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IÑAKI ÁBALOS | CAROLINE PIDCOCK | THOMAS HERZOG | JENNIFER
SIEGAL | FERNANDA CANALES | SAUERBRUCH HUTTON

#30 VISIONS OF
ARCHITECTURE

#30
ARC

PABLO MAROTO *_Idea and coordination*

ALBERT PUNSOLA *_Interviews*

EDAIMON DE JUAN *_Interviews*

VISIONS OF HITECTURE



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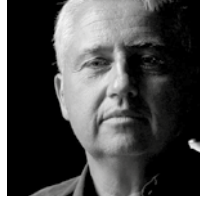
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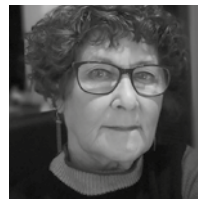
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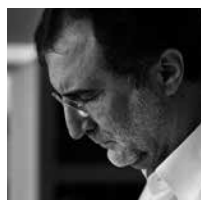
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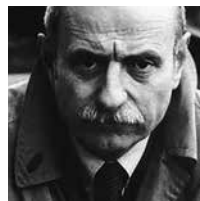
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“Good architecture is exciting
and fills the environment with beauty”

#30 Visions of Architecture is an unprecedented work through which Knauf would like to offer a unique perspective of this exciting discipline in which science, technology, art, economics, and social and environmental factors interact.

We asked leading architects from different countries to reflect on the challenges and stimuli that they encounter in their profession and to place particular emphasis on the influence of sustainability in their projects. We also asked them to talk to us about the beauty of buildings: a factor that is so ethereal and yet –at the same time– so present in the evaluation of architecture.

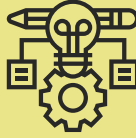
In these interviews, the participants provided us with genuine, thoughtful opinions, as well as several key insights into their profession. They also revealed their own personal preferences and kindly chose images –especially for this publication – which, whether for conceptual or aesthetic reasons, they think best represent their work.

#30 Visions of Architecture can be seen as a compendium of the trends that will dominate architecture in the 21st century. It is a book to read, but also one to look at, enjoying the power of its images to the full.

For Knauf, the publication of this work is consistent with the sense of responsibility that we feel towards the environment and our desire to improve human well-being. This is a commitment that is embodied in the promotion of a more sustainable and healthy construction model and one that can help reduce emissions and use energy more efficiently while, at the same time, achieving a greater degree of habitability and comfort.

ALEXANDER KNAUF






01

The Need for Sustainable Architecture

César Ruiz-Larrea • Patxi Mangado
Valeria del Puerto • Johan Celsing



The concept of sustainable development appeared at the end of the twentieth century as the sum of two main factors. The first was the confrontation between economic growth –previously conceived of as unlimited– and its practical limits. The existence of such limits was detailed by the Club of Rome’s famous report published in 1972, based on the depletion of natural resources, due to the use of non-renewable materials and the rapid rate of their depletion. However, the first oil crisis, which began in 1973, helped raise awareness of the issue.

Although a warning that at some point mankind would run out of sufficient resources to subsist had been voiced by Thomas Malthus at the end of the eighteenth century, it was only in the twentieth century, two centuries later, that this began to be taken seriously. More significantly, the Club of Rome’s report went on to inspire the creation of the concept of sus- >



tainable development, whose main virtue was a less pessimistic vision of the future than that foreseen by Thomas Malthus.

The second important factor behind the emergence of the concept was the rejection –even in the most advanced societies– of environmental degradation carried out in the name of progress. Although this way of thinking was not new, and had important precedents dating back to the beginning of the Industrial Revolution, it was in the 1960s and 1970s that it acquired a more transcendent dimension, giving structure to movements with enough weight to influence public debate.

This intellectual climate crystallised in 1987 with the United Nations document *Our Common Future*, also known as the *Brundtland Report*. Its importance lay in its unprecedented and now paradigmatic definition of sustainability as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.

The problem of defining what is right

Two parallel phenomena have emerged in the 30 years that have passed since then. The first is the criticism to which sustainable development has been subjected, which has revealed several of its limitations as a concept. Who, for example, can really define needs? How can ‘sustainable’ be used as an adjective to describe ‘development’ if it implies growth that essentially contradicts (the idea of) sustainability? Can we really impose limits on a free market economy? Despite such criticism and doubts, however, the concept of sustainable development has firmly taken root in local, regional and national policies, as well as in international society, the world of business and even individual attitudes.

Perhaps the concept’s apparent weakness has instead served as a strength, with it surviving precisely because of criticism, rather than in spite of it. The selection of the commission responsible for drafting the *Brundtland Report* was open to interpretation and consequently to discussion and enrichment. This process has taken place over the course of 30 years and sustainable development, or sustainability, is now seen as an ethical, environmental, social, economic and cultural issue, which requires a holistic approach and one in tune with the complexities of the modern world. This is the true basis of its triumph. Furthermore although our civilisation is yet to become sustainable, it has acquired the awareness that it must pursue this goal. In fact, plans have been drawn up, and methods and instruments used, with the aim of achieving sustainability across all areas of life.

As one of the human activities with the greatest impact on our lives, architecture cannot escape this general awareness. There is also a highly specific reason for this: buildings are large consumers of raw materials and energy. According to Brian Edwards and Paul Hyett, in their work *Rough Guide to Sustainability*, 50% of the world’s resources are used for construction and 45% of the energy generated is used to heat, light and ventilate buildings, in fact according to European Union data energy consumption by buildings could account for up to 40% of total energy consumption.

Sufficient knowledge

Looking beyond specific figures, today we have sufficient knowledge to develop architecture that minimises negative impacts on both the environment and human health. This cannot be said of all fields, however. In terms of energy consumption, for example, transport is yet to provide viable alternatives, as the case of the aviation industry’s absolute dependence on fossil fuels illustrates. In contrast, technological develop-

ments have allowed the construction of zero net energy buildings and even buildings capable of generating more energy than they consume.

While energy is an essential element in the relationship between architecture and sustainability, it is not >

the only one. Other relevant issues include decisions on: where to locate a building; its relation to natural cycles; the investment in construction materials; how healthy its spaces are; and the habits of the people who use the building as a home or workplace. Such a list clearly demonstrates how architecture relates to sustainability in a variety of ways, with more sustainable architecture reflecting the search for a new paradigm that involves not only architects, but also administrators, manufacturers, promoters and even the public.

Although it is relevant to ask whether a building is sustainable or not, it is also important to remember that the question cannot often be answered in a binary manner. Instead of suggesting that sustainability and architecture have a confusing relationship, this demonstrates that the multitude of aspects to consider when designing a building mean it will rarely be perfectly sustainable or completely unsustainable. Sustainability in architecture must therefore be analysed according to the fulfillment of a wide range of criteria throughout the building's lifespan, from its conception as a simple sketch on paper to its physical disappearance, and throughout the duration of its use. This is why the degree to which a building is described as sustainable must be expressed as a grade and not as a rough binary approximation.

Fundamental decisions

There are five features that allow us to establish the extent to which a building is sustainable. The first refers to the moment at which a series of fundamental decisions on design and concept are made regarding the location, orientation, construction materials and the building skin. This initial phase is crucial to reducing energy demands and material resources, which account for 80% of the building's environmental impact. Poor decision-making during this period will obviously condition the build-

ing's future requirements, with examples such as north-facing main façades that receive little solar radiation or poorly-insulated building skins. All sound decisions made at this time will, on the other hand, reduce the need for active systems such as air conditioning and artificial light. This will, in turn, result in a lower energy impact over time.

The second aspect refers to the efficiency of the active systems installed in the building. Although greater efficiency promotes sustainability, we should not lose sight of the fact that the efficiency principle is not the number one priority. This principle becomes relevant once the principle of sufficiency has been applied in the first phase. This involves establishing low energy requirements for the active systems that are required to meet the building's main needs (cooling, heating and lighting) in an optimal fashion. Efficiency also applies to the use of resources such as water. A wide range of solutions have been developed to achieve this goal, such as the location of reduced-flow taps and showers.

Nearby resources

Another essential element in a building's sustainability is its harnessing of materials, water and energy from its immediate surroundings. In most cases, materials should be derived from the local area in order to reduce the environmental impact of transportation, although sometimes extracting local resources can cause a greater impact than bringing them in from places farther away. In terms of water, rainwater collection and grey water reuse systems are the most appropriate options. Finally, the use of wind and solar (ACS and/or photovoltaic) power can allow a building to reduce its energy consumption and even convert it into an energy-producing property. It should be noted, once again, that these solutions deploy their full potential when sound decisions have been made in >

“The implementation of the principles of sustainable development always reveals a tension between abstract ideals and their concretion according to the existing possibilities.”



the initial phase of the building's design. If not, their incorporation may achieve noticeable, although limited, results.

The fourth point refers to the '5 Rs': refuse, reduce, reuse, repurpose, and then recycle. Even if a new building is deemed sustainable thanks to its design and the responsible behaviour of its users, its demolition after a decade will render it unsustainable.

Deconstruction is a process that involves considerable energy consumption and generates waste that is not always handled correctly. For this reason, the permanence of a building is another key element in its sustainability. This makes rehabilitation crucial, positively affecting elements such as insulation and ventilation and allowing for the extension of the construction's useful life. Another way to achieve this goal is by reusing buildings that have become obsolete for their original functions, such as old factories transformed into homes, or offices into social centres.

Compensation strategies

The final aspect is what might be referred to as compensation. No matter how many environmentally-friendly measures are adopted in the design, construction and use of the building, the mere carrying out of a construction project exerts an undeniable impact. First, occupying land that may be a scarce resource, in itself, implies altering the original natural conditions and making changes that cannot be reversed. This unavoidable negative effect may, however, be compensated in other places with strategies focusing on re-naturation –the restoration of an area's biological quality– in what may be termed a rebalancing of the disturbance caused. These strategies make sense in a broad vision of architecture, which extends beyond the specific area that each building occupies and considers the wider urban context.

The complexity of the interrelationship between architecture and sustainability is highlighted once again when there are a series of conditions that influence the five points listed, and these are

social, economic, political-legal and cultural. A clarification of the details of their influence on the building would be better suited to a separate essay, but a few points can be briefly mentioned.

The implementation of the principles of sustainable development always reveals a tension between abstract ideals and their concreteness in terms of existing possibilities, which are the result of the social context. The ability to deliver an optimal project may be limited by the available budget, whether in the private or the public sphere. In the latter case, for instance, the goal of developing affordable social housing may not be compatible with the optimal sustainability standards for a new construction. However, it is also true that access to housing and equity are fundamental elements in the social dimension of sustainability. This trade-off is therefore reasonable, and even desirable, from a pragmatic viewpoint.

International dimension

The political-legal issues relevant at the local scale have now also gained significance at the international level. Global agreements on climate change, especially after the Paris Summit of 2015, urge the international community and each of its members to reduce greenhouse gas emissions in which buildings play a highly prominent role. The European Union, for its part, has developed its own climate and energy strategy. The Commission proposed in 2020 to raise the 2030 greenhouse gas emission reduction target, including emissions and removals, to at least 55% compared to 1990. Key targets for 2030 are at least 32% share for renewable energy and at least 32.5% improvement in energy efficiency.

At the end of 2021, the European Commission published its proposal for a recast of the Energy Performance of Buildings Directive, in the new framework of gas emissions. The revision introduces new standards for energy performance to decarbonize the building sector, with changes to definitions of energy perfor-

“What we want from a building is a transcendent question. In the past, the answer was very simple: shelter. Nowadays it should be more sophisticated.”



both pleasant and healthy. Citizens should be able to participate in architectural projects with the same maturity of knowledge that allows them to make decisions about their diet or wardrobe. Many consumers take an

interest in the origin and composition of food and clothing and reject products based on criteria such as the incorporation of pesticides, in the first case, or certain synthetic fabrics, in the second. This level of demand has not yet reached buildings, but it may in the future.

At the beginning of this chapter, we located the emergence of the concept of sustainable development at one specific moment in time (the end of the twentieth century) due to the need to halt the environmental degradation of industrial civilisation. Traditional architecture has, however, always considered aspects such as orientation, ventilation and the conservation or dissipation of energy. Although there was no concept of sustainable development in the past, sustainable architecture existed *avant la lettre* as resource availability and environmental limits served as the defining conditions for architecture. Today, this approach is no longer possible. Despite the fact that traditional architecture may be reproduced, contemporary criteria must be applied in order to improve on the deficiencies that affect a lot of older architecture. These have often been the result of the lack of technology available at the time of its construction.

Sustainable architecture is necessary for ethical, environmental, economic and social reasons and because laws will increasingly require new buildings to meet objectives in this field. It is also necessary because architecture is a discipline that largely relies on common sense, and sustainable development points in the same direction. x

mance standards, revisions to national building renovation plans and a new requirement for life-cycle emission calculations for new builds. National Building Renovation Plans will need to be revised to include a roadmap and national targets by 2030, 2040 and 2050.

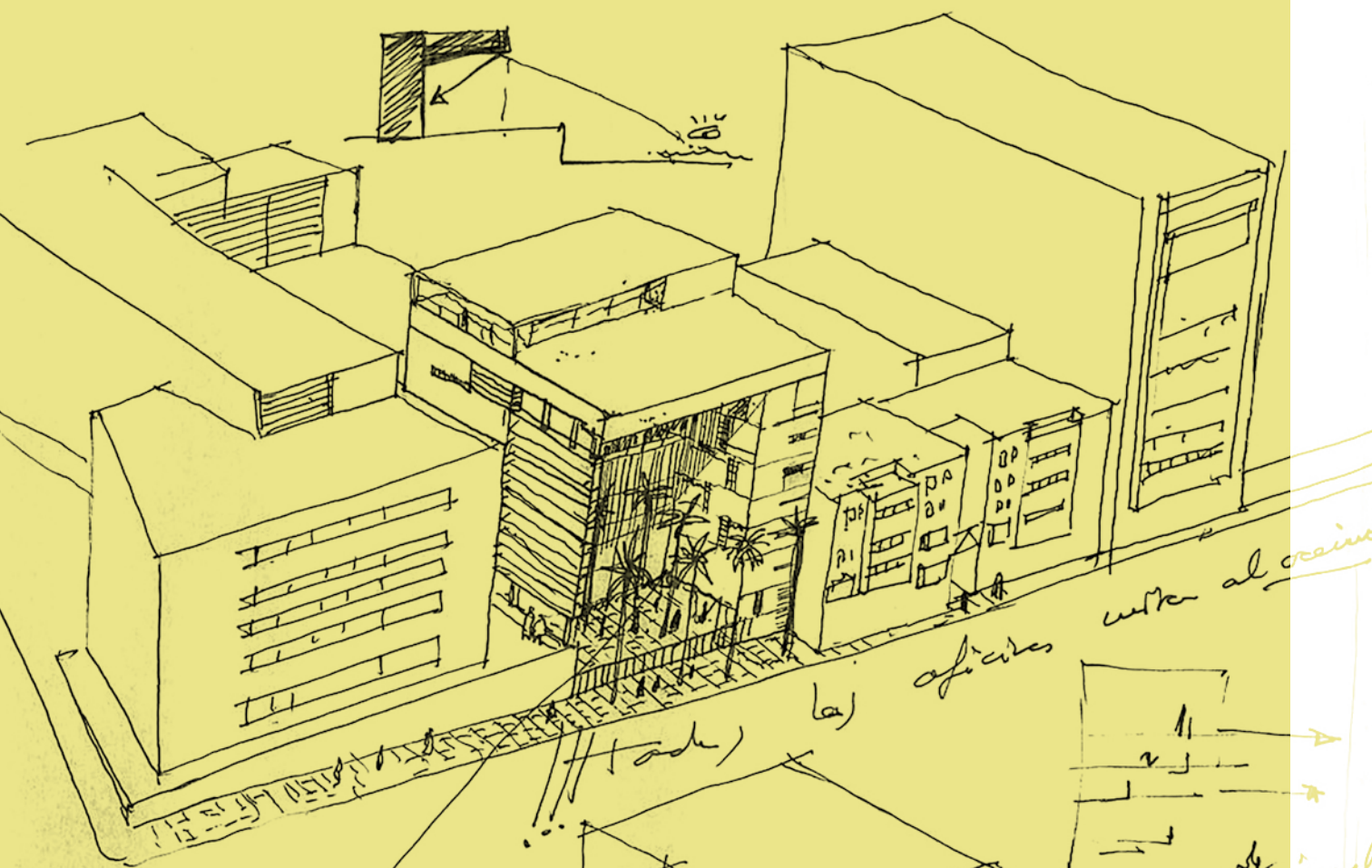
The International Union of Architects, which represents dozens of professional associations around the world, has its own deontological code, which was updated several years ago to include environmental commitment and the consideration of sustainability as part of the exercise of the profession. This positioning has been reinforced –especially in Europe– by the legislative changes outlined in the previous paragraphs. These legal conditions, which have emanated from political decisions, have transformed the need for more sustainable architecture into more than a mere ethical commitment.

Citizenship and architecture

Finally, the cultural dimension must also be mentioned, with ‘culture’ referring not only to a set of knowledge, but also to a set of values that shape a specific vision of the world. The vision behind sustainability is based on respect for the natural environment and its limits, and on the will to improve the lives of human communities. Although these values are often stated on a collective scale by social and political organisations, they only begin to have consequences when internalised on an individual level, inspiring more responsible and supportive attitudes. This is extremely relevant in the relationship between architecture and sustainability for both architects and citizens. A building may be well-designed in environmental terms, but if its users make irresponsible decisions during its life cycle –such as opening windows in an apartment for hours at a time during the winter– the energy performance will be rather poor.

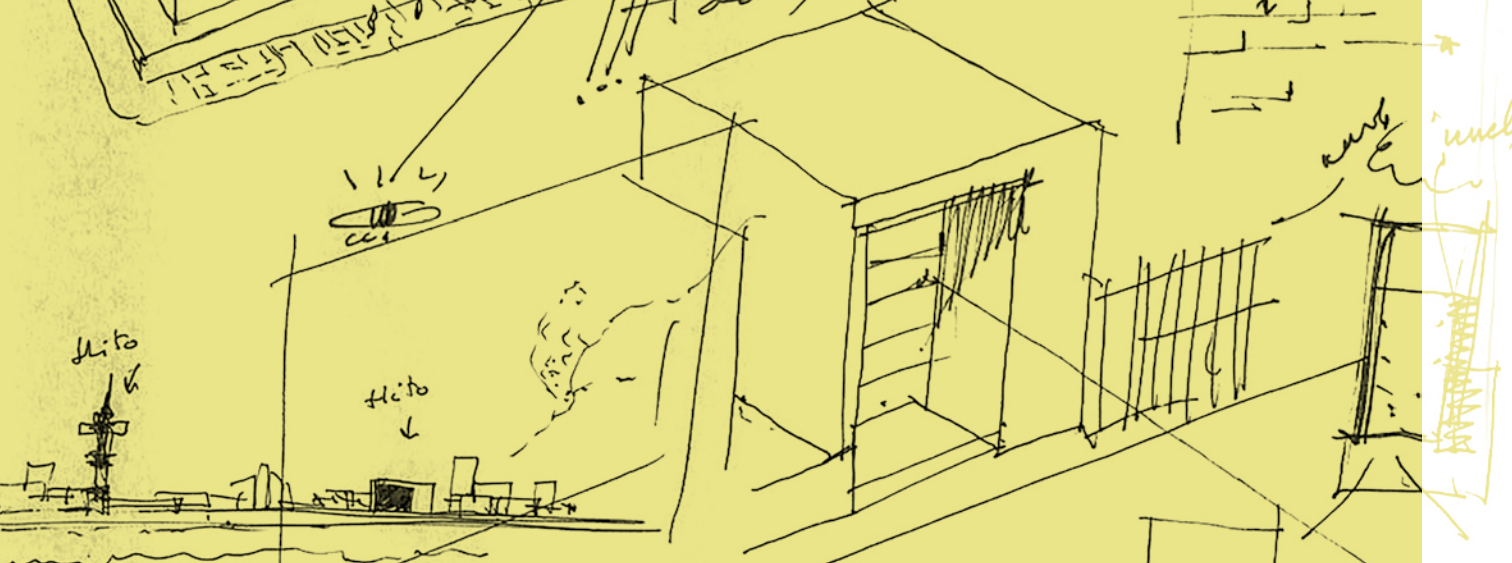
The cultural dimension is also inherent to local citizens’ demands on architecture. What we want from a building is a transcendent question. In the past, the answer was very simple: shelter. Nowadays, it should be more sophisticated: a comfortable place to live that is

“Sustainable architecture existed *avant la lettre* as resource availability and environmental limits served as the defining conditions for architecture in the past.”



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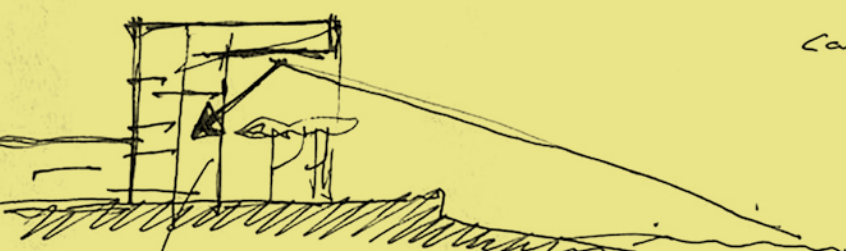
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Espero almorzo



CÉSAR RUIZ-LARREA

“Sustainability is a starting point.”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

CRL. Sustainability is a new paradigm that penetrates all sectors of society and has multiple dimensions: intellectual, political, social, economic and environmental. It is a paradigm that has overcome the approaches of political ideologies dating back to the nineteenth century, which have persisted to the present day but are no longer able to address the current challenges. Sustainability is a real novelty because it emerged through a type of awareness unprecedented in the history of humanity, based on human beings having an impact on the evolution of the planet through the demographic explosion and its impact on resources and the environment.

It is therefore serious in origin, although it is necessary to protect the concept from trivialisation and to prevent it from being reduced to a fad, as it has by those who have turned it into a simple “greening”. In the field of architecture, such trivialisation can create a series of simplistic perceptions. To say that a building taking the shape of a hut, or resembling a natural element, is sustainable merely due to its appearance would obviously be to trivialise it. At the same time, it is very difficult to create a corpus of rigorous knowledge providing us with the tools for modifying architecture in light of concerns over sustainability. >



César Ruiz-Larrea was born in Madrid, where he graduated from the School of Architecture, in 1976. He was subsequently professor of projects there from 1982 to 2004. He completed his training in New York and in Spain with his tutors including Oiza, Carvajal and Cano Lasso. From 1987 to 1997 he participated in the 3AC Architecture Studio with Carlos Rubio Carvajal and Enrique Álvarez-Sala Walther. In 1997, he created the Ruiz-Larrea & Asociados architecture studio and in 2010 he established the international firm OSA (Office for Sustainable Architecture), Office for Sustainable Architecture. His work has received several national and international architecture awards, including the Benedict Award. He was also national representative of architecture at the Green Building Challenge Congress in Tokyo where he won the 1st prize.



“AN ARCHITECT CANNOT BE AN ACCOMPLICE TO THE DESTRUCTION OF THE ENVIRONMENT OR GLOBAL WARMING. ARCHITECTURE IS ETHICAL AND POLITICAL BECAUSE IT IS PART OF HUMAN ACTION.”

Einstein said that one cannot change a system using the same tools that helped create it. This is the main challenge of the times we find ourselves in. If we understand architecture as one of the tools of the system, the conclusion is that we must shift from consuming resources and generating waste to operating more like a tree. I do not refer to the tree as a form, but as a system that employs photosynthesis in order to sustain itself, without damaging the environment. I believe that today we have the knowledge, capacity and techniques for architecture to become that system.

Such architecture would generate benefits not only for its users, but also for the inhabitants of the local environment. Imagine façades, for example, that interact with the environment to transform CO₂ into oxygen, or homes that run completely off renewable energy. This does not mean covering houses with prostheses, such as photovoltaic panels, but better integrating these energies into the built elements themselves.

Do you think that sustainability requirements can condition the beauty and character of an architectural work? If so, in what sense?

CRL. Not only can they condition it, but these requirements are essential for a building's beauty. It is the symbiosis between function and form that creates beauty. Although architecture that does not solve problems can attain a certain beauty, it is artificial and rather empty. It is just as with people: if a pleasant physical appearance is not matched by certain ethical and behavioural dimensions, the former is not of much use.

In the same way, I believe that one of the problems of architecture today is precisely the search for form without the attempt to delve into other aspects. Most current architecture continues to develop according to the old paradigm. There is still talk, in this sense, of composition, of Euclidean geometry and of the plan, etc.

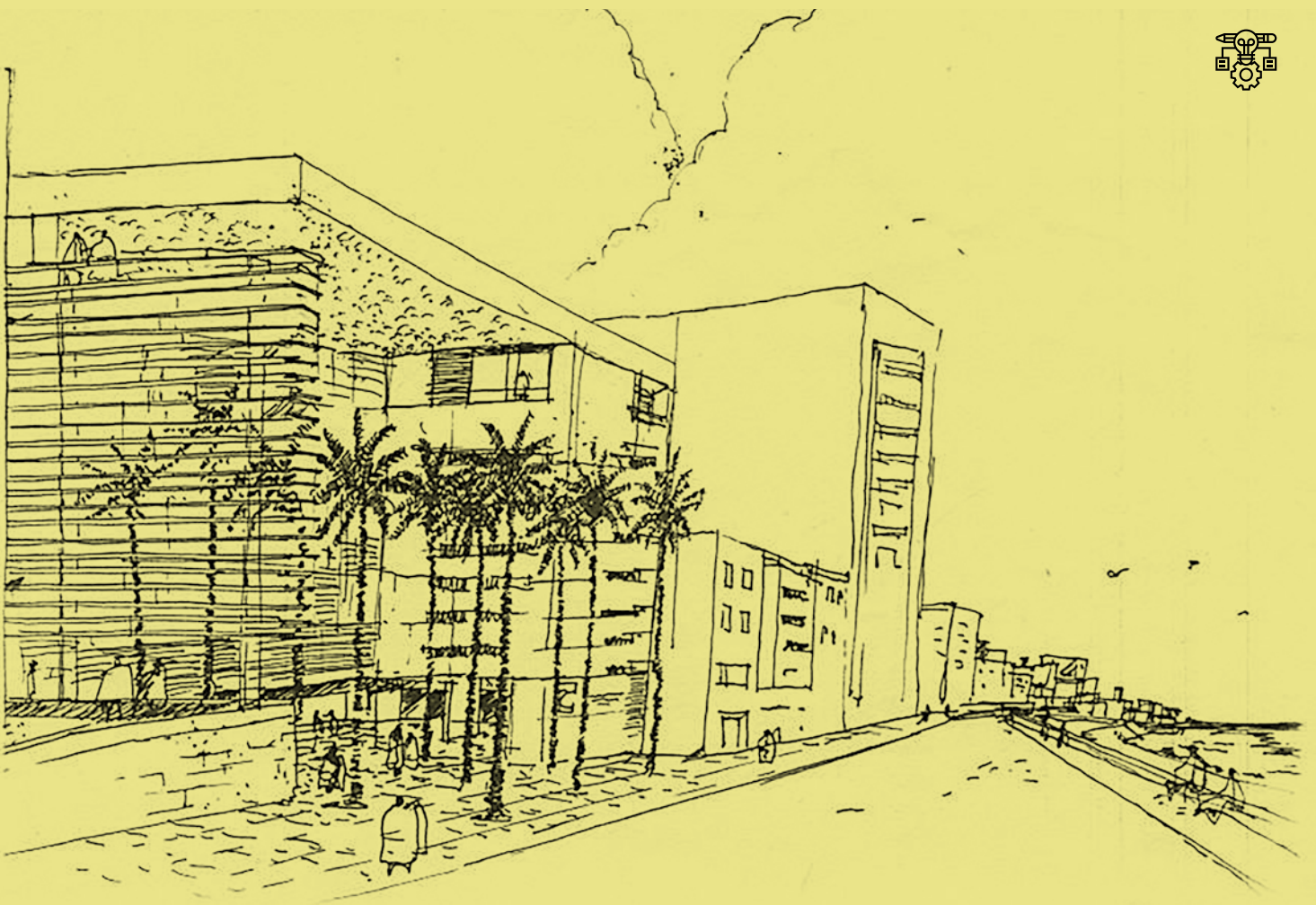
In the 1980s, I began to address this issue in Spain, despite the fact that sustainable architecture was not even a concept in use at the time. I focused on making a critique of the internationalisation of architecture and the abandonment of ancestral local knowledge and on rooting it in the territory.

As a lecturer on architecture, it has surprised me, more than once, to find students with a broad knowledge of the work of global architects and a strong visual culture, but who are unable to distinguish between insulation and inertia. These issues had been treated effectively by traditional architecture.

There is no *tabula rasa* in anything. Starting from scratch is a myth, and architecture is no exception. The future will be built according to what we have been able to resolve in the present. Change is continuous, and the value of an architectural project



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is derived from the degree to which it helps society to participate in that change. I am not interested in sustainability as a purely intellectual concept, but, instead, in its role as an instrument of transformation. Sustainability is not a point of arrival but a point of departure.

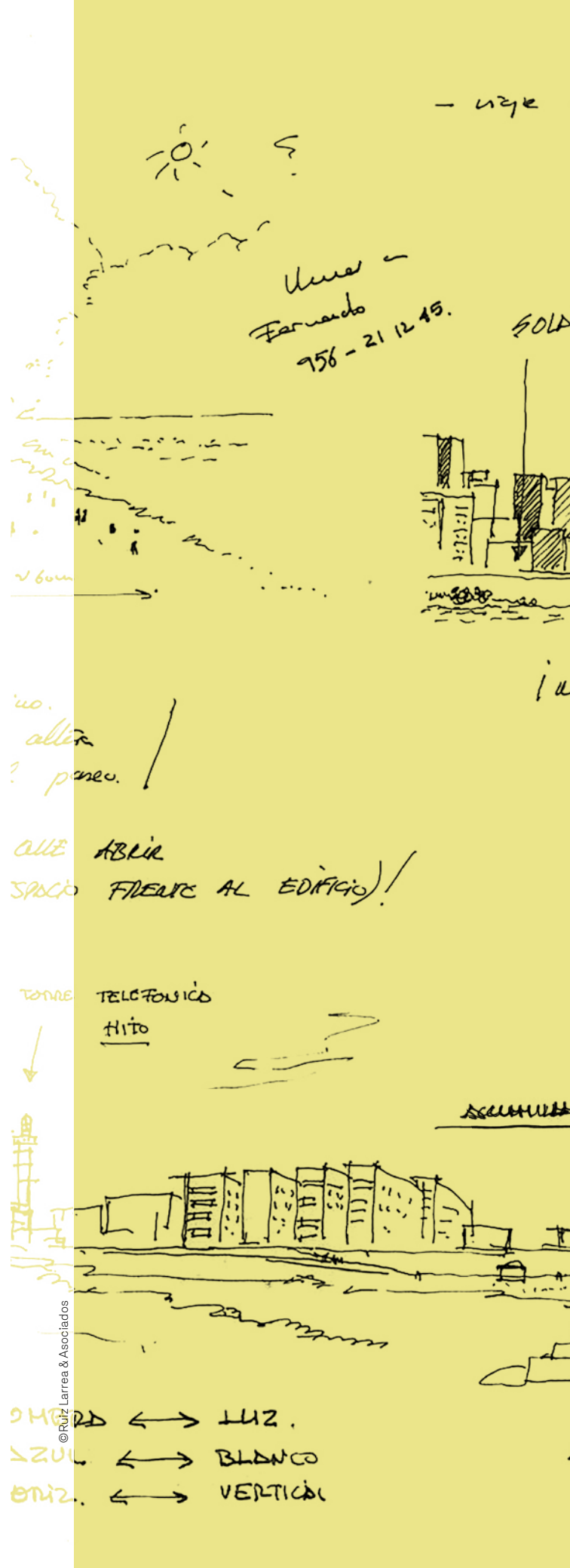
Among all of your projects, which one do you think most highly of? Why?

CRL. The last of these. I am working on the transformation of a building for the Bank of Spain, in Madrid, which is challenging because it is located in an interior patio constructed in the 1970s, depriving the institution of a green space.

The problem, or the challenge, was that this building could not be demolished, so what I did was to naturalise it: to turn it into "a tree". Not literally, of course, but in the sense that the tower that has been built can generate environmental conditions as trees would have done. We have used both technology and other interesting aesthetic aspects, such as glass printed with leaves, in different degrees of density to absorb varying amounts of solar radiation. From the inside, the effect resembles the leaves of a tree, while from the outside, light and shade produce an impression very distinct from that of a traditional façade. The use of passive systems also allowed us to achieve huge reductions in the energy demand.

Should architects be required to take into account the environmental, social, economic, and cultural dimensions in their works?

CRL. Absolutely. Just as a doctor is required to take the Hippocratic Oath, I believe that the equivalent in architecture is taking such dimensions into account. An architect cannot be an accomplice to the destruction of the environment or to climate change. Architecture is ethical and political because it is part of human activity. x





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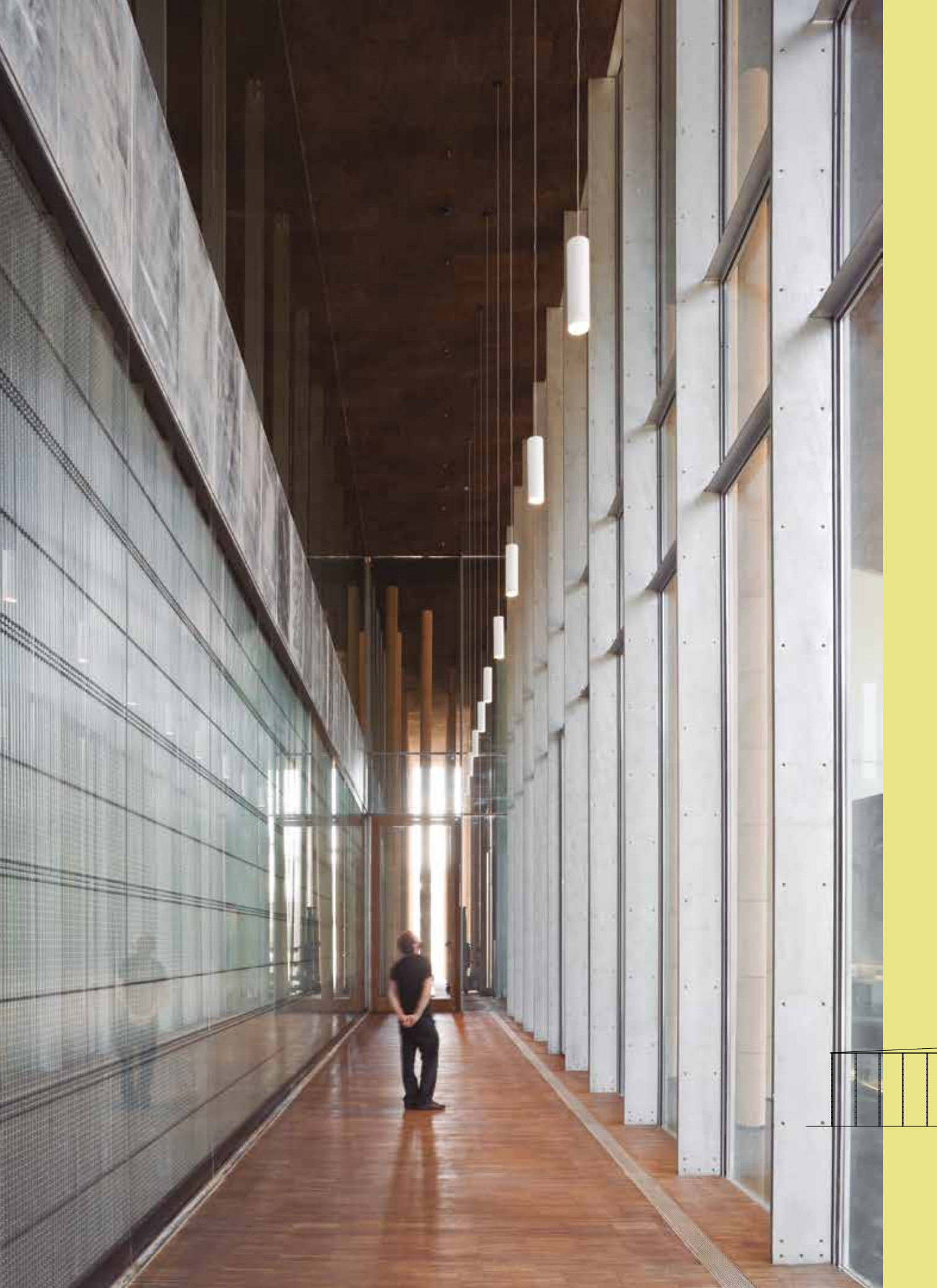
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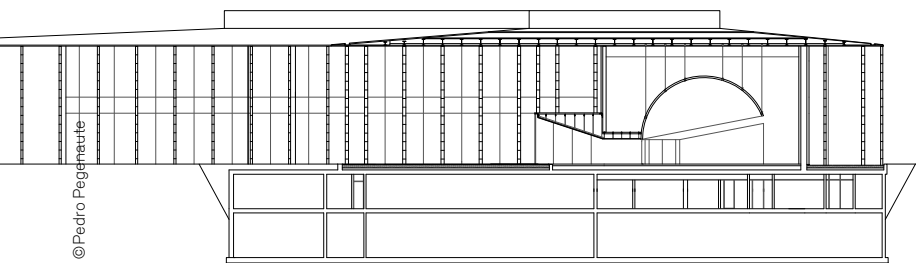


PATXI MANGADO

“The very concept of sustainable architecture somehow sounds redundant.”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

PM. The term ‘sustainability’ has certainly been manipulated and turned into a commercial slogan. During recent years, it has seemed that any association with the term has come to add commercial value to a building, without much explanation given. A kind of code and architectural language – derived from the use of all types of technological artefacts added to current architecture – has even been developed to show environmental concern. This makes it seem like just a fashion or a label. Concern for the relationship between means and ends, the idea of a reasonable use of resources and concern for the specific and the context are all values deeply >



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Francisco Mangado graduated from the School of Architecture of the University of Navarra, where he has been a lecturer since 1982. Some of his most notable works are: The “Baluarte” Congress Hall and Auditorium of Pamplona; the Museum of Archaeology of Vitoria; the Pavilion of Spain for World Expo Zaragoza 2008; the BBAA Museum of Asturias in Oviedo and the Congress Hall of Palma of Mallorca. Among many other awards, he has received: the Andrea Palladio Architecture Award; the FAD Award for Architecture; the CEOE prize; the Construmat Architecture Award; the Fernando García Mercadal Prize; the Asturian Architecture Prize; the Giancarlo Lus gold medal awarded by the International Union of Architects; and the Copper Architecture Prize. In November 2016, the Berlin Academy of Arts granted Francisco Mangado the Berlin Art Prize-Architecture in recognition of his work. In 2011, he was named international fellow of the Royal Institute of British Architects and in 2013 honorary member of the American Institute of Architects.





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“DURING THE YEARS OF MARKET SPECULATION AND UNCONTROLLED GROWTH, ARCHITECTURE CAME TO FOCUS ON THE BUILDING AS AN OBJECT, REMAINING UNCONCERNED WITH LOCATION OR WITH THE RESOURCES THAT IT REQUIRED.”



“CAN A BUILDING THAT DOES NOT CONSIDER A CERTAIN ETHICAL PERSPECTIVE AND A CERTAIN RESPONSIBILITY TO THE ENVIRONMENT REALLY BE DESCRIBED AS BEAUTIFUL?”

©J. Rodríguez



implicit in architecture itself, at least according to my understanding. During years of market speculation and growth without political or cultural control, architecture has fundamentally focused on the building object and remained unconcerned with location or the resources required.

Do you think that sustainability requirements can condition the beauty and character of an architectural work? If so, in what sense?

PM. No, architecture thus conceived does not restrict formal or expressive values. We, architects, can continue to express our freedom. A project's concern for the environment, society or energy resources cannot condition its architecture. These issues should be implicit in the project's own exercise. Architecture, at least according to my way of doing things, is born from reality. A concern for sustainability should be a natural part of the reality that we face. The thing is that reality can be interpreted very differently, leading to the emergence of different solutions. But I would say that there are very few things that constrict architecture. Even a very tight budget can be a wonderful opportunity for a project, if approached creatively. From such

a perspective, I do not believe that the principles that define sustainability condition the beauty, or character, of architecture, especially when many of them are in the DNA of architecture itself. Taking this a step further, can we really say that a building that does not consider a certain ethical perspective and a certain responsibility for the environment is beautiful? This is a debate that would undoubtedly draw great interest to the concepts of architecture.

Among all of your projects, which one do you think most highly of? Why?

PM. It might sound like a cliché, but such a project is always the one on the table. The reality is that the process is always so intense that when you're working on it, it absorbs you and traps you, creating a bond, that at times, makes you forget everything else, including other projects. When you go back to review your work, there are always remarkable projects, but all this depends on circumstances that we do not always control. Sometimes, a small project becomes something very significant, whereas in major ones there is not such a special relationship. In my case, there are some projects that stand out, such as the Spanish Pavilion at the Expo in Zaragoza-



za or the most recent ones I have finished, such as the Palma de Mallorca congress hall, a project in which I invested almost 10 years of my life, or the Norvento company headquarters in Galicia. I recall them for different reasons, but maybe not always good ones. Or perhaps the importance lies in what I learnt while completing them.

Should architects be required to consider the environmental, social, economic and cultural dimensions of their work?

PM. A concern for the physical and human environment is not a new aspiration but rather a principle or a series of forgotten principles that must be injected back into the DNA of architecture. Architecture adapted to the environmental, economic or available resources should not be a cause for merit. Nor should it be that cities are planned out in order to make travel and infrastructure more efficient and comfortable, or to have more attractive public spaces. This should be something essential that is not even considered as an addition or a special achievement. That's why, when talking about sustainable architecture, the concept sounds redundant or unnecessary. ✕



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VALERIA DEL PUERTO

“Sustainable criteria have been implicit in vernacular architecture since ancient times”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

PM. Good architecture cannot be disassociated from the sustainability dimension. Nowadays, we are facing an energy and environmental crisis, climate change, a lack of water, waste production and pollution, where buildings are responsible for 40% of energy expenditure and a third of the emissions causing global warming. The current situation has placed the term “sustainability” on the global agenda.

Many sustainable criteria have been implicit in vernacular architecture since ancient times and around the globe. It is an architecture that demands less technology and more wisdom in the project, that seeks low-cost solutions linked to the site and the available resources. It requires an architecture that is sensitive to nature and its elements, whose design strategies allow for a minimizing of the impact of construction and its subsequent maintenance over time. >



Valeria del Puerto is an Argentinean architect. She is head of one of the most important green architecture and sustainable architecture studios (del Puerto- Sardín). She has vast experience in participating in public competitions in Argentina and is president of the CPAU (Consejo Profesional de Arquitectura y Urbanismo). At the end of 1988, she and Horacio Sardín decided to get together with other colleagues from the Taller Vertical Miguel Ángel Roca, University of Buenos Aires, to set up a studio. Between 1997 and 2001 they formed the studio Grupo Tres. In 2001 they teamed up with Sardín to form the del Puerto-Sardín studio. They also formed working groups with other architects such as Roberto Frangella and Bárbara Berson. Del Puerto has also participated in numerous professional associations in various positions. In her work, a concern for the values of places, regions, and the environment, viewed from a humanistic perspective, are aspects that particularly stand out.



“AN ARCHITECTURAL WORK
MAY TEND TOWARD “BEAUTY”
IF IT CARRIES POETRY, BUT
IT MUST ALSO BE WISE
IN ITS MATERIALITY AND
APPROPRIATE TO THE SITE,
PRODUCING A POSITIVE AND
INTELLIGENT IMPACT”





© del Puerto - Sardin studio

Do you think that sustainability requirements can condition the beauty and character of an architectural work? If so, in what sense?

VDP. The criteria of sustainability involve a response to both climatic conditions and sensitivity to the context in a broad sense, including the social and cultural dimensions. An architectural work may tend toward “beauty” if it carries poetry, but it must also be wise in its materiality and appropriate to the site, producing a positive and intelligent impact.

Among all of your projects, which one do you think most highly of? Why?

VDP. We have poured love into each and every one of our projects and have been part of a search in terms of growth and the deepening of intentions. Some of them stand out in our minds because they represented a gateway to new places and cultures, such as the White Tower in Ulaanbaatar, Mongolia.

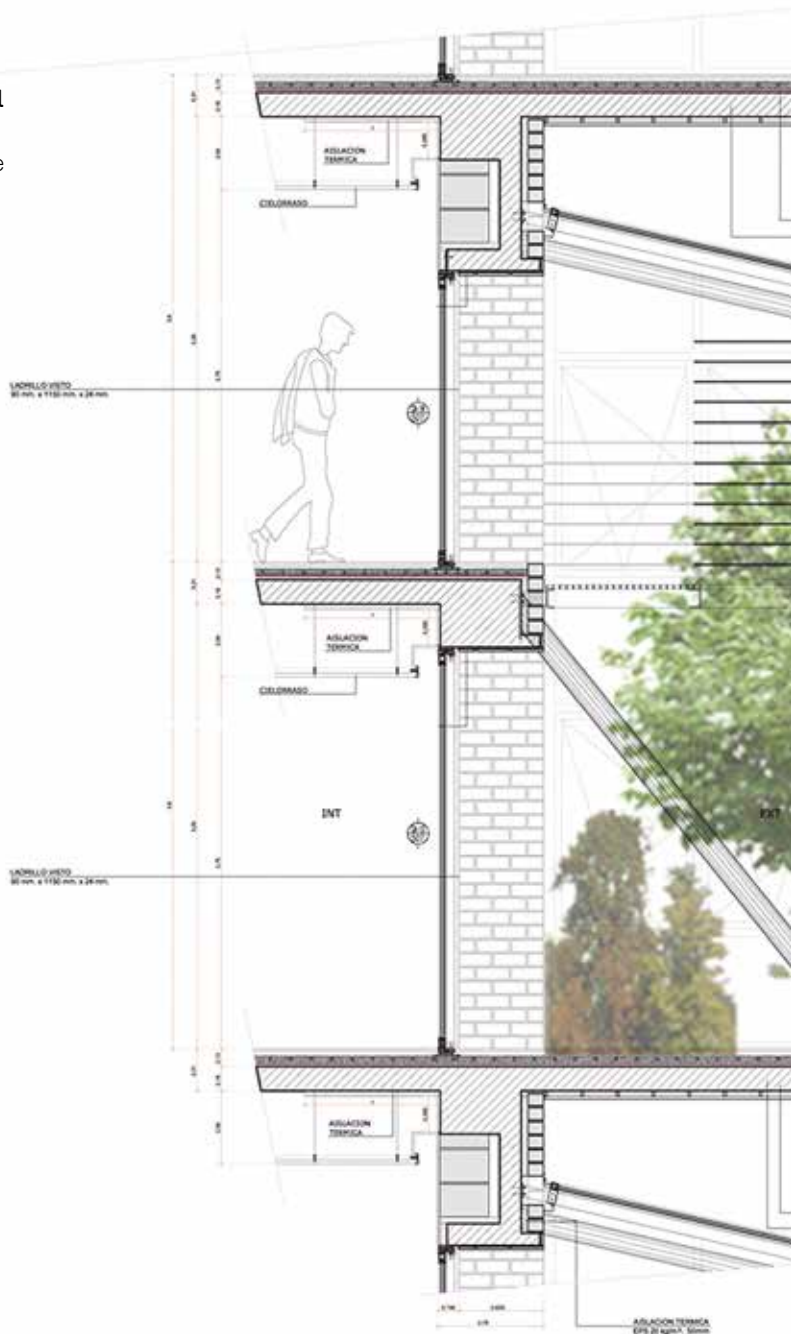
In the world’s coldest capital, we proposed a new type of tower that would be different from the glass buildings that predominate in any city in the world. In the search for the appropriate materiality and in trying to recover the wisdom of the Mongolian yurts, we designed a building wrapped up by thick walls that protect it from temperatures as low as -45°C , also adding triple-glazed windows to minimize energy consumption.

In the base and penthouse, we added glazed boxes with a double skin, forming a winter garden incorporating vegetation, thus searching to locate a balance between nature and architecture.

Should architects be required to take into account the environmental, social, economic, and cultural dimensions in their works?

VDP. As architects, we must try to ensure our architecture makes a positive contribution to the environmental and social imbalance. Our discipline includes the social, economic, and cultural dimensions, and is linked to science, energy, and technology, which is why our responsibility is so great.

The mark we leave on our cities and our natural landscapes challenges us to address these issues, to understand the culture and its inhabitants, to read the spirit of the site and its natural cycles, to know its roots and resources and to consider the full cycle that includes the construction, maintenance, and demolition of buildings, both in relation to materiality and the people who carry them out.



