in microclimates of different countries; California presents different climatic zones;

building in Scandinavia is very different from building in the Middle East. In my opinion, we must privilege an approach to architecture that is differentiated by climatic regions. Very often the way to understand how to do this depends on how cities have developed and how architecture developed in the past. This discussion is somehow aligned with rules of sustainability that we have studied for Dubai. We analysed all the systems for classifying sustainability that exist in the world; there are a staggering 298, the most well known of which are a group of four or five (including LEED and CASBEE).
We compared them to the climatic characteristics in Dubai, using Singapore as the benchmark for the similarity of its situation to Dubai's. What is more, the code of rules for sustainability in Singapore allowed the inclusion of an evaluation system to respect the rules themselves. In other words, the majority of the models of regulating sustainability in the United Kingdom and in other parts of the world are voluntary. Architects adopt them because they want to appear sustainable, but only rarely are there any legislative impositions that establish the achievement of sustainability standards. This situation is gradually changing; in the United Kingdom we have a restriction on the urban planning system that means one can only acquire a building permit if a certain number of points based on the classification system is accrued. However, Singapore appeared to be the first model of convergence between the classification system and sustainability rules. I reiterate that our building regulations and our energy laws precede the concept of sustainability.

London's building regulations date back to 1903 and regulate safety, hygiene, structural integrity and so on; they have nothing to do with the modern-day challenge of sustainability. This is why we have a parallel system of environmental evaluation, applied in addition to these laws. The Dubai code was created to introduce sustainability within a system of laws, in order to make it legally binding.

While creating these rules, we endeavoured to avoid contrary results. For example, a certain percentage of recycled materials in a building was imported because they were not available in loco and this was consistent with an imposed evaluation system. This involves spending a great amount of money to satisfy sustainability requirements.

The main prerequisite of the rules of sustainability is, in my opinion, the connection between the project, its functional use and the observation of its efficiency. As architects, we design a building, obtaining the necessary certifications, and once we hand it over to a client we are no longer concerned about it. In this way, the doubt remains as to whether the building is used according to the rules of energy efficiency and sustainability it was based on. The European Union has recently made a step forward towards what we call **Life Cycle Reporting**.

It entails that the prerequisites for energy performance certifications are now a European Directive for construction. Namely, all buildings must have an energy and carbon dioxide certificate; there is no specification about the performance of the building, but only an indication that it must have this certificate.

What we are doing is creating a relationship between the rules and the next stage: the mandatory divulgation of energy performance. This is the second stage of implementation of the sustainability code, which includes a process of continuous certification for buildings. If it is achieved, it will allow us to conclude the lifecycle of sustainable buildings, spreading awareness throughout the market: for example, people will begin to wonder how much energy a building consumes. The idea of connecting the design, the functioning and the certification stages underlies the rules of sustainability.

Another issue to be addressed is how to maintain a cool city in a hot climate, and there is much talk about the use of water in landscape architecture, which may affect the urban thermal island.

We suggested the adoption of a system of cultivations and regulate regulation of the amount of water used for irrigation. Certainly, one of the main features of the weather in the Middle East is the high level of humidity, which entails a greater difficulty in the design of sustainable buildings; however, there is a fundamental bond between energy production and desalinization. Thus, in the Middle East the production of water and energy go hand in hand since the waste heat deriving from the process of combustion that generates electricity and produces water can be captured. As a consequence, basins for water and electricity production are connected in the urban plan. Part of the studies that we have carried out have to do with the consequences of the rules of sustainability on the intensity of resources

in Dubai and the evaluation of construction material with reference to the climate (for instance the amount of glass on windows and wall isolation).
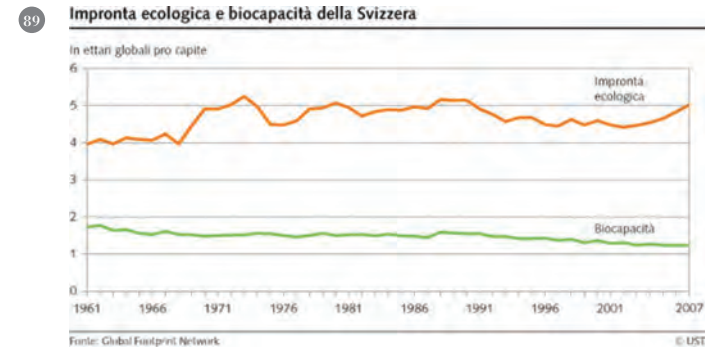
We mostly focused on how code requirements can be met. There are in fact two ways: the first way is a basic compliance with the standards of sustainability. The second is an alternative approach that we offer in the code, a method of evaluating the performance of an existing old building. It consists of the creation of a notional model of building and of the assessment of its impacts. If the overall performance of the building is below a certain threshold, then one has total freedom to do what he wishes (for example, one can add more glass as long as designers prove that they will not employ more energy to cool the building).

To sum up, rules have been conceived to avoid contrary results; to tie the lifecycle of a building not only to its design but also to is operativity and certification. But also to tackle carbon dioxide emissions as a standard for performance other than consumption of water and energy and, finally, to foster creativity in the design stage. The areas that still constitute a challenge for the system of classifying sustainability are generally related to social and economic effects, for example air quality, public health and **ecovitality**. Ecovitality is not used to assess the level of pollution, but rather to establish how we can improve vitality/longevity by measuring, for example, the level of oxygen rather than the level of pollutants. Many social problems are better addressed within the urban planning process, rather than in the building code; as a result, one must be aware that the building code is

not enough alone, but it has to be part of a widespread programme of sustainability planning. At least in relation to the rules of sustainability developed for Dubai. I strongly believe that the road to the future lies in the intelligence of the past. Complex urban structures and city-states existed a long time before technology and all other devices of modern life. Thanks to the experience of cities of the past we can learn to deal with climate, use locally available materials, develop a well balanced food production, closer to our consumption levels, and so on. While we were measuring the ecological footprint in London we imagined a model of London in 2025 to observe what it would look like after having reduced its ecological footprint. Looking at the past, major resemblances were with 16th century London, when the river was the main means of transport, buildings were highly porous, food was grown locally and people travelled on foot, etc. I believe that the future city will rediscover many aspects of the modus vivendi of the past. One of the sectors with the greatest impact on the reduction of London's ecological footprint is food production, not as far as the well known **food miles** are concerned, but as regards the energy expenditure related to treatment, conservation and freezing of food. Strategies for reducing London's ecological footprint consist of its consideration as a matter of public health, rather than a logistic problem. The calorie intake of London citizens ought to decrease from 3,000 to 2,200 calories per day: once this has been sorted out, with the appropriate food education, the city's ecological footprint could be notably reduced as it would result in a completely new approach

to nutrition. This also shows that using a different assessment system allows to find different answers to the correct solution. Instead of thinking about food in the strictest sense of the term, we considered food in terms of energy, calories and public health. When we use the **One Planet Living** assessment system – the global hectare, the ecological footprint – and finally face the issue of carbon dioxide, then new solutions to old problems are found. For example, as part of project I developed with BAA for Satellite 3 at Stansted Airport, we endeavoured to reduce carbon dioxide emissions by 20% without increasing costs. The first designer opted for high insulating glass but – in terms of CO_2 emissions – I found that insulating glass was perfect in the winter for its very low heat loss and that summer cooling was higher than winter heating. This is because heating was provided by methane gas and cooling was powered by electricity. By studying CO_2 to evaluate the building's performance, we ended up saving on glass as its performance is too high on the outside. The final result was a reduction in costs and CO_2. In conclusion, if we look at cities using different assessment methods, we find new solutions.

Impronta ecologica e biocapacità della Svizzera

In ettari globali pro capite

Impronta ecologica

Biocapacità

Fonte: Global Footprint Network

Swiss ecological footprint is four times higher than its biocapacity
Currently, it measures 5 global hectares per person, while the country's biocapacity amounts to 1,2 global hectares per person.