In an increasingly complex and diverse world, thinking about architecture from an environmental, social, economic, and culturally sustainable standpoint will surely contribute to generating better ways to inhabit our buildings and cities. ✕

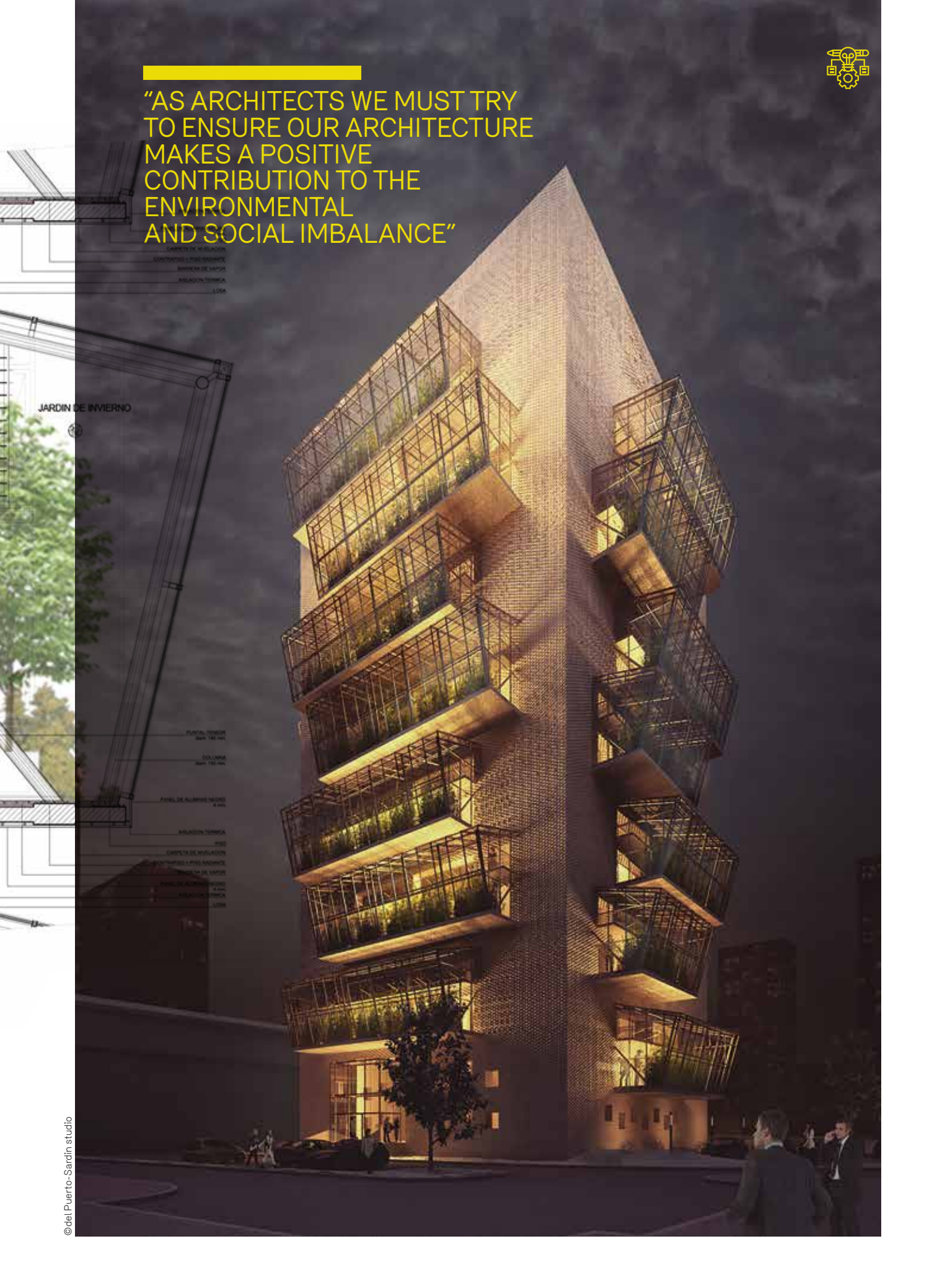


“AS ARCHITECTS WE MUST TRY TO ENSURE OUR ARCHITECTURE MAKES A POSITIVE CONTRIBUTION TO THE ENVIRONMENTAL AND SOCIAL IMBALANCE”

CAPTELA DE MALLACIÓ
CONDICIONADO + PISO INSOLANTE
BARRERA DE VAPOR
INSULACIÓ TÈRMICA
LLOSE

JARDIN DE INVERNO

PLATEAU TENSOR
800x 120 (mm)
COLUMNA
800x 120 (mm)
PANEL DE ALUMINI NEGRO
8 mm
INSULACIÓ TÈRMICA
1000
CAPTELA DE MALLACIÓ
CONDICIONADO + PISO INSOLANTE
BARRERA DE VAPOR
PANEL DE ALUMINI NEGRO
8 mm
INSULACIÓ TÈRMICA
LLOSE







JOHAN CELSING

“Buildings should be built to last”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

JC. As regards Sustainability in Architecture, may I quote from my 2007 essay entitled “the Robust, the Sincere”¹. It begins as follows:

Buildings should be built to last. What is still typical today, despite all the new technology, is, after all, that architecture is a genuinely unwieldy, slow medium that requires major resources for its creation. For this reason, the robust is important if architecture is to be taken seriously and contribute to the development of a sustainable community.

The robust is an alternative to the architecture that is mainly based on visual features. The really significant qualities of a building are complex and not always visually accessible. They quite simply demand a different commitment, or even presence, if they are to be judged.

The robust should not be interpreted to mean something crudely hewn and therefore sturdy through its brute strength. Instead it is intended to engender durable and multifaceted architecture. There are many factors that make architecture relevant in the long term and appearance is only one of them. Robust architecture affirms the context of a project in the broadest sense. Its physical, concrete surroundings are one aspect of this. Other aspects are the technical condi-

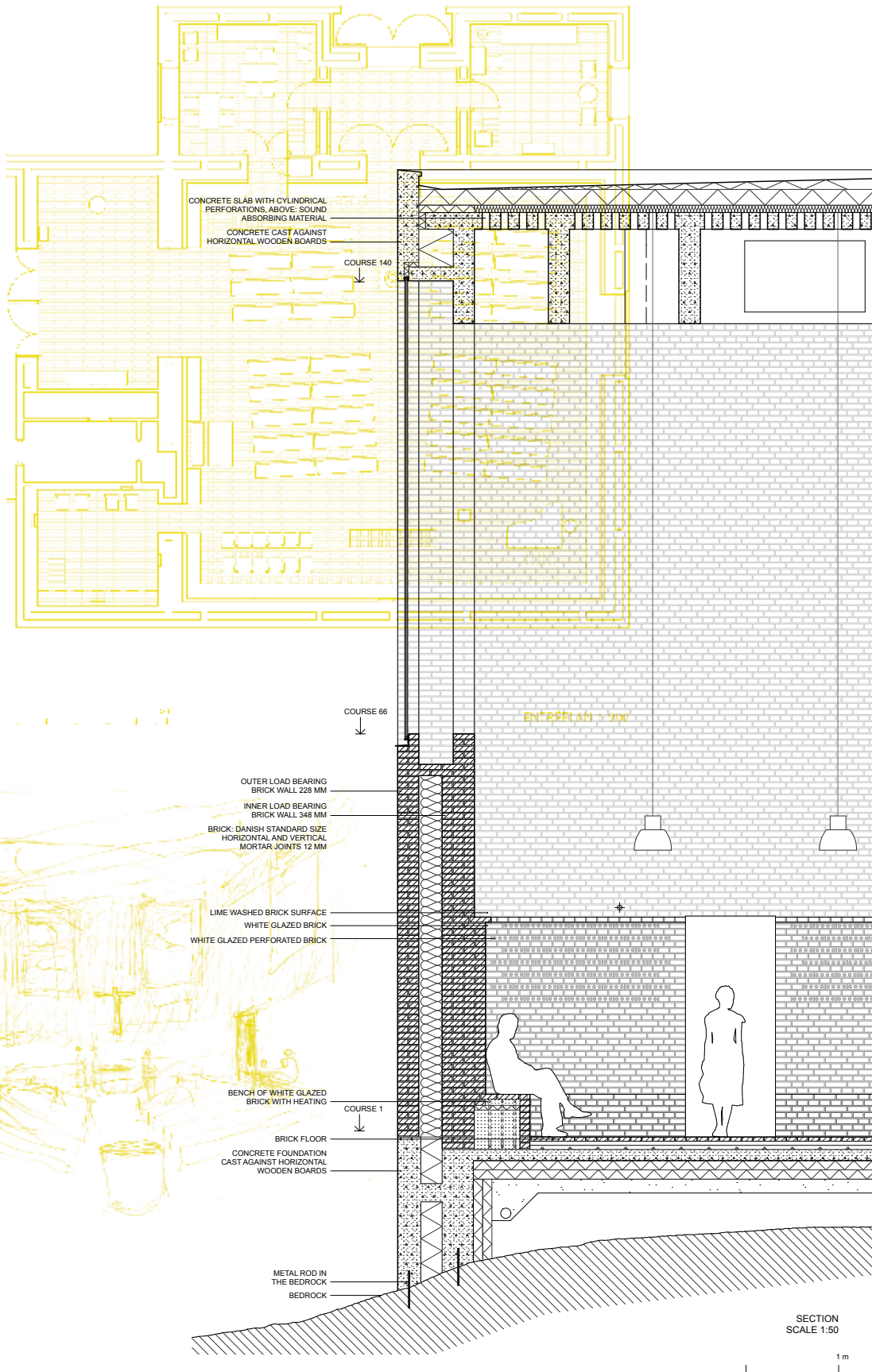
1. The essay *The Robust, the Sincere* was published in the anthology: *Nordic Architects Write*. It was published by Routledge, London, in 2008.



Johan Peter Folke von Celsing, was born, in 1955, in Engelbrekt, a parish in the diocese of Stockholm. He runs an architectural office in the Swedish capital and has designed: the Nobel Forum at the Karolinska Institute in Solna; an extension with an art gallery at Millesgården museum in Lidingö (1999), which was awarded the Kasper Salin award; Bonniers Konsthall in Stockholm (2004); an extension to the Skissernas museum in Lund; and Årsta Church (2011). Celsing has been the architect for Stockholm Castle as well. Among his later works, it is relevant to highlight the new common office building for the National Heritage Board and the National Exhibitions in Visby. This building was one of three nominated for the Kasper Salin Prize in 2008. The forest cemetery's new crematorium, completed in May 2014, was also designed by Celsing. In 2008, he was appointed lecturer at the Royal Institute of Technology, and in 2010 he was elected as a member of the Royal Swedish Academy of Sciences.

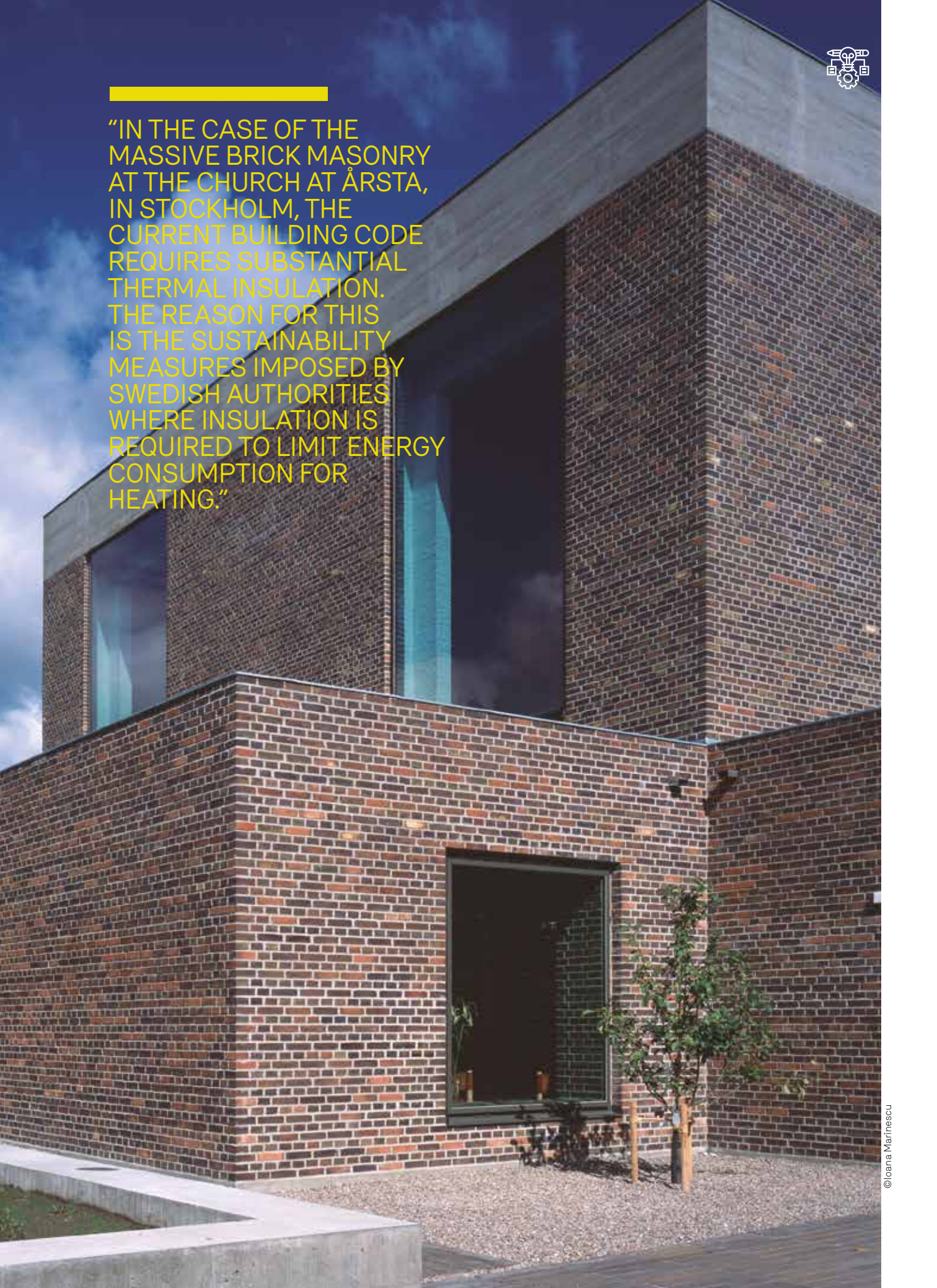


THE NEED FOR SUSTAINABLE ARCHITECTURE





“IN THE CASE OF THE MASSIVE BRICK MASONRY AT THE CHURCH AT ÅRSTA, IN STOCKHOLM, THE CURRENT BUILDING CODE REQUIRES SUBSTANTIAL THERMAL INSULATION. THE REASON FOR THIS IS THE SUSTAINABILITY MEASURES IMPOSED BY SWEDISH AUTHORITIES WHERE INSULATION IS REQUIRED TO LIMIT ENERGY CONSUMPTION FOR HEATING.”





"AN INGENUOUS USE OF SPACE, MATERIALS OR HUMAN ORGANIZATION MAY ENDOW AN ARCHITECTURAL WORK WITH A SENSE OF URGENCY, GRAVITY OR GENEROSITY THAT MAKE IT TRULY MEMORABLE."

tions that apply to the project, its financing, its social context, its history, or current, or expected, social role. Robust architecture aims to determine the state in which all the circumstances can be scrupulously taken into account and synthesised in the form of a building. When one or more of these circumstances change, the building will continue to be relevant, but now superimposed with its own historical overlay.

Sigurd Lewerentz's works provoke thought in this context as they focus on the essential, the poetic, advanced experiments, but not as visually challenging buildings that demand the attention of those who are not really affected by them. On the other hand, those called upon to use them find them more interesting than most other buildings.

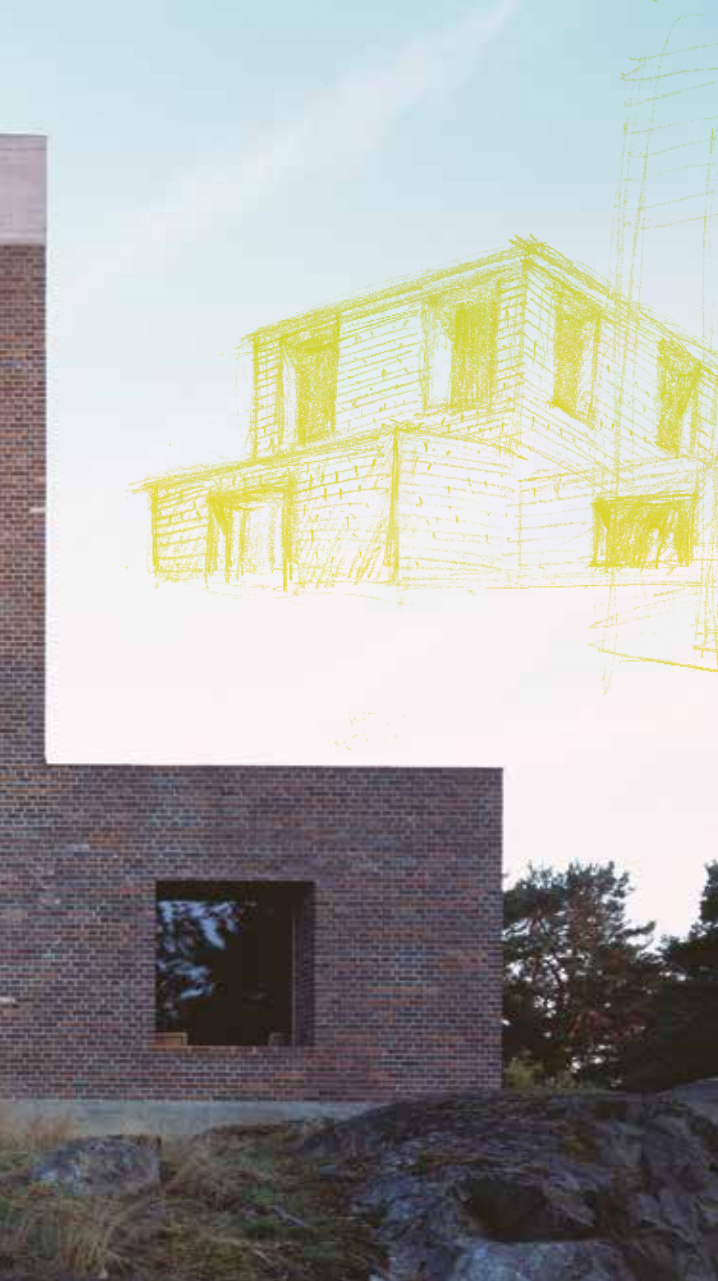
Another aspect of the robust, but different, is how the building may be combined with other buildings,

or perhaps even rebuilt. In this respect robustness denotes how clearly, or as it were self-evidently, the building manifests itself. Here, we could describe the robust as the cut-off point where functional requirements have been fulfilled and where the design acquires an almost generic character. This can also be expressed by saying that it is also open for other forms of use. This is easier said than done.

There are many examples of buildings with contrived, archaic appearances and, what is more, whose appearances may be little more than the sum of all their functions.

Do you think that sustainability requirements can condition the beauty and character of an architectural work? If so, in what sense?

JC. Beauty in architecture is a multifaceted concept. What makes an architectural project great are not



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only aesthetic or visual aspects. An ingenious use of space, materials, or human organization may endow an architectural work with a sense of urgency, gravity, or generosity that make it truly memorable. In my opinion, a statement by Leon Battista Alberti, in his treaty “Ten Books on the Art of Building” is particularly fitting, in the discussion about Sustainability and Beauty. In the tenth chapter of the ninth book, he writes that:

“The greatest glory in the art of building is to have a good sense of what is appropriate.”

And as if to say that there is no quick-fix to achieve the appropriate, he continues:

“...to build something praised by the magnificent, yet not rejected by the frugal, is the province only of an artist of experience, wisdom, and thorough deliberation.”

Among all of your projects, which one do you think most highly of? Why?

JC. I believe a certain ethos of practice has evolved over the years that generally characterizes our projects. Luckily, situations and clients are different, and paradoxes are reoccurring features in our discipline.

In the case of the massive brick masonry at the church at Årsta, in Stockholm, the current building code requires substantial thermal insulation. The reason for this is the Sustainability measures imposed by Swedish Authorities, according to which insulation is required to limit energy consumption for heating. This means that the 88 cm thick brick wall, which may last for 500 years, has to include mineral wool or similar products with a drastically shorter life span.

Should architects be required to take into account the environmental, social, economic, and cultural dimensions in their works?

JC. The discussion about sustainability is a healthy thought-provoker amid the apparent economic affluence of our time. These discussions possibly challenge the dominant tendency to use visual impact or novelty for their own sake. Without a doubt, for cultural, economic and social reasons, we need to look after and maintain what is already built and to cleverly, and with empathy, integrate the new with the old. Hopefully the discussions about sustainability may result in a more efficient use of our resources at large and a more dignified building culture. ✕



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02

The influence of the project

Tatiana Bilbao • Cherubino Gambardella • João Nunes
Ángela García De Paredes & Ignacio Pedrosa



Although buildings appear as static realities, they are in fact the result of dynamic processes, beginning with their design and extending into the periods of construction and use. All of the stages of their development are important, and all are, to varying degrees, related to the requirements of sustainability. The choice of location, for example, will condition a building's energy performance, but this may also be said of the way its inhabitants manage its ventilation.

It is, however, during the initial stages –from the preliminary draft to the basic project and construction– that the decisions that most influence a home, or a building's sustainability, will be made. These decisions will determine what materials will be used and its main structure, as well as other aspects that cannot be modified later on. In fact, as the successive stages unfold, the possibilities for improvements in the field of sustainability progressively diminish.

Initial decisions are only the sole responsibility of the architect in an ideal world. With few exceptions, the architect is usually commissioned by a client. This is the first condition and sets the tone for the project. It is at this point that variables such as the predetermination of the location, the cost restrictions established in the budget, and the architect's and client's sensitivity to environmental matters should be con-



sidered. It is the combination of all of these variables that will provide a solution which may be described as sustainable or not.

The search for balance

This observation seeks to underline the fact that sustainable architecture is not only an achievement derived from the application of a series of principles and techniques at a given moment. It is also the result of achieving a balance between various possibilities which are available to the actors involved in the process, with these actors intervening before, during and after a building's construction. In this sense, the role of the users should not be forgotten, as it is their habits and activities which determine the degree to which a building is sustainable throughout its useful life.

The search for balance is also present in the personal decisions made by the architect. The project must incorporate several elements that seek to find a compromise between costs, availability, impacts, functionality, comfort and beauty. The importance of balance is evident in the resolution of both general and specific issues, such as the management of a building's heating and cooling. Here, a sustainable vi-

sion should promote a sound relationship between the two, with this naturally varying according to the geographical context and the needs deriving from the human activities associated with each case.

Next, we will review the main decisions concerning the location, the building envelope, and the selection of materials. Although these three aspects have been separated in the text for descriptive purposes, they are deeply interrelated. An understanding of these interrelationships is what allows the architect to adopt strategies in order to make their project as sustainable as possible.

The importance of location

The location of the building is crucial to its future energy consumption. If a building located in a cold climate is designed so that its façade faces away from the sun instead of towards it, active systems for capturing heat will have to be installed, rendering the project less sustainable, no matter how efficient its systems may be. In a country with a warm climate, on the other hand, locating a building where it receives large amounts of solar radiation may create the need to mitigate overheating. Such a goal may be achieved by the use of either constructive elements or active systems, or even both, or by planting vegetation such as trees. Arboreal masses provide a series of advantages: cooling a building in summer and also protecting it from the wind. Deciduous species offer shade in the summer period and allow light to be obtained by buildings in winter.

As may be gauged, the choice of location goes beyond the site and extends to the area around the building. Any analysis undertaken must consider both the local vegetation and the topography, due to their well-known influence on temperature, wind and sunlight. These conditions are especially significant in rural areas.

In dense, consolidated cities, it is more difficult to source optimal locations, in terms of sunlight and shade, than in rural environments. Some buildings can obstruct the reception of light by others and can even have undesired effects, creating unwanted effects, such as reflections from glass skins, which are frequent in office buildings. In addition, certain streets can easily become corridors that accelerate wind speeds due to their orientation. The same is true of skyscrapers. >

Considering the ecological footprint of a building in a broad sense also requires taking the mobility patterns of its users into account, whether they are permanent residents or people who use the building as a place of work. Two buildings with basically the same construction characteristics, one of which is located in the city centre and the other out in the countryside will not be equally sustainable, as the latter's distance from public transport will make it less sustainable. The tendency towards the zoning or segregation of activities in separate areas (for residence, work and retail) encourages the use of private transportation, which is now primarily based on non-renewable energy and inefficient from the point of view of transport capacity. Zoning, which has proven so popular in recent decades in different parts of the world, which mimics the North American model, effectively counteracts advances aimed at improving a building's energy performance. While this is undoubtedly a matter that is closely related to urban and territorial planning, the architectural project must determine whether to take this question into account or to ignore it.

Location can also be relevant to health. Possible soil contamination by radon, methane or other gases must be assessed, as must the level of the water table and the presence of underground water currents. The subsoil also has tremendous energy potential. Its harnessing, as geothermal energy, provides access to an inexhaustible source of energy that would potentially allow an optimal climate throughout the year, thanks to the constant temperature of the Earth at a particular depth underground.

In addition to the initial phase, the location of the building also plays an important role during the property's construction and eventual demolition. In both cases, the operations carried out require adequate planning to limit negative environmental impacts.

The skin as an interface

The building envelope is another key aspect of sustainability in architecture. A building's skin is referred to in this way because it serves as its interface with the outside world, operating just like human skin. Its design must therefore incorporate strategies developed to achieve a balance between its opening and closing. The optimal point of this balance will be determined by its geographical region and the corresponding climate, as well as by the location itself. The building materials used and their combination will also contribute to achieving this balance.

The envelope would be expected to moderate extremes of temperature (of cold or heat), delivering a sufficient renewal of indoor air and offering comfort by preventing the intrusion of rain and wind and the generation of moisture. As with the location of the building, the choice of envelope is also subject to certain limitations, especially economic ones, although a sound choice can reduce the need for active heating and cooling systems and will result in savings. The envelope is therefore bound in a close relationship with energy and resource consumption, particularly as not all materials are equally abundant or renewable.

The development of the envelope involves four main concepts which could be considered as strategic project elements: thermal inertia, insulation, ventilation and shade.

Thermal inertia is the property that indicates the amount of heat a body can retain and the speed at which it emits or absorbs it. It depends on the material chosen and, more specifically, on the mass, density, specific heat capacity and thermal conductivity coefficient.

Sound decisions on the materials used in the envelope, in terms of their thermal inertia, help to stabilise the temperature indoors. A wall with a large degree of thermal inertia in summer will, for example, absorb heat during the day, store it, and then progressively dissipate it during the night, both on the inside and outside. The next morning, the temperature of the wall will have dropped, restarting the cycle, and thus reducing the need to use cooling equipment. Thermal inertia is especially relevant when there is a pro-

“The project must find a compromise between costs, availability, impacts, functionality, comfort and beauty. The importance of balance is evident in the resolution of general and specific issues.”



nounced degree of thermal oscillation over a 24-hour period.

Insulation and ventilation combine with thermal inertia to determine indoor comfort and the amount of energy needed to achieve it. Good insulation prevents heat losses that result in the need for more heating in cold climates and during the colder months of the year. It also prevents the production of excessive heat indoors during hot periods, and in warmer latitudes, thus reducing the need for artificial cooling. Ventilation aims to both reduce the indoor temperature and promote air renewal, and may be performed by natural or mechanical means, or a combination of the two. Some mechanical systems allow a building to recover heat from the air extracted, while others do not. From the point of view of sustainability, the best systems are those that facilitate passive cross ventilation through appropriate holes in windows. However, the generation of chilly air currents should be avoided in these cases.

Shade elements are another of the resources that a building envelope can use to protect it from excessive heat or light. The options required to achieve this include shutters, blinds, slats and eaves, which can be fixed or mobile. Another possible choice is between manual and mechanical devices which affect energy consumption. An advanced line of shade devices now includes photovoltaic capture.

Within the envelope, the roof and the base of the building are also important for temperature regulation. Both areas must be subject to isolation, and the roof must also incorporate ventilation.

The envelope may serve as a usable space for the capture of energy (solar from roofs and walls, and wind from roofs).

This may significantly modify the energy balance in a building and also exert an influence on the global environment, if fully developed on a large scale. This is a plausible scenario in the energy transition towards

renewables, as a process in which architecture plays a decisive role, together with transportation.

That said, green roofs and walls help to thermally insulate a building and, at the urban level, contribute to the enhancement of a city's biodiversity, while improving its air quality.

Intelligently orienting a building means that openings can be made in its envelope to receive more natural light, thus reducing its need for electrical consumption. Natural light combined with efficient lighting and technologies such as presence sensors allow energy savings of up to 40%. The openings in the envelope may be traditional windows, but there are also other systems for introducing natural light into its interior, such as through skylights or solar tubes that, without using active systems, can channel the outside light to the most remote parts of a building, using prisms and mirrors. Another relevant aspect of natural light is that it increases the indoor temperature of a building, which implies a greater need for ventilation and/or cooling in summer. Looking beyond the architectural and engineering project, the importance of user awareness of questions related to lighting cannot be emphasised enough.

Embodied energy

Materials are another fundamental issue for sustainability in architecture, primarily due to the amount of energy embodied within them. This encompasses energy consumption linked to the extraction of the raw material, its transportation to the factory, its transformation, and finally its transportation to the construction site. It has been estimated that embodied energy may account for up to a third of a building's total energy consumption.

The implications of this reality are important. Various sustainability criteria may be applied to a building, but if the embodied energy associated with its construction materials is very high, the building's environmental impact will be significant.

“Efforts to introduce sustainability criteria to a project may be distorted in the construction phase by either poor execution or by the substitution of the initially planned materials by others.”



The choice of materials will once again be the result of a balance between several factors: functionality, resistance, durability, recyclability, healthiness and, of course, cost. Other factors such as trends and fashions also play a role and are relevant in terms of the market potential of the project. It is important to know, for example, that the energy required for the manufacture of an aluminium, steel or copper unit is much greater than that needed for the same unit made of wood, ceramics or agglomerated cork. However, although this is a very valuable criterion, it is not the only one.

The specificities of each project call for an ad hoc solution based on more than one consideration. Wood, for example, does not require a large amount of energy for processing and is a renewable, organic and healthy resource, although it does have some drawbacks. One of these is that its thermal inertia is low compared to granite, brick or concrete. Another important consideration is that when it comes to a local resource, the energy expenditure in transport is low, but if the material is imported wood and it has been sourced from regions subject to a process of deforestation, the environmental cost will be high. This kind of analysis should ideally be extended to all of the building materials used. The key to advancing in sustainable architecture is to take into account the main guidelines (energy consumption and impact on resources) relating to construction materials and to use them to calculate gains and losses and to make the most appropriate decisions.

Efforts to introduce sustainability criteria into a project may be distorted in the construction phase by either poor execution or by the substitution of the initially planned materials by others, to give just two examples. For this reason, the architect must adopt a proactive surveillance role and ensure that the established requirements are respected.

Sustainability in the construction process is also linked to carrying out tasks in a way that does not have environmental impacts on the land surrounding the construction site. The natural environment around the site must be protected by plans for the work logistics that prioritise this consideration. The waste generated must also be treated according to a strict protocol that guarantees its separation and subsequent treatment.

Prefabricated pieces

Another relevant consideration at this stage is the amount of time dedicated to the work, which will, naturally, determine the total energy consumption. Prefabricated elements provide solutions for this challenge. Their development during the second half of the twentieth century, mostly thanks to the need for reconstruction after the Second World War, allowed construction methods to evolve considerably. Nowadays, they offer high quality and a significant reduction in costs and execution time. Prefabrication can be applied to any material and has been developed to a degree of sophistication that allows factory assembly of not just basic elements, but also of complex architectural components. The implications for sustainability are obvious: reducing execution time means reducing energy consumption. In addition, such consumption is lower at a factory than on site. Likewise, the factory optimises the quantities of materials used and facilitates their recycling.

The project is therefore very important for achieving a more sustainable approach within the different stages of a building's lifespan, from its construction and use, to its end of life. As previously indicated, sustainability is the result of several decisions made within a complex scenario. Building Information Modelling (BIM) generates a large amount of data about a building, at its different phases, thereby facilitating an analysis of its different construction elements and their interrelationships, establishing comparisons between systems, materials, spaces and forms. These capabilities shape a global vision that is also a vision of the

complexity that the architect and the other agents involved in the project and construction process must face. Hence the enormous potential for innovation and sustainability. x





TATIANA BILBAO

“The essence of everything is to understand the other”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? Is it a significant challenge? Or is it just a concept implicit in any project of quality?

TB. I think it’s an unnecessary label, which has become fashionable. In fact, the word architecture already includes this concept: the task of architecture is to generate spaces that are responsible for other people’s lives. That is the meaning I give to the word sustainability. Perhaps transforming this word into an adjective or a qualifier may seem necessary at this moment, because architecture today has forgotten its deepest function — probably since the end of the last century — and that is why there is now a sudden need to apply this adjective to architecture. However, it is somewhat redundant as it is used as a fashion. We architects have to make spaces that are really sustainable because that is what architecture is all about.

‘Sustainable’ means that resources that could be used in the future should not be used today. These resources are not only environmental, this is another misuse of the word. Sustainable seems to mean that we should be responsible for the environment when — in fact — we should be sustainable with everything around us: in social, cultural, political, economic and, of course, ecological terms. Everything is just as important, even if this word is currently used only to describe responsibility for the environment. >



Tatiana Bilbao is a Mexican architect. She founded Tatiana Bilbao Estudio in 2004 and has completed projects in her own country but also in China, France, the United States, and Guatemala, among others. Her most representative projects include: the Botanical Garden of Culiacán, in Sinaloa (Mexico); the exhibition hall of a park in the city of Jinhua (China); and a prototype for a 62 m² low-cost sustainable social housing unit that was presented at the Chicago Architecture Biennial, in 2015,[4] and which was originally projected for Chiapas (Mexico).

Bilbao’s work has been recognized with the Berliner Kunstpreis, in 2012; the 2010 Architectural League Emerging Voices; the Global Award for Sustainable Architecture of the LOCUS Foundation, in 2014; the 2017 Impact Award at the Architizer A+Awards; along with the 2020 Tau Sigma Delta Gold Medal; and the 2019 Marcus Prize Award.





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Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

TB. Sustainability is not an adjective, but an essential part of architecture's tools. It is not a conditioner, but a springboard for doing something much more suitable, and with much more meaning, than something that is not done responsibly. I cannot talk about the great works of architecture without mentioning works that stand out because of how incredibly rooted and developed they are, with their environment; in a responsible way, and in all senses. And there are some that respond, to a greater or lesser extent, —like all human beings and all things— to certain parts of us, but which also give them beauty. For me, that's what architecture really is.



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“WE ARRIVED TO ENNOBLE THE CULIACÁN BOTANICAL GARDEN, IMPRINTING ITS ESSENCE, BUT WITHOUT ALTERING THE ORDER. WE HAD TO BE RESPONSIBLE TO SOCIETY”



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Of all of your projects, which one do you think most highly of? Why?

TB. One outstanding project is the Culiacán Botanical Garden. The incredible thing is that this place already existed when we arrived. And we arrived to ennoble it, imprinting its essence, but without altering the order. We had to be responsible to society, and this project taught me a lot. The society here identified this place — even before we arrived — as an iconic place, as an important place, as a social meeting place, as a place that really contributes to the urban fabric. And our task was to understand it and to be able to react and add one more experience to this place: the experience of contemporary art.

For a start, the approach was very hard. One of the most incredible ways in which human beings can build

is to understand their history and their existence. Rather than denying everything and starting from scratch, we can understand how it came about, where it came from, and how we can continue its history. This is what we did. We tried to add to this space other values that could give it a wider scope, in order to offer alternatives to the visitor, but also to offer a slightly more educational system. In addition, since the garden already existed, we were able to work with part of the team that managed it. We set up a multidisciplinary team for this action, which was fundamental to generating a wider vision. The vision that I can have as an architect is rather narrow, and if I can share the project development with other professionals who can broaden my vision, it will always be positive. It is always interesting to be able to attract more minds.



“AS A SOCIETY, WHEN WE FAIL TO SEE THE POSSIBILITY OF THE OTHER IS WHEN WE COME INTO CONFLICT.”



One of the most interesting questions was how to act in this environment with a programme that is normally not very receptive: art. It had to be opened in every way, since the physical location is not a box, but a garden. Moreover, this became the purpose of the place, which was to accompany the people visiting the site and to get the rest of the elements integrated in social terms. We could have made a museum: a perfect box, with the ideal conditions to attract people from all over the world and without any budget problems for the project. However, we would have attracted people, but not involved them with the creation of art, as is being done here; because here, people are living art daily, going into art in a very different way, closely related to the garden.

The garden of Culiacán had all these options on the table. In addition, we took on the responsibility of carrying out a project with many fronts and, above all, without it ceasing to be the city's main reference point. Now, it is visited by literally 3000% more people a day, and I think it was therefore a project that fulfilled its purpose.

What are the key elements in the design and construction of a building, in your opinion?

I believe that the essence, the key, is to understand how to put yourself in someone else's shoes. This is a challenge that I have always taken on. I don't think I will solve it in the short time we have of life, but it is a question that I always ask myself: how can I get under another person's skin so that that other person feels as though they have designed the project themselves, since I cannot know what their needs are, as I am not them.

For me, that is the essence of everything: an understanding of the other. In that moment, one enters into the consciousness of seeing what that other person or element sees. When I think about the need for the other, the other can also be the land where the building is erected, and then knowing the needs of this land, how this land is going to receive this space, and in what way. The other can be the land, the orientation, the economy, the society, or the culture.

As a society, when we fail to see the possibility of the other is when we come into conflict, in every sense. In the physical environment, everything is given, and everything is worthwhile. I like to think that this essence already gives us a sense of construction that is based on quality and on taking advantage of the resources available to us: ventilation, materials, labour, etc. x







CHERUBINO GAMBARDELLA

“All difficulties in architecture can be turned into opportunities.”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? Is it a significant challenge? Or is it just a concept implicit in any project of quality?

CG. I think that we have to take the old traditions of architecture and transform them into contemporary forms. Sometimes we forget the importance of historical architecture, which took elements such as the location of a building very seriously. Now, when I work on a building, I always consider using local materials. I want to reduce excavation, demolition and costly works that modify the environment and the landscape, as much as possible. My belief is that all difficulties in architecture can be turned into opportunities, and that every intervention can be made in harmony with the environment.

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

CG. Technology has offered us a wide range of possibilities, but I think that a good architect can >



Cherubino Gambardella has been lecturer in architectural design since 2000, teaching at several Italian universities and lecturing at Cornell, ETH Zurich and the Catholic University of America in Washington DC. He is devoted to theory and research in design issues and has contributed to various international books and journals. He has also written his own books. In 2013, two of his collages were included in the exhibition ‘CUT’n Paste’ at the MoMA in New York. He has participated in six editions of the Venice Architecture Biennial. He has also presented his designs at the Triennale in Milan and at several museums in Europe, America, and Asia. Gambardella has also been recognized in several international design competitions.







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“I AM A BIT TIRED OF SPECTACULAR AND “PERFECT” ARCHITECTURE. ARCHITECTURE MUST SPEAK TO SOCIETY AND SOCIETY IS FAR FROM PERFECT.”

also use the existing regulations to their advantage. If a building requires a zero energy balance, for example, we must try to integrate solar panels in an imaginative way. I have worked on a lot of projects searching for a zero energy balance; among them was a beautiful old villa in the south of Italy, with Knauf walls transforming the skeleton of an old construction. These walls allow good isolation and have wide windows that let lots of light in.

Of all of your projects, which one do you think most highly of? Why?

CG. I really liked the pavilion for 12 Mediterranean countries at the 2015 Milan Expo because I was able to use shade to protect the building from the heat. I also added solar panels and elements collecting rainwater for gardens. I was selected to build the pavilion in a communal space: — a covered square —, with 12 small buildings representing the various nations. Energy savings were obtained in a solid result.

What are the key elements in the design and construction of a building, in your opinion?

CG. I think that you need to have a very strong synthetic idea. All the conceptual capital must be spent on one idea and you must work on this idea obsessively. When a lot of teams with many ideas are involved, then it becomes very difficult to control the work for the building. You can achieve something more valuable with a single idea, a synthesis. So,



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I am very happy when I can work with one team. The building should be integrated with the city, the country and the local culture. This is a strong idea. Another one is that the odd imperfection can be a positive thing, and not necessarily a defect. These imperfections can even be proof of quality. I am a bit tired of this spectacular brand of “perfect” architecture. Architecture must speak to society and society is far from perfect. x





JOÃO NUNES

“Sustainability issues have to be intrinsically integrated into project thinking”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? Is it a significant challenge? Or is it just a concept implicit in any project of quality?

JN. The main theme of my work is Landscape Architecture projects. Landscape, like any other artifact, is constructed from a critical position of man in relation to his environment. In a first set of layers of transformation of the world, this criticism is exercised in relation to the imperfections of nature, revealed as obstacles, threats, or discomforts. Nature carries out her merciless destructive action in a series of events, devoid of any moral sense. This has always stimulated the search for answers to prevent those events from repeating themselves or, at least, to ensure that, when repeated, we find ourselves prepared and protected.

In the subsequent series of layers, corresponding to the architecture of the constructed world, criticism is still concerned with the imperfections of nature, but it is also concerned with the imperfections of the work of man, which are renewed, year after year, decade after decade, generation after generation, with a new technological level, or with the construction of new systems of values.

In this continuous transformation of the world, two different tools are used. One tool shapes the new form of the world with the construction of protection >



João Nunes is a landscape architect with a great passion for drawing and analysing the processes of the world. In 1985, he founded the PROAP studio, which addresses landscaping issues from a very wide angle and takes the landscape as a process in constant transformation. In Nunes’s career, professional activity and teaching are mixed and enriched, contributing to new lines of research and experimentation. He has been a visiting lecturer at various universities around the world (Harvard GSD, the University of Pennsylvania, UNAV-Pamplona, Versailles, etc.) and is currently a member of several scientific committees. In 2013, he obtained the first Adalberto Libera Chair of Excellence. In 2010, he published the monograph PROAP - Arquitectura Paisagista, which summarizes 25 years of study; and in 2011, he co-authored “Lost Competitions”. The projects carried out by PROAP have won national and international prizes and have been among the finalists of the Rosa Barba International Landscape Prize (Barcelona).



spaces. It is a way to protect us that derives from our observation of what other animals do, building shells, cocoons, nests, etc. All are declinations of the same idea of a protection artifact produced from the combination of different parts that are not previously related to each other.

This, in a constructive sense, is linked to the idea of manufacturing, of producing a new thing from materials, and their transformation and assembly are made to the measure of the human body.

Another tool, however, articulates differently with the world and has little to do with the size of our body. It finds its measure in the spontaneous mechanisms and the functioning metabolisms that it tries to regulate.

Here, we have drainage systems that transform swamps into farmland, irrigation canals that cover entire plains or small gardens, agricultural terraces that completely cover a mountain or that are designed as singularities, river dams, and coastal protection structures. In these works, measure is not related to the human body, but to the transformed territory.

Landscape projects often use these two tools at the same time, for their conceptual and constructive processes, mixing their arguments and logic in the same transformative project.

This characteristic gives to the aforementioned projects, and to the construction of buildings in general, a particular relationship with the context that makes sustainability issues intrinsically integrated into project thinking.

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

JN. I would say that more than conditioning beauty, personality, and even continuity, sustainability is the condition that makes these qualities possible over the course of time.

Today, we admire archaeological structures that allow us to understand the ingenuity of their construction. They were structures that involved colossal efforts in the name of artifice and wonder. In these places, we see the vanity of wishing to accomplish the impossible, the inversion of the natural order of things, and also the will to create emotions. But many of these structures withered away once the conditions that had kept them alive were over.

In landscape, we always speak of artifice, but this is an artifice which — brought to the highest degree of perfection — recreates the spontaneous condi-



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VERY RECENTLY,
LANDSCAPE WILL ONLY
WORK PERFECTLY WITH US,
AND WITH OUR INTENSE
AND CONSTANT EFFORT,
UNDER APPARENTLY
NATURAL METABOLIC
CONDITIONS”



tions of operation and self-feeding and which does not require a continuous effort of maintenance at a level that would be impossible to guarantee for long periods.

In the modern dream, the idea of the self-maintained machine, which takes care of its own maintenance and energy supply, is the latest chimera. The landscape tries to be this chimera, this almost perfect machine, that mixes wisely designed artificial conditions with spontaneous functions. Nevertheless, as we have learned very recently, landscape will only work perfectly with us, and with our intense and constant effort, under apparently natural metabolic conditions.

Therefore, the sustainability of a public park, a garden, or a public urban space is not governed by an absolute equation that can establish a standard efficiency threshold. Zero Energy Balance Building ideas can be applied to public spaces, but before that, it is important to draw the equation of community effort. We are talking about the collective love and affection with which the community relates to this space, that is to say, the meaning of this space in the imagination of the community.

Conceptually, it is always related to the idea of domestication; a landscape project is never a complete artifice, just as it will never be completely natural. Domestication involves a commitment: a compromise over time. Domestication is irreversible in the sense that the return to the natural state is impossible. So, these considerations lead to reflections on the temporality of our interventions, on the transmission to the coming generations of responsibility for this continuity. Furthermore, the availability of resources for these future generations, in terms of work effort, water, and energy, are completely unknown.





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Of all of your projects, which one do you think most highly of? Why?

JN. It is difficult to identify a favourite project. I will mention a short list of works built and not built, whose conceptual reflections actually illustrate some of the ideas I have explained so far: the Palatine Project, Archaeological Areas of Rome, Italy, 2016/2017; the Parque do Tejo, Expo 98, Lisbon, Portugal, 1996/2000; Valdebebas Park, Madrid, Spain, 2006/2010; the Waterfront of Antwerp, Belgium 2011/2017; and Kekedala Park, Urumchi, China, 2015/2016.

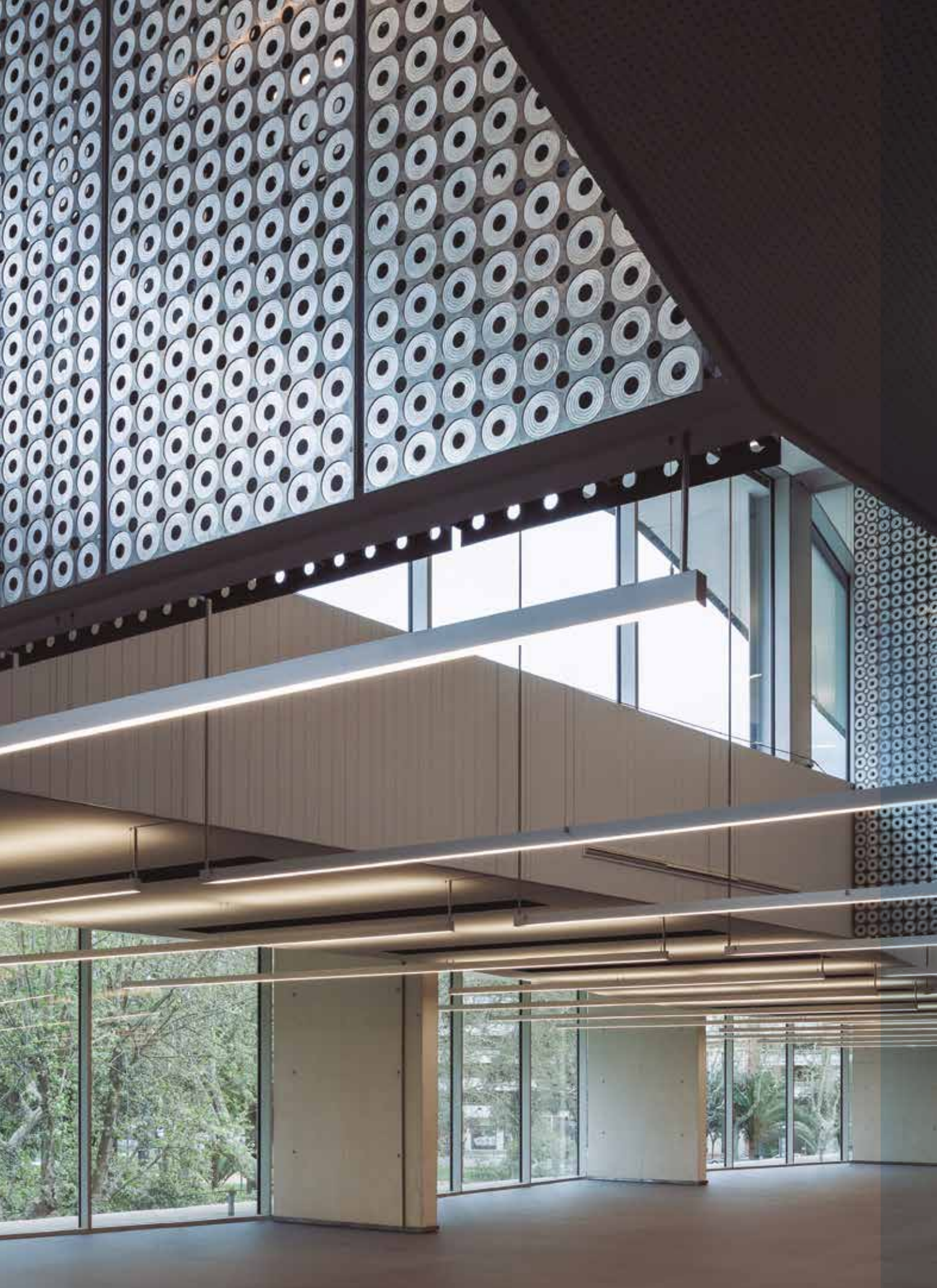
What are the key elements in the design and construction of a building, in your opinion?