Delirious Green
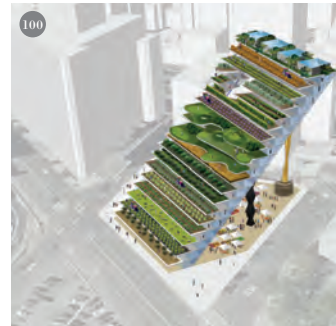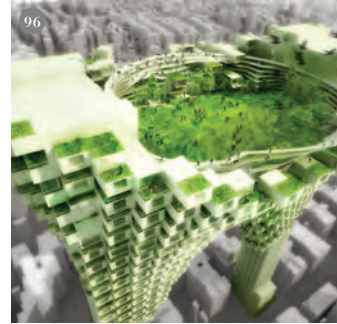
"**Landscape**" is always the final result – inventing it again and again. It means applying the acquired knowledge to combine, overlap, match, align and cross things in a new context, the features of which are unexpected, simulating the modern. The design strategy influences choices in a complicated balance between compositional alchemies, legal obligations and structured engineering. Landscape Design is the interesting result of a thick and rapid growth. Experimentation leads to creative endeavour just as desire forces knowledge. As a concept green reflects the common image of landscape. Green is part of a creative game that can end with a different colour. E.C.

CONVERSATION 7
On Sustainability (... of the sustainable landscape)
JOAO NUNES FERREIRA

....

Everybody is talking about sustainability, in many fields of human activity. Words come from a sort of warehouse of all the appropriate words that, suddenly, face trivialization becoming common expressions in people's everyday conversations. They represent the community of the people who use them just like a birthmark. Words, overwhelming everyday life, reveal people's anxieties, their beliefs, fears, ambitions and collective desires. They are the result of the generalisation of a few ideas that, thanks to the power of social communication, become widely accepted and shared by the mass; facts, or phenomena, which do not require any confirmation, do not require a "truth". They are accepted as a benchmark or as a collective truth and lie within the communities that dictate moral behavioural rules. The same occurred in the past but only locally (in a region or a country for example), thus highlighting a different timing, with smaller contexts and communication processes that were limited in space. The word "**sustainability**" has a clear and unmistakable meaning. The Modern Dictionary of Portuguese links sustainability to the words support or supportable, which mean: **to support from below, to support, to hold up; conserve, protect, maintain, hold on to; nurture, feed, make, exist, to keep alive, to maintain the life of; to be responsible for, to bear the costs, to take care, to be concerned about; to maintain a certain position, to balance; to feed, to exist, to live.** *The meanings of the word sustainability, derived from the first are: what can be supported, maintained or defended.* Regardless of semantics, we will stick to the following meanings of sustainability: *a capacity for self-support, to conserve, to uphold, to exist, to self-balance, and to nurture and to exist.*

… You can touch landscape and change it forever… You can build on landscape making it the actor of an era…

ADD OTHERS
The whole amount of meanings emerged after the modern interest in the field re-proposes and re-dimensions the concept, getting rid of meanings that were traditionally linked with life and life sustenance, to include matters that are clearly linked with collective existence and the survival of our community. Such meanings relate to one another through a number of techniques and problems that must be solved when it comes to sustainability in public areas and environmental provisions. These may include pursuing the smallest ecological footprint possible in design and construction, or trying to maximise the use of natural resources. In its widest perspective, sustainability is about the non decapitalization of irreplaceable capitals and the assessment of transformations at a global level taking the final consequences and impacts of a gesture into account. On a wider scale, it is about raising awareness on the fact that we only have one planet that works like a network, which is why acting at the local level causes bigger consequences (as regards space limits) and promoting responsibility towards future generations (as for time limits) regarding the signs and levels of compromises. One of the main dangers of this word and its trivialization is that it suggests something that can be well sustained, a statute of perfection without an ecological footprint, without collective resource decapitalization, without negative consequences and, moreover, highly efficient, mainly in economic terms. This almost corresponds to a utopia: something impractical that, as such, justifies the attitude of being satisfied

with little and ends up justifying the continuation of the situation intended with the word, without myths. Beyond this, it is in our interest to ensure that, when the future of the world is at stake, this word does not turn into an argumentative cliché, an inaccurate adjective describing projects and spaces which is used as a compensation for other lacking features. We must make sure that this term is a moral guide instead of being the ethics of a design method that should pursue different qualities now and forever. **Applied to the field of the Planning, Design and Realisation of Parks and Public Urban Spaces, this word represents a concept related to the capacity of these spaces to maintain themselves over time. This consideration immediately proposes a reflection: the resources that a community is willing to sacrifice to ensure its existence, and the continuity of the physical presence of a given space or architectural object depend on the esteem, love and regard that the community feels for the object/space**. We speak about continuity of the physical presence because life is referred to as a symbol and not as the persistence of its meaning, or its persistence as a symbol.

The life of a space or of an architectural object may be physically protected through a radical change of its meaning: churches turning into leisure centres, monasteries turning into residential or touristic mansions, our moles passing from industrial areas to free and open spaces for public entertainment. The love of a community for a space is revealed and becomes operative again by guaranteeing the continuity of spatial sustainability through the attribution of different meanings, each

of which re-adapt the physical body of the object to meet the new requirements that justify it. A collective admiration that shows a profound relation between people and sites but which is exhausted in this change, without contributing to the possible orientation of design development. In this way, besides being an asset for a community given the reduction of costs and resources inherent to the maintenance and conservation of these spaces (and we are not only referring to economic resources, but also to any resource that could be more or less remotely assessed in economic terms and which corresponds to another pattern of values mainly focusing on environmental impact reduction and, consequently, ecological footprint reduction), it is clear that the emotional relation between community and space is responsible of its support over time and assures that efforts are made to contrast the entropic deterioration of the space's organisational structure.

Such remarks could actually go beyond the realm of Landscape Architecture since it is applied to the relationship between Communities and architectural objects, it shifts the issue of sustainability from its moral aspect (unbearable to some) to a pragmatic dimension as a mean to passionately endeavour against the loss of a loved object. Such impetus will be regarded by everyone as deeply motivating; on the one hand, its realization is more affordable and, on the other hand, it does not affect other economies or environments. After all, the strategies for contradicting this entropic deterioration are not the same for an architectural object or for products related to the specific field of Landscape Architecture.

The first case is limited to the use of inert matter whose functioning, as relates to time, is exclusively driven by patterns of continuous, inexorable and irreversible loss of organization. A little bit like a stone which will become sand, being the time for this transformation only dependant on the intensity of the meteorological phenomena's activity, the available resources for expanding the existence of the object are to be found in approaches to the durability of materials and the stability of the relations proposed between the construction elements. The capacity of material to stand the test of time determines the duration of the architectural object, without complementary strategies. Duration and durability are related not only by a simple pun on words. In objective terms, stone lasts longer than clay bricks or wood, though in some cases the excellence of the fabricator, the intelligent organization of materials, or circumstances of conservation invert this evident relationship, thus confirming the hierarchy resulting from the analysis of material and building costs and values. As regards the products of Landscape Architecture, generally speaking of landscapes as opposed and similar to the so-called architectural objects, given or built (we will come to this later) speaking of objects in Landscape Architecture will be pointless.

The strategy used will have to be different considering that the materials employed, alive by definition, relate to time in a different manner and their characteristics as "building materials" include special strategies to resist in time, the specific strategies of living entities. In this curious world, life energy supports the capacity to resist, even of the most fragile things, imprinting cycles of renewal, successive phases of reconstruction, and the automatic incorporation of energy that actively contrast the growing entropy to which all inert materials are subject. Therefore, survival strategies don't involve the simple conservation over time of the durability of the materials, but deal with the cooperation with the autonomous existence of the elements constituting the space.