JN. A landscape project is linked to a system of larger areas than the area strictly targeted by the project. This link is crucial for understanding the potentialities of any intervention. A project that does not contemplate the context, — understanding by context, these larger areas —, misses opportunities for transformation, and reaches misunderstood objectives. This is quite easy to understand referring to space, but the same happens with time: in this case, we are talking about the extended temporal context.

The project's time span is just the frame of a long film that began in geological times and will continue, with or without a project, into the future. The starting point of the project needs an awareness of the past that should materialize in understanding the site and its spontaneous transformative energies and contents, which are physical, material, symbolic, inert and living.

A project with all the key elements should control the passage of time between the past and future of a site.

For all these reasons, the idea of Sustainability should be intrinsically integrated into a design. The design should understand the project as part of a whole strategy which considers spatial and temporal aspects, but also social, economic and political issues. In this strategy, affectivity, memory and identity should be integrated as well. The question is whether we should not find the same concerns in all expressions of architecture. x





ÁNGELA GARCÍA DE PAREDES & IGNACIO PEDROSA

“New building materials provide the architect with a wider range of possibilities than in the past.”

What does the word “sustainability” mean to you when it is associated with architecture? Is it a label? Is it a trend? Is it an effort? Is it a challenge? Or is it just an implicit concept in any quality project?

GP&P. Sustainability, understood as the balance between architecture and the resources within its reach, must be implicit in the architectural project itself. This balance is provided by the response that the project contributes to the combined solution to the many and varied problems that the architectural project has to address. Questions such as: attending to human needs, the physical place where the project is implanted, the local climate and winds, and the materiality of its construction... are those that the project must respond to, and this attention reverts back to the architecture, making the project truly sustainable, and not merely one with a label. Without a doubt, this entails design effort, attention to reality and knowledge. It is therefore not, in our >



Ángela García de Paredes (PhD ETSAM) and **Ignacio Pedrosa** (PhD ETSAM) founded the architecture studio Paredes Pedrosa Arquitectos in Madrid, in 1990. They are lecturers at the Escuela de Arquitectura de Madrid (Madrid School of Architecture) and guest lecturers and speakers on academic content relating to national and international architecture. Paredes Pedrosa Arquitectos focuses its activity on public tenders and projects, mainly for public buildings providing cultural facilities. Their built work includes buildings that integrate archaeological remains and also interventions on historic buildings of heritage value. In the case of housing, the EUROPAN II and IV Awards implied the construction of various social housing complexes and the transformation of their public space. Their work has been recognized with prizes including: the 2014 Gold Medal for Merit in Fine Arts; the 2007 Spanish Prize for Architecture, the 2014 Eduardo Torroja Prize for Engineering and Architecture; and the 2015 AADIPA European Prize for Interventions in Architectural Heritage.





opinion, a question of fashion or of the times, although in our time, the need for sustainability is more evident, due to the lack of attention paid in previous times of prosperity and media voices. An example of a sustainable project would be the Basilica of Palladio, in Vicenza, which is built on existing architecture, reusing its materiality, with spaces that are open to the city for public use, with little need for maintenance, and built with durable materials.

Do you think that sustainability requirements can condition the beauty and character of an architectural work? If so, in what sense?

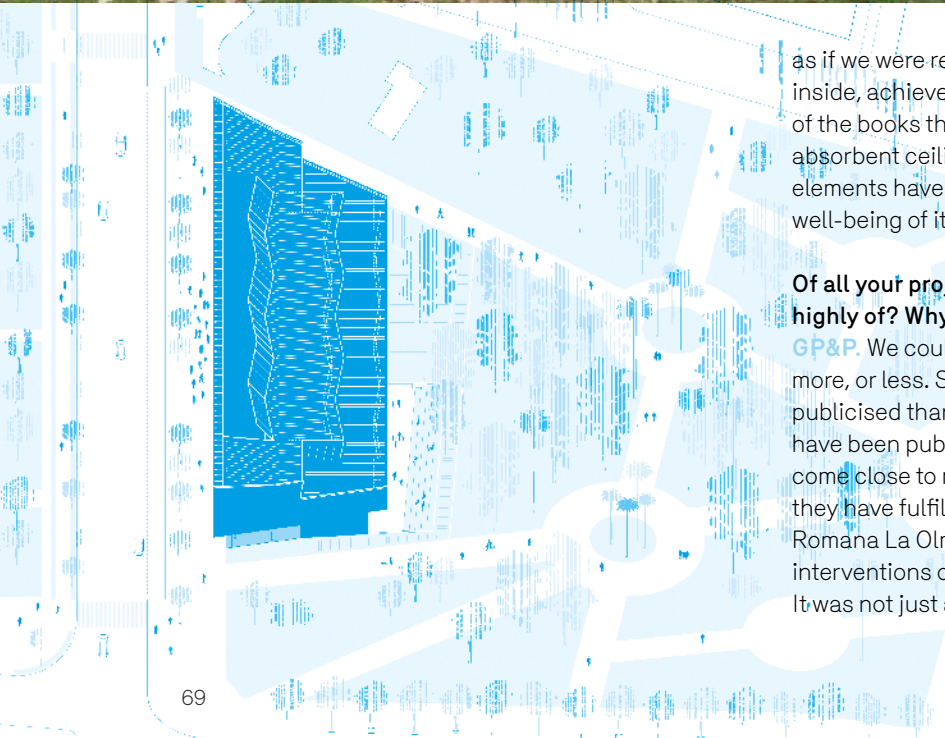
GP&P. Continuing with the reasoning of the Basilica Palladiana, its sustainability contributes to the beauty and balance of its architecture; this is beauty understood as an abstract issue, linked to the

perception of architecture and to psychophysical issues. Beauty produces emotion, satisfaction and pleasure, for the sight and senses, and, in architecture, this includes the satisfaction of human needs. Sustainability implies an ethical position and this undoubtedly conditions and expresses the aesthetics of architecture. In this sense, extending the life of buildings in time, using new spaces, and finding new uses and materials, all implies sustainability and continuing to enjoy a beauty that does not only relate to external forms but also to their spatiality, and the way in which the building interacts with the environment.

In the case of the recently completed, but not yet occupied, Library of Córdoba, we could argue that its beauty lies in its immersion in the park, and amongst the trees of the Agriculture gardens, whose branches and greenery enter both its interior and our senses,



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as if we were reading among the treetops. The silence inside, achieved by the sound-absorbing properties of the books themselves and by an efficient absorbent ceiling, into which all the technical elements have been integrated, contributes to the well-being of its readers and users.

Of all your projects, which one do you think most highly of? Why?

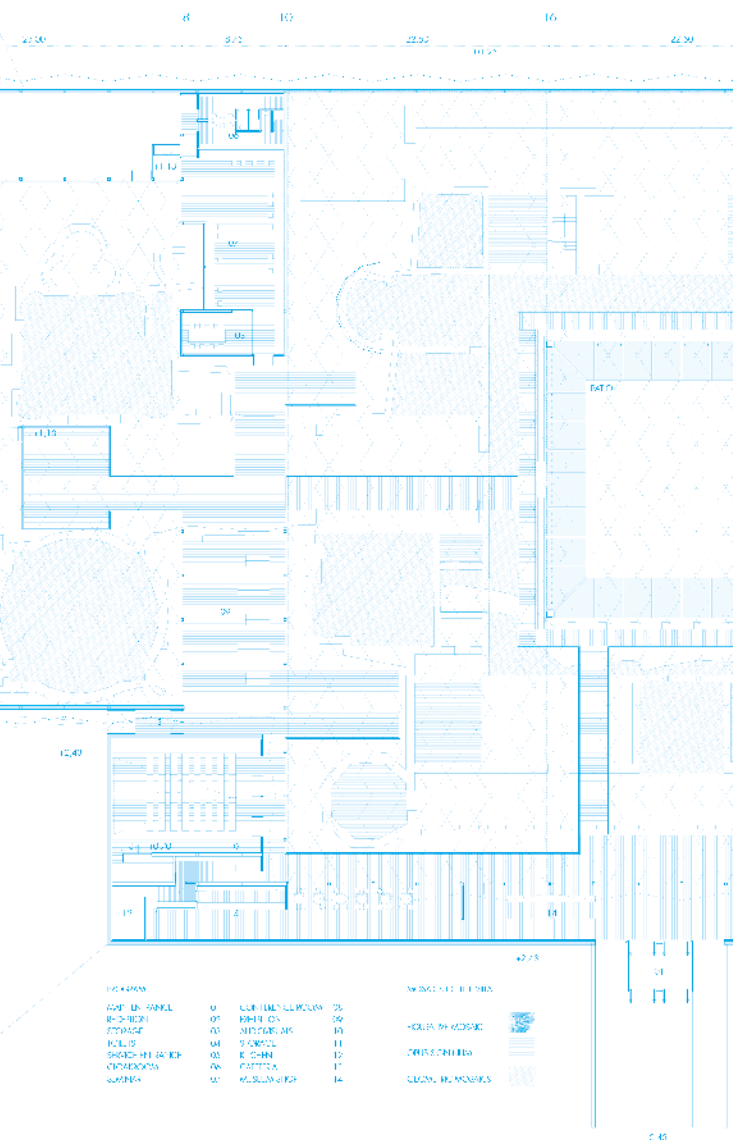
GP&P. We could not say which project we appreciate more, or less. Some projects have been more publicised than others, and not only because they have been published more, but because they have come close to meeting the initial needs; because they have fulfilled their objective. In the case of Villa Romana La Olmeda, there were no references to interventions on this scale in archaeological remains. It was not just about covering some valuable Roman





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THE INFLUENCE OF THE PROJECT



mosaics. Apart from a structure with big lights, it was also necessary to create an atmosphere, with spatial conditions and lighting that were apparent, but not established. There was also the problem of including a large-volume construction in a natural landscape, without it altering the balance of the landscape. There was also the problem of its maintenance, out in the country, which was resolved by using materials which would age with dignity, subject to the patina of time. And issues related to constructing in a place far from any industry or urban centre, on a horizontal landscape of poplars, and out in the open air, were resolved through the prefabrication, in the workshop, of an easily transportable modular structure that was then assembled, on site, with the help of a single crane. At La Olmeda, only 4% of the interior volume was air-conditioned and the collection of water from its immense roof also implied sustainability. This was

“ARCHITECTURE, WHICH IS AN EXTRAORDINARY PROFESSION, HAS TO DEAL WITH DIVERSE ISSUES AND, THEREFORE, ITS POLYTECHNIC NATURE SHOULD NOT BE FORGOTTEN.”



©Luis Astin

achieved by bringing into play old Roman canals that had not carried water since the 4th century.

What are the key elements in the design and construction of a building, in your opinion?

CG. This question is as broad as all the questions that must be considered in the architectural project. Within the project, it is of key importance to know people's needs and the means available to satisfy them. That is to say, the "why", and the "for whom", since the recipients of architecture are not the architects who design it. Attention to reality and to everything that surrounds the architecture are the key tools within the project. It is also useful to have a knowledge of history, understood as something which is close and timeless, and of references that explain to us how successful actions have previously been undertaken in similar situations. These are the true tools of the architectural project, along with having a good human team that can cover the apparently disparate issues that the architecture project must address.

On the other hand, for its construction, it is of key importance to give attention to the materials through which ideas are converted into forms. In this sense, new construction materials, and research into their

use, provide the architect with broader possibilities than in the past. Within the field of the projects that we are working on, it is of great interest that companies offer products that provide acoustic comfort: which are absorbent in libraries or school buildings, and which are also reflective in auditoriums and theatres, where the materials determine their acoustics. Research into new materials helps architects to resolve technical problems, allowing us to deliver projects and thereby to materialize our ideas. Architecture, which is an extraordinary profession, has to deal with diverse issues and, therefore, its polytechnic nature should not be forgotten. We must have knowledge of different issues that are implicit to our work and we must incorporate professionals into our teams who can help us find optimal solutions; having a good human team is once again key.

As an architecture studio, we have dedicated all our efforts to public works. Working in this field has made us aware, both in the project and the construction phases, of the need to obtain the correct result, even when the work threatens to escape our hands and our thinking. x

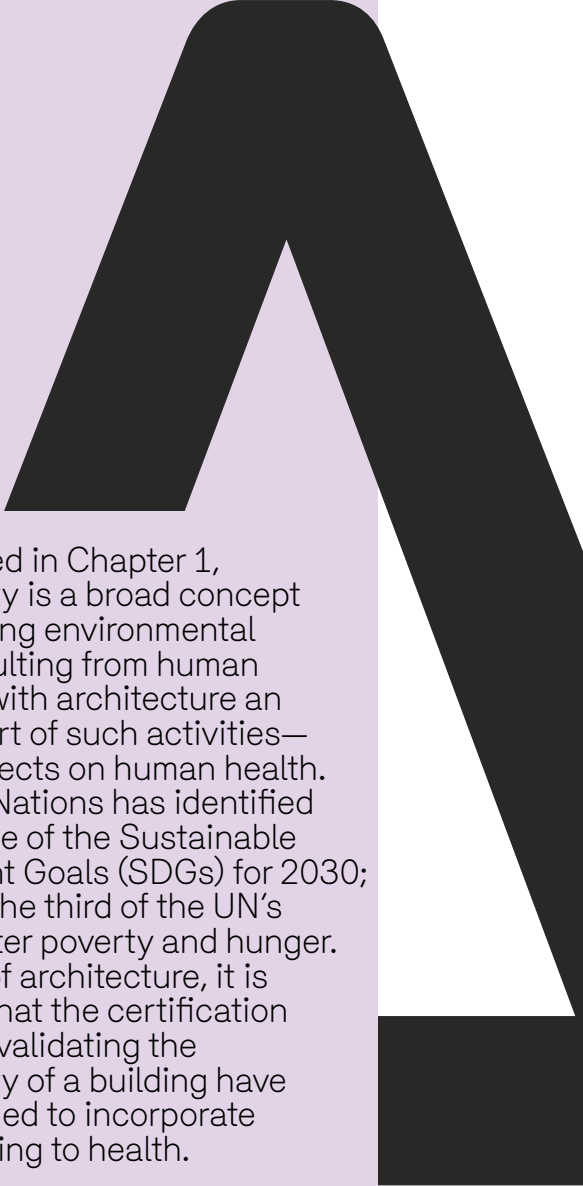




03

Healthy Buildings

Wilfried Wang • Rafael Moneo • Juan Herreros
Enric Batlle • Berta Brusilovsky



As mentioned in Chapter 1, sustainability is a broad concept encompassing environmental impacts resulting from human activities—with architecture an essential part of such activities—and their effects on human health. The United Nations has identified health as one of the Sustainable Development Goals (SDGs) for 2030; in fact, it is the third of the UN’s 17 SDGs, after poverty and hunger. In the field of architecture, it is significant that the certification systems for validating the sustainability of a building have been amended to incorporate criteria relating to health.

Criticism has been made of the fact that the move towards more sustainable architecture seems to have been conditioned by Le Corbusier’s famous assertion that “*une maison est une machine à habiter*”, spurring a vision that emphasises technology as the most useful tool. This criticism is undoubtedly part of a long intellectual debate on the figure of the great modern architect and on the role of technology itself. Without



any intention to add to the debate, whose extension transcends this work, as people spend more than 80% of their lives in buildings, their health should therefore be considered an essential element of architecture. “*Habiter*” should never be subordinate to “*machine*”.

Health and the environment

The separation between the environment and health outlined at the beginning of this text was for purely expository purposes. In actual fact, the two elements are intricately linked. According to the preamble of the Constitution of the World Health Organisation (WHO), adopted in New York in 1946, “Health is a state of complete physical, mental and social wellbeing and not only the absence of diseases or illnesses.” Such a description remains valid today and is especially interesting from the point of view of what we might call ‘healthy buildings’. However, being healthy cannot simply be reduced to being free from disease, it is also a state of fulfilment. There is a strong connection between the search for this particular state and the environment created by the architect inside a building by means of elements such as its orientation, space, ventilation and materials. In a consistent approach, it is a concept that should complement a concern for environmental impacts related to resources and energy consumption.

Before proceeding, it would be useful to clarify the role of the concept of comfort within this framework. If comfort is anything that provides ease and relaxation and generates wellbeing, then it is also an important indicator of how healthy a building is, which should not be confused with health itself. Comfort has now been parameterised, and therefore made objective, in construction regulations, although it must be said that subjectivity continues to play an important role, as no two people ever have exactly the same feelings or perceptions. It is strange to think that an architectural project that considers the parameters of comfort may be detrimental to health, but not all aspects influencing health are necessarily represented by comfort, understood as a subjective sensation. This is because not all elements that are harmful to health are obvious to the human senses. For instance, the presence of chemical contaminants in a space is not always detectable, unlike an unpleasant thermal sensation, for example.

Sick buildings

In 1982, the WHO defined Sick Building Syndrome (SBS) as the set of symptoms and diseases, caused or stimulated, by air pollution in a closed space that are suffered by at least 20% of the occupants of that space, with its symptoms including: dryness and irritation of the respiratory tract and of the skin and eyes, headache, mental fatigue, persistent colds and nonspecific hypersensitivity. The WHO definition added that all of these symptoms occur “without their causes being perfectly defined”.

The years that have passed since then have provided a variety of scientific evidence relating to the causes of discomfort to those using buildings: in addition to air, which acts as a transmitter of toxic elements from various sources, nowadays radiation and noise pollution are also considered important causes of SBS.

There are four main factors on which the healthiness of an indoor space are based. The architect’s knowledge, sensitivity and design capacities will undoubtedly play a determining role in mitigating negative factors for health, as will those of other profes-

sionals, such as engineers, and the users of the buildings themselves, whose everyday activities also carry their share of responsibility.

Location is the first consideration. As mentioned in Chapter 2, the location of a building does not just affect its energy consumption, but also influences the environmental quality of its indoor areas due to pre-existing contamination of the site chosen. It is therefore crucial to take certain decisions before embarking on the project itself. The pre-existing contamination of a given site can be separated into that of natural origin and that resulting from human activities.

The effects of radon

The best-known form of natural contamination is caused by radon gas, which is the result of the radioactive decay of radium and is found in areas with granitic and phosphoric rocks. Although linked to lung cancer, radon cannot be eliminated from a particular building site. If a decision has been made to build on the site in spite of its presence, there are various materials that can be used as barriers to radon. In extreme cases, active collection and extraction systems will have to be installed to prevent emissions from entering the building. Both the WHO and the EU have set recommended levels for radon exposure which have been reduced over time. Another significant natural element in terms of health is the existence of alterations in the Earth's magnetic field in places where there are underground water currents or geological faults, since they cause radiation. As the capacity to reduce these effects is very limited, the soundest option nowadays is to avoid building vertically above the areas of highest permanence where the phenomenon has been identified.

A construction site can also serve as a source of chemical contamination derived from former industrial activities and waste disposal. In such cases, the

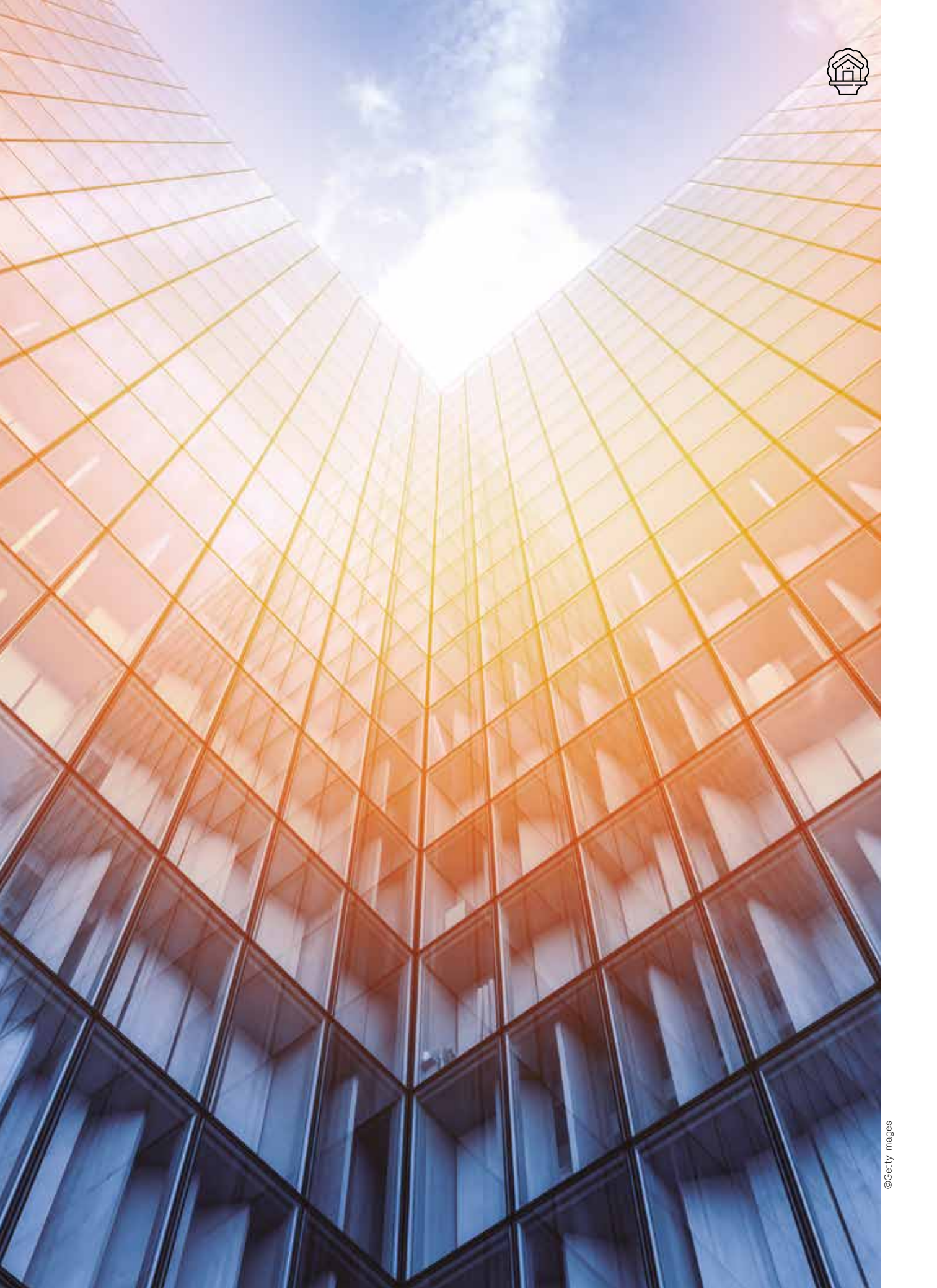
possibilities vary according to the kind of materials present. A widely publicised example is that of asbestos. In the presence of such a substance, the subsoil must be completely decontaminated before any kind of architectural project can be developed on it.

Air quality is another aspect of importance in terms of how healthy a building is. Poor air quality can be the result of various circumstances. One example would be a building which is closed on the outside and has limited or deficient air renewal. According to the WHO, sick buildings tend to be hermetic and feature mechanical ventilation systems that are normally shared by the whole building, or much of it, and in which there is only partial air recirculation. In some of these systems, the air intakes are inadequately placed. This creates a foul environment that favours humidity and the appearance of mould and mites, which may be classified as biological contamination, and in which concentrations of chemical pollutants (volatile organic compounds, among others) from the materials found in the building increase.

It must also be remembered that the daily activities of the people who inhabit or use a given building may, to varying degrees, serve as additional sources of internal contamination (associated with tobacco, cleaning products and aerosols, etc). One extreme example is in the danger posed by a malfunctioning boiler emitting carbon monoxide. System maintenance, from the simplest to the most complex, is therefore a key element in determining how healthy inhabited buildings are.

The flow of outside air into a building is, in itself, a positive factor and one that can help alleviate some of the problems described in the previous paragraph. However, in both mechanical and natural ventilation, the origin of the air introduced must be carefully studied. Such a factor is connected to the physical context. The negative consequences of an outdoor air intake close to car parks, motorways or streets with high levels of pollution can be reduced by means of the in-

“People spend more than 80% of their lives in buildings, therefore their health should be considered an essential element of architecture.”



stalling filters, or the presence of abundant vegetation, but only to a certain extent. The state of air quality in some environments is a major obstacle for air renewal to achieve its beneficial effects.

The third relevant area for a healthy building is that of materials. This includes some construction materials, furniture, and paints and adhesives. Pollutants released by these materials, such as asbestos fibre, formaldehyde vapour and volatile organic compounds, diffuse through the air. Although buildings of a certain age are more prone to asbestosis than newer ones, older buildings register lower presences of volatile organic compounds. New building materials tend to contain reduced levels of toxic substances or to eliminate them completely.

Electromagnetic fields

Finally, electric and electromagnetic fields are another relevant issue that must be seriously considered in terms of health, with the presence of this type of physical contamination in buildings being on the rise. Although the source of the contaminant may be external, such as when buildings are located near high and medium voltage networks or transformer stations, the sources of such pollution are normally inside them. In terms of electrical facilities, a growing number of household appliances and electronic devices have been added to homes and offices, with data transmission performed over Wi-Fi and Bluetooth, cordless landline telephones and mobile phones. The effects produced by electromagnetic fields depend on their power and time exposure. Research into these effects tends to focus on determining their influence on degenerative diseases, cell alterations, the nervous system and tissues, in the case of semi-circular lipoatrophy.

Along with these major areas, it is worth noting the importance of using natural light and sound insula-

tion. The predominance of artificial light in both homes and work environments is related to mood, concentration and even sleep disorders. Exposure to excessive noise levels can also lead to stress and hearing loss.

In the field of lighting, there are numerous construction solutions that allow architects to take full advantage of natural light to parts of a building that cannot otherwise receive it. This can be done using optical fibre systems and can also result in energy savings. Acoustic protection can, in turn, be achieved by means of good construction design and with the strategic use of insulation: incorporating specific materials such as glass, rock wool or wood fibres.

The sensitivity in advanced societies to the interrelationship between architecture and health originated in Central and Northern Europe with the reconstruction of cities following World War II. After building thousands of new buildings, many of the materials used were observed to generate emissions of volatile organic compounds that resulted in discomfort and illness for many people. This phenomenon was particularly pronounced in Germany and inspired the movement known as '*Baubiologie*' (roughly translated as "bioconstruction"). A solid theoretical corpus was compiled which included a series of principles that would favour biological construction. These referred to the site; materials and noise; the indoor environment of the buildings; water and energy; and interior design. As a whole, they were designed to minimise the impact of building on the environment and to anticipate and solve almost all of the problems that buildings can cause to health.

Spain has witnessed the emergence of a similar concept known as '*Biohabitabilidad*'. Its goal is to construct habitable buildings following the rules of human biology. This simple statement in actual fact represents a rich and complex approach, beginning with an in-depth knowledge of human needs transferred

“The sensitivity to the interrelationship between architecture and health originated with the reconstruction of cities following World War II.



to the design of the building. According to the concept, it is in the initial idea where key lines must be established to pursue the intended results, before being applied to relevant aspects such as the location and the choice of materials. In the latter case, the concept advocates greater input from architects and other professionals with knowledge of the composition and physical properties of building materials, such as their conductivity and VOC emissions.

Holistic approach

“Biohabitability” provides a holistic approach to architecture. Without assuming an exact aesthetic formulation, its objective is for buildings to become spaces suitable for human life, minimising the presence of factors that are negative for human wellbeing. These may be present not only in older buildings, but also in some contemporary ones. An architect’s task to develop their own personal creativity becomes both an ethical imperative and a great professional challenge. This is because apart from having

to apply a series of basic principles in different areas, it is also necessary to consider complex interactions between different factors.

Sustainability does not always generate simultaneous progress on all fronts. For example, when the Swedish government began to promote energy efficiency campaigns in the 1980s, excessive efforts to better seal the envelopes of some buildings led to an increase in the incidence of asthma and other respiratory problems. This was due to

a reduction in the quality of indoor air. Biohabitability, on the other hand, studies how the combination of certain conditions can result in negative effects, many of which would be greater than those produced by problems occurring individually. There are many

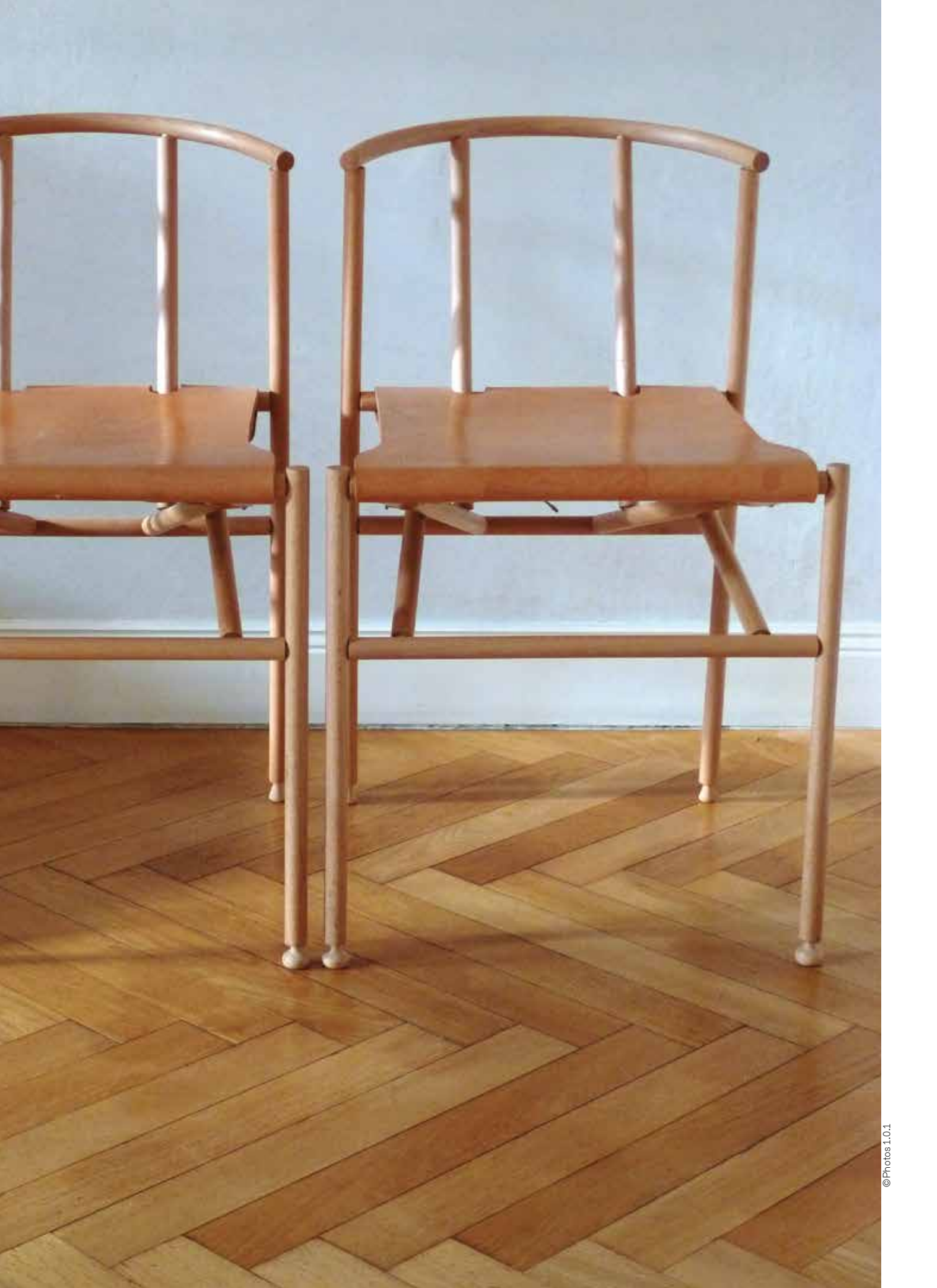
examples of this. For example, toxin emissions from certain materials can be increased by environmental humidity and temperature, while a certain degree of humidity exacerbates the negative effects of electrostatic charges. Such synergies point to the existence of areas of knowledge in which there is still much to discover and many advances yet to be made.

In the normative realm, although building codes include measures that are intended to protect human health, there is still considerable room for improvement in this area. In 2011, the Parliamentary Assembly of the Council of Europe adopted Resolution 1815 relating to “The potential dangers of electromagnetic fields and their effects on the environment”. This resolution recommends the Council’s member states to take measures to protect the population against these potential dangers in a general way, with a minor reference to buildings: “applying strict safety standards to the impact on health of electrical systems in new dwellings”.

In recent years, the United States Environmental Protection Agency has published various reports and studies on air quality inside buildings, with one of them highlighting the fact that indoor air is 2 to 5 times more toxic than outdoor air. This reality contrasts with the poor follow-up given to this issue compared to atmospheric pollution in large urban areas. Although the quality of both (indoor and outdoor air) are connected, as stated earlier in this chapter, building health tends to receive only occasional attention. This

is undoubtedly an indicator of the current level of social awareness of a subject that, from the professional point of view, requires a more proactive and multidisciplinary approach.

“Not all elements that are harmful to health are obvious to the human senses. For example, the presence of chemical contaminants is not always detectable, unlike an unpleasant thermal sensation.”





WILFRIED WANG

“We know that a lot of materials don’t last forever”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

WW. Sustainability is a comprehensive term that not only means that anything we produce as architects should be of an appropriate level technically, reducing CO₂ emissions or minimising toxins, for example, but also that constructions should last as long as possible. A building needs to be designed with the public’s approval, so that they feel that the building deserves to last for a long time. This implies using certain construction materials and systems that don’t have a limited life expectancy. Many products, such as the silicone used in windows to tackle humidity, need to be replaced at regular intervals; at least once every 10 years or so.

We know that a lot of materials don’t last forever. Clients, or building owners, may therefore have to periodically change window systems or roofs. This may cause difficulties if, for example, the materials available in 2007 are scarce in 2017. This also calls the integrity of the building as a whole into question.

Architects should be very clear about how individual components and materials can be assembled, of course, but also about maintenance, and, more specifically, about how individual replacements should be made in the future. I see many complex, high-tech solutions featuring components that may need to be replaced in 20 or 30 years’ time and that might not be available then. >



Wilfried Wang was born in Hamburg and studied architecture in London. He is, together with Barbara Hoidn, the founder of Hoidn Wang Partner, in Berlin. Since 2002, he has also been the O’Neil Ford Centennial Professor in Architecture at the University of Texas, at Austin. Wang is the founder and co-editor with Nadir Tharani, of 9H Magazine, and co-director, with Ricky Burdett, of the 9H Gallery. He has taught at the Polytechnic of North London; University College London; Harvard University; ETH Zürich; and the Universidad de Navarra. Wilfried Wang is the author, editor and curator of various architectural monographs and exhibitions. For instance, he edited the O’Neil Ford Mono- and Duograph series. On the topic of sustainability, he has written an essay entitled “Sustainability is a cultural problem”. Wang is the Manager of the German Architecture Museum and a member of various architectural associations and academies.



HEALTHY BUILDINGS



That is why I think that what are commonly known as “traditional materials” are often preferable, from a maintenance point of view, to highly fashionable ones.

Do you think that sustainability requirements can condition the beauty and character of an architectural work? If so, in what sense?

WW. No, I don't think so. You can construct a building with lots of glass, or few windows, or choose other options, but this has nothing to do with its success as a sustainable project.

Of all of your projects, which one do you think most highly of? Why?

WW. Perhaps I should mention the building conversions we have completed with relatively limited resources and which have given buildings a new lease of life, for at least another 30 years. Some of them are old structures, dating from the early twentieth century, which were used for apartments or factories. We can completely change the floors, ceilings and electrics, but the main substance of such places, which is found in the windows and the walls, is still there. I think that this is one of the most important contributions that architects can make: modernising these old buildings and adapting them to meet contemporary needs. The most sustainable building is one that has been reused.





"I SEE MANY COMPLEX, HIGH-TECH SOLUTIONS FEATURING COMPONENTS THAT MAY NEED TO BE REPLACED IN 20 OR 30 YEARS' TIME AND THAT MIGHT NOT BE AVAILABLE THEN."

What type of building poses the greatest challenge to an architect in terms of sustainability (whether homes, offices, hotels or hospitals, etc)?

WW. Well, it depends on how widely you expand the concept of sustainability. The flows of energy and of people are part of the equation. Airports are the least sustainable types of building because they serve aeroplanes which are the most wasteful mode of transport in terms of resources. Also, millions of people come to these facilities and use a lot of energy. Similarly, big hospitals are also very difficult to bring into a balance that could be referred to as sustainable. x





“AIRPORTS ARE THE LEAST SUSTAINABLE TYPES OF BUILDING BECAUSE THEY SERVE AEROPLANES WHICH ARE THE MOST WASTEFUL MODE OF TRANSPORT IN TERMS OF RESOURCES.”







JUAN HERREROS

“What was sustainable 50 years ago may not be today”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or a concept implicit in any project of quality?

JH. Sustainability is an agenda dating back to the 1970s, before evidence emerged that mankind has occupied and used the planet’s resources very irresponsibly. With time, it has come to acquire a very pertinent sensitivity in a culture that allows us to relate to the world. This is why I am more interested in proposals that accept that there are new equations from which to operate, than those that take refuge in the fact that quality architecture has always been sustainable. These kinds of affirmations, even if true, do not help us to move forward; they effectively shelve a fascinating field of possibilities that could allow architecture to find a place at the epicentre of people’s lives; and that is not to mention the fact that what was sustainable 50 years ago may not be today.

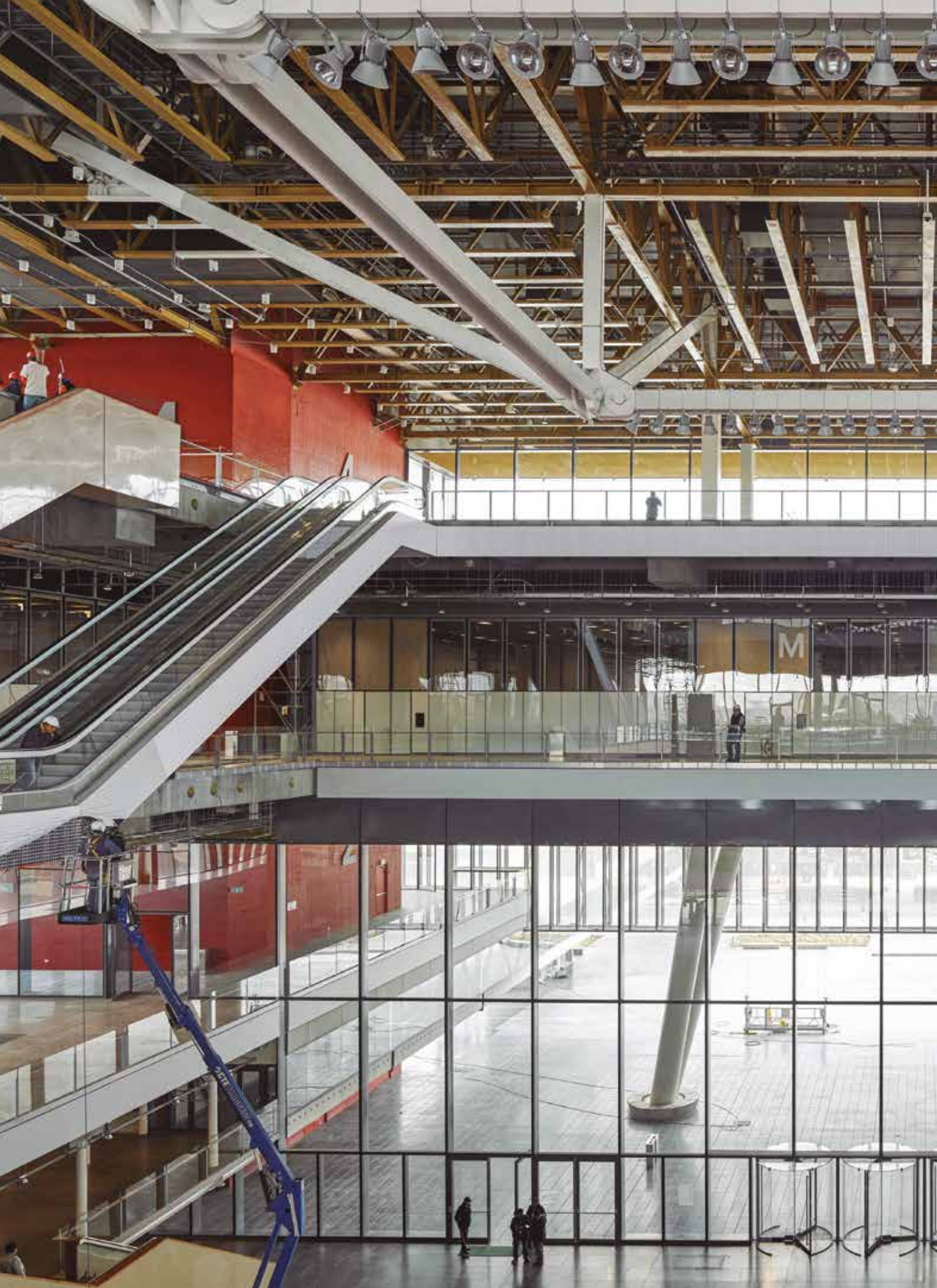
Do you think that sustainability requirements can condition the beauty and character of an architectural work? If so, in what sense?

JH. Sustainability requirements are no more of an obstacle to beauty than building regulations, budget limitations and topographic and climatic conditions. Although the architect must always deploy a critical spirit in their work, their intelligence is shown in creatively managing these contingencies and locating the most pertinent beauty in each case. >



Juan Herreros, born in San Lorenzo del Escorial (Madrid), in 1958, is a PhD Architect, Chair of Architectural Design at the Madrid School of Architecture and full-time lecturer at the GSAPP of Columbia University in New York. He has previously taught at Princeton University, at the Architectural Association, as a Diplomat Unit Master, at the EPF in Lausanne, as *professeur invité* and at the IIT in Chicago, as Morgenstern Visiting Chair in Architecture. Herreros has been appointed a member of the jury for numerous national and international competitions, editorial advisor to specialized media, and a member of several expert committees on academic, sustainability and technology-related programmes. He is currently working on a special edition publication on the works of Cedric Price, along with a piece of research entitled “*Prácticas emergentes en Arquitectura*” (Emergent Practices in Architecture), which is based on the idea of recycling the figure of the architect and design techniques. He founded Ábalos&Herreros, in 1984; the LMI (Liga Multimedia Internacional), in 1999; Herreros Arquitectos, in 2006; and Estudio Herreros, in 2014.





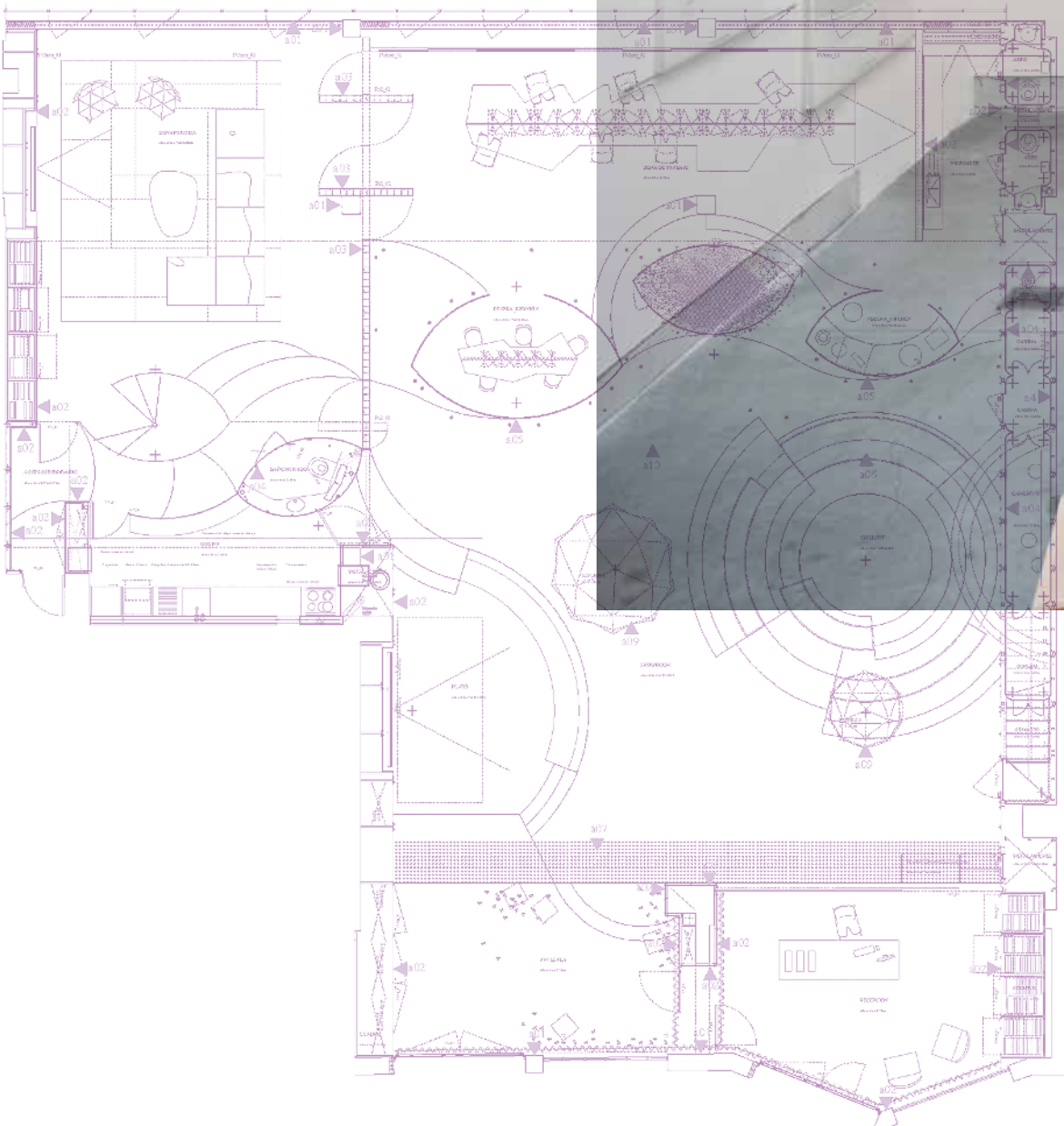


“SUSTAINABILITY REQUIREMENTS ARE NO MORE OF AN OBSTACLE TO BEAUTY THAN BUILDING REGULATIONS, BUDGET LIMITATIONS AND TOPOGRAPHIC AND CLIMATIC CONDITIONS.”

Of all of your projects, which one do you think most highly of? Why?

JH. My most immediate response was to consider the most difficult. I believe that in our field of study, we share an appreciation for the projects that have positively affected the quality of life of the people who use them. This is a feeling which is completely unrelated to scale, cost and freedom of action. The Munch Museum will change the relationship between many local people and visitors with the city of Oslo, beyond its museum programme, while the railway station of Santiago de Compostela will be useful not only for train users but for those looking for a pedestrian or cycle connection between the centre of the city and its suburbs. Such an achievement is highly satisfying.

structural design, Eduardo Barrón
er Monteyes
conceptual thinking, Luis Berrios-Negrón
Juan Navarro
communication, Pati Núñez





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What type of building poses the greatest challenge to an architect in terms of sustainability (whether homes, offices, hotels or hospitals, etc)?