The relationship between Landscape Architecture and sustainability in some aspects of their activity, such as the design of green areas, parks and gardens or urban spaces, is a special relationship as a matter of fact. On one hand, its working objects, its strong conceptual motivation, are – as we will see – the production of artificial systems balanced by inputs of energy, data, etc., which constitute the peak of the art and thus the possibility of achieving it with scarce resources. On the other hand, the crucial challenge of art is precisely the artifice, the breakdown of contextual logics in environmental terms, the production of conflict and surprise through the juxtaposition of elements of different environments, and diverse necessities. This means that, if on one hand sustainability is inherent to Landscape Architecture, if the minimization of the inherent resources may be considered a technical matter, on the other hand going beyond the reasonable limits and the strong eagerness to obtain the highly unproven or naturally feasible are part of the same technical challenge. Such matters are vital and linked with the professional realm of Landscape Architecture and to another professional realm, ethi-

cally opposed: what we would call "gardening", without any prejudice. The first reason determining the curiosity of such relationship is the economy of resources, both in the construction and maintenance stages. This ensures the cancellation of those projects that require uncontrollable maintenance resources to respond to the forces and loads they must support. Not to talk about the ones that require millions to look attractive and popular instead of forgotten, empty and abandoned. Before dwelling on another topic, I would like to make a few remarks on what a project of Landscape architecture really is.

The architect's intervention, notwithstanding the large amount of examples, demonstrations and demagoguism that we can observe in the brief history of this young profession in the work of those who try to link the professional practice of well-known activities with art or is capriciously resolved to leave a personal mark or manipulate the formal configuration of the world, is driven by the need to re-establish equilibriums, to re-design relations whose dynamic stability was threatened by a significant change (at environmental or policy level for example, or implemented by the actors, the builders of landscape).

We will now examine the abstract example of an inhabited area that exists prosperously in equilibrium with the weather and geological conditions that affect the basic survival needs of its residents: animals and vegetal elements. These constitute a complex system of various interdependencies, described by Ecology through a number of approximations to a scientific approach.

Such balance is dynamic as far as equilibrium conditions are variable over time – the cyclical variations in the amount of predators and prey characterising the relation between rabbits and foxes is an example: and the system, through more or less profound alterations to the relationship between its elements, is capable, of adapting to the new conditions. If, due to anthropic appropriation (the political decision to attribute a programmatic use to a territory that differs from the condition of non-use that determines the situation of initial equilibrium described above is an example) or due to a sudden change in the conditions of the system for natural causes – a volcanic eruption, for example – the changes in the system's conditions of collective existence exceed the average cyclic variation that, over a considerable period of time, ensure its harmony and equilibrium. Likewise, the mechanisms of the self-conservation system ensure the re-positioning of the equilibrium, with major or minor alterations to the original composition. This is only productive when the alterations are experienced as an increase in available resources or water resources, therefore changing the system with respect to its initial state but improving its primary productivity and diversity.

On the contrary, when the alterations correspond to a decrease in resources, or an increase in the selectivity due to aquifers' over exploration or to a reverse climate change with respect to the ones previously described, the state of equilibrium is recovered through an alteration, namely a more or less profound reduction in the productivity and diversity of the system.

It means that the spontaneous automatic replacement system is a sort of poor relative of the original system, corresponding to its reduction and simplification. A reductive alteration that, though highly frequent, is considered unproven by the majority of the less well informed observers and results from an increase in the load acting on a system due to a change in the use of the territory.

The newly installed system, balanced for loading conditions that correspond to its original use, tries to adapt to it when exposed to new functions. The difference in the inherent load on both uses is clear– before and after the functional change, and an increase in loading is experimented after the alteration as occurs when a rural function is replaced with an urban one with all the consequent dimensional changes. Of course, the system reacts by simplifying and eliminating the most susceptible elements such as those communities and species with a minor load bearing capacity.

On the other hand, other species with an elevated load bearing capacity will benefit from the change, as for example ruderal vegetation (whose primary productivity is low). Therefore, the system's productivity and diversity are bound to decrease. Before dealing with images, architectural models, architecture or design, landscape architects have the ethical obligation to ensure that the territory's functional changes correspond with productive transformations related to primary productivity and diversity (home to life, always associated with mankind, as the human being's very nature is to change: due to his physical weakness and defensive (in)

capabilities, the human being was forced to change the world). Notwithstanding our necessities and beliefs, they have to make sure that the world we leave behind is not the same we found initially, as our ancestors left it, but they must also be sure it is not poorer, more ravaged or generally worse. We often hear distinguished opinions bearing signatures of responsibility according to which a new intervention can be juxtaposed to the pre-existing landscape.

This suggests an overlapping of a moment in the landscape modified in the very moment that precedes it, as if two different moments in time could co-exist simultaneously...

Presumably, the consequences of overlapping a new use to an abandoned territory thus ensuring a state of equilibrium with the prior loading conditions are regressive consequences where the pre-existing different plants are replaced with ruderal plants: thistles with a significant loading capacity (thistles are indicators of grass' over exploration) increasing the loss in primary productivity and decreasing the amount of vegetation, with negative consequences on all the levels of the ecosystem. Given the issue, we could listen to the advocates of the simplistic overlapping, naively backed by metaphors about landscape and nature as if they were the same, or as if landscape were just a background for urban or architectural transformations. Other stands support the aesthetic value of thistles, as if marketing for the rehabilitation of thistles as a trendy plant could solve the problem. Luckily, the issue is more complicated than merely appreciating a cladding as if it were wallpaper or a carpet.

The issue is, I repeat, ethical and regards the impossibility to admit that a transformation intervention equals a reduction in the productivity and diversity of a territory. The effort is to recreate a system which is able to replace the existing one with a greater loading capacity to ensure that the alteration in use will not negatively affect the world and the future.

The issue of elevating the system's loading capacity is, again, fundamental for the intervention. However, the aim to replace the existing system or to succeed by any means to increase its loading capacity, has to be precisely explained so as to avoid its misunderstanding as elimination and replacement for something: it is not a tabula rasa of what already exists but a constructive attitude.

The relationship between territory and the hosting system does not equal the relationship between container and contained, considering that they fundamentally depend on each other. Therefore, what we call "replacement" is actually a more complex process, deserving an in-depth debate, key to our understanding of landscape: what it is and how it is determined by the relationship between mankind and the environment over time.

As we will shall see later, the relationship between mankind and the means is marked by the need to transform it according to the survival needs of mankind or to the beliefs (regarding such needs) of the group with a dominant position in a human community. Such transformation, not only materialised through the signs that have juxtaposed as continuous physical alteration over ages of interferences, but also in an image, received or desired, in the conceptualization of a bundle of ideas to describe, represent, understand, discuss, propose, change the world: such transformation determines the position of man in the world, from the inborn fragile condition of a species which is able to skilfully carry out any physical effort to the condition of selfish and, sometimes, absurd dominator.

The tools and techniques we learn allow us to abandon the passive attitude of acceptance when faced with the design of Nature and to establish an alternative, that we control. In this way, we are in control of Fire, Water, Earth and Air, benefiting from them for our survival and comfort, we marshal them to our own ends, avoiding that the variety of their shapes and manifestations damages our species' community. We also learn to store them, manage them in time, confine their potential to create and destroy.

The territory we transform not only inherently includes sufficient determinations for conditioning the definitive form of the system's conditions of life that it puts up with at any moment as if it were its DNA or the collection of definitions they will condition: it will affect all the events and transformation possibilities since it contains the signs of the past transformations in its very DNA.

The process is cumulative and includes: further records, various moments of the relationship between mankind and the territory, different beliefs regarding such relationship. Having made these considerations, we ought to start speaking about landscape, rather than territory.

Landscape as a territory which has been, over time, codified by the signs of its physical formation, by the transformations deriving from exposure to natural weather conditions, by the life that inhabited and sustained it and, finally, by mankind with its anxieties, desires and resolve to transform the world into a world it is able to inhabit Therefore, landscape as the juxtaposition of further territories marked by Man during their appropriation over time and of the territories of the other communities that coexisted with him; landscape as the idea received from the perceptions of these signs, representation of such a complex reality at individual or collective level. We shall think, for example, about the signs that are typical of the contemporary Man, cars: simultaneously solution and problem to our lives since the 1930s and the changes of which are clearly recorded. How cars went from being the solution to being the problem, differences in the public attitude towards its use and towards the generalization of its use as a solution versus, for example, the carriage.

Or, again, it is interesting to note the form according to which any sign overlaps previous ones, like a motorway that overlaps the territory: different, arrogant. In the last case we will observe the overlapping of a path, at least partially, the submission of the general path to the new highway serving the same centres that activated the infrastructures that have been surpassed and confined to the condition of vestige, the persistence of the past and the memory of the territory in the most radical examples of transformation.

In this way, the substitution we spoke about must always be seen as an increase, as an additional increment of conditions, of quality, of characteristics that always function in relation to this past, to this memory of its own landscape. This memory is not extinguished or denied; this is not due to the rules of good behaviour, but because we are unable to extinguish it, as we are unable to deny or extinguish our DNA.

On the contrary, memory functions as something that must be recognised before proposing or imposing any transformation, such as the container of information that must be found in any research that precedes any action, the obligatory content of any diagnostic and any pre-design analysis, the black box that contains all the information regarding any site and the living organisms that inhabited and inhabit it. Sustainability, in the field of Landscape Architecture and concretely applied to the design of public urban spaces, is tied in the first place to the economic and ecological cost of the transformations inherent to the impressions of the signs that correspond to the transformation of the environment in adaptation.

Adaptation is necessary once again due to the alteration of the different ways a territory is used in an immediate and mediated cost, designed according to a possible future, and read in a form that does not ignore the complexity of the indirect effects of ecological and environmental costs.

An analysis of sustainability is always an analysis of costs-benefits and, simultaneously, an evaluation of efficiency in disengagement; a possible evaluation of

the relations between economic, ecological and social costs and cultural, artistic, social, ecological and, finally, economic benefits. Economic benefits are complex because they must reflect benefits of another type – cultural and artistic benefits can be translated into economic benefits and the latter into ecological or environmental benefits only if the economic advantage thus achieved is applied to the mitigation of ecological or environmental problems.

Attempting to analyse the complexity of these costs, we must consider them as part of the costs and benefits analysis relative to an abstract example of design and construction of parkland:

1. pragmatic sustainability: the evaluation of the efficiency of the programme, of its effective necessity and its conservation for a significant period of time; an evaluation of life estimated by the sign and the reduction to a cost per unit of time.

2. contextual sustainability: the evaluation of environmental, functional or formal coherence of the relationship with the context and the efficiency of its utilisation in contextual relations in order to improve values or mitigate impacts.

3. social sustainability: the evaluation of the efficiency of the intervention from a social point of view, in terms of its capacity to construct relationships and pacify tensions.

4. the sustainable consumption of resources: water for irrigation, electrical energy, and other forms of energy consumed or used for maintenance.

5. the economic sustainability that corresponds to the independence of space from costs of fixed estimates, of sums not generated by its own disengagement.

Developing these themes undoubtedly represents material for further considerations.

Shenzhen passed from approximately 20.000 to 13,5 million inhabitants in 30 years only… The consequences are impressing… As is, unfortunately, the colour of Shenzen's sky

I met Aldo Cibic in China, Shenzen. Both of us were involved in an adventure with another eight people to represent an idea explaining the concept of "Italian Brand". Giugiaro gave the names of ten Italian designers, architects and fashion representatives. The magnificent ten Italians (that's what they really called us and Bernstein's "the magnificent seven" would actually play any time we walked into a place) had to develop a project, which could return the very idea of "Italian spirit". A sort of virtual tower, able to manage the infinite aspects of our culture.

That's where Aldo Cibic teaches and he is an enthusiast from the marvellous world of Sottsass's Memphis, where objects turn into heroic landscapes in space. Aldo Cibic embodies and expresses much of that passion so we immediately became friends. Our friendship was made of sympathy and appreciation, not to mention that we agree on many topics. He was working on a project for green areas in subway stations that could modify the aesthetic aspect of otherwise disorientating places. It was all about a specific way of conceiving the urban landscape, a way to make it sustainable for use. While working, he would tell me about his project with extreme care, which gave me food for thought, as far as the sense of his work is concerned.

... The modern era needs urban landscape...
It is home to our buy-back programme.

CONVERSATION 8
Do to others whatever you would like them to do to you Redrawing our lives
ALDO CIBIC

In this moment of history we are having to face many challenges that bring about fundamental changes to the concept of project, which can be approached in a different and more modern way. The current economic crisis showed us the limits of a pattern of development and, at the same time, the environmental emergency is forcing us to radically rethink our future.

These two issues only are enough for us to gather that things will never be the same; if, on the other hand, we are resolved to be hopeful, then we cannot miss this occasion to redraw our life, to inaugurate a change strategy. We must be prepared to see things with different eyes, experience a sort of tabula rasa to redefine our needs, habits, activities and dreams according to the new conditions we face and to an updated idea of modernity.

The challenge is multiple: if we want our actions to be meaningful, we have to be clear about the references and models of the road we are to follow. As far as the references are concerned, the future might look grim, without optimistic certainties, but we know many things that are worth being considered and have access to a huge amount of information. Furthermore, we know our action's limits: wastage is not permitted, the logic cannot be individualistic or utilitarian: a cooperation pattern must be the option. This is why single specializations, lacking a general vision upstream, are no longer able per se to provide solutions to understand how changes can be implemented. Now, the main difficulty regards the courage to follow ideal projects and lays in the ability to overcome barriers, namely inadequate laws, partisan po-

litical and economic interests, passive habits and the cynicism according to which any change is a useless effort or, even worse, a threat. When I say ideal projects, I mean projects with a tendency to endeavour the quality of people's lives at the social, economic and environmental level.

The general frustration corresponds to the difficulty to detect the actions that could reignite the feeling of being part of a process in which we are doing our best for the future of our communities. We deal with many of the topics, controversies and problems we have to work on, on an everyday basis. To name just a few: security-related (at personal, food, energy, economic level) and environment-related issues (green, nature, agriculture and also urban and industrial peripheries), waste problems. Not to mention, upstream, the problems of recycling, the patterns of consumption, social urgencies (the elderly and young people). Some problems could be opportunities: the perfect example in Italy, when not embarrassing, is the incapability to enhance tourism. The country is rich in untapped potential, there is much work to do, and the development pattern needs updating. Creative action, in a multidisciplinary perspective, means producing ideas, considerations, proposals that, given the present reality, suggest specific paths at project level, embracing a number of topics, to develop comprehensive and detailed briefs.

This method is more similar to film production than to the traditional approach of architects, urban planners and designers: there is not necessarily a client but a group of, let's say, economists, sociologists, architects, designers, urban planners,

landscapers and citizens who are able to put forward specific projects addressing various issues at the same time, with the aim to deal with the entire project cycle, meaning the traditional project and its follow up too (activation of social and economic dynamics). Over the last few years we endeavoured to lay the basis for implementing such method, using texts and simulations to explicitly define a specific attitude, at project level, and the possible relevant results.

Empirically, we put together all the elements we needed to support our thought. Sustainability was not considered an environmental problem only: it is precisely when we rethink how to face the problems that the concept of sustainability in its widest sense and various meanings needs to be introduced. Thus, it could become a practice of today, a culture, which stems from cooperation among people and their skills laying the foundations for a sense of dignity reflecting in the vision of a project, which gets rid of long unsustainable attitudes and activities.

We carried out a significant amount of workshops in architecture and design schools on the above-mentioned topics, officially implemented through exhibitions and books. The most important are called Family Business, New Stories New Design and Microrealities.

In 1995, Domus Academy published "The Solid Side", that presented a research work on sustainability carried out by various colleagues. It was about a world that would rapidly see the availability of its resources fall from 20 to 50 times less compared to the current availability (particularly, the non renewable ones).

Architects and designers were asked to have a vision on projects that suggested debates, ideas and solutions to the issue at stake. Our project was called Family Business, and was a model of the productive extended family, similar to rural communities and ancient cultures, based on trade, in which people of different ages and culture, with complementary skills and roles, took part in open and autonomous communities. Stemming from the idea that we must reconsider the origins and reasons at the basis of our actions and given the radical changes we are experiencing we believed a new start was the option. We thought that if we reordered primary signs according to a brand new syntax, we could reveal important meanings.