WW. It is a mixture of typologies, climates and comfort concepts, but I believe that minimising the energy consumption, carbon footprint, water consumption and waste generation of large public buildings has the double virtue of managing resources that belong to everyone and creating a culture of solidarity that will be as sustainable as it will be useful. x

“THE MUNCH MUSEUM WILL CHANGE THE RELATIONSHIP THAT MANY PEOPLE HAVE WITH THE CITY OF OSLO.”





ENRIC BATLLE

“Architecture is a complete process that begins in the street”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or a concept implicit in any project of quality?

EB. That’s a tough question. When a word is used by many people and in many ways, it becomes meaningless; nevertheless, we all agree that we must improve the living conditions of our citizens and therefore the conditions of the places where they live: our buildings.

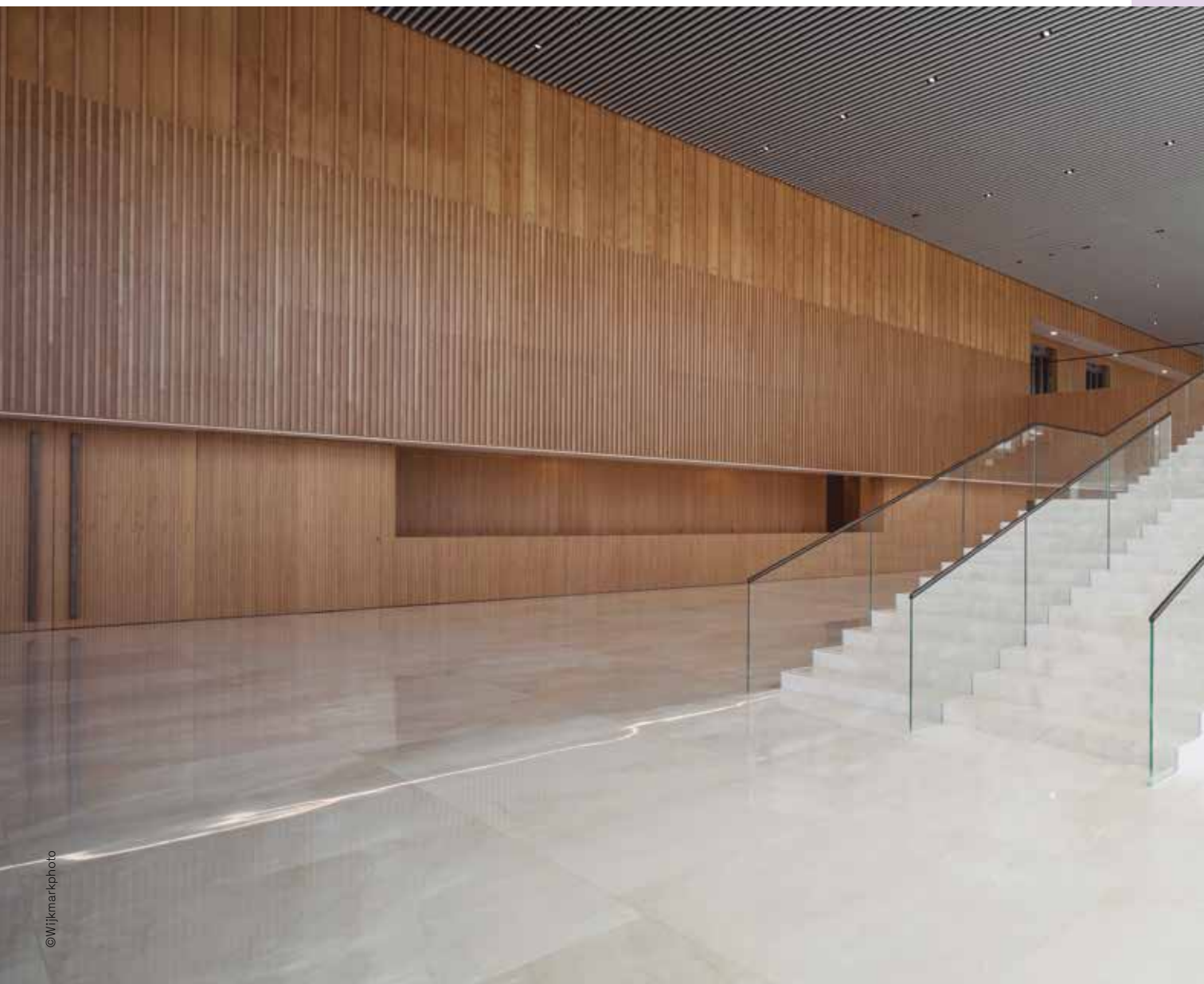
The word sustainability is associated with energy and with many other concepts, such as the comfort of living in a home which has been properly insulated by means of a careful selection of building materials. In our office, we like to think that our job is to translate the understandable forms of this word, that is to say, to explain to people that they will live a better life in a building due to the simple fact that the materials we have used are natural and will not cause any illnesses, or because they insulate better, and that the quality, form and orientation of the building alone will allow them to reduce their electricity bills by 40%. Good architecture is, by definition, sustainable.

The word sustainability is often associated with a building being strange, or rare, or having conditions that are relatively unknown. We need to start to translate the word sustainability into clear and real concepts; for years this issue has gone without the attention it deserves. >



Enric Batlle is an architect and landscaper who was born in Barcelona, in 1956. He studied architecture at the Barcelona School of Architecture, from which he graduated in 1981, and received his doctorate in 2002. He works in association with Joan Roig. He has been a lecturer at the Vallès School of Architecture (ETSAV) and at the Universitat Politècnica de Catalunya (UPC) since 1982. He has completed numerous works, which include office and residential buildings, hotels and large urban parks. He has received the Lluís Domènech i Montaner Prize for Architecture Theory and Criticism for his work “*El Jardí de la Metròpoli: Del paisatge romàntic a l’espai lliure per una ciutat sostenible*”, as well as various other prizes and distinctions: Antonio Camuñas Prize, 1990; Delta FAD Design Award, 1991; Andrea Palladio Award, 1993; Bonaplata Award, 1993; European Prize for Urban Public Space, 2004; WAF Award, 2008 and 2009





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Do you think that sustainability requirements can condition the beauty and character of an architectural work? If so, in what sense?

EB. Yes and no. They often seem antagonistic, with aesthetics (understood as the fact that a building will be of a certain shape, or of a certain style); this is one thing, while sustainability is something else. But for me there's a glaring flaw in making this distinction: our buildings must always fulfil the condition of being as good as possible. If we intend to improve the quality of life of their users, we will therefore almost certainly have to associate them with the concept of sustainability. However, the criterion of being beautiful doesn't mean that a

"WE NEED TO START TO TRANSLATE THE WORD SUSTAINABILITY INTO CLEAR AND REAL CONCEPTS; FOR YEARS THIS ISSUE HAS GONE WITHOUT THE ATTENTION IT DESERVES."



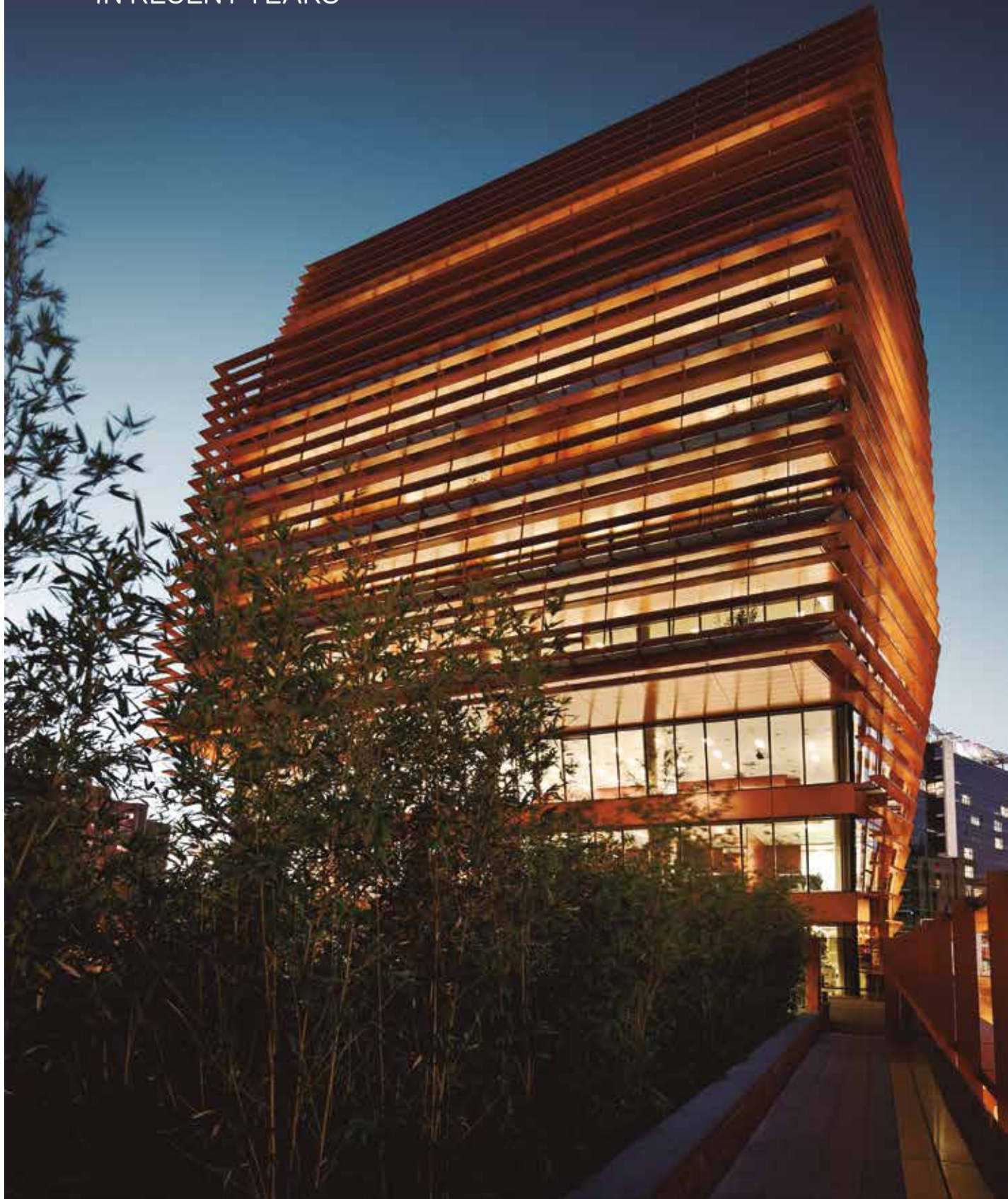
construction has to be constrained by aesthetic conditions. Anyone who raises this as a contradiction is therefore making a mistake.

On the other hand, it is likely that, in years to come, we will witness an aesthetic assessment of the solutions that were based on sustainability. If wood is currently used in a building because we want to reduce its ecological impact, and this solution is more aesthetic and functional and creates warmer buildings (because they are largely made of wood), a trend will be generated. And someone else will probably emulate this trend, and expand on it. But this should never, ever, be understood as an aesthetic contradiction.

Of all of your projects, which one do you think most highly of? Why?

EB. As architects and landscape designers, we dedicate all of our projects to making the streets of our city more liveable: that is the first step to enjoying a more sustainable life. We have worked on several projects for green corridors, such as the Central Park in Sant Cugat, the Riera de Sant Climent, in Viladecans, and, more recently, a bicycle path that links Barcelona and Esplugues de Llobregat, passing over the main road known as Ronda de Dalt, to encourage people to walk and cycle, which has proved to be a huge success. These kinds of projects become very emblematic, although this does not

“HOUSING IS STILL
VERY MUCH ATTACHED TO
WAYS AND FORMS THAT
HAVE HARDLY CHANGED
IN RECENT YEARS”





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mean that the buildings we construct are not emblematic. For us, architecture is a complete process that begins on the street. That is why our studio's most emblematic projects would perhaps be those that have sparked a change in the city model and in the transport model.

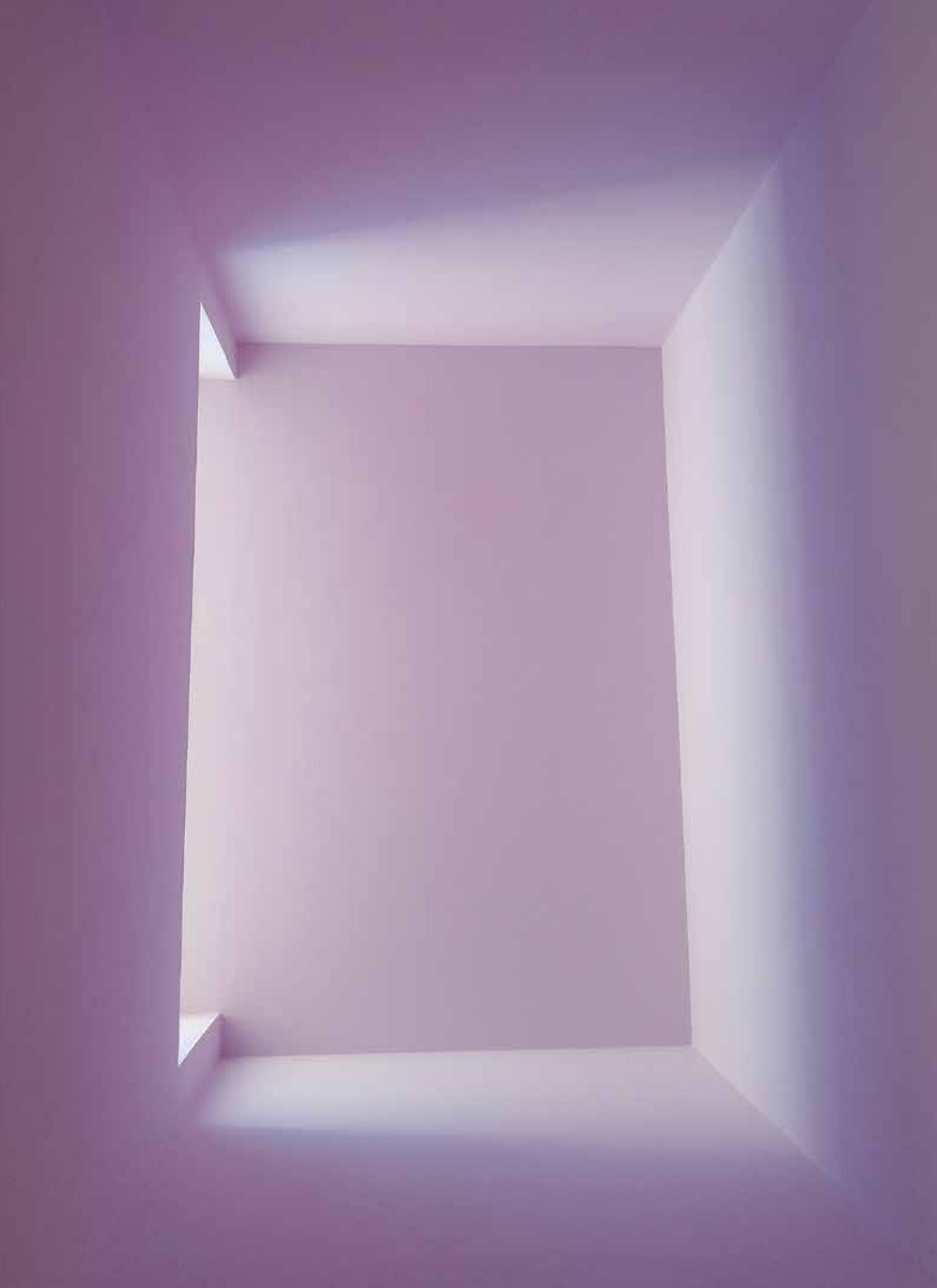
What type of building poses the greatest challenge to an architect in terms of sustainability (whether residential, offices, hotels or hospitals, etc)?

EB. I think all building types pose this question. If something initially appears straightforward, it is often because you have not studied the building type in depth. As they say, ignorance is extremely ignorant of what we don't know at all. Every time you dig deeper into a new field, you realise that there are many challenges ahead.

In recent years, we have worked a lot on offices. The office world was originally anchored in a very specific type of building — often associated with glass, with closed, air-conditioned buildings, without terraces, and with windows that could not be opened — but we have witnessed a revolution in a very short space of time. Now, we are making office buildings

with solar protection, with terraces, and with outdoor spaces for people to go out onto, thereby eliminating the problems that were generated by electromagnetic fields or by other phenomena that can cause illnesses. We are therefore making working environments that are healthy and pleasant spaces for the people who are going to work there.

Something we have been discussing recently, in our office, is our conviction that housing could follow a similar path to that of offices. Despite the fact that there has been a lot of talk, and that different materials are currently being used, housing still needs to catch up a bit; it is still very much attached to ways and forms that have hardly changed in recent years. This doesn't mean that things aren't being done, but we believe that there is still a lot of ground to cover. Although significant change is yet to come, we can sense the early signs that something new is in the pipeline. x





BERTA BRUSILOVSKY

“Architecture, to be sustainable, must consider physical, psychological and emotional health”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or a concept implicit in any project of quality?

BB. There are concepts that do not have a single answer. Sustainability does not refer to an object or physical image but to a set of characteristics that, when they occur, (in an urbanized or undeveloped territory, in constructions whatever their functions, in objects and instruments, or in food) imply that there will be no negative effects in the short, medium or long term on quality of life, the environment, or global health. This includes people and their overall physical, psychological and emotional health.

However, this response also depends on the social space in which one lives, on experiences and — above all — on personal ethics. From my research and my empathy with vulnerable and disadvantaged groups, I would also include in the concept of sustainable architecture “spaces that are understandable and accessible to all.”

When a design generates confusion for many people, so much so that they cannot use it autonomously and with freedom of movement, we >



Berta Brusilovsky is an architect and urban planning expert at the Instituto Universitario de Estudios sobre América Latina. She also has a Master’s degree in Universal accessibility and design for all, from CSEU La Salle. Throughout her career, she has combined architecture with teaching and publishing (including articles in specialized publications and other contributions). She has created the “Model for designing accessible spaces, cognitive spectrum”. This includes a participatory methodology which integrates people with intellectual disabilities as evaluators of environments and buildings. Her research and design has focused on behavioural neurology: intellectual disabilities, active ageing, and autism spectrum disorders. Berta Brusilovsky has done a lot of architectural work which has been consistent with this particular approach. She got an Honourable Mention in the Friendly and Inclusive Spaces Award of the International Union of Architects, in Seoul, South Korea, in September 2017.







“HEALTH CENTRES ARE THE TYPE OF BUILDINGS THAT POSE THE GREATEST CHALLENGES”

can say — or at least those of us who see it that way — that we don't have, in that case, an example of sustainable architecture, because there are obstacles to the preservation of physical, psychological and emotional health.

In any case, a building could be sustainable, for example, from the point of view of its carbon footprint, but not from the life experience and quality of life of the people who use it.

Do you think that sustainability requirements can condition the beauty and character of an architectural work? If so, in what sense?

BB. They do not condition beauty because beauty is not a universal concept. First of all, it responds to each historical, social and cultural moment. It is a concept that is highly influenced by the approach of each society to its perspective and development: demographic, economic, cultural, technological and aesthetic. In architecture, beauty is not permanent and it oscillates a lot between taste, functionality and the personal work of professionals that set styles.

Secondly, a piece of architecture, when it is sustainable from a complete point of view, including the fact that is easy to use and understand,¹ will provide some values, and a kind of aesthetic, that will surely bring it closer to the quality of “beauty”. It's the beauty that a work can have that has been thought and carried out in a way that it can be

1. An approach that I have maintained since the beginning of my research on neuroscience and architecture that distinguishes cognitive accessibility as design, architecture and aesthetics from other approaches where the environment or the building are mere containers of uses or functions.



“WHEN A PIECE OF ARCHITECTURE IS COMPLETE FROM A SUSTAINABLE POINT OF VIEW, IT GETS CLOSER TO BEAUTY”

looked at with admiration, pleasure or tranquility. This means a piece of architecture that is harmonious and inclusive, gives security, offers comfort and satisfies everybody.

Of all of your projects, which one do you think most highly of? Why?

BB. I think that, after a lifetime dedicated to the profession, there are many projects that, like children, give us some satisfaction in one way or another. But if they had to be measured by the appreciation I have for them, I think that my last years dedicated to the Tetralogy of neuroscience and architecture have been the most relevant: publications and architecture projects carried out between 2014 and 2021: research on cognitive





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accessibility, brain, mind, people with intellectual disabilities, older adults and autistic spectrum disorders.

What type of building poses the greatest challenge to an architect in terms of sustainability (whether residential, offices, hotels or hospitals, etc)?

From a global point of view, I believe all these typologies should focus on sustainability because environmental conservation does not distinguish between functional differences. But of all the aforementioned typologies -which do not include facilities where industrial or dangerous products are manufactured- health centres are the ones that pose the greatest challenges. This is due to the type and character of this kind of facility and to the need that people have to feel good in spaces which are satisfying, well-organized and easy to use. This also includes having sunlight, and adequate artificial light at night, suitable materials in order to avoid contagion and prevent slipping, making cleaning work easier, and applying an effective waste management system to avoid any danger. The main goal should be the global health of all people in an understandable, warm and pleasant environment, going beyond medical and health interventions. x








04

End Of Life

Eva Prats & Ricardo Flores • Christine Conix
Diba Salam • Bogdan & Van Broeck



By extending its useful lifespan, rehabilitation serves as a sustainable option at the end of the life of a building and helps to conserve resources. Unfortunately, however, this is not always a valid option. Sometimes there are serious structural deficiencies, or a building is so obsolete that –after analysis and evaluation– the best option is demolition. Such obsolescence may be the result of a lack of investment or maintenance, or simply reflect the fact that the building was not designed to adapt to the changes that have occurred in the course of its life.

Other times, however, the decision to end the life of a building is not so much based on technical reasons, but the single criterion of economic benefit. To make an analogy with the world of emails, it might be said that in the world of construction, there is no equivalent to the message: “Before printing this email, please consider the environment”, replacing “printing” with “wrecking” and “email” with “building”. In short, many demolitions could be prevented due to the fact that they are not strictly necessary.

If rehabilitation significantly reduces the enormous impact caused by the demolition of a building which is in reasonable condition, it is best to carry out this rehabilitation and to extend the useful life of the building. The same could not, however, be said of an office block, whose rehabilitation would probably be extremely complex and costly. If there is a high demand for housing in the area in which the building is locat-



ed, the most advisable course of action would probably be to demolish it and start a new construction to respond to the need. Apart from environmental issues, economic and social dimensions must also enter the debate about the end of life of a building.

Decisions cannot, however, always be reduced to a simple dichotomy of demolition or continuity. Continuity means one of two things: the building remains erect with the same use, or shifts to new one. The latter – such as converting a factory into housing – does not only depend on the needs of the market, but also on whether or not the current urban regulations and bylaws permit such a change.

The decision about the end of life of a building is therefore subject to a complex debate in which no one aspect should take priority over another without an in-depth analysis of all the factors concerned. Rehabilitation could promote both energy savings (environmental aspect) and an increase in tenant comfort (social aspect), but achieving both of these objectives may require an investment of thousands of euros per square metre (economic aspect) that would not be feasible.

Demolition and deconstruction

Although demolition and deconstruction may seem synonymous, there is a major difference between the two. Deconstruction makes the end of life of a building sound like a selective and orderly process in which all of the materials that can be reused are recovered. This prevents the generation of debris that would end up as landfill and the closure of the cycles of many materials that would still be perfectly usable (wood, metal, glass and ceramics, etc). In theory, ma-

terial can also be recovered from a demolition, but it does not make much sense, from a technical and economic point of view, to separate materials that are mixed together in small quantities.

In other areas of the economy, such as aviation or the car industry, there are methods to systematically recover most of the components once aircraft or motor vehicles come to the end of their useful lives, with European regulations establishing that recovery should reach up to 95%. In contrast, the construction sector is still a long way from reaching these objectives, although some countries have made some impressive advances in this direction.

We must also distinguish between reuse and recycling. The first is the best option; it implies that the component or material can be used again, exactly as it is, without any transformation. Recycling, on the other hand, involves treating the material via a physical or chemical process and then reintroducing it into the production chain. In such cases, there is a possibility of the material being reprocessed suffering degradation and a loss of quality that will limit its subsequent use and imply a loss of value.

The question of recovering the remains of a building that is deconstructed or demolished for reuse or recycling may have been programmed into the original project for the building, but this can also occur spontaneously. This is the case in some countries with scant resources, where second-hand markets often flourish and rely on the remains resulting from demolitions. Another scenario is found in societies with very limited industrial development, in which construction based on organic materials often predominates. In these cases, once a building ceases to be used, nature and the pass-

ing of time are usually responsible for erasing what remains, with hardly any human intervention being required. In this respect, the biosphere is an excellent recycling machine. In stark contrast, today's most modern industrial societies now use much larger amounts of construction materials than were used in buildings in previous centuries, and this can be an obstacle to their recovery.

Construction and demolition waste

In both industrialising and industrialised countries, promoters and architects have begun to search for new ways to produce architecture from reused materials. With this in mind, it is not uncommon for them to create a “building harvesting map”: a study of the availability of material that can be reused in the immediate environment.

The European Union uses the term construction and demolition waste (CDW) to include—as the name suggests—not only the waste generated at the end of a building’s life, but also during its construction phase. According to European authorities, CDW is, by volume, one of the greatest fractions generated in the European Union; in fact, it has been estimated to represent 25% to 30% of all waste generated. The degree to which this waste is recycled and recovered in the EU currently ranges from a minimum of 10% to a maximum of 90%, with the latter rate being achieved in the Netherlands, Belgium and Denmark for concrete, bricks and tiles. Finland, Austria and the United Kingdom recycle between 30% and 40% of their building-related waste, with countries such as Portugal, Greece and Spain being those that least recycle.

In countries where there is a substantial level of recycling, public administrations tend to offer economic incentives for the separation of the different fractions of waste and research and development in this field, through specific projects, is actively encouraged. These countries also tend to prohibit and/or restrict the use of landfill and to charge significantly higher prices for depositing waste at such sites. The countries that recycle the most are undoubtedly those with the highest prices. For example, the cost of depositing waste at a landfill site in the Netherlands is six times higher than that charged in Spain.

Landfill has increasingly become the last viable option in the European Union, with the clandestine dumping of waste being strictly monitored and sanctioned. There is no doubt that fly-tipping demolition materials implies a reduction in the quality of the landscape, with its most serious side-effects, which include the chemical contamination of soils and groundwaters, having evidently negative consequences for public health.

Many construction materials can be attributed a value. In the specific case of aggregates, the environmental impact of their production, through extraction from quarries, is generally greater than that corresponding to their recycling. Plastic and wood can be recycled or used for energy recovery and there is a continuous market demand for such materials. The list of recoverable materials is much longer, however; it includes: aluminium, copper, brass, bronze, steel, iron, stone, marble, plaster, rubber, glass, zinc and mineral fibres.

Recycling potential

The European Union has underlined that building materials have a very high recycling potential and considers that it is a priority to act in this area. Directive 2008/98/EC -revised and updated in 2018- was drawn up to this end, establishing a legal framework for the treatment of waste in the EU. Its objective is to protect the environment and human health by emphasising the importance of using appropriate waste management, recovery and recycling techniques, in order to reduce pressure on resources and improve their use. The waste directive states that “Member States shall take measures to promote selective demolition in order to enable removal and safe handling of hazardous substances and facilitate reuse and high-quality recycling by selective removal

“Whether the remains of a building’s deconstruction or demolition should be reused or recycled may have been programmed into the project for the building, but can also occur spontaneously”



of materials, and to ensure the establishment of sorting systems for construction and demolition waste at least for wood, mineral fractions (concrete, bricks, tiles and ceramics, stones), metal, glass, plastic and plaster.”

In 2016, the European Commission also published a Protocol for Construction and Demolition Wastes. This serves as an important set of guidelines, albeit of

“Extending the life of a building is a sustainable option due to the commitment to conserving resources”

a non-binding nature, that are based on independent research and have been presented to the industry as a working proposal. Its general objective is to increase trust in the process of managing construction and demolition waste and the quality of recycled construction and demolition materials. To achieve this, the document calls for

improvements in the identification, separation and collection of waste; for better logistics and waste treatment; and for the adoption of appropriate policies within this field. It also calls for the participation of all relevant stakeholders, whether industrial, local, regional, or national, including European authorities, construction certification bodies and potential CDW clients. One particularly important point within the Protocol concerns the elimination of hazardous waste. It refers to specific examples relating to construction, alteration and/or demolition work, associated with asbestos, tar, radioactive waste, polychlorinated biphenyls (PCB), lead, and electrical components containing mercury.

The Protocol must be understood as forming a key part of a strategy aimed at improving the competitiveness of companies within the sector. It is also related to the 2014 Communication on Opportunities for Resource Efficiency in the Construction Sector. The main objectives of the latter initiative are: to encourage a more efficient use of the resources consumed by commercial, residential and public buildings, whether new or renewed; to reduce their global environmental impact, throughout their life cycles; and to

improve the market for recycled construction materials. The Communication further states that “The recycling of materials generates employment growth in the demolition, selection and recycling of construction materials. It is a typically local job that could create jobs across Europe.”

Circular economy

The Protocol is also part of the European Commission’s ambitious Circular Economy Package. In a circular economy, the value of products and materials is maintained for as long as possible by closing cycles. Waste and the use of resources are minimised and these are to remain within the economy. When a product has reached the end of its life, it is to be used again and again, thus creating additional value. The Circular Economy Package includes legis-

lative proposals on waste, as well as a comprehensive Action Plan that establishes a specific mandate to increase recycling and reduce the current role of landfill, taking into account the different situations found in different EU member states. x





EVA PRATS & RICARDO FLORES

“A period of reflection seems to be a primary measure of sustainability”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

EP&RF. It suggests ancient times: examples of sustainability are mainly found in popular architecture, which adapted to the climate over the course of generations. For this reason, sustainability also suggests long cycles for architecture, both for design and for the useful life of a building. In this sense, the design also has to incorporate the time that the building has to last for. It is very important to allow some time for reflection in the design process; this is a way to make buildings more sustainable. In many architectural contests, you are rated favourably for having designed a sustainable building, but they only give you two weeks to devise the proposal.

Project deadlines are usually so tight that it is very difficult to coordinate the design work with consultation with engineers and other specialists. As sustainability is a concept that must be implicit in the very design of the building, allowing a period for reflection seems to us to be a primary measure of sustainability. >



Flores & Prats is a Barcelona-based architectural studio dedicated to reconciling architectural theory with projective and constructive activity. After a long collaboration in the studio of Enric Miralles, Ricardo Flores and Eva Prats embarked upon a career in which research has always been linked to the responsibility of designing buildings. They have worked on the rehabilitation of disused facilities, on schemes involving neighbourhood participation in the design of urban public spaces, and on social housing projects that take into account the influence that such initiatives can have in creating a community. The work of Flores & Prats won: the Grand Award for the Best Work in Architecture of the Royal Academy of Arts of London, in 2009; the International Dedalo Minosse International Prize of Vicenza, in 2011; and the City of Barcelona Award, in 2016. It was also exhibited at the Biennial of Architecture of Venice in 2012, 2014 and 2016.

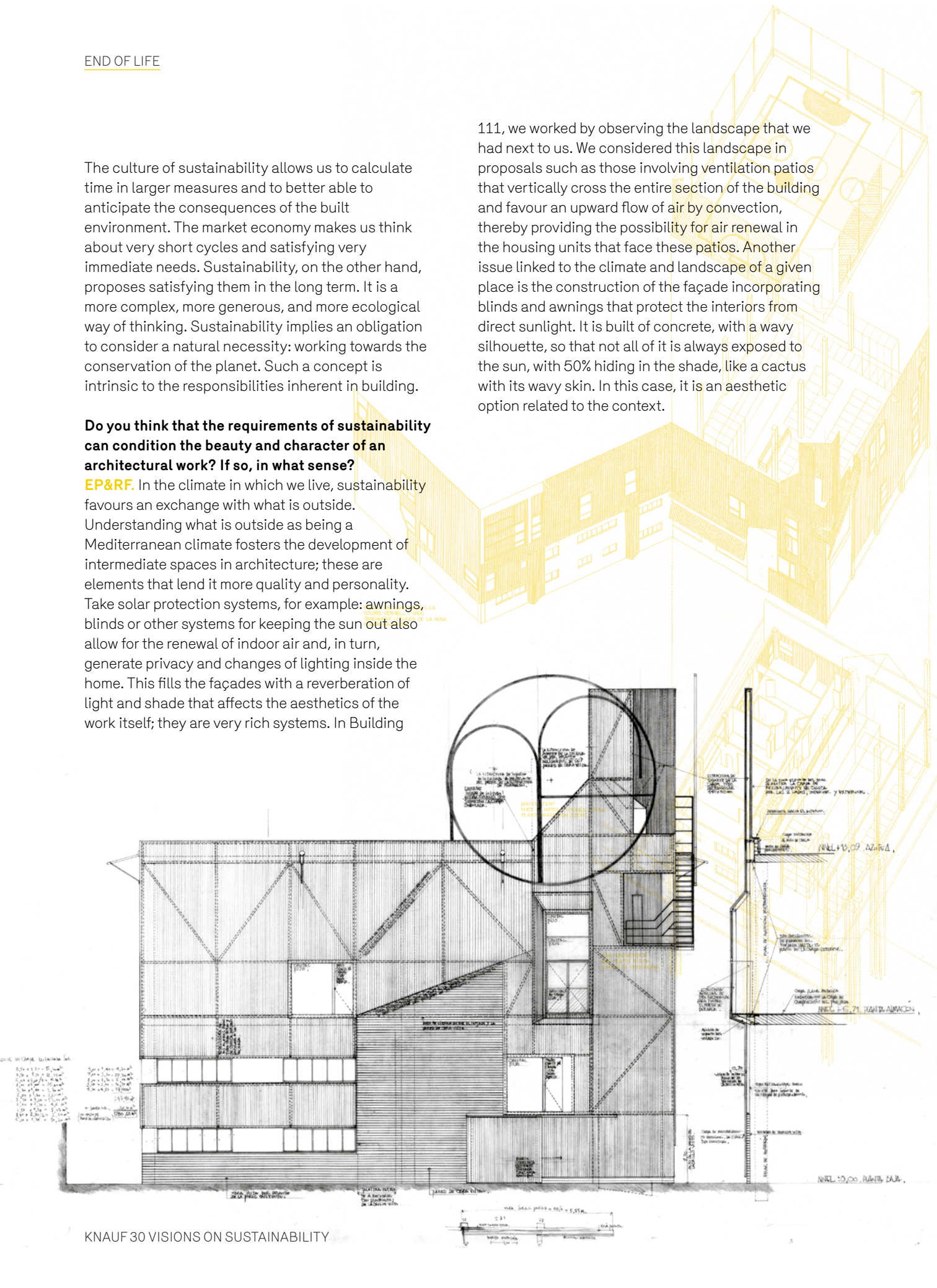


The culture of sustainability allows us to calculate time in larger measures and to better able to anticipate the consequences of the built environment. The market economy makes us think about very short cycles and satisfying very immediate needs. Sustainability, on the other hand, proposes satisfying them in the long term. It is a more complex, more generous, and more ecological way of thinking. Sustainability implies an obligation to consider a natural necessity: working towards the conservation of the planet. Such a concept is intrinsic to the responsibilities inherent in building.

Do you think that the requirements of sustainability can condition the beauty and character of an architectural work? If so, in what sense?

EP&RF. In the climate in which we live, sustainability favours an exchange with what is outside. Understanding what is outside as being a Mediterranean climate fosters the development of intermediate spaces in architecture; these are elements that lend it more quality and personality. Take solar protection systems, for example: awnings, blinds or other systems for keeping the sun out also allow for the renewal of indoor air and, in turn, generate privacy and changes of lighting inside the home. This fills the façades with a reverberation of light and shade that affects the aesthetics of the work itself; they are very rich systems. In Building

111, we worked by observing the landscape that we had next to us. We considered this landscape in proposals such as those involving ventilation patios that vertically cross the entire section of the building and favour an upward flow of air by convection, thereby providing the possibility for air renewal in the housing units that face these patios. Another issue linked to the climate and landscape of a given place is the construction of the façade incorporating blinds and awnings that protect the interiors from direct sunlight. It is built of concrete, with a wavy silhouette, so that not all of it is always exposed to the sun, with 50% hiding in the shade, like a cactus with its wavy skin. In this case, it is an aesthetic option related to the context.





ESPRIU & JA. OUBERO
PROFECTE IMB. IED. IECOLICA
DE GATE. IMLQDA.

“WE UNDERSTAND
OUR WORK AS THE
ORGANISATION AND
CONSTRUCTION
OF PLACES THAT
HELP PEOPLE, WITH
AN ENVIRONMENT
WHERE TECHNOLOGY
AND ALL THE OTHER
REQUIREMENTS HAVE
BEEN COORDINATED.”

ESTRUCTURA DE ACERO
CUBIERTA DE CEMENTO
PULIDO
MUR DE LADRILLO
CERAMICO
PISO DE CEMENTO
PULIDO



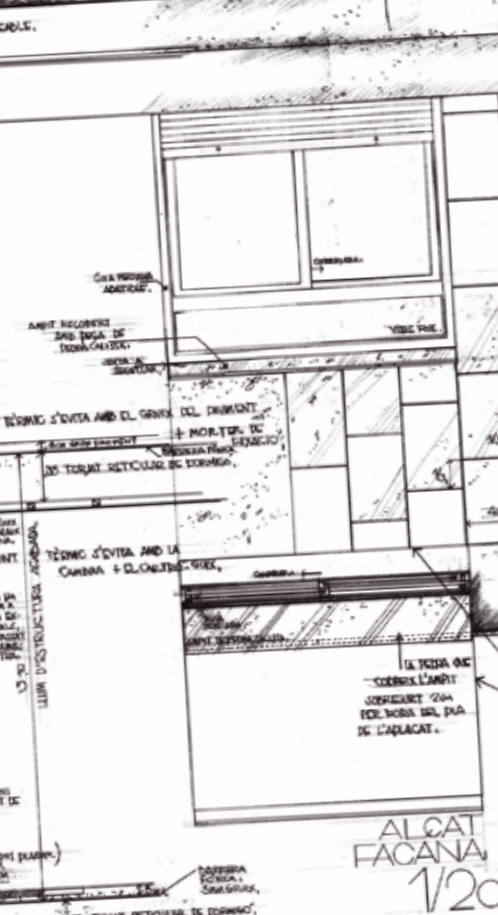
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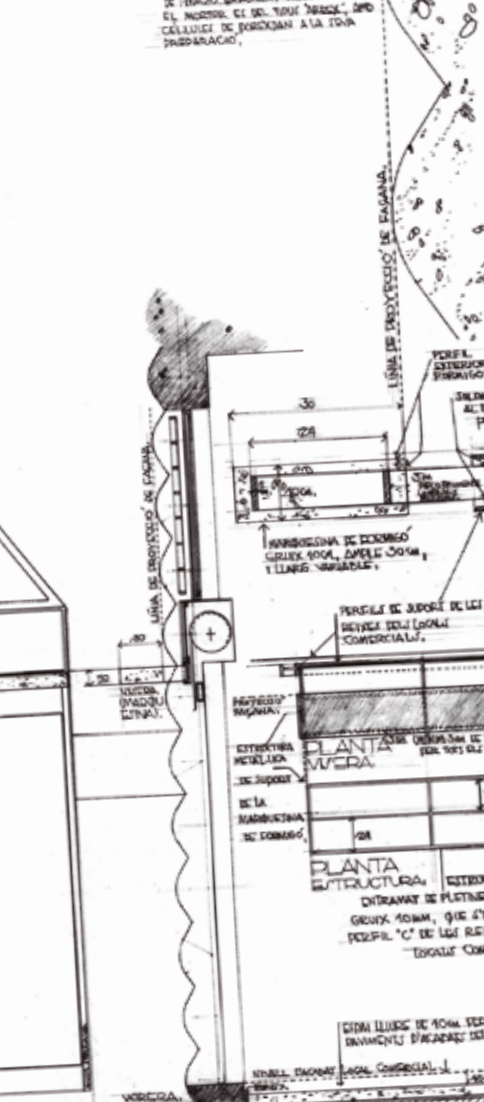
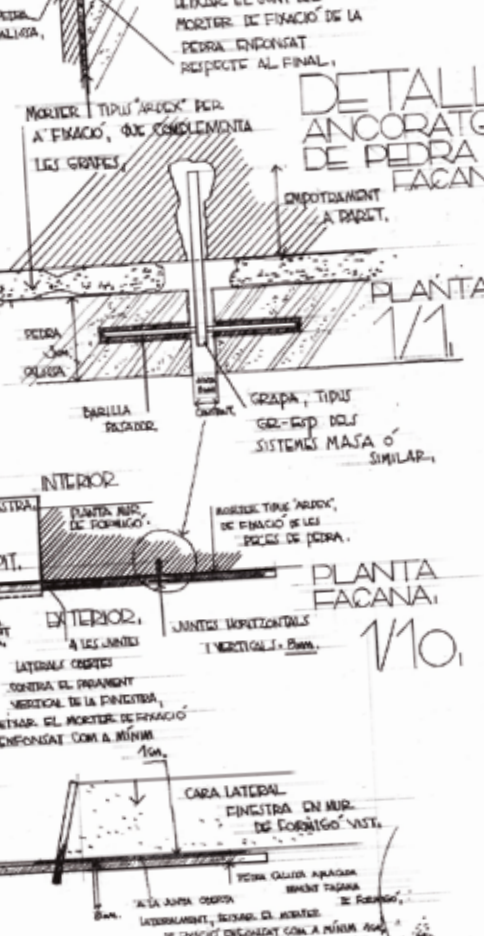
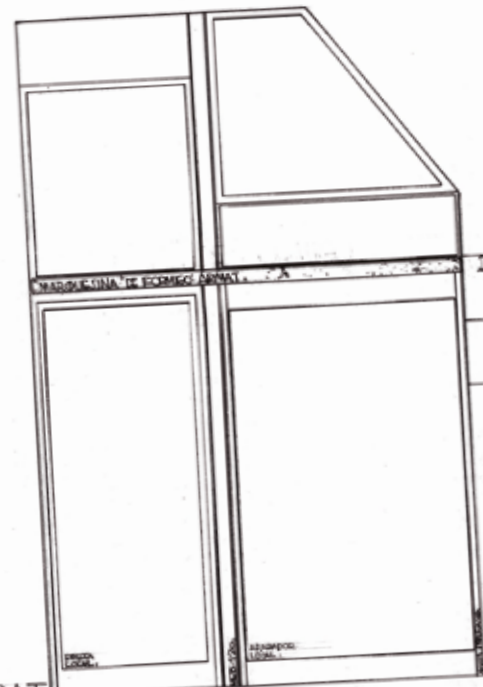
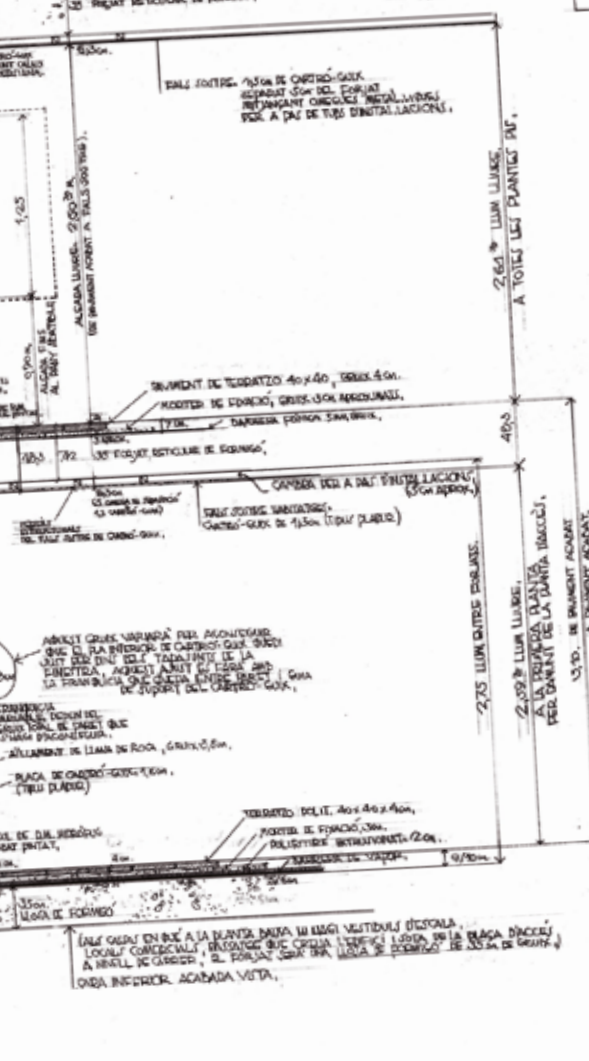


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ADLACAT DE PEDRA

SECCIO 1/10



1/5
TRIA DELS
ADLACAT

ALCAT

ALCAT

DETALL ANCORATGE DE PEDRA FACANA

PLANTA 1/1

PLANTA FACANA 1/10

1/10

LINEA DE IMPEDIMENTOS DE FACANA

PLANTA MICRA

PLANTA ESTRUCTURAL

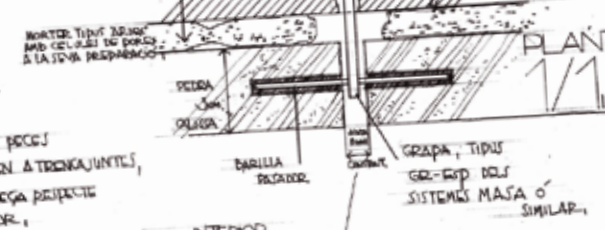
PLANTA DE COORDINACIO

LETJAMA DE FINACIO DE LA PEDRA ENCONSAT RESPECTE AL FINAL.

MORTER TIPUS 'ARCO' PER A FINACIO, QUE CONSOLIDA LES GRAVES.

TANT LA JUNTA HORIZONTAL COM LA VERTICAL SON DE 8 MM.

ADLACAT AMB PEDRA CALLESA DE 30x40x30x DE GRUPE SEGONS DEBUX D'EL PROCEJAMENT, LES PECES DE PEDRA ES COL·LOQUEN A TRONCAUNTES, DESPLAÇANT 1/3 CADA PEÇA RESPECTE DE LA FRADA ANTERIOR.



S'ENTRE QUE LA PEDRA CALLESA AGAN ORIENTA D'UN DELS SEUS COSTATS, A AQUEST FINAL NO HI ANIRAN GRAVES, I EL MORTER QUINIC QUEDARA ENCONSAT COM A MÍNIM 5CM DE L'EXTORJA DE LA PEÇA.

CARA LATERAL D'INTERIOR EN MUR DE FORNIGO VIST.

LA JUNTA ORIENTA LATERALMENT, RESPECTE EL MORTER DE FINACIO ENCONSAT COM A MÍNIM 5CM EL MORTER DE DEL TIPUS 'ARCO' I EL COL·LEU DE FORNIGAN A LA TOVA PREDERACIO.

LA JUNTA ORIENTA LATERALMENT, RESPECTE EL MORTER DE FINACIO ENCONSAT COM A MÍNIM 5CM EL MORTER DE DEL TIPUS 'ARCO' I EL COL·LEU DE FORNIGAN A LA TOVA PREDERACIO.

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“THE CONCEPT OF A CIRCULAR ECONOMY INTERESTS US BECAUSE, IN BARCELONA, WE HAVE WITNESSED THE DEMOLITION OF VERY BEAUTIFUL BUILDINGS WITHOUT ANY SPECIFIC CRITERIA.”

We understand our work as the organisation and construction of places that help people to feel good, providing them with an environment in which technology and all the other requirements that we have to meet have been coordinated.

Of all of your projects, which one do you think most highly of? Why?

EP&RF. We recall all of our projects as a continuity; almost as a single whole. One of them has led to another. Normally, we like to talk about the latest project, or the next one. But, we often recall those developed with a good client, whether these were people who brought us closer to a new discipline, or who were able to explain their ideas and to accept the slow process of thought and design. Theatre director Toni Casares was one of them. The new Sala Beckett theatre, in Barcelona, manages to unite the desires of a very ambitious client, in his aim to take a leap forward in the development of his activity, with the renovation of an old building that is linked to the memory of a whole neighbourhood. It recalls Casares’s previous life and is in harmony with our working methods. In the end, the new building has been renewed and gained a new use, not only for contemporary theatre, but also for the neighbourhood, and yet it continues to be part of the memory of the place. In terms of methodology, we managed to find a new way of dealing with something without disturbing it, without intervening too much, and yet just enough to allow it to become active once again, in our time. The building was subject to intensive renovation work, but in the end, as Toni said: “It doesn’t seem like anything has happened here”.

How can new paradigms, such as the circular economy or cradle to cradle, be engendered at a building’s end of life?