New Stories New Design (2002, 2004 – Biennale di Venezia) was an attempt to view the world of design in a different way. Designers would be explorers and collectors, readers and interpreters, critics and narrators at the same time. The project started by carrying out a double analysis of activities and relations, then it generated occasions for new entrepreneurial opportunities where quality and dignity were the reference values.

Microrealities (2004 – Biennale di Venezia) was a self-produced project to test alternative ways to generate vitality in a disadvantaged situation. The approach was narrative and it proved how the many little stories happening in one place were the potential to create bigger and more significant stories, thus demonstrating how personal tangible actions were the key to identify space. This work was implemented through four stories: three of them focused on the regeneration of suburban situations while a fourth one was all about free time dedicated to nature. The first, entitled **The Gates of the City** (Le porte della Città), considered the bypass roads around the city walls, the place where the subway line crosses them becomes a symbolic location, a multitude of services and leisure opportunities in a strategic and easily accessible place. The idea was to create various situations: a lounge to work in while watching the traffic go by, baby sitting for mothers, the chance to get a lift anywhere, availability of scooters to move around the city, etc.

The second was called **SHANGHAI: 100 new subway stations** (100 nuove stazioni del metro). It focused on the kind of projects that could be developed in large metropolitan areas as concerns the issue of relocation. When a multitude of people is shifted from the old neighbourhoods (that will be demolished) of the city centre to suburban estates, they might find it more comfortable and spacious but they completely loose a whole world of values and relations. The subway lines and their stations are an incredible opportunity to keep recreating the centre of a new community in which people can identify themselves. The third story, entitled **Shopping Centre + Public Spaces +... The possibility of creating new urban centre** (Centro Commerciale + Spazi Pubblici +... La possibilità di creare nuovi centri urbani) addressed the idea of using shopping centres to join activities of public life: squares, arcades, houses, schools, gardens, offices, the post office, bars, the flea market, shops, music, cinemas... This would give the chance to generate new and lively places in which people could meet for business or simple leisure.

The last one was called **The Vegetable Garden City - Living the seasons** (La città degli orti - Riappropriarsi delle stagioni). It did not actually stem from a bucolic idea but it considered how the strongly penalized middle class was able to find a quality and economic solution in an aesthetic approach to nature.

The project consisted in an inhabited natural park, not far from the city, that people could reach either by train or bicycle, with low environmental impact architectures and vegetable gardens (similar to those of the elderly) where both children and adults could live a rich and meaningful experience with nature, its fruits and seasons. This particular project is the seed of my own interest for this kind of lifestyle and I worked on it over the following years, implementing increasingly real projects that were actually able to outline an alternative lifestyle. The projects that generated from this latest work are known as **A Perfect Weekend** 2005; **View with a Room,** 2007 (Vista con Camera); Rural Landscapes, 2008 (Paesaggi Rurali) and **More with Less** (2009) and we must thank them for making The vegetable Garden Citu (Città degli Orti) reality.


MICROREALITIES
un progetto sui luoghi e sulle persone

... ...

Delirious Aesthetics
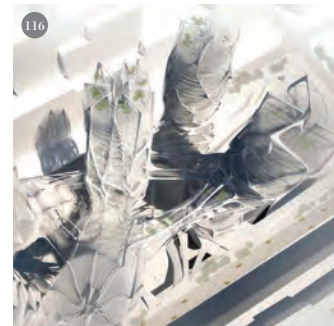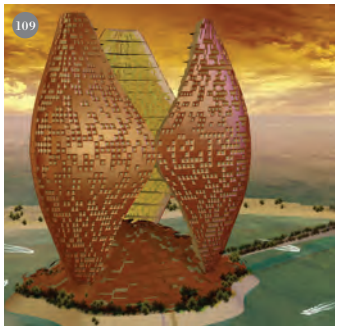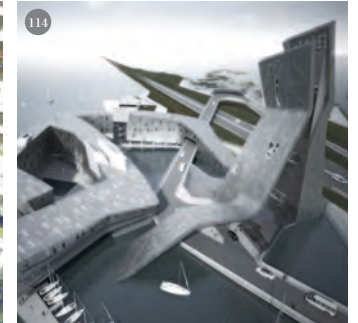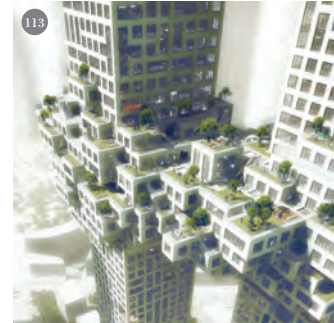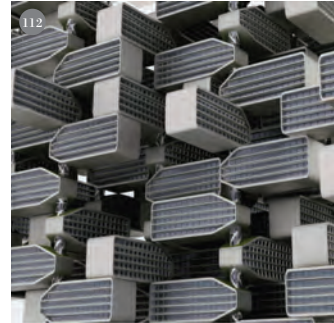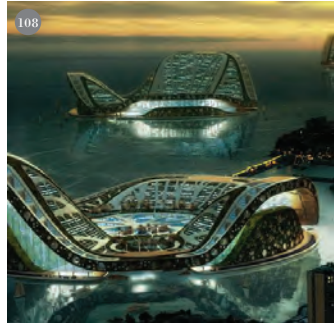
"Aesthetic" is the image that is getting lost, allowing process management inability to replace it. Nowadays, people think of aesthetic as something bad, almost embarrassing: a misunderstanding doesn't allow us to acknowledge the beauty of events when they are perceived as exceptions to the rule. Hence, we are disaccustomed to thinking and being in a certain way. But aesthetic also means control. Control over our actions, movements, over the way we talk, expose ourselves, get out in the world. Aesthetic is our own smell, like the sound of our voice. We cannot accept the world without it. In architecture, Aesthetic is all about how we place ourselves in the architectural space itself, the way we are host and guest. It is the most difficult part, as we cannot control it through certainties. It is part of a way of being that should pertain to anybody and to each architect. We need to conquer such way of being once again. E. C.
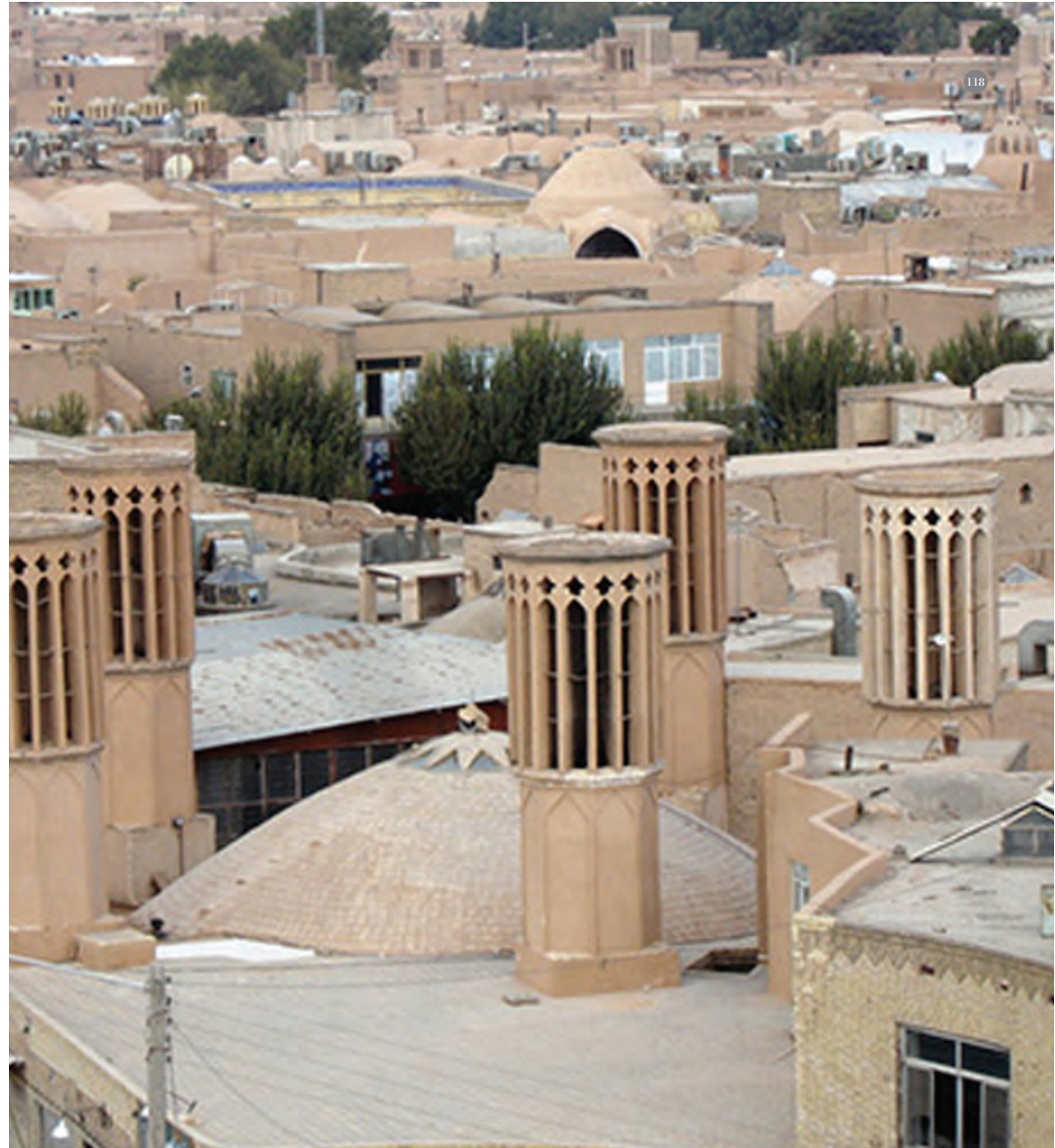
CONCLUSIONS
ENZO CALABRESE