EP&RF. A building’s end of life is very rarely linked to an obsolescence of materials. In our opinion, it often

comes about because of the difficulty of incorporating a new function into it, or because of variations in the city caused by new urban plans or by its own growth. Buildings can last for centuries, but it is the city, itself, that

makes them obsolete. So, we take a lot of care in rehabilitating and recovering obsolete or underused structures, seeking to extend their life cycle and adapting them to new uses.

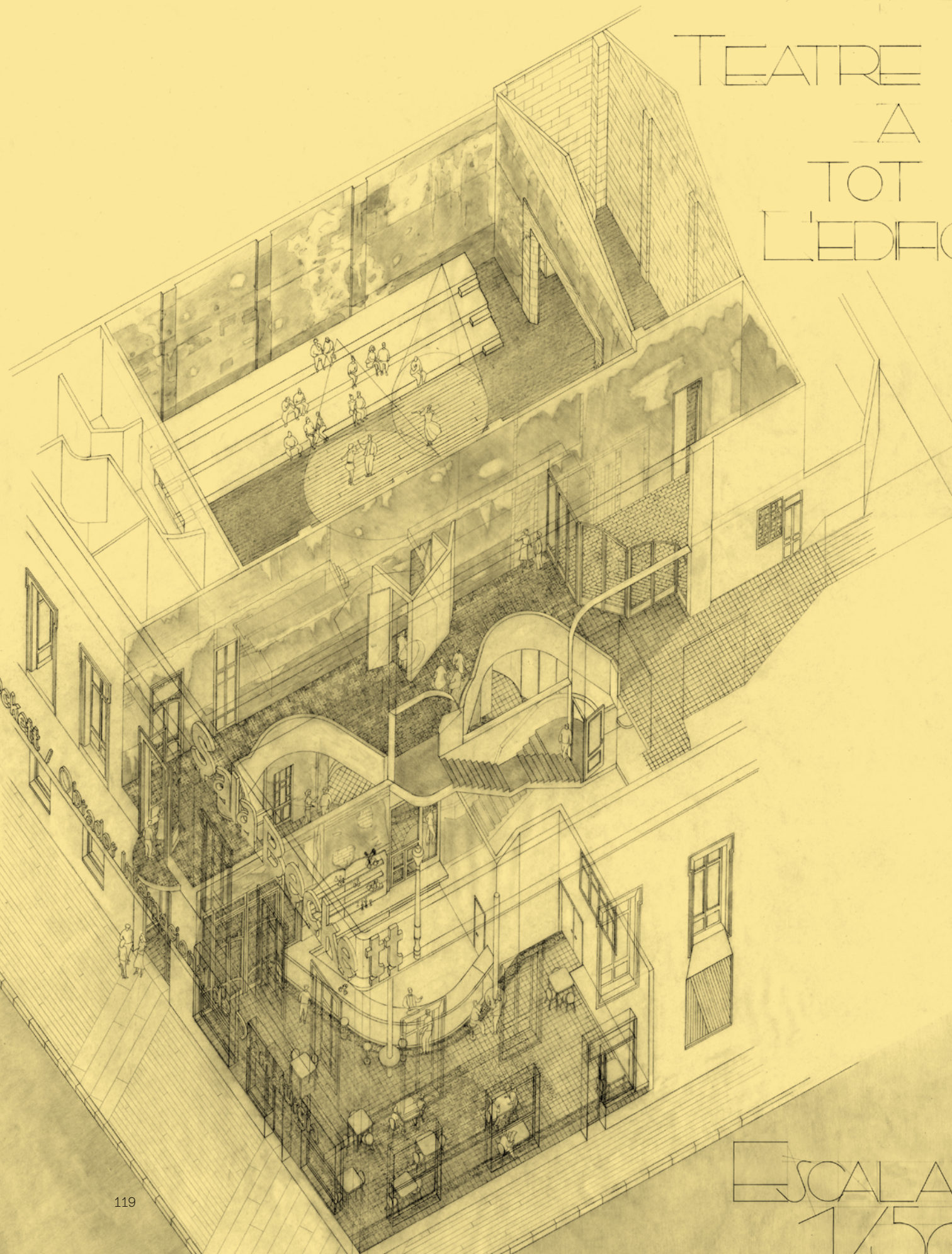
The concept of a circular economy interests us because, in Barcelona, we have witnessed the demolition of very beautiful buildings without any specific criteria. In this sense, we believe that the organisation of the deconstruction of a building is a key issue. We are interested in projected deconstruction, thinking about the separation of elements according to materials and qualities, and valuing their reuse rather than their recycling. x



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SALA DECKEL

TEATRE
A
TOT
L'EDIFICI



ESCALA
1/50





DIBA SALAM

“Sustainability became a challenge when the impact on climate change was laid bare to all”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

DS. As a student, sustainability simply meant good design: designing for people, within their local context, learning how age-old techniques cooled or heated buildings in the region, and maximizing local supply chains to ensure efficiency and a sense of ownership for each community. Research and engagement were essential. The design had to capture social, economic, and environmental benefits; it was never a point of departure in itself. I was not really very involved in celebrating excellence in design and innovation, until I started working in my own practice.

Leadership dictates the culture within an organization. If those providing the leadership are not actively interested, then sustainability becomes a label available for clients who are only interested in their CSR. Sustainability became a challenge at a time when the impact of climate change was laid bare to all.

Opening my own studio enabled me to create a shift from traditional forms of practice. By establishing our philosophy in response to United Nations findings on the impact of climate change >



Diba Salam is the founder and Creative Director of StudioDS. She established this studio in 2012, after leading national and international projects such as Imperial College’s White City, London; and Aldar’s Yas Island Hotels, in the United Arab Emirates.

Diba has made research a key part of her entrepreneurial business, analysing place-making, smart designs, and the role of neuroscience in architecture. Her studio actively participates in research papers and Diba has written for the British Council and participated in various government research articles. As a member of the RIBA International Committee, Leaders Network at UK Green Building Council, and an ambassador for Women in Construction, Diba is an active voice in promoting sustainable innovation and diversity in the built environment.

The studio regularly represents UK creativity at leading international trade fairs, in collaboration with the Department of International Trade, which has also selected Diba as an Export Champion.



and utilizing a wealth of knowledge gained from national and international projects, we set out to create our toolkit based on research and interdisciplinary collaborative thinking and have evolved into a creative agency with environmental design embodying the DNA of our brand.

Sustainability is always implicit in the way we design; the key has been to explore environmental initiatives as partners with our clients and ensure the design is futureproofed to adapt to budgets and technology.

What has become apparent through our international work has been the importance of presence. Creating local bureaus and establishing local partnerships is key to our ethos of building an ecosystem of companies and individuals. Disrupting the traditional notion of staffing, and adopting flexible resources with a detailed, specialist approach, allows us – as the lead design consultant – to evidence the value of design. I feel this is fundamental to ensuring sustainable design has meaning and, above all, value to the client, community, and environment.

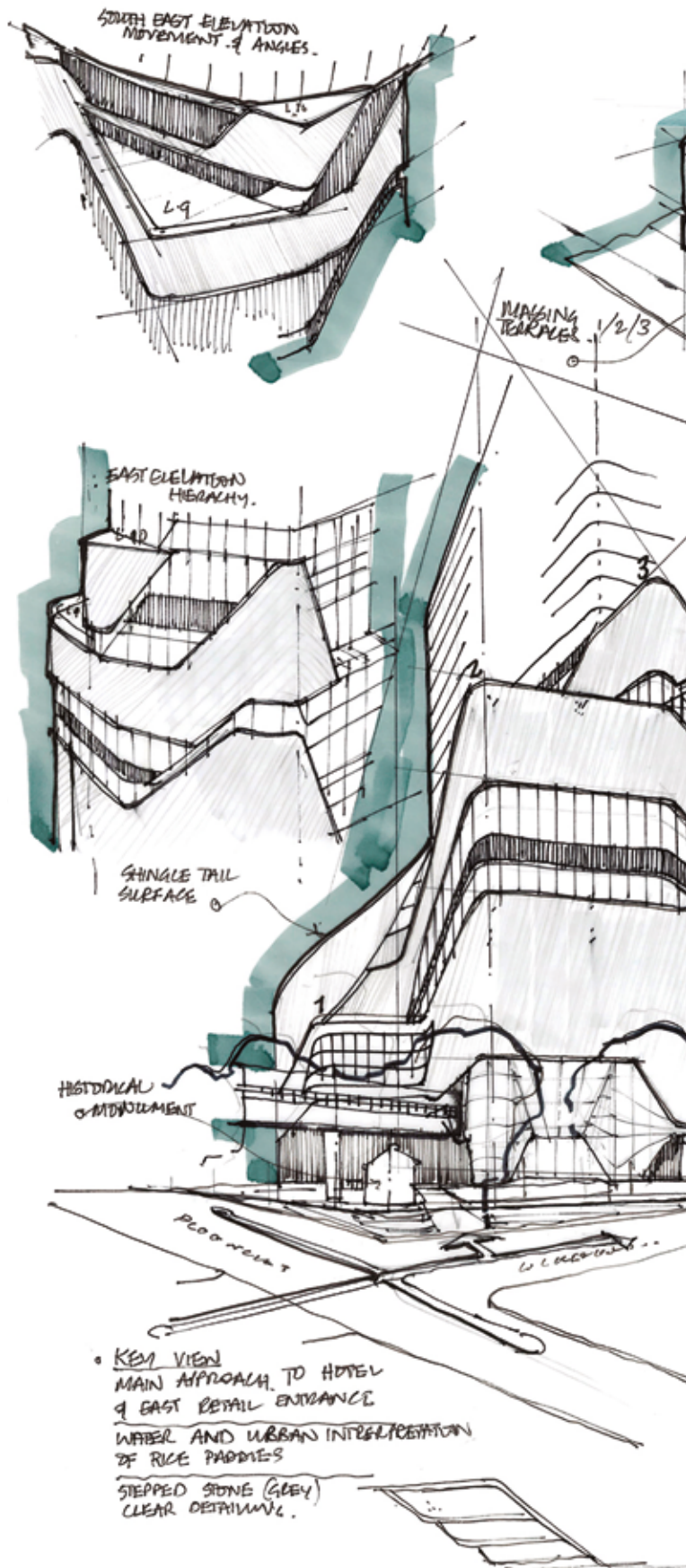
Do you think that the requirements of sustainability can condition the beauty and character of an architectural work? If so, in what sense?

DS. No, on the contrary, sustainable design responds to the local context: climate, typology, and local vernacular. This provides an opportunity to articulate form and seek geometries which promote modern methods of construction. A creative architect who understands design through to construction will create design solutions.

No doubt, as we all target zero carbon buildings, our behaviour and aspirations towards buildings must change. This poses a very exciting challenge, which all architects must be prepared to tackle head on.

Of all of your projects, which one do you think most highly of? Why?

DS. I have worked on some special projects, from co-leading Imperial College London’s mixed-use masterplan, for White City, London, to designing a hotel in the Amazon rainforest, using local vernacular techniques, which the indigenous population built themselves. Perhaps our most recently completed commercial project, Central Phuket, stands out; or perhaps the studio itself, which has always broken the typecast of what, and how, design should be procured, and continues to evolve into a dynamic business model prepared to take on the challenges of net zero carbon designs.





RICE 'PADDIE'
' TERRACE.

CENTRAL EMBASSY APPROACH

- o APPROACH OFF WIRELESS ROAD
& PUDONGHIT ROAD. -
- o GREEN 'PADDIE' STYLE TERRACES
@ APPROACH - COMBINE WITH WATER
50m FEATURGES & SELECTIVE AVIS.

- o SHINGING TERRACES / 12, 3 STEPS
SHINGING INSPIRATION SHOULD
BE USED AS GUIDANCE

- o STAIRS WITH FOR SHINGLES

- o EAST ELEVATION

CENTRAL EMBASSY.

ELIXIR APPROACH
1100

SDS / SKID PLATE

THICK FLOOR

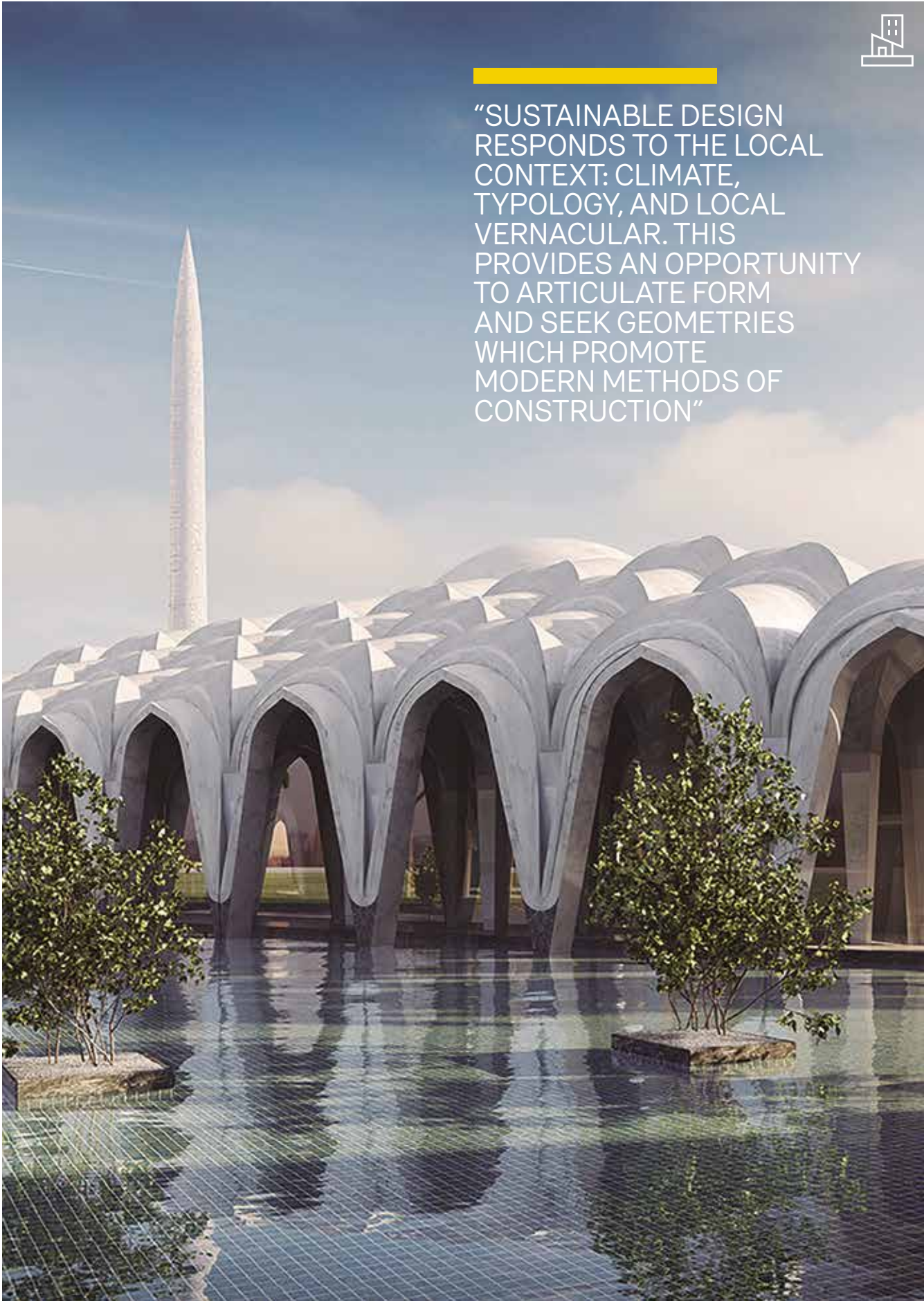
T2

- o RUN 50m
APPROX AROUND
EAST ELEVATION





“SUSTAINABLE DESIGN RESPONDS TO THE LOCAL CONTEXT: CLIMATE, TYPOLOGY, AND LOCAL VERNACULAR. THIS PROVIDES AN OPPORTUNITY TO ARTICULATE FORM AND SEEK GEOMETRIES WHICH PROMOTE MODERN METHODS OF CONSTRUCTION”



Let's explore Central Phuket as a completed project.

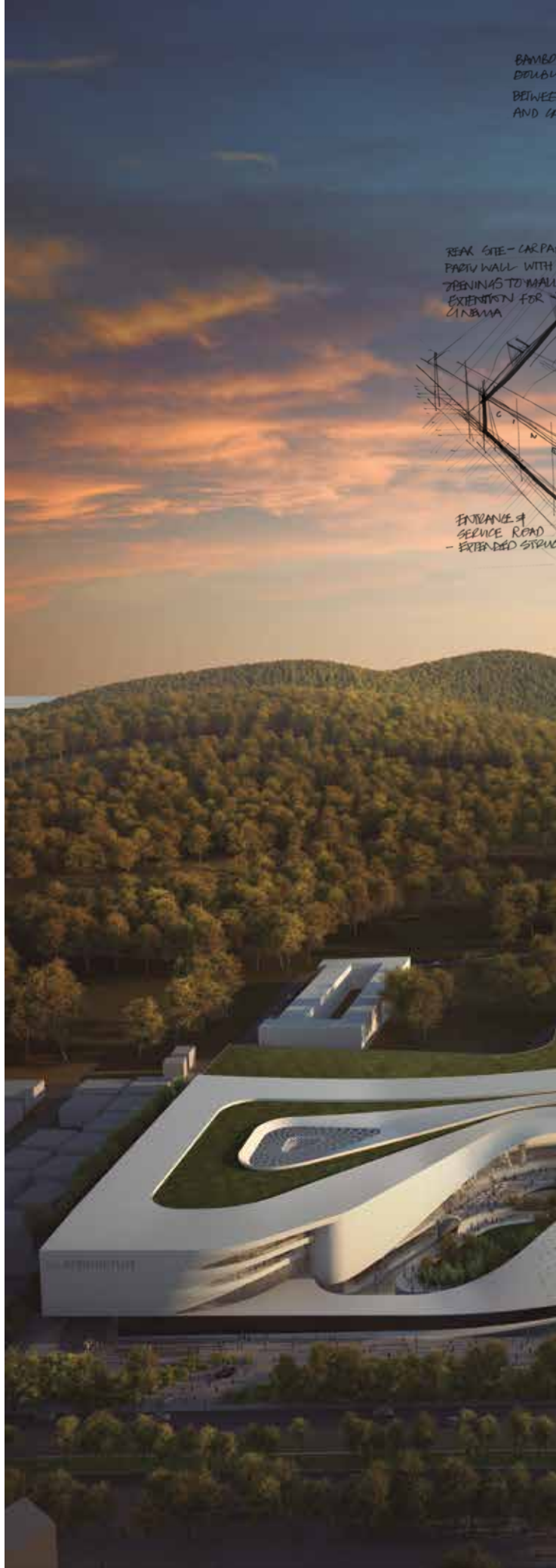
StudioDS was appointed as Lead Design Consultant to design a masterplan, architecture, and interior design in the heart of Phuket. The Central Phuket masterplan draws on sustainable innovation combined with traditional craft to create a memorable sense of place and identity for Phuket's residents and visitors. It highlighted the importance of strategically developing brownfield sites and protecting the oceanic features, encouraging sustainable values developed by the island authorities and residents, in the wake of the tragedy of the 2004 tsunami. However, the challenges created by tourism and emerging domestic wealth have placed pressure on its environment. Modern inland facilities, for both residents and tourists, are essential to reducing pressure on coastal areas.

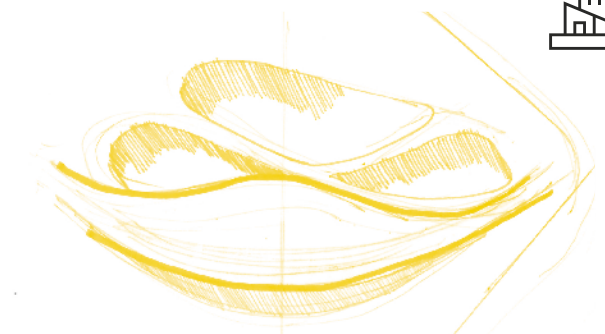
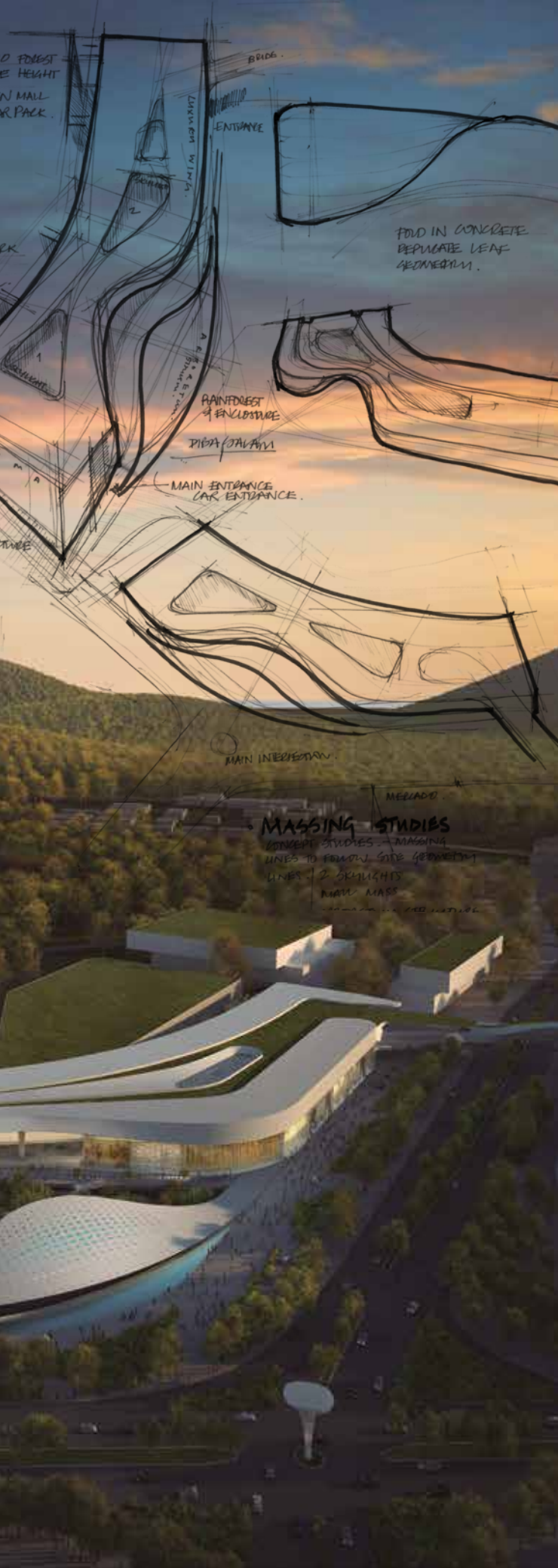
Central Floresta, the newly built mall, was developed on brownfield land. The project vision aimed to provide Phuket with its first mixed use retail district, with environmental, economic, and social initiatives serving as its core DNA. Our leading role led to a departure from traditional mall designs, by consciously shifting the focus onto place, local engagement, and health and wellbeing.

The studio's philosophy focused on creating elegant, efficient, and adaptable designs which were successfully managed to keep to a standard domestic budget. Phasing in active renewables and futureproofing smart technology allowed the project to evolve over time, as accessible technology matured in the domestic market, and global changes in retail were better understood.

The geometric form embodies the DNA brand; this was inspired by Phuket's tropical environment and Sino-Portuguese vernacular. The folded facades were drawn from large canopy-like leaves with each fold revealing internal spaces and also responding to requirements to provide shade from solar glare and shelter from monsoon rains.

The active use of VR and coding, including mapping emotional responses through spaces, was part of the studio's in-house programmes that use technology to develop design techniques. This allowed the strategic curation of spaces associated with floating markets, internal gardens, external green spaces, and artwork by Thai artists. The largest space created a botanical cocoon experience, in which people could come together for events, with F&B garden balconies overlooking the central space. Natural light and height were maximized through the roof's north-facing geometry,





which also responded to planning height restrictions in Phuket.

How can new paradigms, such as the circular economy or cradle to cradle, be engendered at a building's end of life?

DS. Our approach to all concepts explores how effectively we can create a flexible space and structure which are ready to adapt as their use may evolve over time.

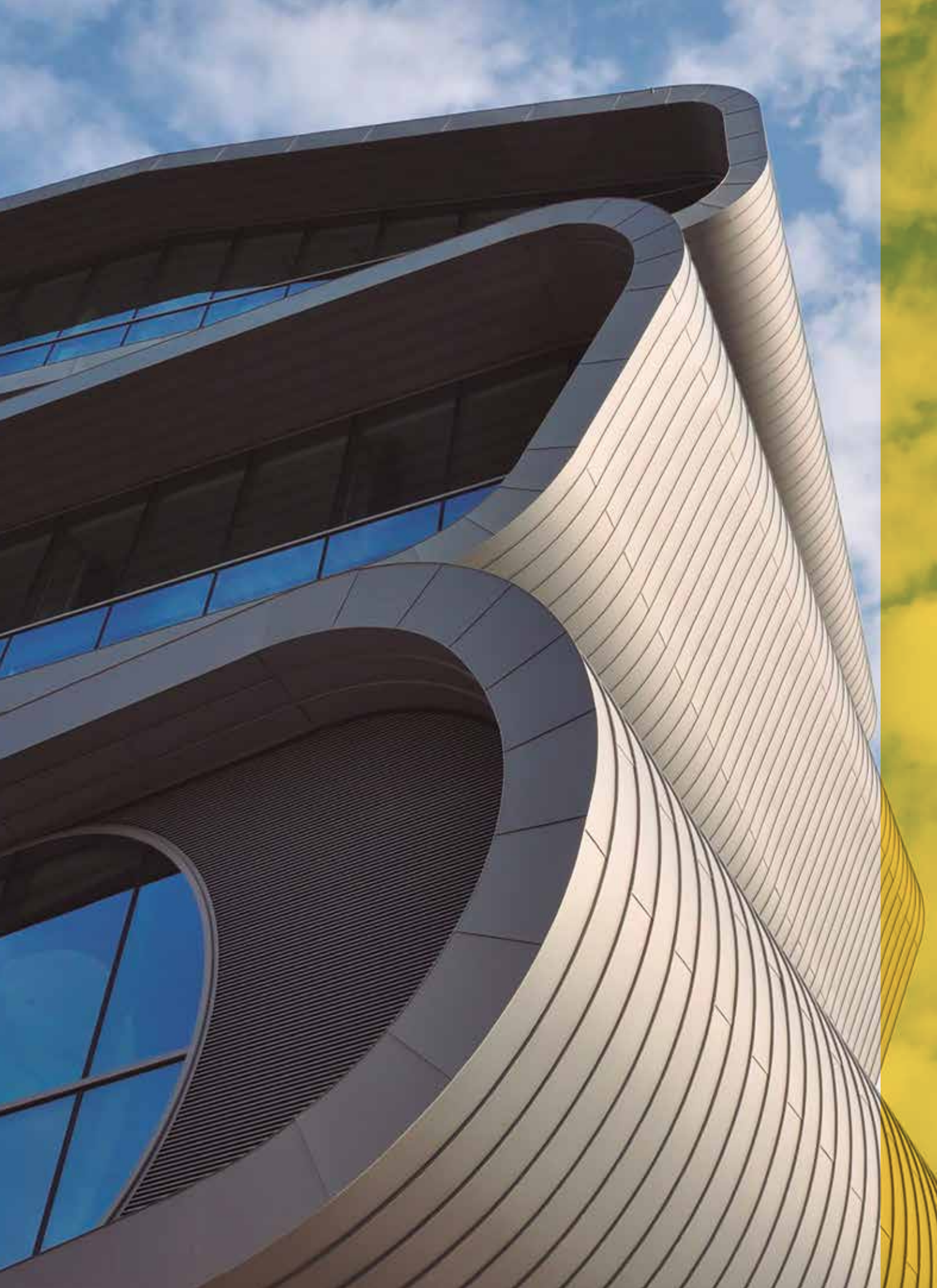
Central to this approach is working directly with the supply chain and understanding its processes. Despite our best efforts and intentions, we struggled once the construction programmes commenced and when the client and contractor came in search of a quick, conventional approach.

Our work in the Middle East has exposed the studio to turn-key projects. We have taken on full design consultancy projects, but also construction work too. This has led to a developer approach, through which we have created opportunities for traditional developers to procure, meaning that we have been able to explore a "cradle to cradle" approach to design and construction.

No doubt this has involved a certain element of risk, but perhaps this is the way architects must work to exact change and play a leading role in a project. This approach has also given us the confidence to explore projects in the UK in a different way. We are currently developing a housing scheme and working separately with investors to establish a "people's fund" to help the victims of tower blocks affected by flammable cladding, provide affordable housing, and establish benchmarks for acceptable levels of living standards, environmental performance and social cohesive flexibility.

2018 was an important year for us. We had to examine what worked and what did not and to decide how we wanted to continue for the next 5-10 years. We made fundamental changes to our business in 2019 to make the studio's international footprint more effective in delivering a circular economy and meeting targets for net zero carbon. ✕







CHRISTINE CONIX

“Buildings made from natural materials and with green façades feel much more alive”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

CC. Sustainability is definitely not a trend; it’s something that needs to be worked on today, and into the future. Sustainability in architecture is about seeing the bigger picture (not just the pretty, current picture), which means taking responsibility, planning for the future, and using a complex approach. We are currently in a state of global transformation; the climate is demanding that we become more conscious of everything we do, and in a very short period of time. Personally, I think this is a very interesting period in history to be a part of.

I’ve also noticed that, in the domain of architecture and urbanism, the system of sustainability is very complex. We don’t understand it fully yet. That’s why we decided to get involved. We’ve started a learning process and a consciousness-awareness process within our own team and in relation to our clients. We have made it our responsibility to change the way we think, design and speak about architecture, even though we don’t know all the answers yet.

So, I think that sustainability in architecture is currently shifting. It’s a shift in consciousness that is happening globally and which will find its way into >



Christine Conix is a Belgian architect, who was born in 1955. She created her company, Conix Architects, in Antwerp, in 1979. In 2007, it employed 67 people, and by 2014, it had offices in Brussels, Warsaw, Rotterdam, and Terneuzen. In 2013, Conix Architects won a contract to rebuild the Moroccan city of Nador and to transform it into a centre for economics and tourism; this involved constructing critical infrastructure such as houses, schools, and hospitals. Conix Architects also designed a renovation and expansion project for the Atomium, in Belgium, a structure that was originally built for the 1958 World’s Fair, in Brussels. It also designed the Belgian pavilion at the World Expo in Shanghai, in 2010. Her company also won a contest, among 28 architectural firms and agencies, to produce an architectural project for the Vrije Universiteit Brussel.





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"WE ARE CURRENTLY IN A GLOBAL TRANSFORMATION. THE CLIMATE IS DEMANDING THAT WE BECOME MORE CONSCIOUS OF EVERYTHING WE DO. PERSONALLY, I THINK THIS IS A VERY INTERESTING PERIOD IN HISTORY TO BE A PART OF"



architecture on the broader scale: from the approach to the project, throughout the design phase, and right up until the last material is in place. The goal is to arrive at a synthesised solution for a multi-layered question. We aim to create more added value by developing an identity that stands for a lot more than just a solution to all aspects of the question.

We are proud to have responded to client requests that push the energy performance, material use and overall sustainability of their projects beyond basic legal requirements. In projects such as “WZC Zonnes-traal” in Lint, “Werf 44” in Schilde, “Multi’ in Temse, and “Gyproc” in Kallo, and in other retirement homes, schools and community centres, we have moved far beyond the legal obligations. The majority of these requests have come from governments and subsidised clients. Unfortunately, project developers do not typically demonstrate much interest in the sustainability of their projects beyond the legal requirements. However, when they do open the doors to increased sustainability, the results are simply amazing. Examples of this include the BATEX framework and the Oxygen Office Building in Brussels.

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

CC. Yes, sustainable buildings –buildings made from natural materials, and buildings with green façades, for example– feel much more alive. They respond to their surroundings in a very natural way and provide a different sense of physical and emotional comfort for the user. As human beings, we all need nature to keep us mentally, emotionally and physically healthy. So, adding natural materials and optimizing the visual link to nature with living, breathing vegetation can be important in architecture.

I also think architecture can give people hope. We can demonstrate ways of building that benefit nature, the planet and people. When we show people that taking care of the world doesn’t mean standing still, we give hope to society and to the generation that has to deal with climate change. The more we can demonstrate a positive future through architecture, the more confidence we will have in our search for further solutions.

Of all of your projects, which one do you think most highly of? Why?

CC. The project that immediately comes to mind when I think of sustainability is the “Umicore”

“ARCHITECTURE CAN GIVE HOPE. WE CAN DEMONSTRATE WAYS OF BUILDING THAT BENEFIT NATURE, THE PLANET AND PEOPLE”





project. It is a transparent and creative building that adds a visible identity to the organisation and leads through its industrial site.

In our projects, we always pay a lot of attention to the context. The way a building fits into its environment, and contributes to that environment, is the starting point for all our designs.

In Bergen op Zoom, we designed a centre for the elderly: GGZ, which is located in the middle of the woods and a park. We kept the trees that were already there and designed the shape of the building around them. This makes it feel like the building really fits into its environment.

How can new paradigms, such as the circular economy or cradle to cradle, be engendered at a building's end of life?

CC. The way we treat a project today is extremely important. The first and essential question is: can we re-use existing buildings instead of tearing them down? When a building is re-used, it means a reduction of CO₂ throughout the whole cycle of extraction: transport to factories, production, transport to site, construction, deconstruction, transport of waste, sorting and, eventually, the destruction of waste.

If we decide to build a new building, the second question we have to ask is: can we build it in a way that will still facilitate this function, or other future functions, in a changing society?

Only then do we ask: how will the building be built and what materials can we use? We combine the re-use of existing construction materials, recycling materials, the use of locally produced materials, and the use of durable new materials to plan a sustainable solution.

The design should be made in such a way that no materials are permanently in place and can look forward to a second (or third) life, after the building's end. Waste is actually just material without an identity. We should always start with the idea that no materials are to be wasted. And, if the building doesn't work anymore, we should be able to find a new purpose for the building or, at least, a way to re-use the materials. This allows us to keep more of our resources working for us for longer. ✕





BOGDAN & VAN BROECK

“We imagine spaces that influence people’s behaviour, experience, and emotions”



Bogdan & Van Broeck is a Brussels-based architectural company that was founded, in 2007, by architect Oana Bogdan and engineer-architect Leo Van Broeck. The company takes an active part in social and public debate and the policy-making that goes with that. Oana Bogdan was State Secretary for Cultural Heritage in Romania, in 2016-2017, and is a member of the Board of Directors of A+ Architecture, in Belgium. Leo Van Broeck was the Flemish Government Architect from 2016 to 2020. He is lecturer in architecture and urban planning at KU Leuven and a member of the Club of Rome EU Chapter.

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

B&B. Sustainability means real improvement in human life, prioritised over growth, reducing the economic footprint, and completely redefining growth.

Sustainability means reusing, adapting, and avoiding building, if you can.

Sustainability means the economy of means that comes along with a good concept.

Sustainability means addressing the existing constraints of the place as the latent potential for the architectural project.

Sustainability means designing spaces which can cope with change and yet do not exclude unforeseen future uses.

Sustainability means the creation of socially porous architecture by empowering spatial relations which embed social relations, communities, a feeling of belonging, human interaction and innovation.

Sustainability means acknowledging the power of cultural heritage to create a sense of belonging and social cohesion. >





©Saskia Vanderstichele



“ARCHITECTURE EXPANDS
BEYOND BUILDING
AND BECOMES MORE OF
A PROCESS OVER TIME
THAN JUST THE BUILDING
OF A PRODUCT”



Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

B&B. We see sustainability requirements as an opportunity to think about the way architecture can shape and organise the space needed by humans, knowing that the pressure exerted by the rapidly growing global population on the hitherto untouched terrestrial surface –the main source of life, energy and biodiversity– is not sustainable. As land-use is the source of many of the environmental issues that we are confronted with in our projects, we start from the land, the open space, the space in-between, the space that has the capacity to be both disjunction and conjunction, separation and bonding. These reveal existing relations, and establish new ones, between closed and open, interior and exterior, public and private, individual and collective, repetition and difference.

We imagine spaces that influence people's behaviour, experiences, emotions and wellbeing, in a structuring, stimulating and positive way, both now and in the future. As such, architecture expands beyond building and becomes more of a process over time than just the building of a product: people, cities, places, activities, scenarios, politics, sociology, culture and sciences all broaden the picture. The development of the built environment is not a solitary act of creativity, but rather a social act and a collaborative effort of the society, community, political forces, economy and technical expertise, within the constraints imposed by the environment. And this is something beautiful.

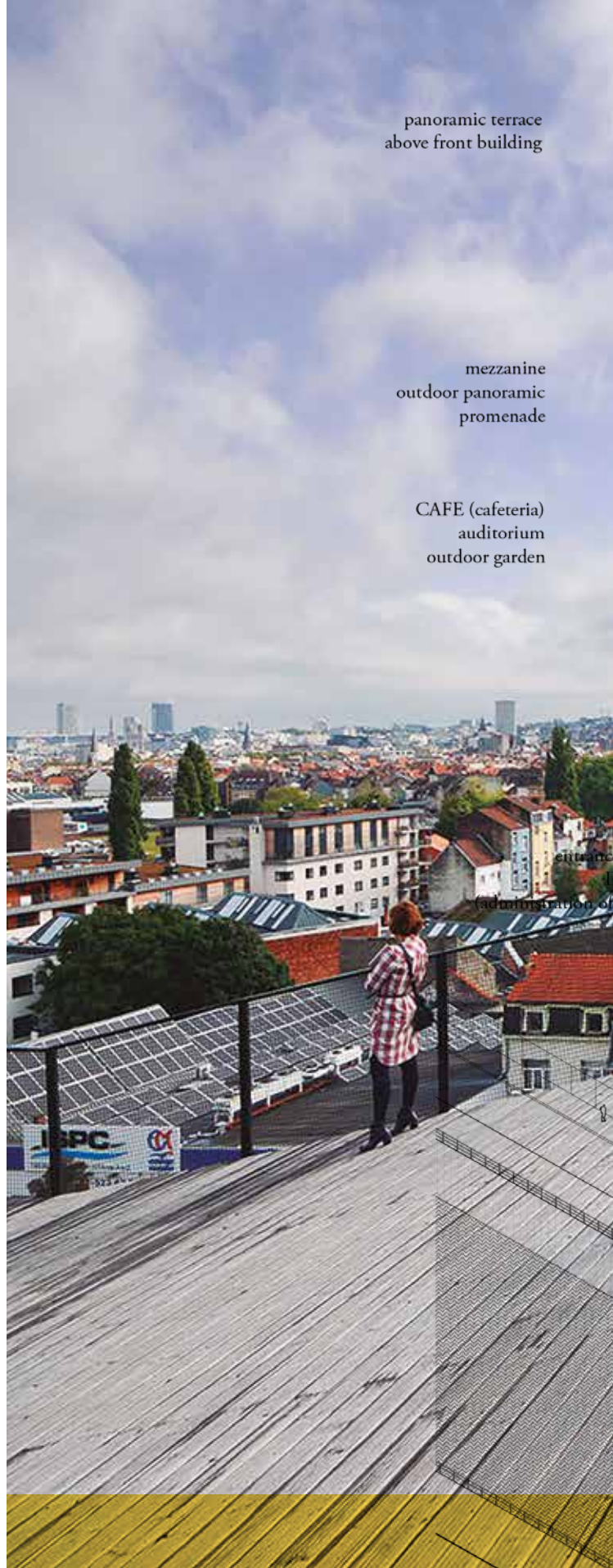
Of all of your projects, which one do you think most highly of? Why?

B&B. The COOP project, which involved the reconversion of a mill, dating back to 1903, into a socio-cultural amenity and an engine for the revitalisation of the canal area of Brussels. This area is one of those miracles that can happen thanks to ignorance. As most cities have privatised their land, it has become increasingly difficult to build the city in a meaningful way. Architecture has become a tool of capital and development plans: the sum of private interests. Certain strategies cannot be implemented along the canal in Brussels due to lack of political will, despite the fact that the city still owns a considerable amount of land there. This situation offered a huge opportunity to come up with a vision for regeneration. This is how The Canal Plan was born, with COOP as one of its strategic projects: an

panoramic terrace
above front building

mezzanine
outdoor panoramic
promenade

CAFE (cafeteria)
auditorium
outdoor garden





niv. +7

niv. +7

new CLT roof above back building

niv. +6

niv. +7

elevator access to terrace

niv. +5

niv. +5

niv. +4

niv. +3

niv. +2

niv. +1

niv. +0

central circulation core
sanitaries
technical shaft

niv. +1

roof terrace
and outdoor auditorium

niv. +0

niv. +5

CASTING
(exhibition space)







“WE CONSIDER THE REHABILITATION OF HERITAGE TO BE ONE OF THE MOST NOBLE FORMS OF RECYCLING”

incubator for small and medium enterprises linked to an innovative shipyard, a framework for professional training and reinsertion, and a centre for interpretation that offers a reading of the past and of the future heritage of the neighbourhood.

Through ecological recycling and cultural sustainability, we revalued the industrial heritage. We considered the elements of the programme not as fixed “spaces” or “buildings”, but rather as evolving “projects” that are in constant interaction with each other. We took time (and therefore change), rather than space, as the main context of our architecture, allowing flexibility and permanent adjustability to become key qualities. We reduced the threshold between this neighbourhood and the city, so that COOP could interact on both the local and supra-local levels.

All of these things could be done thanks to a process of co-creation that started long before the competition phase, which is where the most

important decisions for the future of our cities are taken: at the political level. The right decision taken at the political level, combined with the cooperation of all the stakeholders, on issues ranging from the definition of the competition brief to the realisation and the use of the building, make us think highly of this project. In fact, we love it.

How can new paradigms, such as the circular economy or cradle-to-cradle, be engendered at a building’s end of life?

B&B. Buildings should be conceived as either “intelligent ruins”, which are re-used, or temporary constructions, which are dismantled at the end of their life. We consider the rehabilitation of heritage to be one of the most noble forms of recycling, as the most ecological building is the one with a footprint that does not use unbuilt space.

In the case of COOP, the strategic decision to consider the two main historical buildings as qualitative containers allowed us to incorporate interchangeable functions to inhabit the building. The areas dedicated to SMEs are divided into modules with a lightweight, and reversible, partitioning system. The minimum room size is defined by a single window, and each of these virtual minimal rooms is supplied with an independent line of heating, electricity and ventilation and can potentially be isolated.

We kept the two main historical buildings in a raw state, which allows their story to be read. Traces of demolitions have been maintained as scars. Each new construction, alteration, repair, or renovation, is legible as something new, providing a clear reading of the era in which it was undertaken. As such, vertical circulation shafts, technical elements and shared functions have been placed in a contemporary add on, using a light, and transparent, architectural “machine” that activates and enhances the historical buildings in a non-invasive manner.

All the existing buildings are, first and foremost, treated as resources with which to build our future. The more a building is deemed valuable by society, the more it requires the attentive eye of a qualified author to intervene and reintegrate it into contemporary society. The word “intervention” is, in this regard, more suitable than “adaptation”. While most buildings can, and must, be adapted, some only have to be simply touched in order to be meaningfully re-used today. ✕








05

The building in the city

Gonçalo Byrne • José María Ezquiaga
Roger Riewe • Josep Bunyesc



Many architectural visions –from the most technical to those emphasizing aesthetics and formal solutions– view buildings as isolated objects. Although such an analysis is plausible, in order to capture the enormous influence and effects that buildings are capable of generating, we must consider them as pieces within a larger set. The urban environment appears as the most important and complex environment into which architecture is inserted.

In 2007, for the first time in history, the population of urban areas exceeded that of rural areas. Furthermore, the United Nations expects to see two out of three people living in conurbations by 2050. In terms of complexity, this frames cities as realities that are analogous to ecosystems. Several classical authors, including Lewis Mumford, in his impressive 1961 work “The City in History”, foresaw this situation. Mumford, in particular, reviewed the evolution of the functions of cities in history and proposed the vision of the city as a living organism. It was not, however, until the 1970s that the notion of the city as an ecosystem would make its way into academic discussions.



Natural ecosystems are obviously highly complex, but those pertaining to cities may be even more so. This is especially true if we consider the fact that variables such as civilisation's social, economic and political activities are intensified in urban scenarios and may add to the inherent flows of matter and energy.

Urban Metabolism

And what might be the role of architecture within this framework? The key lies in the urban metabolism. Metabolism is the set of chemical, physical and biological transformations that take place in living beings in order to produce the energy necessary for the development of their vital functions. In an urban context, the concept of metabolism is defined as the exchange of matter, energy and information between the urban settlement and its surroundings. In the case of matter, a building is directly linked to the consumption of materials, both in its construction and use phases, and in the large-scale generation of waste, at the end of its useful life. With regard to energy and its impact, buildings are responsible for 40% of total energy consumption and 36% of CO₂ emissions in Europe.

The European Union has recognised the significant link between energy and architecture. To improve energy performance of buildings, the EU has established a legislative framework that includes the Energy Performance of Buildings Directive 2010/31/EU and the Energy Efficiency Directive 2012/27/EU. These directives promote policies that serve three objectives at once: achieve a highly energy efficient and decarbonised building stock by 2050; create a stable environment for investment decisions; and enable consumers and businesses to make more informed choices to save energy and money. Both directives were amended in 2018 and 2019, as part of the Clean Energy for all Europeans package.

In October 2020, the Commission presented its Renovation Wave strategy, as part of the European Green Deal. It contains an action plan to boost building renovation. Its objective is to at least double the annual energy renovation rate of buildings by 2030.

The aim of improving the energy performance of buildings is not only limited to Europe. There are several

alliances between cities on a global scale, including a network of large cities representing 600 million people known as the C-40 group, committed to reducing greenhouse gas emissions. This is proof of the power of urban initiatives compared to the power of states.

The main difference between the functioning of natural ecosystems and what we have agreed to call urban ecosystems is the closing of cycles. In nature, there is no waste, as nutrients and water make up closed cycles. Conventional buildings operating without sustainability criteria do the opposite: instead of closing cycles, they generate linear flows of energy, water and materials with an input and an output. This output is normally referred to as their environmental impact.

The energy used in the construction process, and later by the consumer goods used in buildings and by commuters, is therefore returned to the environment in the form of greenhouse gas emissions and pollution. In the case of building materials, once their life cycle is over, they become waste that must be treated; this, in turn, increases energy consumption. On the other hand, substantial amounts of water, which could be reused in buildings in order to reduce this type of output, are also returned to the environment, as a problematic output.

Zero-energy buildings

Generally speaking, architects have little say in decisions regarding the location of a construction project within a city, and especially, as mentioned in Chapter 2, if the urban typology is compact and dense. Instead, architects have the real possibility of adopting other strategies and of aiming for the zero-energy (or zero net energy) building model and, in more ambitious cases, of erecting

buildings that can produce more energy than that required to run them.

These strategies imply a strong commitment to renewable energies generated in situ, insofar as possible, through photovoltaic panels, small wind turbines, and geothermal installations. There are also other >

possibilities, extending beyond the capture of energy, which still affect its management, such as the installation of green roofs. Such solutions guarantee good thermal insulation, both in winter and summer, and permit a considerable reduction in the need for air conditioning and the associated energy consumption.

In some cities, buildings, or at least some of them, are connected to a district heating and cooling network. These centralised heating and cooling systems use a pipe networks to meet the demands for heating and sanitary hot and cold water of all of their users. This system takes advantage of residual thermal energy from co-generation produced by waste treatment and/or industrial processes, which would otherwise be lost.

With this series of decisions, architects can offer users conditions that allow them to moderate their energy consumption while maintaining habitability and comfort, pending further support from promoters and favourable legislation. A very different issue related to the user behaviour patterns is the proliferation, in recent years, of the use large numbers of appliances used. There is little that architects can do about this, as consumers are tasked with making responsible purchases. This should not only involve the choice of the most efficient machines but also of limiting the number of appliances used.

Buildings can also help to minimise water consumption. This input can be reduced by means of taps and showers equipped with flow reduction mechanisms, by using waterless urinals, and by establishing recirculation circuits that allow greywaters to be reused in toilet tanks and even for watering gardens. Nowadays, most greywater are outputs that end up as effluent in rivers, seas and lakes. Another complementary strategy is rainwater retention. This usually involves capturing the water from roofs and storing it in water deposits. Once treated, this water can be distributed through a circuit separate from that of

drinking water, and dedicated to different uses, such as its use in washing machines, toilet tanks, car washes and irrigation.

Reducing the environmental impact of energy has important consequences on different scales, ranging from the global to the local. Less energy consumed also means lower emissions of the greenhouse gases that cause climate change. The world's leading authority on urban issues, the United Nations Human Settlements Programme (UN-HABITAT), has stated that cities can improve how they function in order to better respond to climate change and it provides practical strategies that they can follow to strengthen their role as part of the solution.

At the local level, reducing the energy consumption of buildings helps to mitigate the "urban heat island" effect, which is typical of cities. This consists of them accumulating heat during the day, due to the presence of large amounts of concrete and other heat absorbing materials which, in the presence of anticyclones, does not readily dissipate at night. This phenomenon is directly reinforced by many economic and domestic activities in which energy consumption is fundamental. This produces a vicious circle, since higher temperatures imply a greater need for refrigeration, etc.

In light of the examples listed so far, it could be said that buildings offer different possibilities for positively influencing the urban metabolism and guiding it towards a less linear and more circular scheme in terms of the flows of energy and matter. Consolidating such a trend would allow a city to reduce its ecological footprint, which is nowadays one of the most accepted indicators of sustainability at the international level. The existence of more sustainable buildings will result in a city that is also more sustainable as a whole.

Urban land

At this point, we must mention a resource that plays a determining role in the relationship between buildings and the city: land. Construction activities involve the destruction of land, impeding some of its basic natural >

“According to the United Nations, two out of every three people will live in conurbations by 2050.”



functions, such as water drainage and vegetation growth. Although there are some exceptions, urban land is generally sealed, and this hinders these natural functions. It is therefore logical to think of urban land as something that needs to be preserved. This is the basis of an argument in favour of containing the territorial expansion of urban development and of placing limitations on new building. Such arguments are reinforced by the fact that constructing new buildings involves a greater consumption of resources and energy than the rehabilitation of existing ones.

In a context such as that of Europe, with a relatively old building stock, compact cities and well-defined urban boundaries –compared to the urban sprawl characteristic of the USA– rehabilitation would seem a useful and practical way to reinforce environmental, economic and social sustainability, due to its intrinsic capacity to generate new investment and create employment.

Despite this, in some cities it is possible to observe an apparent paradox: while the urban fabric in the suburbs continues to expand, there are thousands of unused apartments and offices in the city centre that could meet the need for new housing and work space. The non-use of existing buildings is a clear example of unsustainability.

“On a local level, a reduction of energy consumption in buildings helps mitigate the effect known as the “urban heat island”.

different areas are segregated according to distinct functions (housing, economic activity, leisure) and this generates a greater demand for mobility. In addition, precisely because of this low density of this urban sprawl, public transport systems are less profitable: the potential number of users that these systems can at-

The compact city model remains hegemonic in Europe, despite the fact that urban sprawl, due to mimicry with the American model, has spread across the land “like an oil stain”, with the single-family dwelling as the dominant typology. A priori, these expanded low-density cities are far less sustainable than denser, compact cities because their dif-

tain is lower, which –in turn– encourages the use of private vehicles.

It would be possible to imagine a different situation in which the ecological impact of urban sprawl could be more nuanced. This would entail a scenario with a strong presence of teleworkers, with energy self-sufficient homes, and even with the use of land for growing food locally.

However, cities enjoying the benefits of compactness might be less sustainable than sprawling suburban areas in some respects, due to the higher income of their residents. If people’s habits are to be taken into account when planning a building’s energy performance, in order to shape a more realistic picture of its sustainability, the same could also be done at the urban scale. If a large percentage of the inhabitants of a city leave a substantial ecological footprint (due to transoceanic trips and the purchase of imported products, etc), this will prove detrimental to the city’s sustainability.

Urban planning and architecture

Urbanism meets architecture in the definition of urban models. There is an aesthetic-formal urbanism, which is one of a more technical and functional nature, and another strand oriented towards social transformation. One very clear example of this are eco-neighbourhoods, which seek to achieve the goal of urban sustainability (by reducing energy inputs and materials, using local resources and reducing waste outputs) on a larger scale than a single building, but on a smaller scale than a whole city.

Urban planning generates a specific layout and architectural pieces must be consistent with the objective established in each area. The eco-district should be developed on land contiguous to the city. If it is promot-

ed in a remote, or isolated, area, it will hardly contribute to the promotion of sustainability. The physical configuration of spaces does not, however, predetermine individual decisions or life models. This belongs to a cultural sphere in which architecture and urbanism can only exert a limited influence. x





GONÇALO BYRNE

“The architect is not a sublime artist who acts out of context, but rather the opposite”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

GB. I believe that the word sustainability embraces a much broader meaning than that of architecture. The basic idea is to achieve a balance between the home we inhabit (our planet) and human activity. In my opinion, it is not about “conserving” nature, because nature is always subject to change, but about carrying out activities that can transform the environment by improving it. To give an analogy, in the field of architecture, the question is how to carry out projects that are capable of improving the environment and people’s lives. By this, I mean that sustainability only makes sense if we put humanity at the centre. This reasoning also applies to technology, which is neither good nor bad, but an instrument that has its own *raison d’être* to the extent that it is at our service and not the other way around.

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

GB. I have always thought that the beauty of architecture results from different conditioning. The architect is not a sublime artist who acts out of context, but rather the opposite. Being an architect >



Gonçalo Byrne (Alcobaça, 1941) obtained a Degree in Architecture from the School of Fine Arts in Lisbon and he is Doctor Honoris Causa from the Faculty of Architecture of the Technical University of Lisbon and the University of Alghero, in Italy. Since 1975, Byrne has been the founder and executive director of Gonçalo Byrne Arquitectos Atelier of Architecture, which is a multidisciplinary team of professionals with skills in architecture, urban planning, and landscape design. He has worked on a variety of projects, ranging from urban planning and redevelopment to designing private and public spaces and buildings. His work has been widely recognized at both the national and international levels: he won the gold medal of the French Academy of Architecture, in 2000, and the AICA / SEC Award, in 1988, among many other awards. At the heart of his professional practice, Gonçalo Byrne is in constant dialogue with the places and components of his projects, and always in search of rigour and consistency, from the idea to the built reality.







“A GOOD BUILDING
MUST WITHSTAND
THE CHANGES, BUT
THE LACK OF CARE IN
CONSERVATION NO
LONGER DEPENDS
ON THE ARCHITECT”



undeniably has an artistic dimension, but it is not related to art, like being a painter or a sculptor. The architect must recognise the value of a place, its geographical location, and its historical condition, and use these as roots to carry out a contemporary intervention that looks to the future. And in that work, there is beauty, because the architect projects containers of life, whether these be houses, office buildings or public squares.

Another source of beauty is in the subsequent use that people will make of these spaces. In this sense, it can be affirmed that the beauty of an architectural work is not static, like that of a painting, but rather in line with the dynamics of life. Nowadays, when an image dominates completely, many architectural works are considered beautiful from the rendering of the project, which is a serious error. A work does not only depend on its apprehension by sight when there are many other very subtle aspects that appeal to wellbeing and the notion of time, etc.

This connection with the dynamics of life seems fundamental to me, from the point of view of sustainability; it extends far beyond the application of technology to greater energy efficiency. It is the possibility of establishing a connection with human complexity.



Architectural professionals therefore have a lot to reflect upon. We have been dragged along by a tendency towards naval-gazing that only isolates us. We have to build bridges with society again.

Of all of your projects, which one do you think most highly of? Why?

GB. I always say it's the next one. But in terms of past projects, each and every one has been memorable and I could cite several. I have one in Coimbra, for example, called the Machado de Castro National Museum, which is very special since it occupies the space of what was once the Roman Forum, and although the forum has now disappeared, it is a place with Moorish, pre-Romanesque, Gothic, Renaissance and Baroque ruins. The project had to manage this kind of historical condensate, making a modern building, while respecting the past. It is this kind of richness and complexity that I personally love to develop.

I would also like to mention a project from around 12 years ago, in Leuven (Belgium), for a new



©Andre Nullens

“THE IDEA THAT ARCHITECTURE ALONE CAN TRANSFORM A CITY IS AN ILLUSION. THE CITY IS THE MOST COMPLEX AND PERMANENT EXPRESSION OF HUMAN CULTURE.”

government seat in the province of Brabant, located between the old town and the railway tracks, which was a great challenge.

Can good architecture alone transform a city for the better?

GB. The idea that architecture alone can transform a city is an illusion. The city –and this definition is not mine– is the most complex and permanent expression of human culture. This means that it is a mechanism that is complete even without architects.

From a constructive point of view, the city is thousands of years old, but in this aspect, specialists such as architects have not always intervened.

The architect may be relevant at a given historical moment, but the political and economic worlds are essentially in charge of a city. The great architects of the Italian Renaissance always had funding from a prince; and although there are few princes behind modern cities, the power hasn't shifted far. It is vain to think that the architect owns the world. Architects don't own anything. I say this to my students in class: you can't work without funding.

The city –especially in Europe– represents a succession of different contemporaneities, as every style and way of understanding architecture was contemporary in its own time. And although forms can be reproduced, the historical conditions that created them can never be repeated. ✕





JOSÉ MARÍA EZQUIAGA

“People living in cities have needs beyond architecture itself”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? Is it an effort? A significant challenge? Or is it just a concept implicit in any project of quality?

JH. I understand it as a challenge because I frame it within the global challenge of sustainability. Sustainability is about solidarity between generations. It is not a code of good conduct or an aesthetic, but the responsibility that each generation has towards successive ones, in such a way that the natural and built environment that it leaves for the future is better.

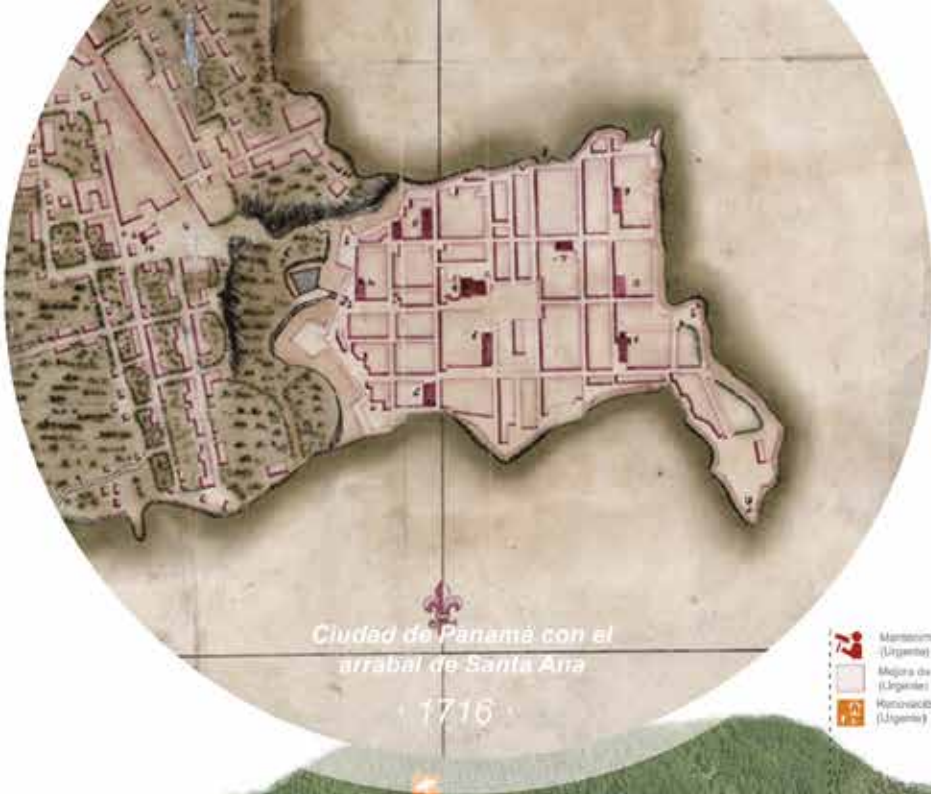
Sustainability arises from an awareness of the limits of development. And in the field of architecture, this awareness affects critical aspects such as materials, energy and land. These aspects are, in turn, linked to other major issues, such as geopolitics, or the management of climate change, and in the specific case of land, to the fact that the built territory competes with agriculture, which is vital for our survival.

For architecture to be sustainable, we first need to decide if it is worth building a new construction or if it is better to reuse and rehabilitate pre-existing buildings. The introduction of the circular economy paradigm is also very important in confronting the throwaway culture. On an urban scale, such containment in the use of resources implies not >



José M^a Ezquiaga is a Doctor of Architecture, having won the Special Prize for his Doctorate from the Polytechnic University of Madrid (1990). He qualified as an Architect from the School of Architecture of Madrid (1979) and also holds a Bachelor's Degree in Sociology and Political Science from the Complutense University of Madrid (1981). He has been linked to the capital of Spain and its urban project since the beginning of his professional activity. In recent years, he has focused his academic and professional interest in theoretical research and project integration, working at different geographical and social scales, and focusing on the interrelation between the city and the landscape. Ezquiaga has worked for both the local and regional administrations in Madrid where he has also held relevant positions related to urban planning. He is currently the Dean of the Official College of Architects of Madrid.





Ciudad de Panamá con el
arrabal de Santa Ana

1716

-  Mantenimiento de la edificación (Urgente)
-  Mejora de las infraestructuras básicas (Urgente)
-  Renovación de los espacios públicos (Urgente)

-  Planificación urbana y territorial suficiente y efectiva (Largo Plazo)
-  Creación Centros de acogida y recepción de visitantes (Urgente)
-  Proyecto de señalética (Urgente)
-  Diagnóstico de las condiciones sociales, económicas y ambientales de Santa Ana, El Chorrillo y San Felipe (Urgente)
-  Campaña formativa de plan de prevención de riesgos (Medio Plazo)

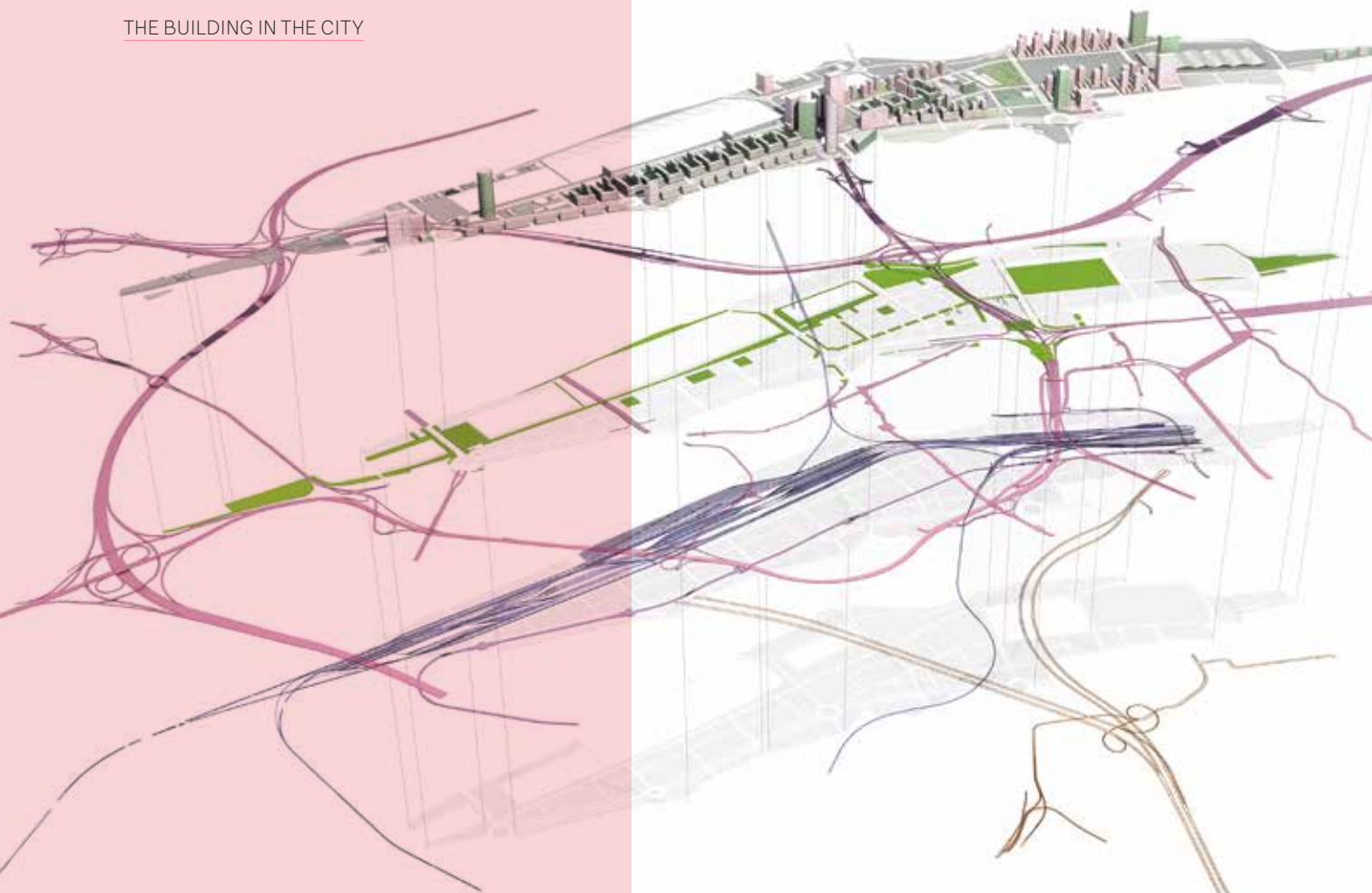
-  Mantenimiento de jardines (Urgente)



-  Transporte público adecuado (Urgente)
-  Nuevas espacios públicos (Medio Plazo)
-  Parking (Medio Plazo)
-  Creación + Centro de acogida y recepción de visitantes (Urgente)

1. Caserío
2. Iglesia de la Merced
3. Iglesia de San Felipe Neri
4. Iglesia y Arco del Convento de Santo Domingo
5. Museo de Arte Colonial y Religioso
6. Ruinas del Convento de los Jesuitas
7. Iglesia de San José
8. Iglesia de San Francisco
9. Palacio Barrios (Baldón Barrios)
10. Palacio Presidencial
11. Ica Rivera
12. Instituto Nacional de Cultura
13. Antiguo Museo Nacional
14. Palacio Municipal
15. Ministerio de Justicia y Gobierno (Antiguo Palacio de Gobierno)
16. Teatro Nacional
17. Museo del Casco de Panamá

Zona de Amortiguamiento / Buffer Zone



“A BUILDING THAT IS RIGOROUS IN ITS ENERGY SAVING AND THAT REASONABLY SATISFIES HUMAN NEEDS HAS A CERTAIN ETHICAL BEAUTY.”

building in places that have agricultural uses and environmental value, and instead favouring sites that have already been urbanised.

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

JH. Beauty is a cultural construction and sustainability may end up changing our perception of it. We must bear in mind that our gaze is conditioned by centuries of development and that this is a dynamic process that is subject to the changes of time and place. Beauty is therefore not as universal as the Greeks thought. The Western canons have little to do with those of other civilisations, as anthropology first revealed in the nineteenth century.

Returning to sustainability, there are already authors who speak of a “thermodynamic beauty”, that in this case would not be based on physical proportions, like the classic canons, but on other types of parameters, such as energy consumption, and others more linked to functionalities.

A building that is rigorous in its energy saving and that reasonably satisfies human needs has a certain ethical beauty. I think that elements that were previously considered distorting or disturbing in



architecture, in terms of the aesthetic equilibrium have today been assimilated and accepted as par for the course. This has also been the case at several other times in the history of architecture. When the first railway stations appeared, they were not considered to be as beautiful as a city's cathedral, for example. These same facilities were, however, later converted into magnificent "iron cathedrals" which shifted the way they were perceived and now they constitute undisputed elements of heritage. The same may happen with green walls or other types of facilities related to renewable energy in buildings. On another scale, problems may arise, for example, in relation to the installation of wind turbines on land or at sea. Do they enhance or ruin the landscape? It is a debate with opinions based on many different factors. There is no single criterion, with the answer being qualified according to each place.

Of all of your projects, which one do you think most highly of? Why?

JH. Architects are very fond of all the projects we have developed. I would mention the challenge of rethinking the island of Menorca in order to reconcile the development of tourism with the natural landscape and people's quality of life. This was a territorial project rather than an architectural one, but it was highly satisfying to carry out.

In architecture, I would like to highlight a social housing project that we worked on with the late Colombian architect Rogelio Salmons, whose objective was to grant the highest quality and dignity to this type of housing. This is easier to achieve in subway stations or large airports, but is more difficult with housing.

Then, in a more experimental sense, it is worth mentioning an innovative project we completed in

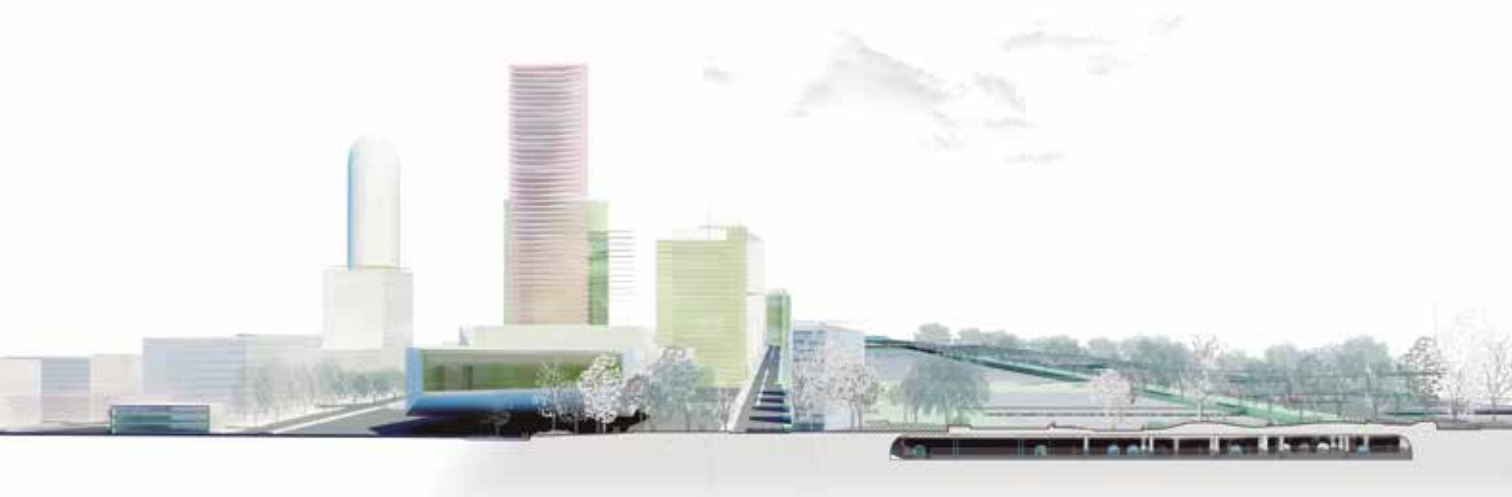
the centre of Madrid, with Juan Herreros. In general, I love all the projects I've worked on in Latin America, especially because they have a very direct impact on the lives of people, and this has been demonstrated in Lima, Managua and various cities across Colombia.

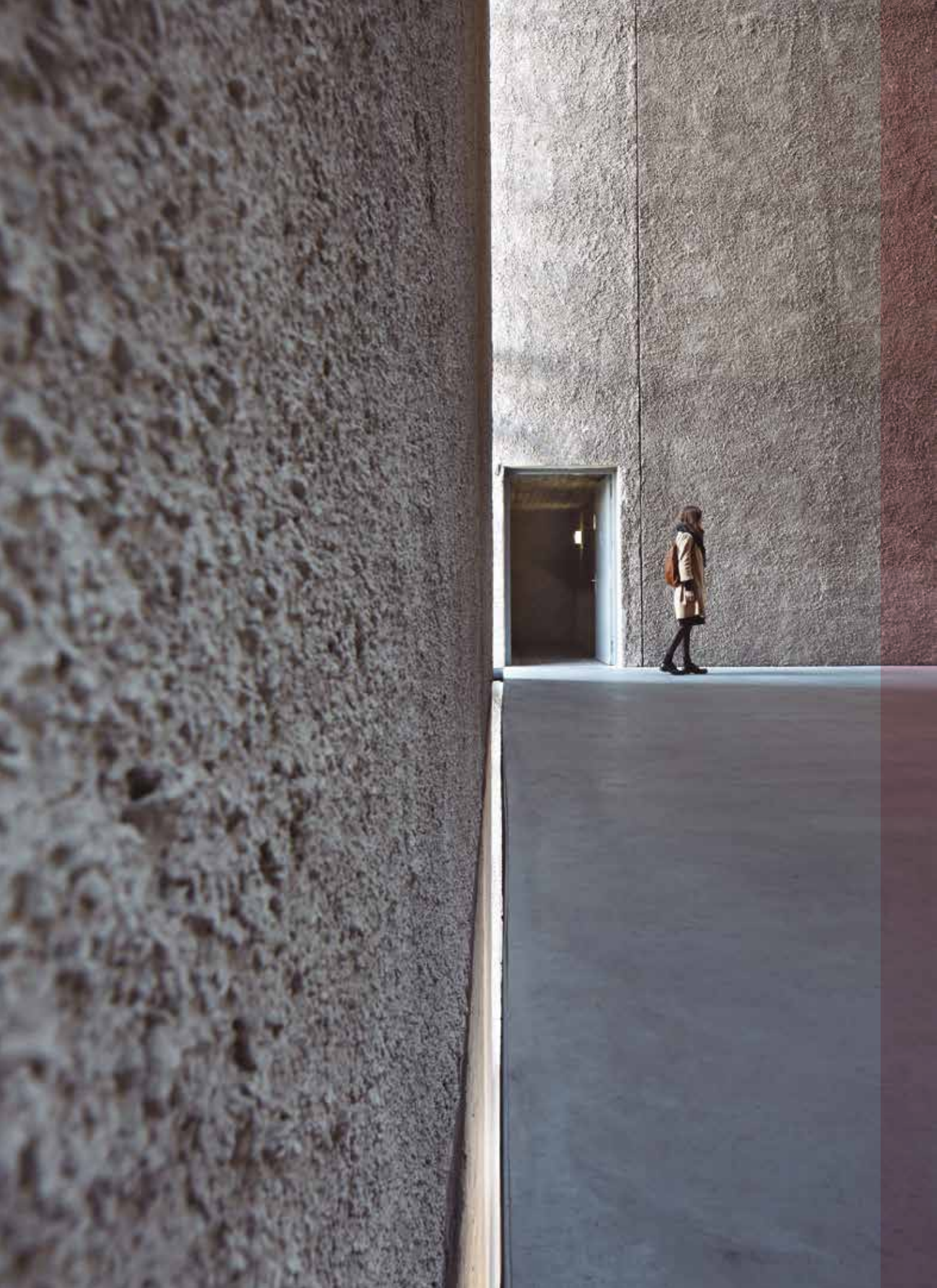
Just as doctors take satisfaction from restoring people's health, we architects are also happy when an intervention allows us to regenerate an impoverished area and improve the quality of people's lives. It is fascinating to think that what was born in the mind, or in a small pencil sketch, can become a three-dimensional reality. There is some magic in it, as with any creative act, be it artistic or scientific. In conclusion, I should add that the idea of individual genius no longer corresponds much to reality and that more and more architecture is a collaborative work between various professionals.

Can good architecture alone transform a city for the better?

JH. No, not radically. The reason is that people who live in a city have needs beyond architecture itself. A polluted atmosphere cannot produce comfortable conditions even if beautiful buildings have been built and no matter how sustainable they are. Without security, sanitation, mobility and accessibility, a city will not work. Now, if we ask ourselves how satisfactory a city can be with the listed questions resolved, but with bad architecture, I would say not at all.

The reason is that the need for cultural expression would not be met. Architecture is the expression of our way of living, personally and collectively, and, when you have a strong idea of a city, you attain a kind of power that an isolated building cannot achieve. x







ROGER RIEWE

“Buildings with a personality usually possess beauty without having to shout it out loud!”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

RR. The term sustainability is often used in context with architecture; but maybe too often. Very often, I get suspicious when the term is used, trying to figure out if it is used to upgrade middle class architecture or if there is a serious position supporting the issue as such.


Basically, it is an implicit concept in just about any contemporary project. The building codes and laws have been adjusted in such a way that every building is now more or less sustainable.

But if we take a more holistic approach to sustainability, that is when things become interesting. Old cities –the ones we like visiting– basically have not changed over the last two centuries or more. Only minor adaptations have been made and their inhabitants now have Wi-Fi and other benefits. But the buildings have not been demolished, nor have they been rebuilt. This is the ultimate in sustainability! There has never been a necessity to build new buildings by demolishing historic cities. This has saved an enormous amount of energy: no add-on insulation, no PV-element can be more energy efficient on a long-term basis! This is sustainability at its best! >



Roger Riewe was born in 1959 in Bielefeld (Germany). He studied architecture at the RWTH in Aachen. In 1987, he founded the Architekturbüro Riegler Riewe, in Graz (Austria). He has also been a member of the board of the Austrian Architecture Foundation and of several other boards and commissions. Riewe deals with architectural topics that look beyond form, with architecture as a background to everyday life and as a signatureless reality. In the field of technology, he focuses on new materials, and their use, and on the demand for as of yet unavailable materials as a demand of architecture.





“THE BUILDING CODES
AND LAWS HAVE BEEN
ADJUSTED IN SUCH A WAY
THAT EVERY BUILDING
IS NOW MORE OR LESS
SUSTAINABLE.”



©Wojciech Krynski

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

RR. If sustainability is only seen as a goal for reducing energy consumption, which as a conventional reaction implies an intensive use of insulation material, of triple glazing etc, then this could endanger calls for good architecture. But if sustainability is seen in a holistic way, then we might head for high-quality performance and for good architecture. Buildings with a personality are usually buildings in which this is self-evident from their appearance. They possess beauty without having to shout it out loud! They save energy, because they are long-lasting!

Of all of your projects, which one do you think most highly of? Why?

RR. I actually like all of our projects. The reason is that we were always able to communicate certain topics in each project; this gives them a bottom line and a body that are important for the respective architectural discourses. In this way, the projects are taken away from any legibility, built exclusively on aesthetic considerations. This makes them interesting. Curiosity is generated and it becomes possible to perceive the projects on different levels at the same time.

You can take them home as a mental souvenir and keep them in your memory.

Can good architecture alone transform a city for the better?

RR. No, definitely not. Good architecture can certainly play an important role in transforming the city in a positive way, but a city does not only consist of buildings. Inhabitants are just as important for creating positive atmospheres. Politics and economy are important as well. Just imagine, if the unemployment rate was 50%! Then public space, a vital part of the cityscape, would be utilised in a completely different way than if the unemployment rate were 2%! But, on the other hand, what is good architecture? Good architecture should be seen on an urban scale; it should be seen as a background for utilisation, and as a field of potentiality, for the known and for the unknown. On the one hand, good architecture should be resilient enough to withstand daily trends, while on the other hand, it should be self-evident in an urban context. x



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“GOOD ARCHITECTURE
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JOSEP BUNYESC

“Sustainable architecture is that which is independent of what is not architecture”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

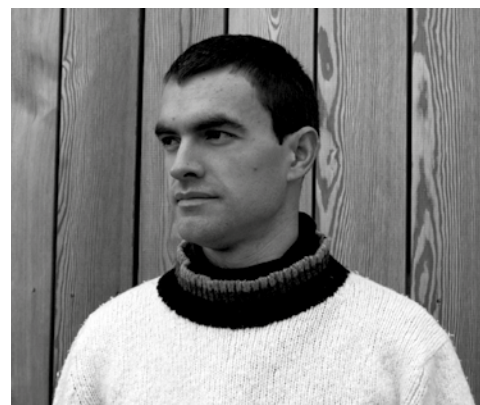
JB. Unsustainable architecture means, in a way, an outdated architecture which has no future. Therefore the adjective sustainable should already be incorporated into the very concept of architecture, just as aerodynamics is incorporated into the concept of the car.

So we could talk about sustainability as an intrinsic feature of architecture and that view could be extended to any activity today. When something is unsustainable, it means it will last only a short time and will disappear soon.

Pre-industrial architecture was perfectly sustainable. It had no capacity to burn non-renewable energy.

Our planet, and the life it contains, works with solar energy. With the massive use of fossil fuels in the industrial age, a kind of “energy credit” was established. Until then, human societies had developed with renewable energy, which was the only energy available at the time.

This was also the case in construction. The materials that were within reach at a given place were used to make buildings in that place. Those buildings could either be robust and last many years >



Josep Bunyesc is an architect and PhD in sustainable architecture and the economy of energy and habitat in mountain areas. He has been working as an independent architect since 2003 and in 2017 he created the firm Bunyesc Arquitectura Eficient. He has completed more than 100 renovation or new construction works involving energy class A buildings, including the Can Portabella community centre in Barcelona and the extension to the Ventosa-Calvell mountain refuge in the Catalan Pyrenees. He has been a visiting professor at various universities and has received the following awards: First prize in the Ibero-American Passivhaus Contest (2011); National Prize for Culture of Catalonia in architecture and public space (2012); Prize for Energetic Excellence for the rehabilitation and extension of Can Portabella (2016); and Award for good quality in university teaching (2021).



“PRE-INDUSTRIAL
ARCHITECTURE WAS
PERFECTLY SUSTAINABLE;
IT HAD NO CAPACITY TO
BURN NON-RENEWABLE
ENERGY”





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or, on the contrary, be made of straw and last for only a short period of time, with the possibility of reconstructing them continuously due to the great availability of materials and resources.

This happened in a dynamic of non-waste generation that today we would call the circular economy, but which obviously did not need to be conceptualized at the time, because it was the only possible reality. In the same way, it was not possible to speak of km 0 in materials. Nobody would have thought of carrying a stone 300 kilometres to be used at a construction site. The concepts came later.

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

JB. All projects must incorporate sustainability as a core feature. If sustainability either conditions or limits a project, it must be in the same sense that a structure also conditions it. Not everything is allowed in a structure, since a building has to stand up and water must not be able to penetrate inside it, and the same goes for sustainability. But other than that, I don't think it conditions or limits anything else.

Any building is made for some main reason and it has some specific functions. It might, for example, perform an artistic function, or even a sculptural one, which is not negligible, but this cannot make us forget some basic functions that must also be fulfilled. A building that is not fulfilling these functions is not sustainable. In other words, a



work of rehabilitation and extension of a small and modest two-storey building that has made it possible for the building to maintain its personality in what is a rather peculiar urban environment, since it is surrounded by very tall buildings.

Another reason is that we have managed to make the building generate more energy than it consumes. Furthermore, the structure has been rebuilt with wood, so the CO₂ balance is also positive. All this has been done within the framework of a typical city council public work in a neighbourhood of Barcelona, and with the usual budget for this type of project; nothing extraordinary, therefore.

Another project of which I am proud is the extension to the Ventosa-Calvell mountain refuge, located in the Catalan Pyrenees. Using only architectural elements, it has a comfortable temperature of 25 degrees inside, whereas in the old refuge, next door, people have to really wrap up well to keep warm. The message is that if we've been able to do this up there in the mountains, with extreme temperatures in the winter, what can't be done anywhere else?

Can good architecture alone transform a city for the better?

JB. I do not think so. To transform a city, architecture does not have the last word. This is something that depends on the desire of the people to transform their environment. Architecture is not carried out unless someone asks for it and pays for it.

Architecture can only do something about this as long as people have that will. If there is a society without a certain degree of culture, or without high requirement levels, transformative architecture will simply not exist.

Architecture is a reflection of society at every moment in time. There are people who want to put more emphasis on energy, others on aesthetics, others on health issues... Projects in a city will just pick up on what that society values most. Architecture is not able to choose the way by itself; it goes where developers or investors want it to go. x






06

Evaluating a building

Arthur Huang • Raya Ani
Esteve Bonell • Tony Fretton



What it takes to evaluate a building is a very broad subject. Different aspects of architecture can be, and often are, evaluated. These tend to include: whether the construction serves the functions for which it was intended, whether the initial budget was exceeded, and if the building adapts aesthetically to the urban context in which it is inserted. Evaluation is a fundamental instrument in the move towards sustainability; after all, it is not possible to improve on something that has not first been assessed and measured.

Evaluation is also a necessary step prior to certification, which is a formula for accrediting the fulfilment of certain requirements and a means of describing the behaviour of a highly complex system, such as a building, in simple language.

To carry out an evaluation and certify a building, it is first necessary to establish the sustainability targets and strategies that need to be met. A set of quantitative and/or qualitative indicators must also be created to provide information about the extent to which the targets have been achieved. This will help to measure the building's environmental quality.

There are various different groups of indicators, with each of them defining a particular vision of environmental quality and sustainability. This does not mean that there are radically different views on this subject, but simply that some systems consider a greater number of parameters than others, just as some place special emphasis on certain parameters while neglecting others.

Diversity of approaches

One way to examine such a diversity of approaches is to take the analysis of the life cycle of a building as an example (from the extraction and use of its raw materials, through their transformation, transportation to



the construction site, use in the building, and eventual elimination when the building comes to the end of its life). Based on this, it is possible to establish levels of analysis for different indicator systems. There is a first level, at which systems that analyse the entire life cycle of the building are located, which includes a wide range of parameters (water, energy, materials, air quality and emissions, etc). At the second level, there are the systems that focus on a single phase of the life cycle and which analyse a wide range of parameters. The third level is one at which a single parameter is analysed within a phase of the life cycle. However, it is still possible to reduce the scope to a fourth level, at which a given phase, or part of a parameter, can be analysed.

A sound evaluation is possible across all levels, but must consider the fact that sustainability covers a very broad spectrum of variables. It could be said that the systems of indicators at the first level are those closest to a measurement of sustainability in all its dimensions. The main aspects which certifications target are: the efficiency of the use of energy and water; the energy embodied in the construction materials; the impacts resulting from the location of the building; the flexibility of use of the building; comfort; safety; how healthy the indoor spaces are; and the emissions, etc.

As indicated above, evaluation is a condition for certification. It involves obtaining recognition (whether in the form of a seal or a label) from an independent organisation that confirms the fact that certain goals have been achieved. Certification organisations base their decision on evaluations carried out by professionals who are self-accredited. Certification is expressed in categories that reflect different degrees of compliance with the established goals.

The consequences of certification

Submission to a certification process has a number of implications. From the outset, it establishes a set of indicators that reflect real improvements in comfort levels perceived by users and/or a reduction in a building's operating expenses. There is also a commercial dimension. Obtaining a label increases a building's market value and underlines the develop-

er's interest in environmental responsibility. This move to promote certification can also be of collective importance, because when this is available in countries that have a built stock with deficiencies in energy management and the use of materials, it can help to raise awareness about the importance of sustainability for future projects.

The most important certification systems offer the possibility of developing evaluations in the design or use phase, as well as in new constructions, or existing buildings undergoing rehabilitation. Certifications issued in the use phase which are made a priori, are based on simulations of the behaviour of hypothetical users, and do not have to match with subsequent reality. In this sense, some certifications could include manuals of use for a building, so that their users are able to control certain variables. This could include regulating temperature or natural ventilation in an optimal way and in accordance with established expectations.

A brief history

The history of sustainability in building dates back many centuries and predates the creation of the concept itself; some traditional architecture intuitively materialised many of the parameters that are nowadays defined as sustainable. Certification, on the other hand, is a relatively recent phenomenon. The earliest certifications (BREEAM, LEED and GBTOOL) date back to the 1990s and their appearance coincided with the emergence of sustainable development on the global agenda.

The most widespread certification system in current use is LEED (Leadership in Energy and Environmental Design), which is used in more than 160 countries. It was developed by the US Green Building Council and covers all aspects of energy, water, materials, pollution and waste management in the design, construction, use and management of buildings. LEED has also developed specialised versions for different building typologies and has been subject to frequent updates over the years.

The oldest certification system, BREEAM (Building Research Establishment Environmental Assessment Method), was created in





“Evaluation is a fundamental instrument in moving towards sustainability, as you cannot improve what was never measured in the first place.”

1990, in the United Kingdom. Like LEED, it has a strong international presence and covers a wide spectrum of parameters in all phases of the life cycle of a building. It can also be applied to practically all types of building thanks to its flexibility and its different versions.

Despite the global implementation of LEED and BREEAM, several countries have their own systems. This is the case of HQE in France; DGNB in Germany; GREEN in Spain; ITACA in Italy; Minergie in Switzerland; CASBEE in Japan; and Green Star in Australia, among others.

The Passivhaus construction standard responds to the challenge of creating buildings with very low energy consumption. It arose from a collaboration between Swedish, German and North American academics at the beginning of the 1990s. Apart from its role as a construction norm, it is also a certification, and was initially conceived for countries with cold climates. Inspired by its example, a research and dissemination project

sponsored by the European SAVE programme has been developed with the aim of promoting passive houses in warm climates; it goes by the name of Passive-On.

Voluntary

As certification systems are voluntary, the proportion of certified buildings is still very small compared to the total number constructed. In some cases, however, these voluntary systems can effectively

come to serve as construction regulations. Passivhaus has now become a mandatory standard in German cities such as Frankfurt, while Minergie, a Swiss quality certification which has been granted to energy-efficient buildings since the 1990s, has now become a mandatory standard, in its basic version, throughout that country. At the regional level, in Spain, the Basque government’s environmental management organisation (IHOBE) has become a mandatory standard for public buildings constructed in this autonomous region.

Via its directive on the energy performance of buildings, the European Union declared that all new buildings had to meet zero net energy standards by the end of 2020. This new scenario may help to further pro-

mote the evaluation and certification of buildings. The EU is also currently working on the design of its own public certification system. Such a task faces several challenges, including that of setting the priority levels of its targets and the scores that must be attributed to different parameters.

Implementing a system of this type at the European scale is not an easy task, since it must combine and balance technical and scientific decisions with those of a political nature. There are also several global problems, such as climate change, which are common to all countries, but also environmental and economic realities that are closely linked to local contexts and these are also questions that must be considered when evaluating and certifying.

Potential for development

Evaluation and certification systems are not neutral instruments, nor are they necessarily independent from the categories that are evaluated, or the distribution of the relative weights of the parameters in each category with respect to their reference values, which may also vary according to the different systems employed. Although each method is merely the expression of a point of view about sustainability, despite their many limitations, the passing of time has seen the different systems –or at least the most important ones– raising the level of their requirements. Their potential to introduce a progressive improvement in environmental quality within the building sector is therefore undeniable.

Another positive aspect is that these systems are subject to public scrutiny and debate. Analyses and comparisons that highlight aspects that require improvement are undertaken in each system, as well as in their successive versions. In the same way that each certification system decides what it should prioritise in its evaluation, agents working in the sector can also choose the system that they find most accessible and reliable and that best suits their needs and targets. For all of these reasons, certification opens up new possibilities in the path towards achieving more sustainable architecture, although much of this potential is still largely undeveloped. x





ARTHUR HUANG

“Our research has mainly focused on using local trash as the new local construction material”

What does the word “sustainability” mean to you when it is associated with architecture? Is it a label? Is it a trend? Is it an effort? Is it a challenge? Or is it just a concept implicit in any project of quality?

AH. It is definitely not a label, nor is it a trend. It has always been a challenge, because sustainability means humans must be able to live for a long time, with the limited resources that we have.

The architecture of the last 80 to 100 years has not been sustainable, despite the fact that it was before. In the past, it did not, for example, make sense to select a material that was only found over 100 kilometres away, because it then cost too much.

When the Romans built their roads, they used whatever material they could find next to the construction site: that is the basis of economics and sustainability for construction.

Because of industrialization, the situation has been blown way out of proportion. We buy materials from China, England... from anywhere. Just because they like it, somebody takes a piece of marble that they find in Brazil and brings it to Spain, for example. In light of such actions, how can you create architecture that is supposed to be in tune with the resources that nature has given us? The existing architecture is no longer sustainable. >



Arthur Huang (1978) is a Taiwanese structural engineer and architect. In 2005, he established Miniwiz, an internationally operating company based in Taiwan, Singapore, Beijing and Milan, dedicated to upcycling consumer rubbish and industrial waste. He trained as an architect at Cornell University, where he was awarded the Charles Goodwin Sands Memorial Medal, an academic leadership award, for his work in design and technical performance. He also graduated from Harvard University with a Master of Architecture degree, in 2004, having dedicated special interest to green business development.



The word sustainability just means trying to be efficient, building architecture with the lowest carbon footprint that is technologically possible at that time.

Our research has mainly focused on using local trash as the new local construction material. This means that trash collected in Barcelona must only be used to build in Barcelona.

It is all about technology, about machinery. It is the process of recognizing and processing such trash to build, or transform, a certain area with it. Right now, this is a technological challenge, but also one of consumer behaviour, because consumers are scared of trash. How can you use something dirty, scary, poisonous? And how do you turn that into a material that you need?

We embed this concept in any quality project, whether it is architecture or construction, and we are very confident that it is a natural way of doing things; the constructions of Roman architecture were carried out based on the economy of trash. This applied everywhere, except –perhaps– on the top layer of the building.

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

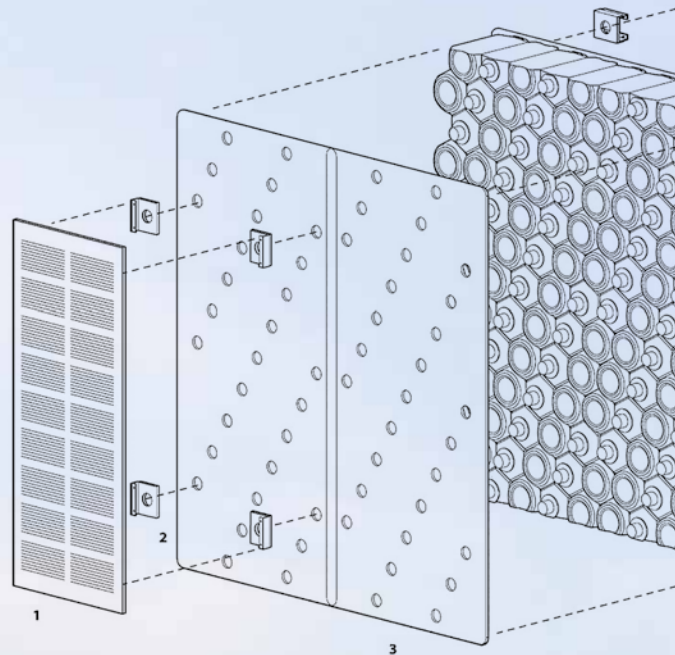
AH. Of course. To change design or consumer behaviour, you must always start with what your eyes see. We have five senses, and sight is the first sense we use to see things from far away. Then, we have an impression of wanting to be close to something because we find it interesting.

The transformation of form is therefore the first step in turning something ugly into something beautiful. And then the form becomes the structure. As we get closer and closer, it is then touch, then smell... It is about how we react in front of a building, given its design.