n conclusion, I would like to point out that aesthetic beholds the meaning of things and expresses it with clear toughness. The way things reveal themselves. Architecture invents places, responding to precise questions. The result is the end stage of a complex project. As Nietzsche has it, it is the expression of a mathematic formula with multiple variables and beauty depends on the power and simplicity of a gesture. If aesthetic were the main objective, then everything we said until now would be the logical prerequisite of any action in architecture. But those who mix up the complexity of aesthetic with the formal beauty of the pure project outcome, as if it were a logical, or mechanical process, perfectly embody the misunderstanding currently in place. Knowledge is the fundamental prerequisite to start a sustainable project, in all respects: in this sense, we cannot ignore that relies on the soul. Hence, sustainability has a different meaning from what we would actually think. Energy has little to do with this, and this should be obvious. Mobility is an introduc-

tion and it always goes hand in hand with a good project, technology is know-how, landscape is ethical attention. Architecture summarizes these elements, it looks at them with different eyes, and it controls it, digests it and turns it into something new through the project. When all these elements are summed up, we can talk about a sustainable project. We should not take all this for granted."
Educational beauty is no longer the case" is what you would think as you take a stroll down new neighbourhoods, where the pavements are made of pink and grey hexagonal concrete, serving as parterre for green buildings, that may even be anti seismic, perhaps eco friendly too, with large, blooming semicircle balconies, hence green. There you have the reality of who is no longer able to desire. On would wonder what the future is: iconographic affection for the past like in the crusades of an enterprise of architecture or what? The most sustainable action would be to support architecture.

AFTERWORD
The unbearable superficiality of sustainability
or "notes on human contact phobia"
GIANLUCA PELUFFO

For years I have been asking myself if us, architects, are simply stupid, if engineers are terribly mean or if, unbelievably but comprehensibly enough, we are mano-euvred by an invisible Spectre operating our thoughts with a remote control and making us blind. These thoughts have kept me up at night too quite often.
While I was discussing with Ernesta Caviola about the affinities between Google Earth and Enola Gay, I came across a stimulating debate on the skin of buildings as a key architectural topic of the past 20 years of modern architecture, and on Simmel's notion of "blasé". Now, the link between the much-celebrated total knowledge we receive from satellite and the beatified environmental sustainability is not totally unfounded. Like shiny and exciting Trojan horses, both come from the Anglo-Saxon world. Just like the financial crisis by the way.
The author will forgive me, as he inevitably referred to the Anglo-Saxon world for this stimulating text, if the afterword is rather rebellious. Certainly polemic. At the beginning of past century, G. Simmel wrote about the metropolitan citizen's "pho-bia" (mainly belonging to the bourgeoisie, according to the German sociologist) of the unknowable, the uncontrollable, the chaos of urban life and its dangers.
These dangers were kept outside cities (protected by walls) before the Industrial Revolution hidden in the malign, fearful and scary Nature.
Such fear brings us to being detached, it causes the typical "blasé attitude" (there-fore cynical) of those who fear contact with others or are even horrified by it.
Architecture of the end of the 20th century and of the first ten years of the 21st repre-sent the state of the art of this phobia: the extraordinary interest towards the "skin" of the buildings often stems from a commercial and psychiatric need to be detached from the outside, thus creating a perfect, green, ideal, clean, perfectly conditioned world. All of Kubrick, Gilliam o Ridley Scott's worst fears ("2001 Space Odyssey", "Brasil", "Blade Runner"), are left outside of these sophisticated and technological buildings, left to the world of others.
Therefore, sustainability's amazing success is a fundamental anomaly that cannot be underrated. It refuses the imperfection of the human and natural world trying to convince others and ourselves that the sustainability of the materials and building techniques could be the solution to all evil in this world. Indeed, this is the insane belief according to which satellite views allow us to know reality, to control it, that sending bombers or missiles or intelligent weapons allows us to win the war, or that a sustainable building allows us to make our world good, democratic and clean. Actually, these are surrogates of reality, an obvious make-believe to avoid studying, trying to understand and see. The refusal to "see", hence to know. And I will not be talking about social networks and their psychiatric claim to replace the public space. Know not, understand not, meet not, get dirty not, smell not, shake hands not. Get caught not. Kill as you are unseen. Fear not. Feel pain not. Those who believe that evil lies in the distance and in the refusal of reality also believe that architecture should be the antidote to fear. Sustainability in architecture can only be a prere-quisite in ethical terms but, first of all, it refers to technology and construction...

It certainly cannot be ideological or refer to communication. When connected to scientific research or to structural or plant development, "Green scientology" cannot influence the expressive language or the shape of a building, since no building are that weak that they need to symbolize green awareness, by now obvious and unavoidable. Unless these arguments are used to hide less ethical aspects. After all, if we think of the linguistic evolution of "green" buildings we go from a rural-bucolic Heidi-style setting, "close to the vernacular architecture of the German people of the 30's", to the cold wooden modernism of Heidi's children's homes. Not to forget the expensive bunches of scrap iron, "in terms of maintenance and construction", on the front of houses with brise soleil o solar panels, or the overambitious, almost ridiculous, triumph of propellers and trees as surrogates of architecture. And, again, implementation of bad urban and political conscience. We often find out that to pursue the formal translation of sustainability, these green buildings forget to consider orientation and exposure, namely the basic and obvious aspects of building. Ignoring the existence of North and South, not to mention North-East or South-West. Often enough, the facade of the building and its "face", its very character, get lost behind the best technological research, often translated into the discovery of layers and outer shells of buildings. Sometimes, the whole idea that a building should "talk to" the world, rather than protect its perfect inner space is forgotten (design hotels, the same everywhere even in their local global variations, airports, high-speed rail stations, museums etc.). A building should act like a body with its own sexuality, made of matter and physics, whose weight is more or less significant, able to feel pleasure, to strive for beauty, to be surprised.

Myths should be rediscovered as ancient strengths that Architecture has always carried, as a duty and a mission to share. In this sense, we must argue, in a vehement and romantic way, over concrete, for its extraordinary power of expression, for its translation of a creative freedom, both at structural and formal level; we must argue over its genuinely green productive simplicity.

We cannot blame the sad way in which the world has been covered in concrete on the material itself. Those to blame are the cynical people who run away from the essence and history of a place while still boasting some form of greenness.

Sustainability is a prosaic need: not a religion, certainly not a poetic choice. Confused architects, orphans of stepfathers, joined the sociological theory of the "non-places", that Augè introduced as a disease, a phobia, turning it into an icon of the absence of the modern language. This theory enhances their own laziness or incapability to "see" the life of places, that always exists and it is so special. These architects now discover ecology, late, as a tool for self-affirmation and research, waiting for something new to come from other sociologists, physics or chefs. Not so long ago, architecture was in debt to Art and Philosophy and interacted on a daily basis with scientific research. Today, plagued by fear and speed, it is slave of too many masters, not up to the mission: see and change Reality.
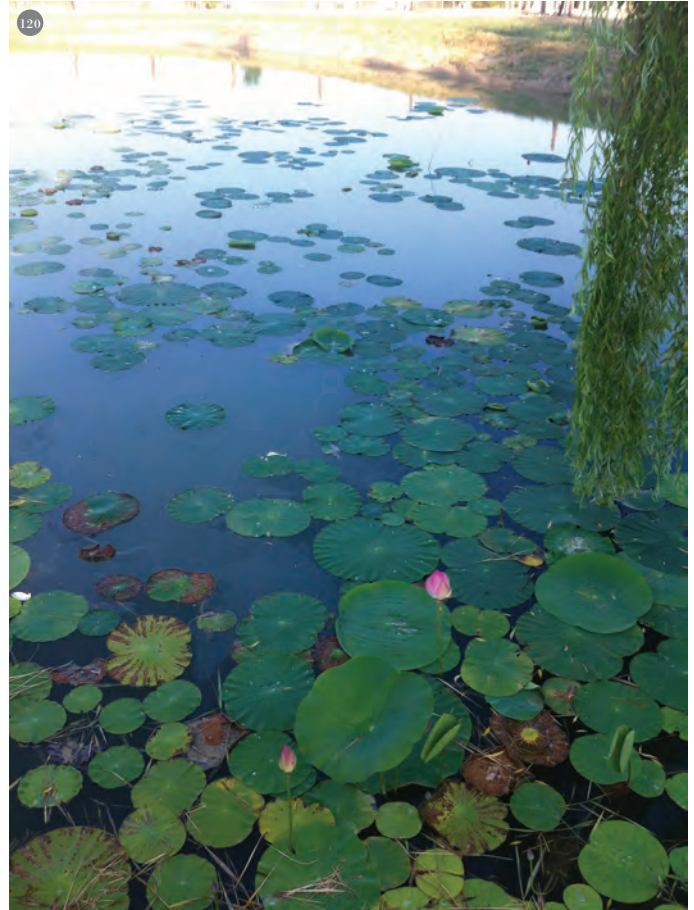
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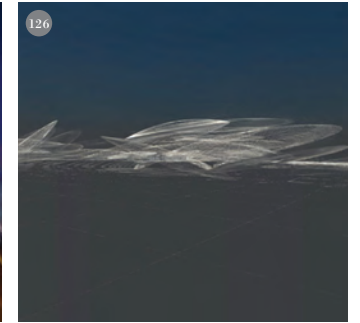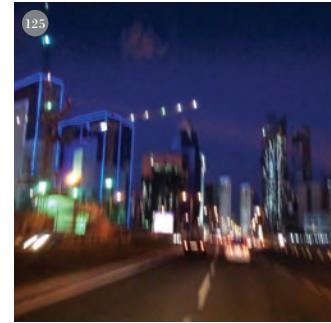
Enzo Calabrese, 11/12/2010 - *The hysterical life of architectural studios: like crazy bacchae, they are born following freedom, live as slaves of their dream, win freedom when they no longer exist!!*

Doha, 25/11/2011 - This morning, as usual, many fighter-bombers took off ...They fly to Syria and Bahrain... "The Cornice"... This is what they call the long promenade separating water from the skyscrapers all stacked close to each other in the City. As you walk it, it shows you the different sides of this strange place... As if they were painted on unrolled tissue!! After the skyscrapers, looking like toys of a peevish child, there is the Suk, then the Ministries, the shabby houses, and then the skyscrapers again... The Cornice is circular... One of the toys is by Jean Nouvel. A sort of "Gherkin" but smaller: a little Gherkin!!
To adapt it to the local culture, Nouvel made three aluminium layers with patterns resembling the retina that allows women to see through their burqa... They cover the tower with a transparency effect... But dust and humidity are a problem and the impossibility to maintain due to the very same reasons that make it so beautiful also make it the ideal home to many unpleasant things...The building site of the National Museum of Qatar is open... You can see nothing from outside but this time the project deeply focuses on the surrounding area to gather the best of it. Perhaps a new era has just begun!

Lago Issyk kul, Kirghizistan, 10/2007 - ... I don't know if there is a more beautiful place in the world, all I know is that I cried... Lake Issik Kul is like the sea, its water is not cold, the steam forms a mist that frames the Himalaya in the background... Tsars used to spend the winter here, where children play with a ball made of dried fish. There are no TV aerials on the roofs of the village houses and from the helicopter I can see flocks of snow leopards...

2010 - to apply for the Associate Professor competition you have to print a certified copy of all your papers, publications and a complete list of your essays...Basically, each file stored in your computer memory! All applications, of all participants, must be submitted in three copies! What? Shouldn't University be a centre of excellence and shouldn't its managers understand that they could solve it all with a single mouse click? How can't they see that once documents are stored in the Internet, they are in a place corresponding to a point, equally spaced from all others? And then, they even send them back to you too... Arrgghh!

Doha, 24/11/2011, ore 22:00 - ... In 1950 Doha had the desert, tents and the Suk!!... It wasn't big but it had everything there... Including desert hawks... Hooded and chained... Then, everything in Doha was demolished to build the new city... At first, without even thinking... Then, they thought about it a little bit... And tore it all down again, so now it's being rebuilt... The same thing happened with the stations, the cultural centres, museums, schools and squares... Squares can only be used for 7 months a year since temperatures can even reach 45 degrees making it almost unbearable to go outside... People started noticing that they no longer had their central meeting point anymore. The Suk!! So they built a new one... it took them a year, but it was identical!!... Perhaps they added a few plants and air conditioners... But the result is stunning...
The same thing could be done in L'Aquila (Italian city recently hit by an earthquake, n.d.t.) if, besides the money, we stopped thinking that you do not rebuild the old...But you know, every now and then. I'm sitting here, eating something down the streets of the newborn Suk... I have been told that dried grouper is a typical dish... Falconers capture fish thanks to hawks: they can dive deep down under water to reach it... Some women in front of me raised their veil to smoke the hookah that in Qatar is also called shisha... Their smoky image is very fascinating; there are other men sitting in circles next to them who are also smoking... There are various ethnic groups here and they all smoke in a different way... Then some Western tourists ask how it works... He tries it out and you can tell from his eyes that he is thinking about something else!!... The intense aroma fills the air.... And now the sound of the muezzin's voice takes part in the picture... The sound of his voice is just as embracing as the smell of smoke... The words I cannot understand dance among the people in the Suk... Everything is fine now... Seems fine... Even the hooded hawks... Purchased at an auction and exhibited with some pride, while walking, they will be faithful friends of their owners... Forever!!!

Bayelsa State, 11/2009 - *The people, men and women who leave their shack at dawn are employees, civil servants, nurses...They wear their shoes only outside their homes to avoid getting them dirty with mud. They walk on the side of the street, their clothes are always clean, flawless and proud...Like ancient warriors.*

Kirghizistan,lago Issyk kul, 10/2007 - That day the helicopter could not fly because of the wind... For this reason a trail of off-roaders was set up to cross the border point...We were welcomed by a man who was supposed to take us across the Kazakh border and reach Kyrgyzstan. I thought he was a real estate agent but he only told us who he was after telling us, to our surprise, about the hours spent by the lake in his Dacia with Mikhail Gorbaciov talking about Perestroika. Our customer was Chinghiz Ajtmatov, nominated for the Nobel Prize for literature, author of several masterpieces, as well as Gorbaciov's cultural counsellor. He decided to give his property on the lake to the Russians in exchange of the Ajtmatov foundation for young Kyrgyz writers... He told us that that paradise was going to be seized very soon... He died a few months after and a group of Kyrgyz terrorists attacked Russia thus giving the military authorization to invade Kirghizstan...