Initially, the building needs to be transformed into something of visual beauty. Next, you have to align

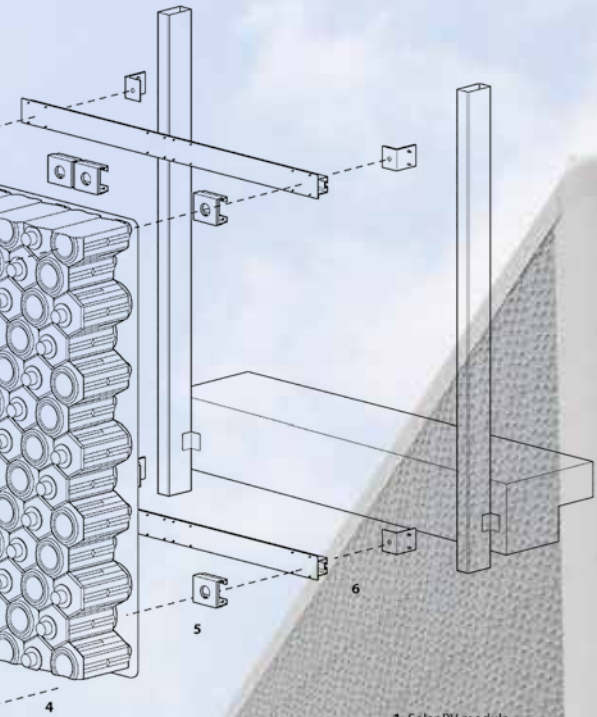


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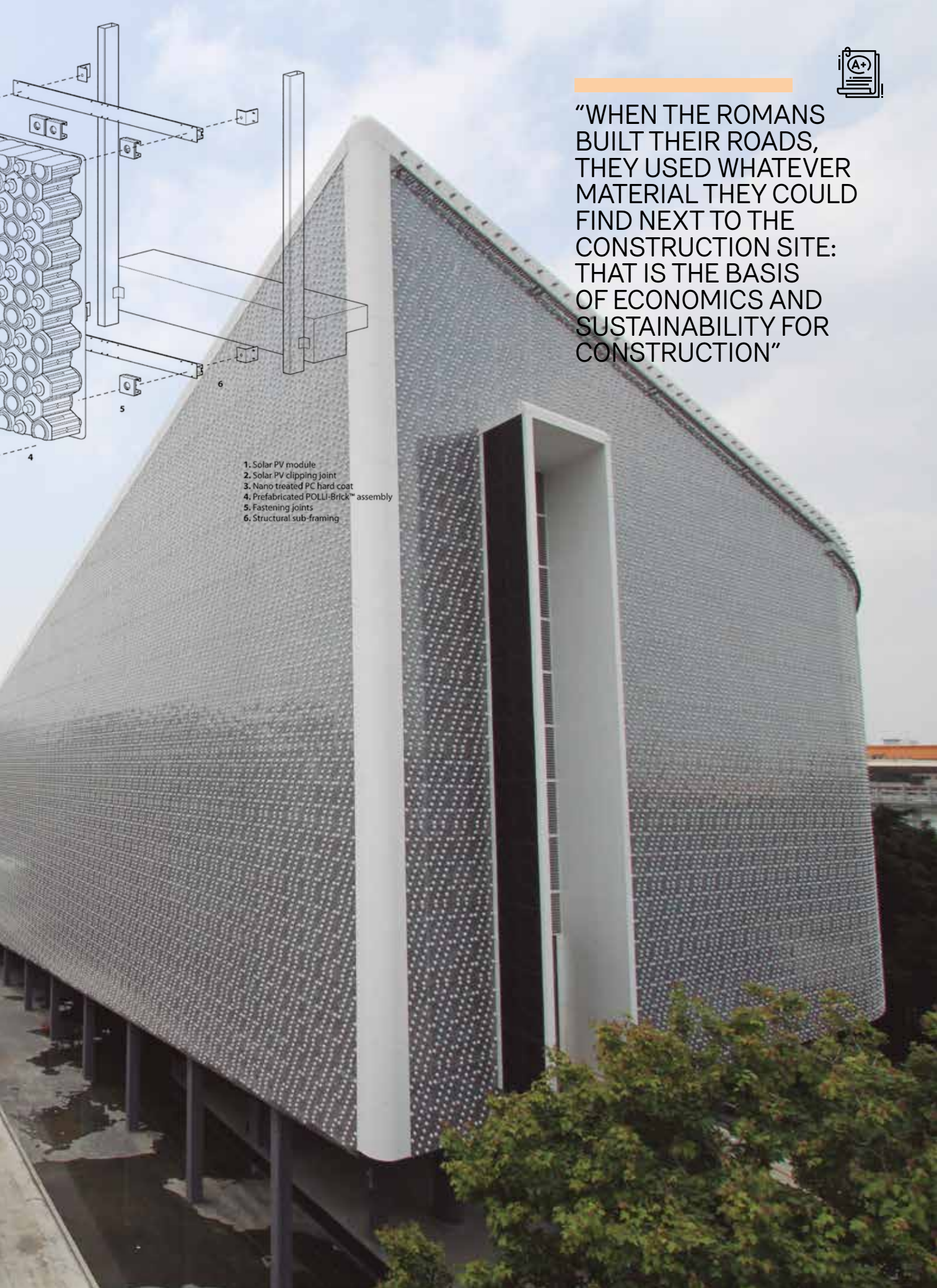




“WHEN THE ROMANS BUILT THEIR ROADS, THEY USED WHATEVER MATERIAL THEY COULD FIND NEXT TO THE CONSTRUCTION SITE: THAT IS THE BASIS OF ECONOMICS AND SUSTAINABILITY FOR CONSTRUCTION”



- 1. Solar PV module
- 2. Solar PV clipping joint
- 3. Nano treated PC hard coat
- 4. Prefabricated POLLI-Brick™ assembly
- 5. Fastening joints
- 6. Structural sub-framing





all the performance requirements of a structure to conjure that physical beauty and, finally, you have to convert something of no value into something of value.

Of all of your projects, which one do you think most highly of? Why?

AH. There are two types of projects that I find very interesting right now.

The first one actually involves the community, and mobilizing people to help collect the material for a building. An example of this is when 260,000 people joined forces to help us collect trash around a city.

What type of trash? Only plastic bottles and plastic bags. In return, our sponsors provided the participants with Italian olive oil. We exchanged olive oil for trash. We collected 1.6 million PP bottles and around 26 tons of plastic bags.

That was the beginning. Next, we used this material to build the city's museum, with the whole process filmed and documented, on literally 60

kilometres of tape. For us, this was the first time we were able to involve the community and then use the technology locally. We were also able to build, and our construction is still there: it is called EcoARK. It is still there.

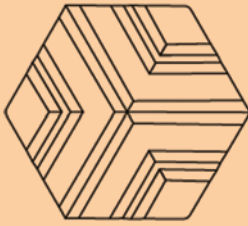
Our latest project is heavily focused on decentralized recycling machinery. The goal is to be able to take your trash and transform that into architecture, or architectural material, within two and a half minutes. You see it, and you cannot believe it, right? There is no transportation footprint. There is no toxicity. You can see the trash.

How is such a transformation brought about? It involves robotics and image recognition, which are able to adapt to different materials and shapes. Then, we work with local engineers and designers to produce the final material.

In a way, what we do is to shrink materials with a 3D printer in order to produce serious building material. Current 3D printers are more of a gimmick than anything else, because the material they use



Hexa Tile



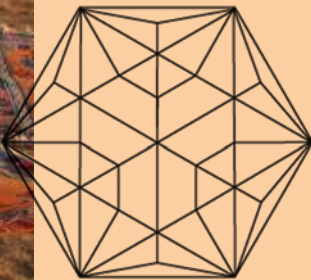
Shanghai Earth Day 2017
Beijing Launch 2017
Tibet Mission 2017

Finger Print Tile



London Design Festival 2017
Milan Design Week 2018

Star Tile



Milan Design Week 2017

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After 15 years of dealing with different certifications, I am strongly of the opinion that they are actually a pretty bad thing. In the end, they all refer to the same tests, whether fire testing or structural safety, etc. It is common sense. Despite the fact that they are all the same tests, with different names, the certification processes are different in every country, making them difficult to avoid.

The issue is quite simple: the safety standards for buildings should have been unified a long time ago.

On top of that, using innovative materials means fighting against the previous traditional understanding of what a material should be. Wood, glass, tapestry, and many fibrous materials that are flammable and potentially dangerous, all have very relaxed tests, for example, merely because they are traditional materials. It is as simple as that.

If we want to devise sustainable architecture, however, we need to have new innovative building methods. We need certifications capable of making evaluations on a project-by-project basis. We need to have a sandbox where we can play, but not with the regular tools.

Currently, if you want to use a new construction material, in any city, the materials cannot be evaluated. A strict structure, based on traditional materials, has been in place for the last couple of hundred years, with all these big companies sitting there.

Young people have not been able to come up with other designs. You can tell that architecture has not changed. It must change, however, because we have to react to the environment to be sustainable, but we are not reacting.

We are still using stone. In fact, we use more stone than ever; we use more cement than ever, more materials that rely on imports. With the regulations, we are perpetuating this bad behaviour and we are making more and more unsustainable buildings.

To pass the regulations, we combine tactics. We are our own clients. We are architects. We are also engineers. That is Miniwiz: design directly linked to engineering and financed by us.

We combine tactics to get our project built. We try to reduce all the internal factors in the design process and only deal with the external factors, so we can get approval and get the go-ahead for the project. x

has no strength. The process is based on forging methods using pressure, rather than heat. Heat is needed to soften the trash, but pressure is required to form very strong elements, such as architectural joints, or tiles.

The TRASHPRESSO project is the final element that allows us to bring this transformation to other architects and designers in the global economy, in a scalable way. It is like a robot arm, or leg, with a camera that is able to automatically select different settings with which you can create different products.

Are there too many certifications available for buildings? Should certifications be abolished or just reformulated?

AH. I work on a lot of international buildings, and every country has its own certifications. For any new material or fabric that we want to introduce into a building, we need to acquire certification.





RAYA ANI

“Rating systems are great but we should not see them as an end in themselves”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

RA. For me, sustainability is an outcome of a thinking process. The sustainability I am interested in is not a forced principle that requires effort. Most of the time, the effort that is required is related to convincing the client to allocate resources and a budget to embrace it. When clients don't support it, we find ways to take passive measures that will not cost the client beyond what is normal.

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

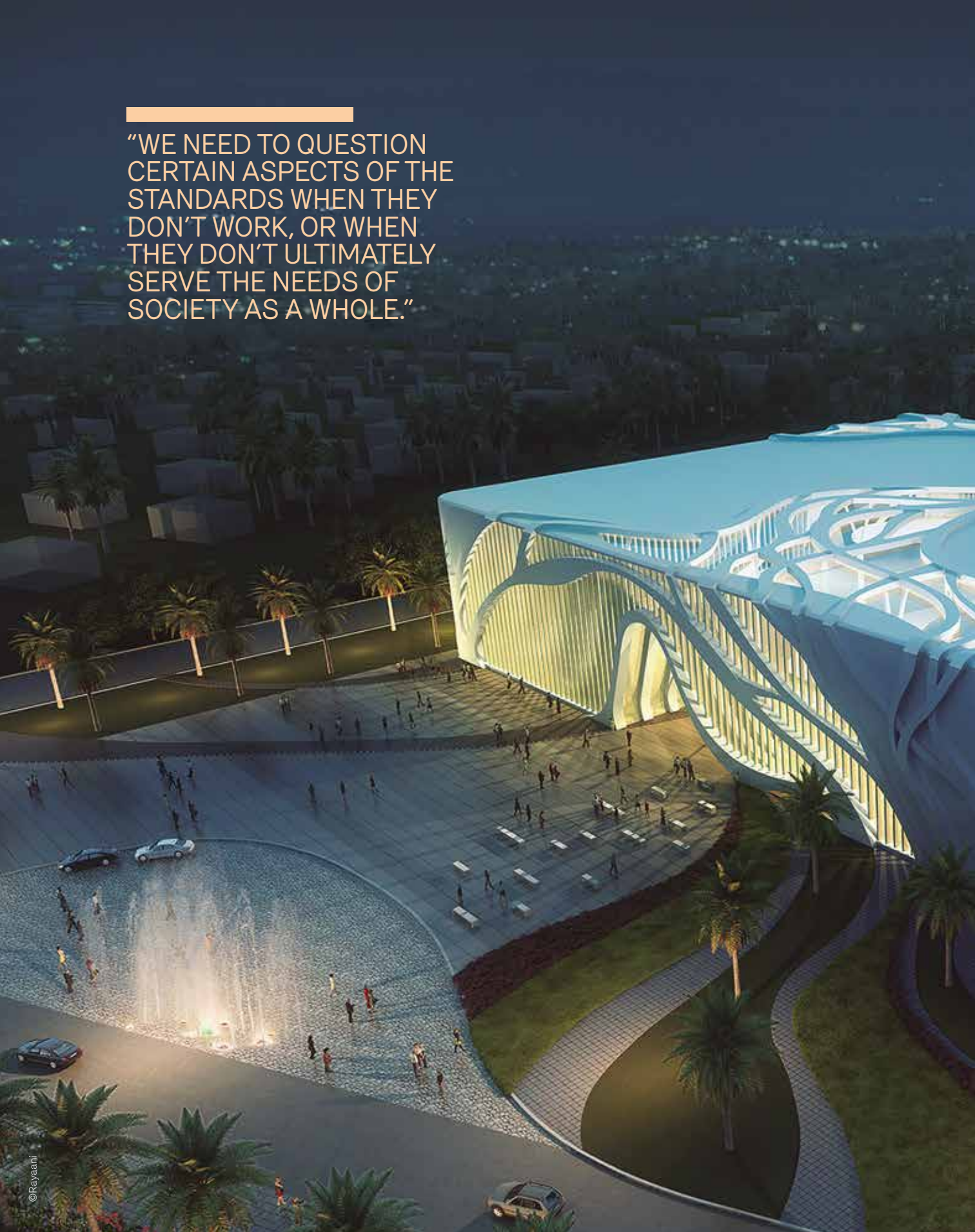
RA. If I take the Qatar Sports Complex as an example, it started with a simple idea of wanting the feeling of playing outdoors but being indoors to avoid the high temperatures of hot summers, so I allowed light to come in and filter through the ceiling. Once I had made that decision, everything fell in place. Then, we worked with our engineers to find the best, and most sustainable, way to cool the building using passive strategies. That, I believe, is an example of the building design, and its sustainability strategies, being integrated as part of the whole design. >



Raya Ani is an Iraqi-American architect and urban designer with 25 years of experience. In 2015, 2016 and 2017, she was named one of the top, and most powerful, architects in the Middle East. Raya designed the first public green school in New York City and two green-certified (LEED) residential towers, in Battery Park City. In 2011, she was nominated for the Middle East Architect of the Year Award, and her work was highly commended by the jury. In 2012, she founded RAW-NYC Architects, an interdisciplinary architectural studio based in New York City. In 2014, she established her Dubai office. In 2013, she received the AIA-ME honour award for her visionary work on the marshes of southern Iraq, as well as a merit award for her design of the Aspire Sports Complex. In 2014, her Aspire Sports Complex project received the Leisure Project of the Year Award from Middle East Architect. She was made President of the American Institute of Architects - Middle East Chapter, in 2017 and in 2018, Middle East Architect selected her as one of the most influential architects in the region.



“WE NEED TO QUESTION CERTAIN ASPECTS OF THE STANDARDS WHEN THEY DON’T WORK, OR WHEN THEY DON’T ULTIMATELY SERVE THE NEEDS OF SOCIETY AS A WHOLE.”





Of all of your projects, which one do you think most highly of? Why?

RA. For me, each project has its own unique circumstances; thus, each one has a special place. Each one addresses sustainability from a certain perspective, whether that is environmental, social or economic. I am interested in all aspects of sustainability. They all aspire, in their approach of using natural, available resources, to maximize the experience of living, working or playing. Some of the projects also aim to empower individuals and communities, like Liberland and the Marshes of Southern Iraq.

Are there too many certifications available for buildings? Should certifications be abolished or just reformulated?

RA. I believe that the efforts that have been put in place so far to ensure sustainability commitments and to establish industry standards to be followed by developers, business owners and any individual, are to be commended. I think having certification programmes that have brought awareness and motivated people and businesses to be environmentally conscious is important. Since I am a LEED accredited professional, I know more about LEED than BREEAM. However, my comments here are rather general, so they probably apply to both. Companies often use sustainability to distinguish themselves from others, and for their own PR! This is a good thing, as creating incentives –whether they be tax incentives or PR incentives– is a positive thing, in my view, as long as the company, or individual, is truthful and thoughtful in their pursuit. However, since I am a believer and an advocate of all aspects of sustainability, –whether environmental, social or economic– I would say that rating systems, like LEED and BREEAM, are great; but they are just like anything else; they also have their pitfalls and we should not, therefore, see certification as an end in itself. For me, everything is a good start, but you always need to aspire to going beyond LEED and BREEAM and to push for more design innovation on the sustainability front. Certification should be more than a case of ticking boxes; it needs to be a sustainable system in its own right, meaning flexibility and adaptability, and it should always consider the context in which it is being applied, as there are issues that might make a building less sustainable, but still meet the requirements of the rating system.



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We do, however, need to think through some of the drawbacks and must always be critical, as that is what makes us true leaders. We need to question certain aspects of the standards when they don't work, or when they don't ultimately serve the needs of society as a whole. We obviously need to critically think about this when we start applying certification to a project, and I think that both LEED and BREEAM can learn from each other and learn from the actual operation of the buildings that have been certified and revisit some of their criteria, based on their post-occupancy operation and maintenance. I also think it is good to have competition in the market, as that pushes us all, as individuals, and as companies,

and prevents us from becoming complacent. I also believe that creating incentives for architects and designers to consider sustainability in their process, from the very beginning, is something to be supported and empowered.

We need an honest, empowered and integrated process for applying sustainable design! It is a philosophical position, first and foremost, and we need to think about all aspects of sustainability because, in the end, it has to empower us – as a society – to live an inspired and prosperous life. ✕





ESTEVE BONELL

“Regulations are necessary, but they should be applied with care”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

EB. You cannot talk about making a building without taking sustainability into account. Sustainability is part of good architecture and if it is absent, then it is simply not good architecture. Sustainability should be understood as something more than zero energy consumption, as there are other aspects and values that make a building sustainable..

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

EB. If intelligent, sustainability requirements do not influence the beauty of a building, they must instead contribute to it with something else. Sometimes the demands of sustainability can, however, come into conflict with the aesthetics of a work. I will give an example. We have just finished building the Parliament of the Canton of Vaud, in Lausanne (Switzerland). At the project stage, great energy savings were a priority issue. For this reason, the roof of the parliament hall was designed applying functional, constructive and material criteria that met the requirement of maximum energy saving. >



Esteve Bonell is an architect who has been at the ETSAB (Polytechnic University of Catalonia) since 1971. He worked in the studio of Ricardo Bofill before creating his own office in 1973. He has collaborated with architects including Francesc Rius, Ramon Artigues, Albert de Pineda and Marc Collomb. Since 1999, he has worked with Jose María Gil, in the studio Bonell i Gil arquitectes. His works include large sports and cultural facilities, hospital, and residential buildings, most of which have earned international recognition. Throughout his career, Esteve Bonell has combined professional practice with teaching. Between 1980 and 2016, he gave conferences and lectures at numerous universities: Madrid, Pamplona, Seville, San Sebastian and La Coruña, in Spain; and Paris, Zürich, Lausanne, Buenos Aires, London, Helsinki, Dublin, Oslo, Bologna, Milan and Mexico D.F., abroad.





But a group of citizens objected to the zinc cover that we had suggested and held a popular vote on the subject. They voted that the roof should be made of traditional tile from the eighteenth century, a material that involved a higher energy cost. In short, what was an indisputable issue at the beginning of the project, subsequently ceased to be so.

Of all of your projects, which one do you think most highly of? Why?

EB. Most of them have withstood the passing of time and all kinds of changes quite well, retaining their essence. Unfortunately, in some cases, such as the Badalona Olympic Pavilion (1992 Mies van der Rohe Prize), the placing of a large number of advertising panels on the façade, combined with a lack of maintenance, has significantly damaged the construction. A good building must withstand changes, but a lack of care paid to its conservation is out of the architect's hands.

Are there too many certifications available for buildings? Should certifications be abolished or just reformulated?

EB. Yes, I think there is an excess, but above all, there is too much bureaucracy. I do not know if it is the certifications that create bureaucracy or the other way around. Regarding regulations, although necessary, they should be thoughtfully applied so that the aesthetics of a building are not affected by an overly strict interpretation of them. ✕

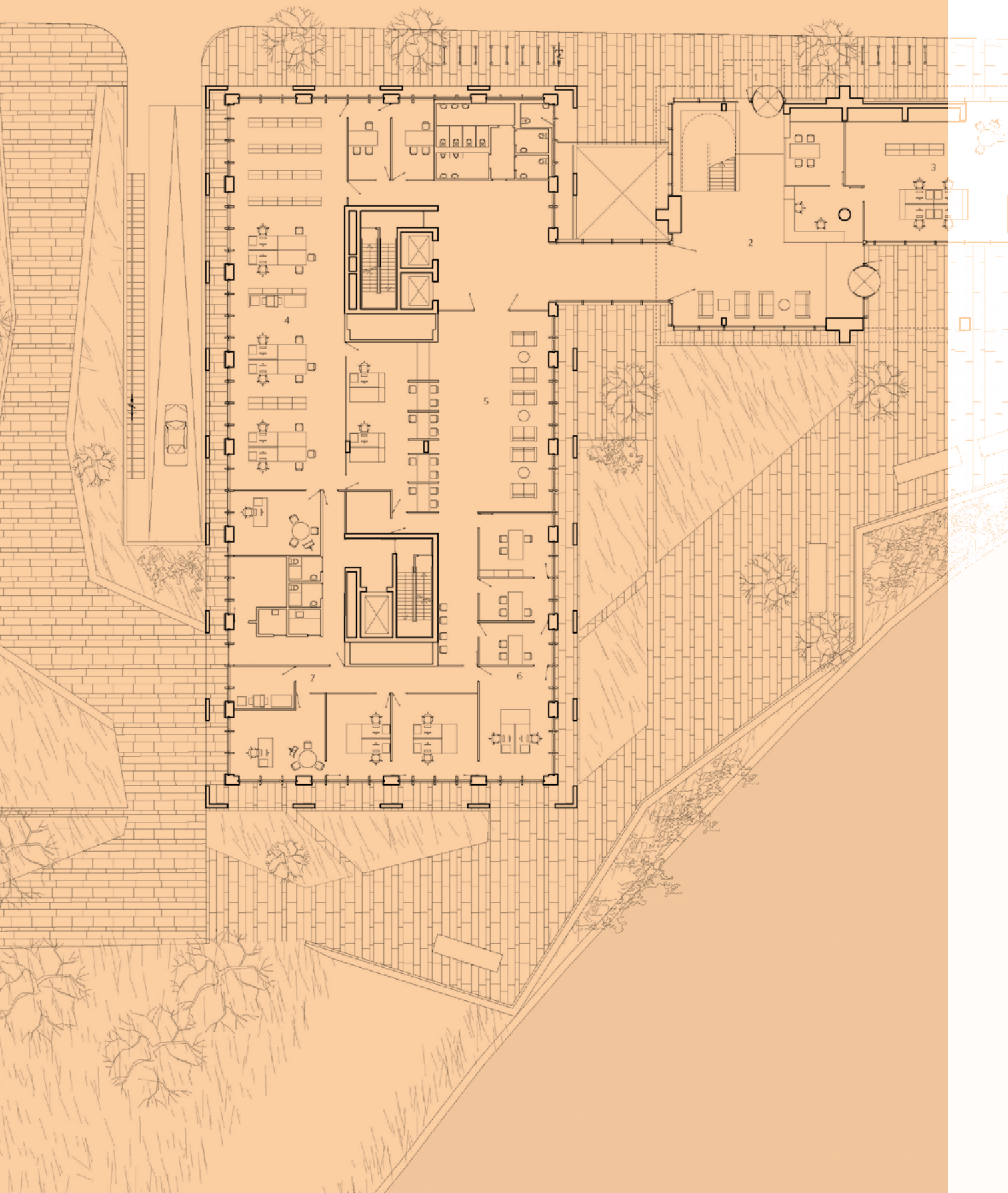
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“IF INTELLIGENT, SUSTAINABILITY REQUIREMENTS DO NOT INFLUENCE THE BEAUTY OF A BUILDING, THEY MUST INSTEAD CONTRIBUTE TO IT WITH SOMETHING ELSE.”

“A GOOD BUILDING MUST WITHSTAND CHANGES, BUT A LACK OF CARE PAID TO ITS CONSERVATION IS OUT OF THE ARCHITECT’S HANDS”





TONY FRETTON

“It seems immoral to me to produce a building that isn’t sustainable.”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

TF. Improving the sustainability of our projects is an imperative but also a challenge. We comply with BREEAM, the international measure for sustainability, which was an improvement before the legislation was responsive to environmental issues; but it is not enough. We know it is not because the problem is that the norm isn’t strict enough. Of course, the norm is better than 20 years ago, but there is still a challenge in this field. The purpose of legislation is to make us do the right thing. In Britain, building regulations are progressing towards creating higher standards for contractors, developers and clients, but this can only work with major agreements in legislation to make all agents comply.

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

TF. Technical advances and social demands always need to be reached in cooperation with architects. Two hundred years ago, we built in solid brick or stone. Architecture has always developed and >



Tony Fretton (1945) is a British architect known for his residential and public gallery buildings, as well as other British and international design work. He graduated from the Architectural Association (AA) and then worked for various practices, including: Arup, Neyland and Ungless, and Chapman Taylor, before setting up his own firm, Tony Fretton Architects, in 1982. His first major project was the Lisson Gallery, in 1990. He is known for designing location-sensitive art spaces, using a combination of vernacular and minimalist approaches, and balancing new and age-old designs. From 1999 to 2013, Tony Fretton held the post of Professor, within the Chair of Architecture and Interiors, at TU Delft, in the Netherlands. Tony Fretton Architects was founded in 1982 and is now headed by partners Tony Fretton and James McKinney.







“AS AN ARCHITECT, YOU
CAN NEVER SAY THAT YOU
WILL BE DEFEATED BY
TECHNOLOGY. YOU CAN
ALSO MAKE POETRY WITH
PRAGMATIC ISSUES”



invented, and as an architect, you can never say that you will be defeated by technology. You can also blend poetry with pragmatic issues. That's our main job. Regarding aesthetics, we sometimes tend to think that each major change will create a revolutionary form, but it doesn't.

Of all of your projects, which one do you think most highly of? Why?

TF. I do like the Town Hall in Deinze (Belgium), which uses ground-sourced heat, daylight, natural ventilation and solar-shading loggias that allow for open windows without blinds. They also provide informal meeting and working places outside the building. So, the people that work in the town hall get that kind of freedom. They can step out of their offices and that's what they do. They go out to have conversations, to read a paper, to think about a problem, or to smoke a cigarette. One of the methods of creating sustainability in this building in Deinze is that it makes something for the human spirit. It seems immoral to me to produce a building that isn't sustainable, and Deinze is.

Are there too many certifications available for buildings? Should certifications be abolished or just reformulated?

TF. The problem with certification is that it is not mandatory, and people don't do things unless they have to. You should have certifications to improve sustainability levels but you have to be very careful how people comply with them. For instance, in Britain, we have builders that spend a lot of time certifying, but not telling the truth. Again, you cannot have people making things unless you legislate. The challenges we have are important. There are some technological developments that can help us to extract excess carbon dioxide from the air, but scientists have already said that it is not enough. We must reduce the causes of global warming if we want to have a better environment. We need to achieve savage reductions in emissions, otherwise we will have a global catastrophe, so this is getting to a point that is very serious. The only solution is legislation and policing the way people comply; there is no other way. If you are a developer and your building does not comply, then you must go to prison and this sends a clear message. Remember that fire in the Grenfell tower in London? Well, the architect specified the

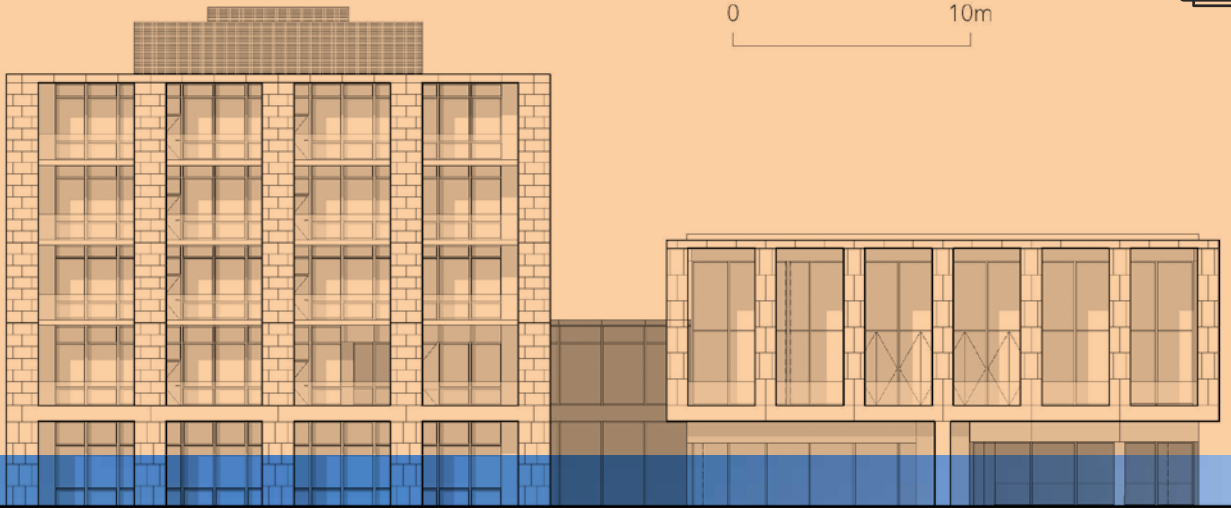
use of non-combustible materials, but the builder thought he could get it done much cheaper, and you can see what happened. The problem in the Grenfell case is that everybody has found a way not to be responsible for it and so nobody will go to prison. x



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“YOU SHOULD HAVE CERTIFICATIONS TO IMPROVE SUSTAINABILITY LEVELS, BUT YOU HAVE TO BE VERY CAREFUL HOW PEOPLE COMPLY WITH THEM.”






07

Future Architecture

Iñaki Ábalos • Caroline Pidcock • Thomas Herzog
Jennifer Siegal • Fernanda Canales • Sauerbruch Hutton



According to German historian Lucian Hölscher, in his essay *"The Discovery of the Future"*, our habit of speculating about the future was not forged until the eighteenth century. In previous times, mankind's concept of the future did not exist as we understand it today. What was to come was simply predetermined by sacred writings and was not seen as an open stage, full of opportunities.

Society's secularisation and technological evolution, together with the rise of progress as a driving force in history, were the determining factors of the new idea of future, which was understood as a time that would be shaped by the choices made in the present. The nineteenth and twentieth centuries were especially fertile for the projection of all kinds of future utopias, as well as threats and fears. In the twentieth century, some of these threats were consummated –as were others which had not been unforeseen– and with them a certain scepticism with regard to the future emerged, as did the notion that it would not necessarily be any better than the past.

The concept of sustainability is connected with this distrust for the future, albeit in a rational way: things



will go wrong only to the extent that we abuse our relationship with the environment. The concept therefore offers the possibility of building a future that is worthwhile, if sound decisions are made in the present. The field of architecture is no exception. In the absence of a crystal ball, describing the future, in any field, can only be attempted by studying current trends and then projecting them forward in order to be able to speculate with any degree of certainty.

This is what prospective science does, although –correctly stated– its object of study is not the future per se, but rather the possibilities offered by what may happen in the future, which is something very different. It is possible to discuss forecasts for the decades to come from this perspective, based on an insightful observation of what is happening today. Evidently, there can always be disruptions, with sudden and unexpected changes making it impossible to predict future trends with any degree of accuracy, but within the framework of this article, we will leave this point aside. Instead, we will proceed to empirically focus on some of the most relevant aspects of modern architecture that may provide clues to what could happen in the twenty-first century.

Bound to reality

In the twentieth century, a rejection of the past, combined with an almost infinite trust in technology, led humanity to disregard the notion of limits. This intellectual environment spurred on great transformations in architecture that sometimes seemed to represent a kind of *tabula rasa* with respect to earlier times. The creation of the city of Brasilia, in the middle of the jungle, in the 1950s, was an example of this spirit, although not the only one. The idea of a limitless world was not just expressed as a formal issue, but also in choices made relating to magnitude, location and resource consumption. The limitations of the past and of the planet were seen as challenges there to be overcome, at almost any price. In spite of multiple signs of continued vigour, this trend has recently been losing steam. This can be observed in the relationship between humanity and the environment: the exploitation of the Earth is now being seriously questioned; the need to adapt to context is increasingly valued; and the idea of *tabula rasa* has been all but abandoned. The built environment can no longer be erased and entirely replaced by something new. Firstly, this is because it would not make sense either economically and environmentally, and secondly, because of the historical and heritage value that it offers to society.

In order to understand this shift, the classic concepts of *Urbs*, *Civitas* and *Polis* can certainly be of help. The *urbs* is the physical or the formal dimension of the habitat. *Civitas* –which is the root of the word “civilisation”– refers to the culture and values that gave rise to the *urbs*. The *polis* is the organisational and administrative dimension of the *urbs*. Taking these three concepts into account, the future should focus more on the evolution of the *civitas* and the *polis* (ideas, ways of life, customs, management and governance) than on the radical transformation of the *urbs* (physical entity).

Accountability and openness

The increasing emphasis on management can be exemplified by a century-old building whose useful life has been prolonged by means of extensive rehabilitation. Its physical appearance will be the same as in

1920, but its energy performance and our ability to measure this will completely change its evaluation. Environmental accountability is therefore an emerging trend and one that, at some point, will become as important in architecture as it has already become for motor vehicles and their emissions. Does this mean that, well into the twenty-first century, our cities will have hardly changed in appearance? Will buildings in 30 or 40 years' time be just older, but with high-tech devices built onto them? Probably not. There will undoubtedly be new buildings, with previously unprecedented designs and appearances, but the most radical transformations will be related to their management. The fundamental requirement for the good management of a building is that practised by its users: the people that live and work in it. Accompanying this are technological developments, such as sensor systems and Big Data, which can be turned into first-rate instruments for enhancing management.

Another element of change can be found in the project. The project, which has traditionally been considered the culmination of a process, could become another step in a more extended vision: that of the life cycle of a building. Since management and accountability are important, it is pointless to focus on just one specific moment in the life cycle of a building; instead, a synchronic vision must be replaced with a diachronic one. The project cannot foresee all the elements of use and, even when a building is designed to adapt as well as possible to its environment, this will always be conditioned by the behaviour of the people who will live or work in it.

The architect's stamp on a building will continue to be a fundamental element for reasons such as creativity, personality and professional prestige, without forgetting the responsibility that they have for defin-

ing the building's main parameters. However, when adopting a diachronic vision, there will be various "co-authors". The users themselves will also end up defining the building and its evolution over time. To carry out this task, in the best way conceivable, will imply its users having a high level of awareness of the significant role that they have to play, which –in turn– should be based on a knowledge of key issues related to the behaviour of buildings. All of this may seem distant but, in fact, it is not very different from what is already happening today, when people buy and learn to use a domestic appliance.

Perfectibility

The other requirement for users to strengthen their relationships with buildings, over time, is the concept of perfectibility. The main idea behind this concept is that a building is, in itself, unfinished, but not in the sense that it lacks any essential elements to function, but rather that it should be designed in such a way that it would not be too complicated to make modifications to it in the future. Modularity –which is connected to perfectibility– constitutes an added value, because it allows a given space to adapt to the changing demands of its tenants, according to their ages, incomes, jobs, family situations and tastes. In the case of companies, the different variables would be related to the evolution of their economic-productive activity.

Within the idea of architecture, which is more open to social participation, it is worth highlighting the involvement of several types of professionals in decisions taken with respect to the built environment, which extends beyond just buildings. The vision of cities as ecosystems calls for a holistic approach to architectural challenges. Geographers, anthropolo-

“Perhaps the most important aesthetic changes that will take place in the future will be the result of a use of materials that will respond to environmental, social and economic demands with truly innovative solutions.”



gists, sociologists and philosophers may come into play and have important roles in the definition of new spaces, in both the public and private sectors, giving rise to hybrid teams capable of responding to customers' most sophisticated demands.

Technology has been developed in order to facilitate architecture's response to these contemporary trends. For example, BIM (Building Information Modelling) allows the generation and management of highly diverse data relating to a building (its geometry, materials and the properties of its components) throughout its life cycle. These data can then be shared by the architect and other professionals engaged in the construction industry, as well as by owners, from the moment that the project comes online. BIM can be seen as an instrument for promoting efficiency in the design and construction processes, but also as a tool for the maintenance, management and updating of a building, and even for planning its eventual end of life.

The shape of things to come

Several cultural changes in the shaping and understanding of architecture have been highlighted. These are changes that are already here and that have set clear trends for the coming decades. However, looking to the future prompts questions as to what will happen regarding aesthetics and style. Such forecasts rely on the observation of contemporary trends, which is something that is not exclusive to architecture; this can also be seen in the fine arts, music and fashion. This current trend may be summarised in one word: diversity. Today, different forms and styles coexist, but none of them is sufficiently predominant to claim hegemony, and even less, exclusive identification with our time.

The only dominant fashion is eclecticism and the expression of individual creativity. For this reason, new projects can encompass anything from vernacular architecture to cutting-edge construction that is com-

pletely disconnected from tradition. The international style and historicism are also thriving trends.

The culture of sustainability has ushered in a number of formal changes that are related to bioclimatic approaches, with the greening of façades and roofs, and designs aimed at energy harvesting, being just some of these developments. However, perhaps the most important aesthetic changes that will take place in the future will result from the use of materials that respond to environmental, social and economic demands for truly innovative solutions.

Materials

The field of materials is rich in possibilities. In addition to those used in recent times, such as steel and concrete, there are others that have been used since ancient times and which are now becoming increasingly important. This is the case of plaster, wood and clay (wooden skyscrapers are beginning to appear as an increasingly common option). There is also a third group which includes materials that are the result of advanced scientific research.

Various trends have emerged in the world of innovative materials. One of them is the combination of levity with high resistance, as in the case of fibre-reinforced polymers. To these initial qualities, others are then added, such as high insulation and fire resistance, as is the case of fiberglass. Another significant example is the application of carbon fibre (a material used in aviation to increase an aircraft's energy efficiency) in buildings. This, amongst other advantages, greatly simplifies the construction process. Then, there are biocomposites, which stand out for the fact that they are entirely based on renewable materials.

Another trend closely related to sustainability is the search for strategies to prolong the life of a building

“Building construction in the future will be an increasingly industrialised process. This will undoubtedly lead to more qualified work teams both in factories and on construction sites, resulting in savings in both time and money.”



“Architecture must connect with society and respond to phenomena such as urban diversity and changing ways of life.”

through its construction materials. The mechanical wear and tear produced over time, which affects the different surfaces of a construction, can be minimised by using Corten steel or thermally modified wood. It is even possible to design and build surfaces that repel dirt, water, corrosion and pollution, which prevent the formation of moisture, and which are even “self-healing”, meaning that they are able to “erase” breaks or scratches. These latter possibilities have been opened up by nanotechnology (the modification of matter at a nanoscale), based on specific alterations to the molecular structure of certain materials.

Energy consumption is another capital element in building sustainability and can gain in efficiency thanks to combinations of materials such as expanded polystyrene concrete with graphite to provide excellent thermal insulation. Moreover, a new generation of solar panels, made of a variety of materials (such as amorphous silicon, copper indium diselenide, or cadmium telluride) which look like thin film, can be integrated into windows, walls, and ceilings, considerably increasing the collecting surface area

compared with “classic” solar panels. Many of these films are also available in prefabricated parts. Piezoelectric elements also open the door to further possibilities for promoting the energy self-sufficiency of buildings.

Technology and reflection

Building construction is set to become an increasingly industrialised process. This will undoubtedly lead to more

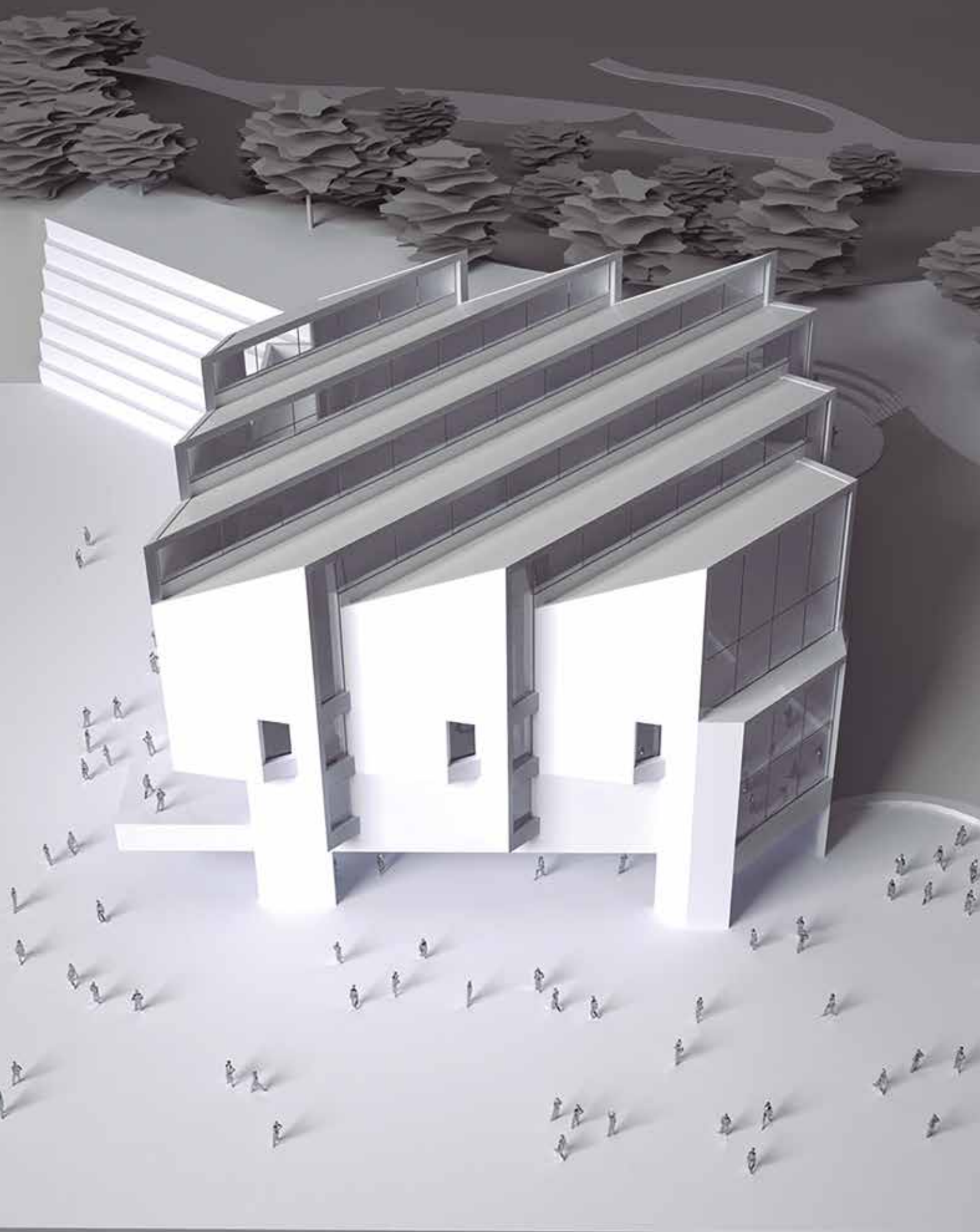
qualified work teams, both in factories and on construction sites, and savings in both time and money. In terms of sustainability, the generation of waste and the expenses involved with all types of resources will

be reduced. The emergence of robotics and 3D printing, and even the use of drones in construction, will afford greater precision to many processes undertaken in this field.

Technological innovations will play a significant role in the design, construction and management of future buildings. This promises serious advances in sustainability, but at the same time poses a great challenge to society, as we increase our ability to understand that we cannot achieve everything with technology alone.

A reflective, cultural and critical vision is needed to prevent buildings from becoming perfectly functional but socially isolated structures. Architecture must connect with society and respond to phenomena such as urban diversity and changing ways of life. In fact, it is already responding. Some architectural achievements point to erasing the boundaries between public and private space and between different types of activities. There are corporate buildings where agoras and corridors –which are open to everyone– now flourish. Some architects have even boldly placed offices, homes, libraries and schools within a single construction. The built environment is open to many more new possibilities, such as the integration of electric mobility and urban agriculture.

To face all these challenges, and others yet to arise, architecture need only express its own, historical essence, which consists of a unique ability to combine technical skills with imagination. ✕





IÑAKI ÁBALOS

“It is now up to us to define the architecture of our time”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

IA. The idea of sustainability was initially so limited to maintaining, or sustaining, the status quo that it was barely capable of sparking any emotion or serious will for change. You cannot propose such timid goals to a world that is heading towards collapse, both in terms of climate and energy, and that is why it is not surprising that today, this idea of sustainability has been reduced to a prestigious label promoted by certain classification systems that use it for the commercial “branding” of buildings. One of the architectural objectives that is most relevant to this decade is that of getting schools of architecture and architects to define a way of thinking about buildings that could be considered a real alternative to the legacy of modernity that large architectural firms have generalised: sealed buildings with interiors reduced to a minimum in the distance between floors and ceilings (to reduce the volume of air) and hiding their materiality in a range of catalogue products that generate a standardised image. These include buildings that use their public space (for example ventilated façade systems) as dumping grounds for the energy that they need to dissipate in order to attain their gold and platinum >



Iñaki Ábalos is a Spanish architect, who was born in San Sebastián. He qualified as an architect (1978) and Lecturer in Construction (1988) at the School of Architecture of Madrid and founded the Abalos & Herreros studio, with Juan Herreros, in 1984. The team debuted with a project for the water treatment plants of Villalba, Guadarrama and Majadahonda (1988). The Luis Gordillo Studio in Villanueva de la Cañada (2000); the Gymnastics Pavilion in the Retiro Park, in Madrid; the Litoral Forum Park, in Barcelona (2003); the Woermann Tower, in Las Palmas de Gran Canaria (2005); and the Mixed Bioclimatic Towers, in Vitoria (2005), are just some of their most notable works. Ábalos’s work has been awarded prizes on several occasions and he is currently Professor at the School of Architecture of Madrid. In 2008, the firm Ábalos & Herreros, which until then had been the author of all the projects it produced, started to function as a platform, differentiating between the projects signed by Juan Herreros and those that were the responsibility of Ábalos.



seals; this raises the problem of the very idea of thinking about sustainability applied to closed, isolated systems. There should be no closed systems: the city is only a city if it is an open system. It would be interesting to levy a tax on the residual energy released out into the public space by these inefficient buildings: adopting an outdoor perspective.

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

IA. A new type of architecture that breathes through its form and matter is an increasingly real proposal since we now have the knowledge and the software to make buildings breathe. For example, radiant systems allow for small pipes to be embedded in the mass of a building's structure in order to increase comfort without the need for excessive energy expenditure. This is a way of generating a kind of new primitivism that allows us to restore a thermodynamic role to architecture and to add a new way of thinking about aesthetics. In this way, we can shape architecture and retain a dialogue with the environment, the climate and the city. Working with matter, form and airflow as part of an equation is a reality today and one that allows us to think about a different type of aesthetics and about how we conceive of buildings. We must remember that there is no new beauty if there is no new architecture. More and more architects believe in redefining architecture and forgetting about buildings conceived as refrigerators that manage comfort by isolating themselves from the outside. All this is part of an ancient beauty that has degenerated into routine and an absolute homogeneity found in all cities and in all climates. This routine represents what we no longer want.

Of all of your projects, which one do you think most highly of? Why?

IA. We have worked on ideas to balance the relationship between matter, form and ventilation, whether crossed or buoyant, in works such as the Azuqueca de Henares leisure centre or the museum for the Sorigué art collection, which was developed at a stone quarry. These are two different examples of how to negotiate these new equilibria, depending on their contexts and the programmes and material resources available. In the case of the gravel quarry, for us, it was essential that the material used should be concrete, while in an industrial city like

Azuqueca, we had to work with the construction systems typical of the surrounding industrial buildings, as well as with the typology and compactness, and to make use of glass as a solar collector. The objective was to temper the air and to make it flow vertically, as we did in the Sorigué project, or horizontally, as in that at Azuqueca.



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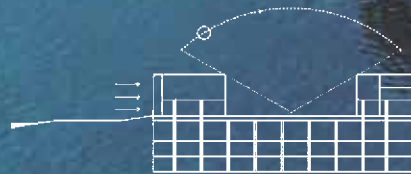


“IT WOULD BE INTERESTING TO LEVY A TAX ON THE RESIDUAL ENERGY RELEASED OUT INTO THE PUBLIC SPACE BY THESE INEFFICIENT BUILDINGS: ADOPTING AN OUTDOOR PERSPECTIVE.”

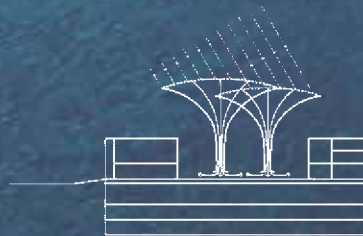




“CIRCULAR ECONOMY PARADIGMS, OR THE LIFE OF BUILDINGS AND THEIR SUBSYSTEMS, ARE IDEAS THAT MAKE SENSE WITHIN A PROFOUND RENEWAL”



1. COURTYARD AND EXTENSION OF THE CAR PARK STRUCTURES
PROTECTION AGAINST HUMIDITY AND EXCESSIVE VELOCITY OF THE WIND
LIMITED SHADOW



2. TREES CANOPY
EFFICIENT SHADOW
WATER COLLECTOR
RADIATIVE COOLING DOWNDRAFT (NIGHT)
EVAPORATIVE COOLING DOWNDRAFT (DAY)
SOLAR UPDRAFT
DEWFAH BY RADIATIVE COOLING(NIGHT)



3. WAVES
THERMAL MASS STABILIZES TEMPERATURE
RADIATIVE COOLING AT NIGHT
DEHUMIDIFICATION
(POROUS MATERIAL)



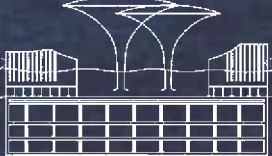
4. BUBBLES
SPATIAL UNITY
VIRTUAL AND UNIFIED EXPERIENCE OF
OUTDOOR AND INDOOR ENVIRONMENTS



5. THERMAL MASS
CONCRETE CONDUCTIVITY USES STABLE
TEMPERATURE FROM THE EARTH AS A
PASSIVE MEAN
WHITE CONCRETE EXTERNAL ENVELOPE
REFLECTS DIRECT RADIATION



6. CROSS VENTILATION
STRIPED WINDOWS MINIMIZE HEAT GAINS
ALLOW NATURAL VENTILATION, AVOID DIRECT
SUN RAYS





What issues do you think will have the greatest influence on architecture in the coming decades?