Lagos, 7/3/2011 - *The jungle...It is dismantled into a million units and is pieced together again everyday at dawn, carried by a shapeless river of rusty carcasses spaced out by extra luxury exceptions, tuning in Dubai... The river screams out loud and stops to recover slowly: when it finally reaches its destination, it's already time to go back...*

In 2013 we could all save on aperitifs and buy a LED light bulb. Our homes would be full of light which would make them cosier while saving energy, and that would make us happy.

Port Harcourt, Delta del Niger 11/2009 - *Women...Beautiful, extremely beautiful, remain beautiful even when they carry loads on their heads... gas cans, fruit, basins... In a perfect balance, they resemble dancing sculptures... Their hair is flawless, braided and wrapped tight to the head, decorated: perfect, like a queen's crown.*

Doha 23/11/2011 ore 22:00 - I arrived yesterday evening and the moment I stepped ashore it started raining, tonight it was pouring... I thought I jinxed it... I mean!! In the desert!... But I've been told this has been the best day in two years... It hadn't rained for 24 months and when it does water usually evaporates in 30 seconds!... Now the streets are flooded and the temperature has gone below 25 degrees!! Everybody is happy... They look at me with a friendly look!!

Abuja, 5/3/2011 - *Mist made of dust and high-octane gasoline burned by euro zero engines... the tree of fire is there, unchanged, it appears everywhere like the memory of something you just imagined... Some Westerns say they like it here since you can afford to play tennis and to have two, even three, waitresses... Afrika afrika afrika.*

Aereoporto internazionale di Dubai, ore 21:00 - Here they have Wi-Fi and perhaps all my Facebook posts will be visualized as an unit (before I just used to write... Just to write down my notes). Terminal 3, restricted to Emirates Airways... Luxury and waterfalls everywhere. I have to go to Doha in Qatar... I had to leave my ruler at the metal detector!! A ruler dealer gave it to me as a present ... I loved it!! They said: "ooh very nice" then they told me I could strangle the pilot and kept it... On board Emirates' planes dishes are served with stainless steel cutlery (including sharp knives)... I said "fuck" in my dialect (I'm from Brindisi, southern Italy) and a person from Bangladesh understood me and got pissed... Unbelievable!!

Source of the Images

0. Wall in Naples,Jones - *guardian. co.uk*/ **1**. Favelas, smmichelangelo - *livorno.org*/ **2**. Habitat 67 Montreal Expo – s*kyscrapercity. com*/ **3**. Interlace Singapore, OMA – *dezen.com*/ **4**. Tokyo apartments, Sou_Fujimoto - *carballoestrela. blogspot.com*/ **5**. Disney bans junk food 2006 - *ntotheloop.blogspot.it*/ **6**. CrazyBuildingsSkyline, OMA - eikongraphia.com/ **7**. Andrew Maynard Architects, CV08 The suburb-eating robot - *plataformaarquitectura. cl*/ **8**. biennale di architettura venezia 2012 nordicpavilion - *it.livegreenblog.com*/ **9**. Rucksack House, Stefan Eberstadt -*atcasa. corriere.it*/ **10**. Facciate In Cemento stampato, Reckli - *archiexpo. it*/ **11**. Silent Gardens Victoria & Albert museum, SouFujimoto - *afasiaarq.blogspot.com*/ **12**. recupero dell'acqua di condensa, Lagos Nigeria– *foto dell'autore*/ **13**. sunflower - nextnature. net + parabole nel villaggio - *supercalifragili.com*/ **14**. 1+1=?, schizzo dell'autore/ **15**. Lahore (Pakistan) "fuori controllo": *foto dell'autore*/ **16**. **17**. **18**. Bo01 Malmoeexibition - *archnewsnow. com*/ **19**. **20**. **21**. scuola materna a gaza, Mario Cucinella - *architetturaecosostenibile.it*/ **22**. **23**. **24**. Cattedrale Vittoriana di

Christchurch in Nuova Zelanda, ShigeruBan - *artinfo.com*/

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com/ **48**. Symbiotic Interlock, Skyscraper Additions - Daekwon Park - *treehugger.com*/ **49**. Heung Yuen Wai Terminal Building, Alan Cheung Kwok lun and Sam Hau Sum ming - *archdaily.com*/ **50**. The Wave St. Petersburg Pier Design Concept,BIG - *archdaily.com*/ **51**. Amsterdam Iconic Pedestrian Bridge Proposal, Michael Labory & Bertrand Schippan ,*archdaily. com*/ **52**. The Yokohama Project, F.O.A. - *w-a.home.pl*/ **53**. MIC mobility in Chain- Piazzale Loreto (Milano)/ **54**. The Earthscaper, BNKR Arquitectura - *boston.com*/ **55**. cleve[r]land,Influx_Studio - *archdaily.com*/

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jdsa.eu/ **65**. International Centre of Excellence for Urban Agriculture, Plantagon - *inhabitat.com*/ **66**. Masdar City, Adrian Smith + Gordon Gill Architecture LLP - *blog.urbangreencouncil.org*/ **67**. Masdar City - *dizainmania.com*/ **68**. Masdar City, Foster + Partners - *my.opera.com*/ **69**. Masdar Sustainable City, LAVA - *archdaily. com*/ **70**. Work on second stage of Masdar Institute - utilities - *me.com*/ **71**. Masdar Headquarters, Adrian Smith + Gordon Gill Architecture LLP - *novarchitectura. com*/ **72**. Masdar Institute, Foster + Partners - *archdaily.com*/ **73**. COR, Oppenheim Architecture - *arch2o. com*/ **74**. The Wind Lens, Yuji Ohya - *inhabitat.com*/ **75**. Media-TIC building - Cloud9 - *bustler.net*/ **76**. Zira Island Carbon Neutral Master Plan, BIG Architects - *archdaily. com*/ **77**. Vertical Park, Jorge Hernandez La Garza - *mimaristil. com*/ **78**. *archdaily.com*/ **79**. Bahrain World Trade Center, Atkins - *ecogeek.org*/ **80**. Layers of Dubai, Mekano - *archdaily.com*/ **81**. Wind turbines offshore, 2-B Energy - *inhabitat.com*/ **82**. Taiwan Tower - Little - *lolkout.org*/ **83**. Bionic Tower, LAVA - *l-a-v-a.net*/

84. Tower of power, NL architects - *inhabitat.com*/ **85**. Transsolar Meteorosensitive Morphology,

Hygroscope - *achimmenges. net*/ **86**. Aachen Energy ResearchDepartment, Zaha Hadid – *evolo.us*/ **87**. impronta ecologica - *associazioni.prato.it*/ **88**. Sus brochure, WSP - *docstoc. com*/ **89**. Diagramma Impronta Ecologica della Svizzera - *bfs. admin.ch*/ 9**0**. Milano Stadt Krone 2030, Studio Shift - *archdaily.com*/ 9**1**. Filene's Eco Pods, Höweler + Yoon Architecture - *mystudio. us*/ **92**. Gwanggyo Power Center, MVRDV Architects - *10.aeccafe. com*/ **93**. Noah's Ark Sustainable City, Aleksandar Joksimovic& Jelena Nikolic - *evolo.us*/ **94**. Europa City, Manuelle Gautrand Architecture - *archdaily.com*/ **95**. The Rise of Retrofit, Viktor Koen and Jonathan Michael Johnson - *continuingeducation.construction. com*/ **96**. Tehran Tower, CAAT Architecture Studio - *archdaily. com*/ **97**. Harmonia 57, Triptyque - *plataformaarquitectura.cl*/ **98**. The New York Tower, Daniel Libeskind - simbiosisgroup.net/ **99**. Sea Tree, Waterstudio.NL - *archdaily. com*/ **100**. Source Vertical farm, WORKac - *inspirationgreen.com*/ **101**. Gardens by the Bay, Wilkinson Eyre + Grant Associates - dezeen. com / **102**. Castelo de Silves, PROAP - *arquimaster.com.ar*/ **103**. Shenzen Skyline View - *foto

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