IA. Circular economy paradigms, and the lives of buildings and their subsystems, are ideas that make sense within a profound renewal of the way in which we go about design. It is true, for example, that wood is a truly unbeatable material in terms of its energy performance and also for the quality of the environ-

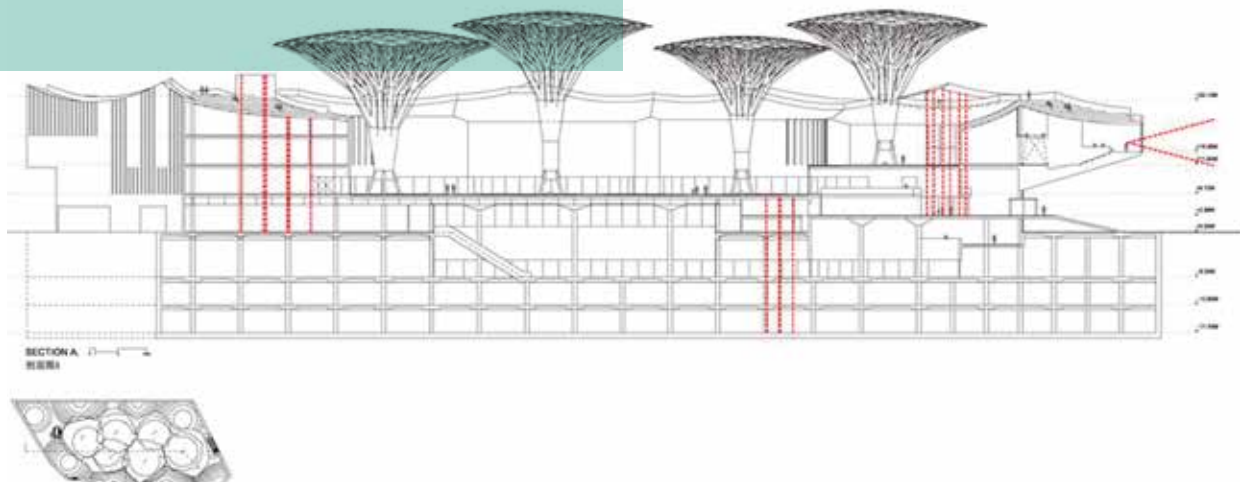
ment. However, on the other hand, we have to know if we have forests nearby or if the wood must be imported from very far away. This also sometimes happens with concrete, as in the case of Sorigué, because we should not comply with the conventional seals of ranking systems if they do not meet the needs of the specific circumstances in question. In that case, concrete was the best material at hand, since



we were working in a quarry where a wide variety of concrete types and parts were prefabricated.

From my point of view, what is important for architecture today, and for a future in which architecture can proudly say that it has contributed to improving the quality of life, is to be aware that we have two great inheritances. The first is that of vernacular architecture which involves, under any circumstances and climatic conditions, a master-class in achieving a balance between the use of the resources at hand, the economy, and a building's energy responses. And this is true of both an igloo in Alaska and a patio house in Seville. We are orphans of this tradition because we no longer know how to build like this. We cannot now build like this because our context, scale, production systems and economy have changed. The second point relates to modern tradition: we are far from overlooking the magnificent examples of the heroic architects of modernity. They are wonderful works of art, but when their typologies are applied to climatic contexts for which they were not conceived, they are disastrous. Yet the reductive approaches applied by corporate offices often systematically reproduce typologies and closures that are highly inefficient, rather than setting an example to follow. We are therefore orphans of two traditions: the vernacular and the modern. This could be understood as an uncomfortable situation, as we only have examples of how material, traditional and industrial cultures have been able to build architecture adapted to their own contexts. This may also, however, be viewed with a certain optimism: it is now up to us to fight against this, and this is a great opportunity to define the architecture of our time and a new form of beauty. x

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CAROLINE PIDCOCK

“We need to return to the idea of buildings being related to their place”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

CP. When I founded my own practice, in 1992, I identified, at that time, that sustainability, or “green architecture”, as it was called then, was what I wanted to focus on. Here I am still trying to work out what that means, 28 years later! I think that the idea of what that means has evolved a lot over that time. Initially, I started thinking it was about passive design, energy efficiency and healthy materials, before it grew to include water efficiency and –more recently– the Living Buildings Challenge. This has expanded my understanding to include a very ambitious and broad approach to what good design should be about. Even more recently, I became very interested in regenerative design, which is, I believe, where we need to be going.

When someone asks you about sustainability, it really means that you sustain something, which is good, but I think that the opportunity to create even better architecture means creating regenerative design. To me, that is about deeply understanding the place, and the people, and the systems within >



Caroline Pidcock is an Australian architect and a prominent advocate of sustainable development; she is based in Sydney. In fact, her commitment led her to stand as an independent candidate for her local Legislative Council in the 2007 New South Wales state election. She has also been an ambassador for the Al Gore Climate Change movement and the 1 Million Women initiative (a movement of women and girls fighting climate change by taking practical action).

Pidcock’s sustained leadership in the built environment sector led to her appointment as a Life Fellow of the Royal Australian Institute of Architects, in 2006. In July 2011, Pidcock was awarded the prestigious Marion Mahony Griffin Award by the Australian Institute of Architects in recognition of her contribution to architecture in New South Wales.

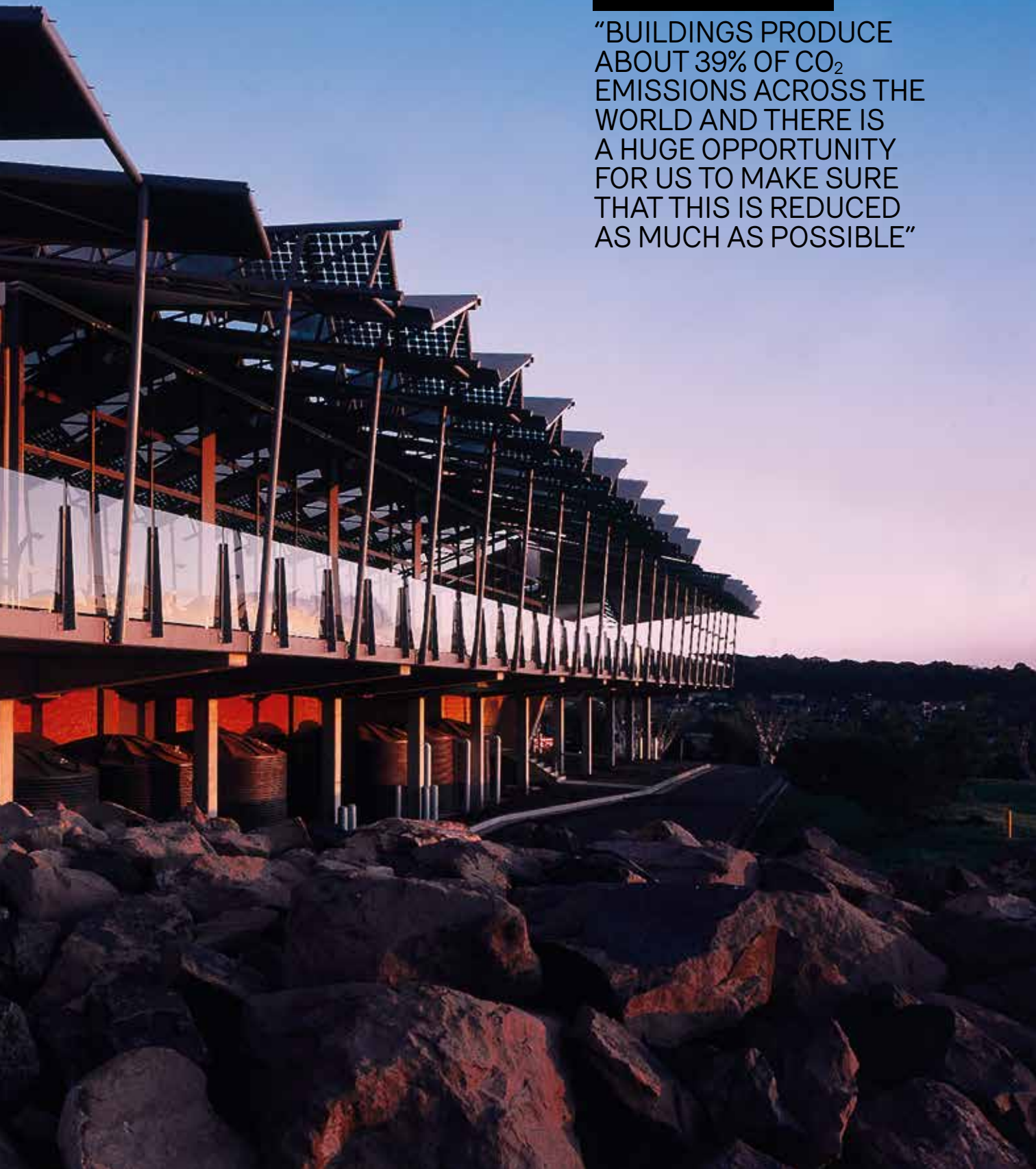




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“BUILDINGS PRODUCE ABOUT 39% OF CO₂ EMISSIONS ACROSS THE WORLD AND THERE IS A HUGE OPPORTUNITY FOR US TO MAKE SURE THAT THIS IS REDUCED AS MUCH AS POSSIBLE”





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which our work operates. Rather than problem solving, which can be a bit narrow and less positive in its approach, the idea of realising the potential of those systems through our work is a much more exciting way of thinking about what architecture can and should be.

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

CP. I believe that these conditions can inspire and inform the personality of our architecture. A building that is truly regenerative will respond inherently to the ecosystem, the place and the people, thereby fulfilling its purpose. The personality and beauty will arise from these very specific and special attributes. The whole modern movement in architecture, in

which the building becomes placeless –meaning that the same idea could be applied anywhere– has probably ventured down a pathway that is not so great. We need to return to the idea of buildings being related to their place and thus informed by the conditions that are there. This is a real opportunity to get all the players together –albeit with different thoughts, voices and sounds– to produce quality in each building as well as in a very complex group of buildings.

The same approach has the potential to make each of those responses fantastic and this does not have to be hard to achieve. It is just about understanding a real regenerative response, finding the energy within, after doing the necessary research at the beginning. When working with the energy of the system, this can produce a much



1 North Elevation
Scale: 1:100



2 East Elevation
Scale: 1:100



easier outcome, because you're approaching local issues and finding solutions as opportunities.

Of all of your projects, which one do you think most highly of? Why?

CP. A project which is currently in progress and that I have been working on for 10 years: First Steps Count Child and Community Centre. It is located in Taree, a country town, located 3.5 hours north of Sydney. This place is a one-stop shop for families experiencing difficulties.

Families can go to this beautiful place and find all the help they need, whether it be for the parents, or the kids; whether it be psychological or physical; or whether it be just helping them with very standard things. They can go and hang out at this place, which connects easily between inside and outside. The specialist consultants will come to the people at this place and help them there.

We are aiming to get the Living Building Challenge (LBC) Certification for this building. When I first described to the client what that was and how it

might be of interest, back in 2012, I explained that it is about making every act of development both positive and regenerative. The clients responded that that is exactly what they are trying to do with their work too.

It has been a long process, as we had to find all the money to build it. In the later part of this journey, I replaced myself as the architect and took on the role of sustainability guide. We have also strengthened the team with the early appointment of the builder and have engaged specialist engineering consultants to help us achieve the LBC. The last two years have just been fantastic because we are all working together in very productive and synergistic ways.

We are also working with the University of Newcastle, and its departments of Architecture and Construction Management. They have seen an opportunity with the Living Building Challenge to reshape some of their coursework. They are very engaged in helping us deal with the materials, representing a wonderful university/professional collaboration.



The team has explored many ways of trying to reduce the amount of carbon in our buildings. These have included minimising the amount of timber used throughout the building process by undertaking specific calculations for this purpose. A local builder is working in collaboration with local concrete providers to minimise CO₂ emissions. We hope that this will then be used for all local council projects, and not just for this one. Additionally, we are looking to work with the local authorities on how to improve their waste recycling ideas and practices and to apply them for construction waste and water treatment.

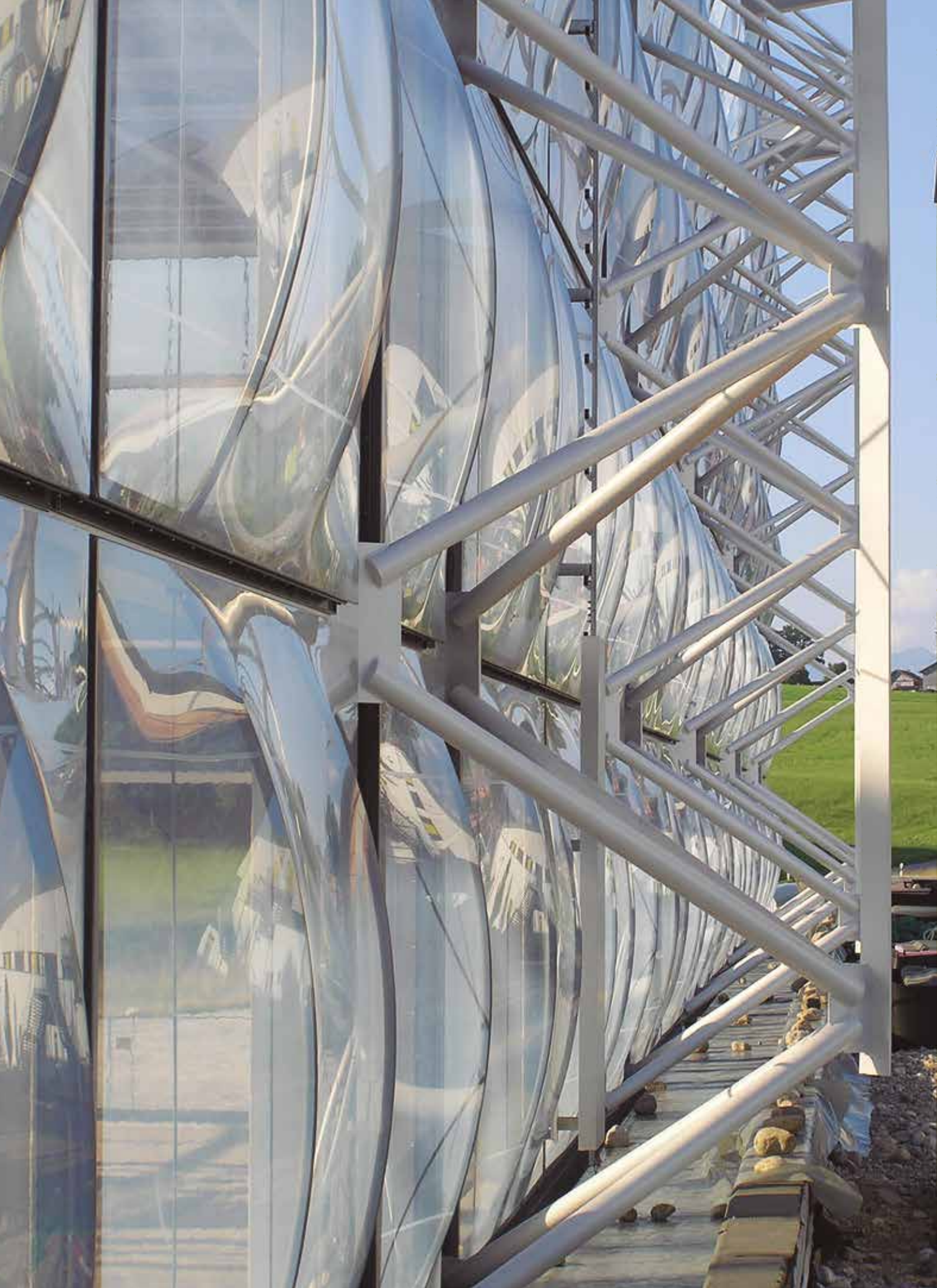
What issues do you think will most strongly influence architecture in the near future?

CP. It has been great to see Australian architects declaring a climate and biodiversity emergency and to see them embrace the need to collectively understand what potential changes this will require for their practices. We have been absolutely devastated by a really long and terrible drought, which has been exacerbated by climate change. This was the

precursor to the catastrophic bushfires that occurred up and down the whole east coast of Australia, in South Australia and in the area around Perth. Cities are not immune to these problems; the air quality in most of them was amongst the worst in the world over some of this time.

The biodiversity challenges are now extreme in Australia, as bushfires have wiped out many forests (including rainforests) and killed over 1 billion native animals. The scale of this ecological destruction is almost beyond comprehension.

It is very important that architects address climate change. Buildings produce about 39% of the world's CO₂ emissions and there is a huge opportunity for us to make sure that this percentage is reduced as much as possible. I think this situation provides a real opportunity to re-evaluate how we work, what we work on, and how we can bring our skills and talents to bear on this most pressing issue. x





THOMAS HERZOG

“Creativity is much in need, but based on knowledge, not just on fashionable superficial thinking or joking”

What does the word “sustainability” mean to you in terms of architecture? Is it a label? A trend? An effort? A significant challenge? Or is it just a concept implicit in any project of quality?

TH. Future generations will have terrible problems because the world’s increasing population will suffer from a tremendous deficit of basic resources. No sector is perhaps more involved in this undesirable trend than the building sector, due to: the erection and all the consequences of operating and maintaining buildings, the way of feeding them with energy, and the use of appropriate strategies to guarantee the kind of indoor climate required. The focus is therefore on builders and architects and their conglomeration of buildings within an urban dimension; it is not just on people who only feel responsible for labelling or decoration.

I would never be willing to give up my firm conviction that responsible planning and architectural design must be based on a holistic understanding of things, which clearly includes the “green agenda”. I also think the profession must be understood in a new way and must be understood in the right way. This is quite provocative, because creativity is much in need as long as it is based on knowledge and not just on fashionable, superficial thinking, or joking around. This is not about fashion, it is about our survival. >



Thomas Herzog was born in Munich in 1941. He studied architecture in the 1960s, at the Technische Universität München (TUM), and obtained his Doctorate from the University of Rome, La Sapienza. Since 1971, he has had his own office and has worked with Verena Herzog-Loibl, Dipl.-Designer, on the development of building systems for the use of renewable forms of energy and on new building products, focusing on housing, administration, industrial and exhibition buildings, etc. He has also devoted much of his career to teaching at different German universities (Kassel, Darmstadt, Munich) and also at the École Polytechnique Fédérale de Lausanne (EPFL); Tsinghua University, in Beijing, China; the University of Pennsylvania (PENN); and the Royal Danish Academy, in Copenhagen. Herzog is a member of various academies and is the author and editor of a series of books, including several monographs in different languages.





©Christoph Stepan

Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

TH. It is by avoiding the copying of traditional styles that we learn and improve and find out the best solutions and ways to make building structures survive for years. When people in the past wanted to make decorations, they added something useful and beautiful without compromising on functionality. The inter-relationship between function, construction and beauty has therefore always been of fundamental interest and has been one of the dominant reasons for different cultures in architecture.

Of all of your projects, which one do you think most highly of? Why?

TH. Should I say which of my children I like best?! I have never substantially changed my attitude towards my contribution to architecture. Things I've had to study and learn and insights from research and development have naturally exerted an influence on my work in the sense of understanding-choice-implementation-testing-reflection. Conse-

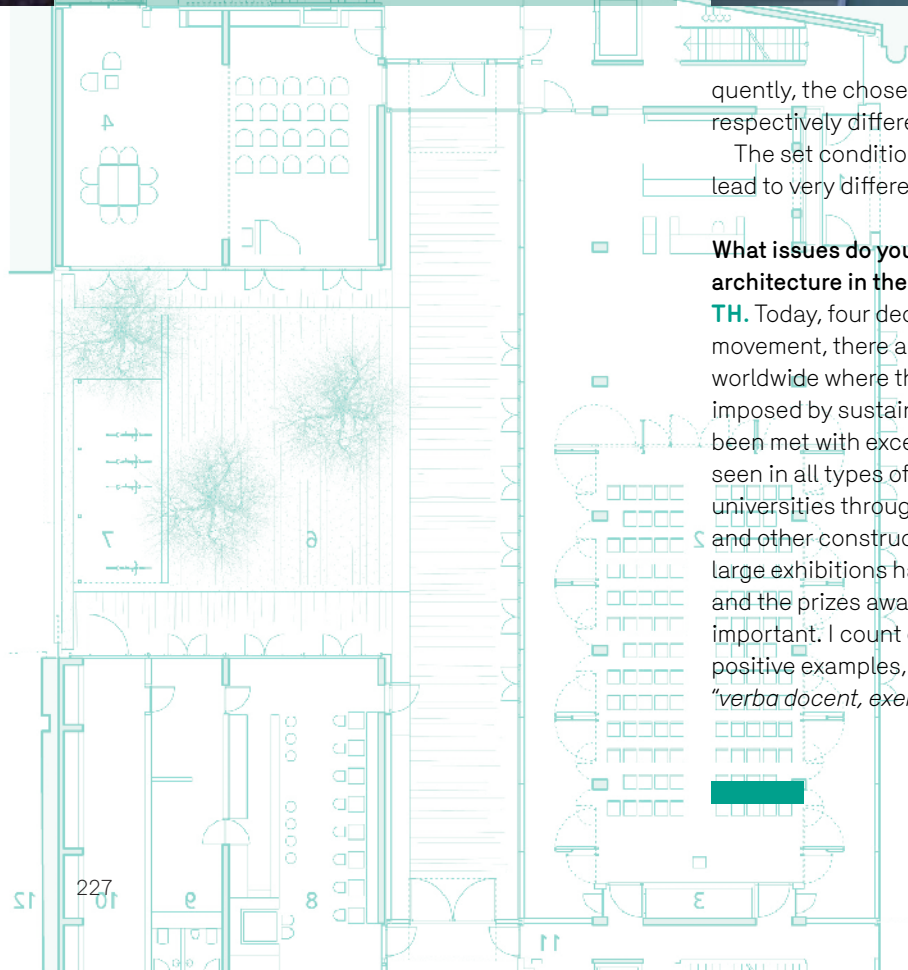




“THE INTER-RELATIONSHIP BETWEEN FUNCTION, CONSTRUCTION AND BEAUTY HAS THEREFORE ALWAYS BEEN OF FUNDAMENTAL INTEREST AND HAS BEEN ONE OF THE DOMINANT REASONS FOR DIFFERENT CULTURES IN ARCHITECTURE.”



©Verena Herzog



©Verena Herzog

quently, the chosen approaches and results are respectively different.

The set conditions for each project and its focus lead to very different performance forms.

What issues do you think will most strongly influence architecture in the near future?

TH. Today, four decades after the beginning of the movement, there are already many examples worldwide where the structural requirements imposed by sustainable architectural systems have been met with excellent aesthetic results and this is seen in all types of buildings, from schools and universities through to residences, offices, museums and other construction types. For twenty years, large exhibitions have been dealing with this issue and the prizes awarded are becoming ever more important. I count on the educational effect of positive examples, in line with the Roman proverb: *“verba docent, exempla trahunt”*. x







JENNIFER SIEGAL

“The future built-environment needs to achieve harmony through social infrastructure”

What does the word “sustainability” mean to you when it is associated with architecture? Is it a label? Is it a trend? Is it an effort? Is it a challenge? Or is it just an implicit concept in any quality project?

JS. Sustainability and architecture are inseparable. Architecture is a noun and Sustainability is a verb meaning to live. It is a way of being in harmony with the planet. Being sustainable is interacting holistically with plants, animals, and human beings.

There is the practice of architecture, the built form, which involves materiality and infrastructure, utility, water, power, waste... Sustainability is the action upon the built form.

Being Sustainable is being intelligent; it proves the individual’s commitment to the community.

Do you think that the requirement for sustainability can condition the beauty and personality of a piece of architecture? If so, in what way?

JS. For 30 years, I have been studying and developing my theories and putting them into practice. I create architecture using prefabricated, modular, or offsite construction techniques. The design and making of my designs are embedded within a sustainable practice. My buildings are dynamic; they are more efficient, have less material waste, >



Jennifer Siegal is the founder and principal of the Los Angeles-based firm Office of Mobile Design (OMD), which is dedicated to the design and construction of ecologically dynamic structures and utilizing prefabricated industrial processes to create a more efficient form of architecture. She is the CDO and a Managing Partner of Wildernests: a company which has been described as “the Tesla of real estate”, due to how it has revolutionised the real-estate industry and spearheaded the sector’s transition from carbon-intensive to carbon-neutral. As a resident at Arco Santi, in 1984, she worked with Paolo Soleri and also developed an interest in nomadic design and culture and in hands-on construction. As an architecture graduate student, at the anti-establishment SCI-Arc, from 1990 to 1994, she embraced new ways of thinking about architecture. She was the first American to win the arcVision Prize, an international award for women in architecture.





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“WE MUST VIEW
OURSELVES WITHIN
THE CONTEXT IN WHICH
WE LIVE: A NATURAL
BIOSYSTEM”



"I CREATE ARCHITECTURE USING PREFABRICATED, MODULAR, OR OFFSITE CONSTRUCTION TECHNIQUES. THE DESIGN AND MAKING OF MY DESIGNS ARE EMBEDDED WITHIN A SUSTAINABLE PRACTICE"



are precisely-crafted, and take 50% less time to build, making them less expensive.

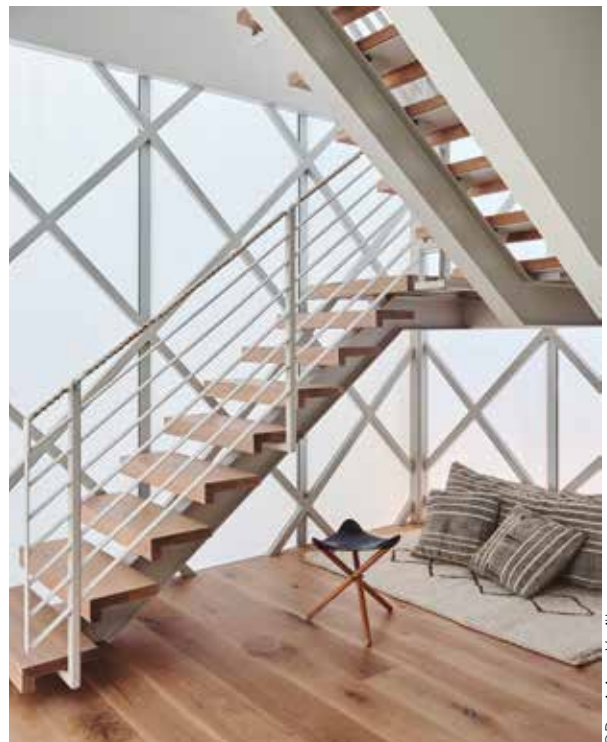
Being intelligent human beings and stewards of our planet, we must view ourselves within the context in which we live: a natural biosystem. We often forget how to exist within the organic system. The key question moving forward is: How do we trigger our primitive memories and develop a modern and sustainable co-existence with nature?

Of all of your projects, which one do you think most highly of? Why?

JS. My architecture strives to be an example of living-lighter-on-the-land.

I find mobility in architecture useful and fascinating. My newest company, called Wildernests, is launching the world's first fully off-the-grid modular dwelling. Built in a controlled manufacturing facility, the home is delivered to the site fully complete.

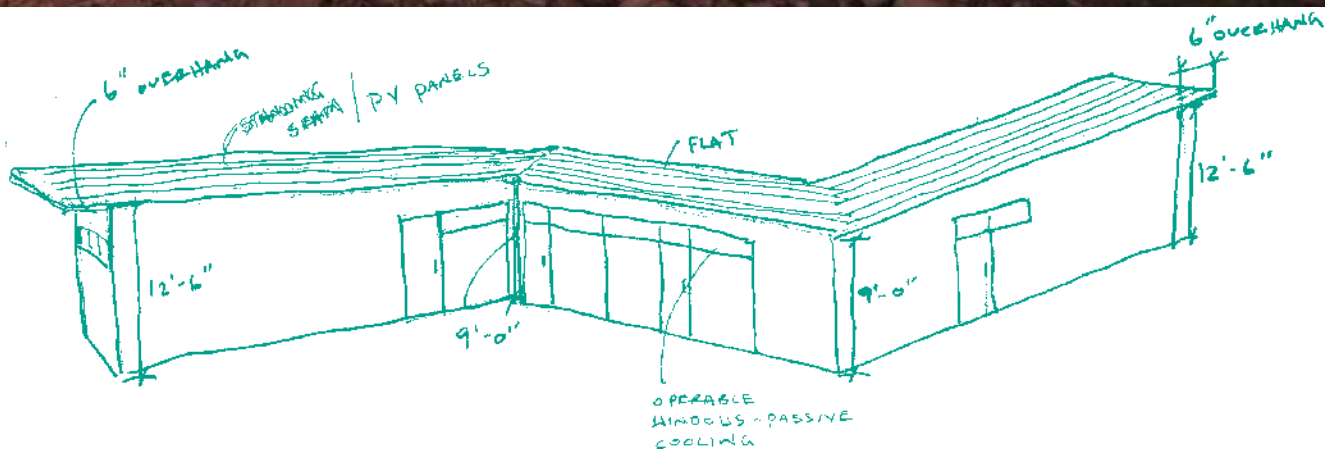
My theories of architecture also revolve around upcycling and the adaptive reuse of materials. I seek out newer, smarter, composite materials: materials that can be embedded with intelligence



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to be more responsive to our senses and physical needs.

What issues do you think will most strongly influence architecture in the near future?

JS. Economic considerations have the greatest influence on architecture. The costs associated with construction and where those materials come from impact our decisions on what, where and how we build. The economic crisis has become a health crisis.

Our buildings need to provide healthier and better adaptable solutions for living. The future built-environment needs to achieve harmony through social infrastructure.

The structure of the family is changing as are the communities in which we live. The big questions are: What is shared? What is private? What is public? These are questions that will be at the forefront in the decades to come. **x**





FERNANDA CANALES

“I liked it better when there was no such concept as sustainability”

What does the word “sustainability” mean to you when it is associated with architecture? Is it a label? Is it a trend? Is it an effort? Is it a challenge? Or is it just an implicit concept in any quality project?

FC. The word sustainability is a trap when it does not imply, in the broadest sense of the term, not only an environmental perspective, but also a social, historical, and economic one.

It is often understood as a green label and reflects the acquisition of expensive technical equipment or categories and ratings that are applied without considering the specific conditions of each site and culture.

What is sustainable in a city like Berlin is not usually so in an indigenous community in Chiapas, and vice versa. The word “sustainability” is widely used without regard for local contexts. I liked it better when there was no such concept; in the past, we just talked about coherence.

The majority of buildings that have received environmental certification have done so based on a misconception, relating to their location, height, density and/or connectivity. This tends to have placed enormous limitations on how people can move around, interact, and relate to the environment and to other people. >



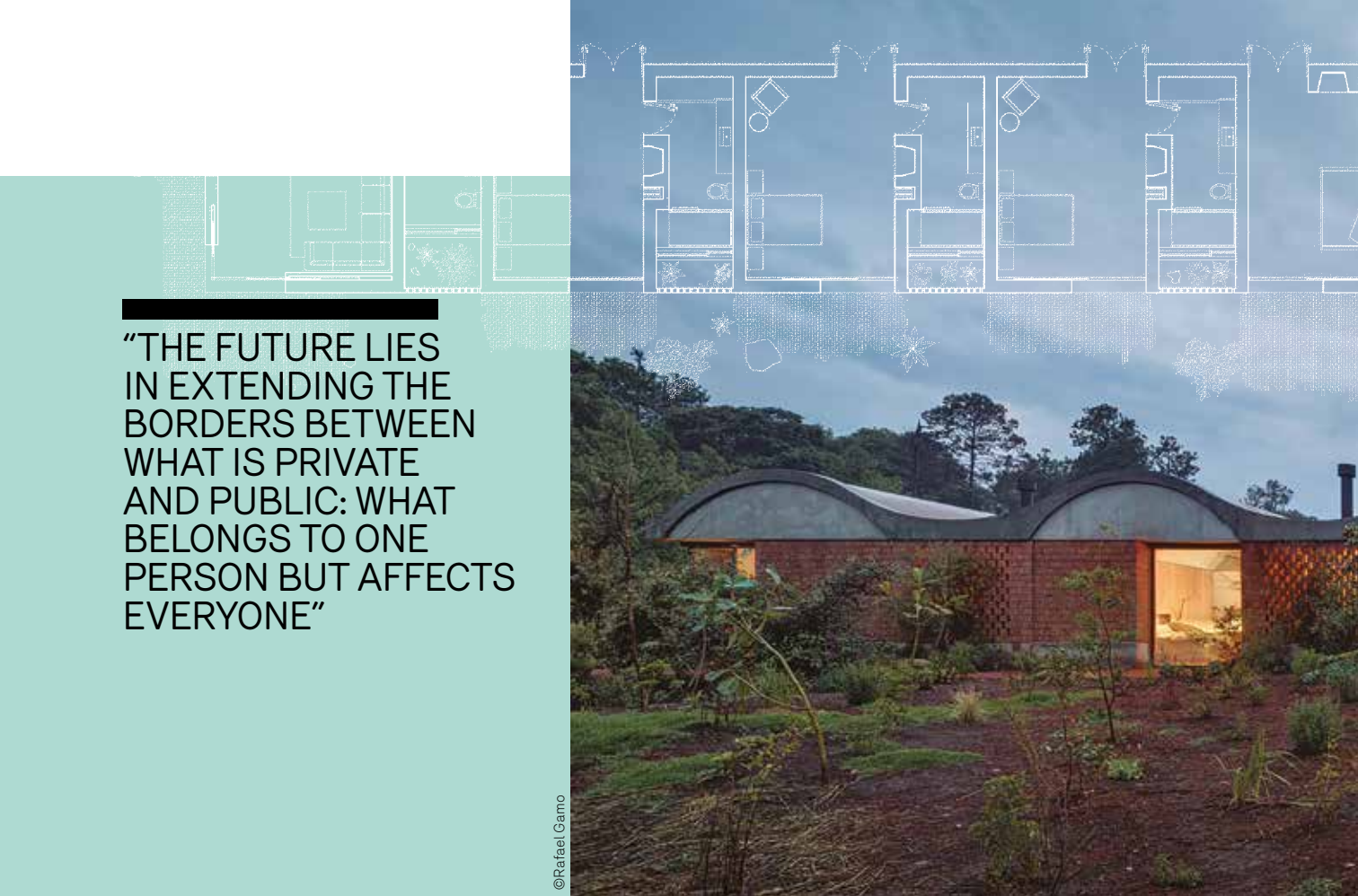
Fernanda Canales is Doctor *cum laude* in Architecture, from the Escuela Técnica Superior de Arquitectura de Madrid (ETSAM), with a Master’s degree from the Universitat Politècnica de Barcelona (UPC), and a Degree in Architecture from the Universidad Iberoamericana de México (UIA). She has received several awards, including the Emerging Voices prize of the Architectural League of New York, and her work has been exhibited at: the Royal Academy of the Arts, in London; the ifa Gallery, in Stuttgart; the Museum of Modern Art, in San Francisco; the Gallatin Gallery at NYU, in New York; and the Venice Biennale. She is the author of the following books: “Shared Structures, Private Spaces” (Actar, Barcelona, 2020), “Collective Housing in Mexico, The Right to Architecture” (Gustavo Gili, Barcelona, 2017), and “Architecture in Mexico 1900-2010, The Construction of Modernity” (Arquine, Mexico, 2014).





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"I AM INTERESTED IN
GETTING CLOSE TO DOING
THINGS THAT SEEM
IMPOSSIBLE, OR THAT ARE
VERY HARD TO IMAGINE"



“THE FUTURE LIES IN EXTENDING THE BORDERS BETWEEN WHAT IS PRIVATE AND PUBLIC: WHAT BELONGS TO ONE PERSON BUT AFFECTS EVERYONE”

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Do you think that the requirement for sustainability can condition the beauty and character of an architectural work? If so, in what sense?

FC. They can certainly act like a straitjacket that restricts its natural logic and condition the meaning of a work of art and therefore its beauty.

But this happens precisely because of misconceptions associated with the requirements for sustainability, which are often poorly understood, or only in very general terms.

When the personality of a work and its rationale are specifically born out of an understanding of everything relating to its aspects, location and users, and we do not only consider the building itself, but also its future maintenance and its adaptability over time, we can then talk about the condition that makes a specific piece of architecture more than just sustainable, but also relevant.

Talking about sustainability in architecture, with the way we build today, is simply an oxymoron.

Of all of your projects, which one do you think most highly of? Why?

FC. The projects that I most appreciate are those that stayed on paper, because they keep me curious about their utility and whether they would stand

the test of time. Above all, those that are difficult to imagine, as they imply a greater risk or a more adventurous approach.

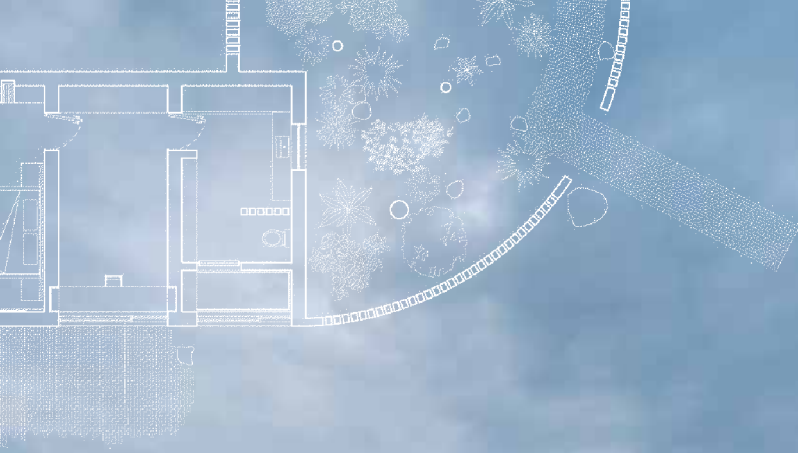
I am interested in getting close to doing things that seem impossible, or that are very hard to imagine. When they already exist, checking the constructed work eliminates that great leap in the dark that unbuilt projects always maintain.

In this sense, I particularly appreciate a piece of work that I projected to go on top of some abandoned houses on the outskirts of Mexico City, to provide public and recreational space for areas of segregated housing.

This project began from the reality that while Mexico is one of the countries in the world with the greatest housing shortfalls, it is also one of those with the greatest stock of abandoned dwellings (one out of every seven houses is empty because it does not meet in the minimum standards for habitability).

This is particularly true of recent projects and is the result of a lack of coordination between the provision of housing and public transport, employment, education and safe public spaces.

In this sense, making architecture sustainable is not about constructing but rather about wisely using what we already have.



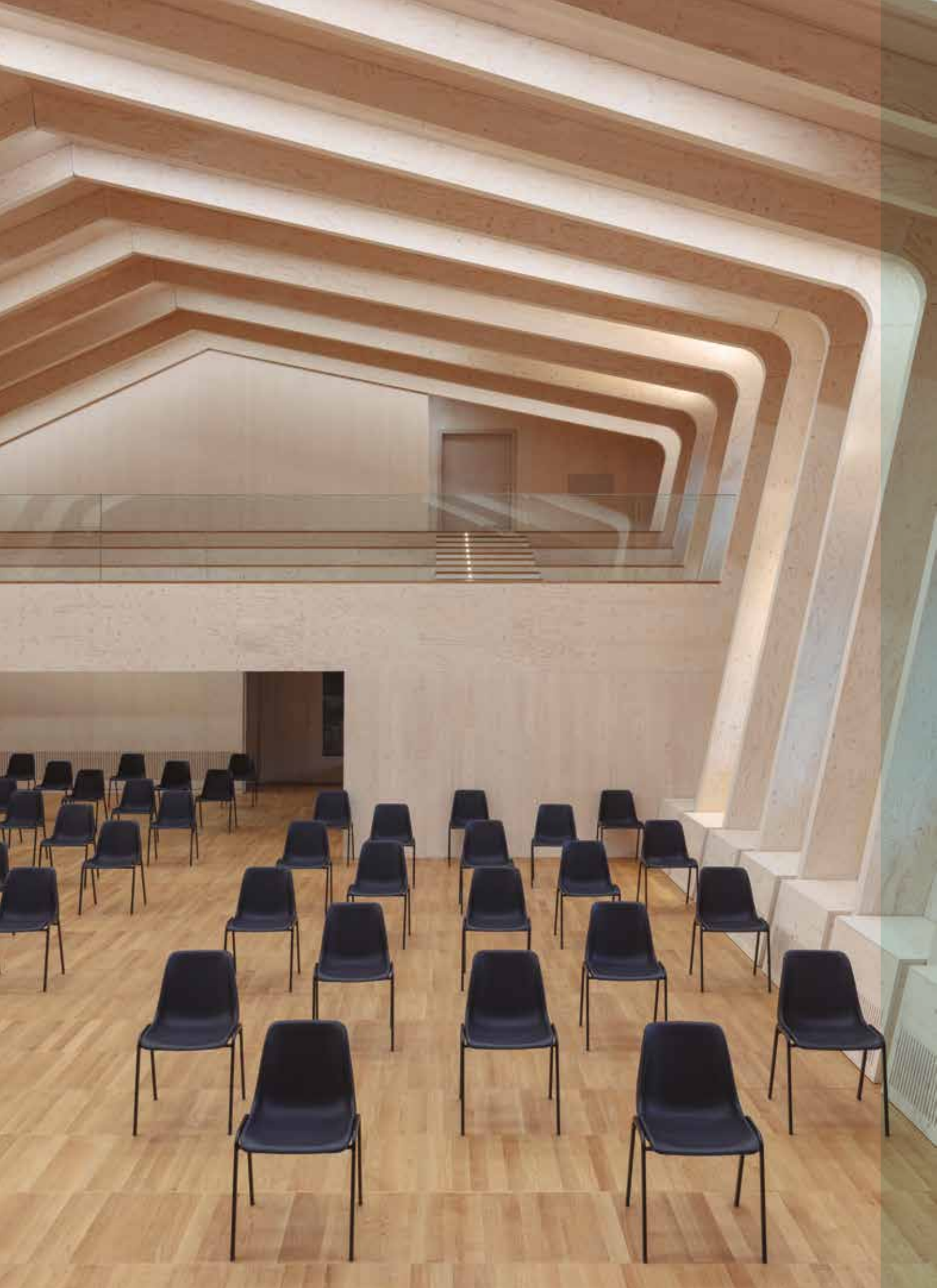
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What issues do you think will define the architecture of the coming decades?

FC. Hopefully, there will come a time when we will see a work and be able to know that it belongs to a specific period in the past and that it will be clear when we stopped building in a way that was so violent to the planet and our society. It is up to us

to make those types of architectures that exacerbate social divisions and damage the ecosystem obsolete. The future lies in extending the borders between what is private and public: what belongs to one person but affects everyone. x







SAUERBRUCH HUTTON

“Modern architecture has always been trying to address and to resolve the problems of its time”

What does the word “sustainability” mean to you when it is associated with architecture? Is it a label? Is it a trend? Is it an effort? Is it a challenge? Or is it just an implicit concept in any quality project?

S&H. We are operating in an untenable situation today: the countries that we live in have carbon footprints five to six times the size of what can be sustained by the planet. The reason why the planetary ecosystems haven’t collapsed yet is to do with the fact that there are still countries that are using only a fraction of what they are entitled to. In other words, we –the rich, developed countries– are living at the expense of the poor, undeveloped countries. This has to change and it is for us to show how global resources and consumption can be brought into congruence again.

So, here is a serious problem. Modern architecture has always been trying to address and to resolve the problems of its time; it has even drawn inspiration from the resulting challenges and their solutions.

Do you think that the requirement for sustainability can condition the beauty and personality of an architectural work? If so, in what sense? >



Sauerbruch Hutton is an international agency for architecture, urban planning and design that was founded in London, in 1989, by Matthias Sauerbruch and Louisa Hutton, and is now based in Berlin. They create individual and sustainable solutions for architectural projects, urban master plans, interiors, furniture and exhibitions. Pleasure in the sensual handling of space and material, curiosity for technical and spatial innovation, as well as the responsible use of all kinds of existing resources, constitute the focus of their architectural practice.

The office’s best-known buildings from over 30 years of design activity include the GSW Headquarters in Berlin, the Federal Environment Agency in Dessau and the Brandhorst Museum in Munich. More recently, their Experimenta Science Centre in Heilbronn, the Museum District M9 in Venice Mestre and the Headquarters for Médecins sans Frontières in Geneva have also opened.



“DEPENDING ON THE NATIONAL CONTEXT, THE REALM OF ARCHITECTURE AND THAT OF BUILDING HAVE –MORE AND MORE– BECOME TWO DISTINCT TERRITORIES EACH WITH ITS OWN (AND NOT ALWAYS COMPATIBLE) LOGIC AND CULTURE”





© Rafael Ocampo
© Jan Bitter



S&H. Yes, of course; if we take the challenge seriously, every aspect of construction has to be reconsidered, just as much as any other aspect of our lives has to be examined in the light of this new paradigm. In architecture, for example, a new awareness of the thermodynamics or a heightened sensibility to the ecological performance of building materials has already led to different aesthetic and spatial solutions and will continue to produce the very particular buildings of our time.

Of all of your projects, which one do you think most highly of? Why?

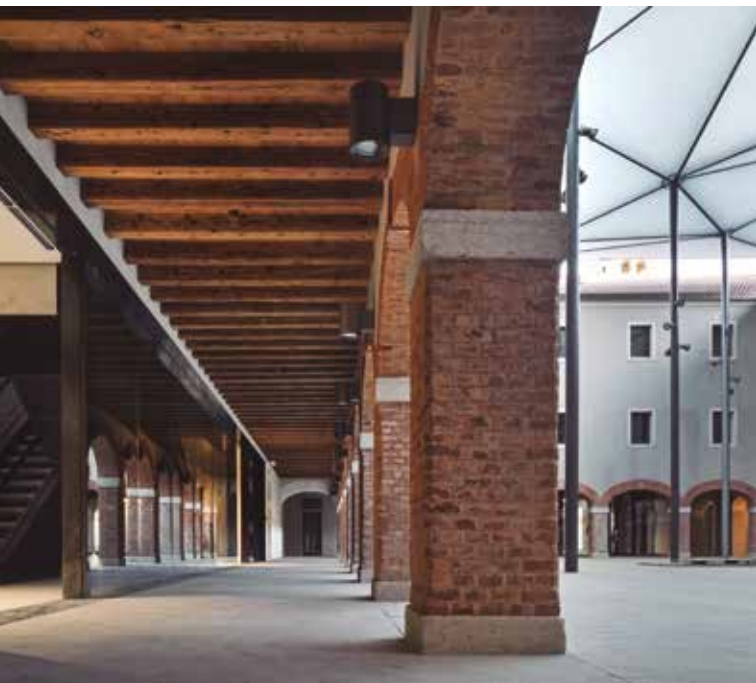
S&H. I don't have preferences for any individual project; they are all the product of their various preconditions to which we are reacting within our particular sensibilities.

Which typology presents the greatest challenges for architecture in terms of sustainability? (residential, offices, hotels, health services, etc.)

S&H. I don't think that it is a question of typology; if anything, it is maybe a question of clientship. What is the motivation to build a building? Are we talking about real estate business (with maximum short-term profits in mind) or are we dealing with long-term investment in structures that will still be used in 100 years? Also, we know that a building's ecological footprint is a question of its whole life cycle. It includes the carbon embedded in the construction and the energy needed to operate a building for 60-100 years, as well as the footprint involved in the demolition and potential re-, down- or upcycling of the materials involved. So, can we really economise in the initial investment to the detriment of the whole life cycle of a building?



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What issues do you think will most strongly influence architecture in the near future?

S&H. Already, today, the architectural discourse is more and more separate from the actual real estate market. Depending on the national context, the realm of Architecture and that of Building have –more and more– become two distinct territories, each with its own (and not always compatible) logic and culture. In the various initiatives to further rationalize and automate the building process, traditional design and production formats will be challenged further. The need to reduce cost and to increase the transparency and control of building processes will inevitably lead to a certain standardization and systemization. The challenge for architects will be to embrace these developments and to work with them, critically and creatively. x



KNAUF

For KNAUF, the only possible future is to grow in an intelligent and sustainable way. We are fully committed to our environment and that is why we create value in all our activities, focusing on improving people's quality of life, health, and comfort. We are innovation. We are an agent of change.