SUSTAINABLE & GREEN BUILDING

VOL.3 CULTURAL + MEDICAL + RESIDENCE

节能建筑（下）

文化 + 医疗 + 住宅

高迪国际出版有限公司 编
大连理工大学出版社

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刘健琨 杨韵竹 译

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PREFACE 1

RESHAPING OUR BASES OF GROWTH

I'm not discovering anything when I state that our buildings are still inefficient from an energy standpoint, I venture to say that there is an international consensus in this regard. On the one hand, Europe, and since the mid-90s, launched a set of Directives in order to reduce consumption, which has placed Europe as a reference, on the other hand, worldwide, all major economies, with China leading the way, are reformulating their energy base to not stifle their growth, aware that the building is one of the key parts, because it is the area that gets the bulk of demand.

Throughout our careers, in Europe and beyond, we have worked to implement in the project reality and applied this new paradigm. We are impressed to perceive broadly common characteristics to this global initiative, as if beyond the cultural-historical characteristics we identify each other, there were others, common, current and full force of what means to be sustainable in the construction of the contemporary world and the future.

What interests me to relation is that a major international effort of concreteness is being done to bring to reality the intentions related to energy efficiency and the respect for the environment, to consolidate a sort of shared knowledge.

What is this common knowledge? Recognizing that a preamble can only be schematic, I will dare to mention those starting points that I think are most important:

THE URBAN DIMENSION OF THE CONSTRUCTION: We cannot understand the buildings as independent units, subjected to its own logic as if they were isolated in themselves. We know that the basic unit is not the building but rather the neighborhood or set of buildings, open spaces and infrastructure that when linked can build up a living environment that provides a good management of the needs of the community and individuals.

ARCHITECTURE AND MACHINES: The architecture is in itself the construction of an indoor climate and some natural/artificial conditions best fitted to the expectations of our habitation. We can conceive architecture as a bioclimatic envelope that filters and manages natural conditions in order to obtain a new and comfortable balance. The mechanical installation should work only as a complement, equipment sizing to meet the ends of the system.

We know how to make buildings with much less energy demand for operating. There is nothing extraordinary in lowering the demand of 100 kWh/m^2 of a standard conventional housing, up to 50 kWh/m^2, without incurring a higher cost.

THE BUILDINGS WILL HAVE TO PRODUCE THE ENERGY THEY CONSUME: Currently in Europe, about 40% of the energy consumed is applied to build and inhabit the buildings, so that meeting this consumption with renewable production near the point of consumption (integrated in the building itself, raised in neighborhoods decentralized production...) is a technological challenge and a substantial change in the current model.

PARAMETERIZE AND EVALUATE THE PERFORMANCE OF BUILDINGS: We measure the performance of buildings in order to improve them. If we do not, all can be in good intentions.

Measure means first of all reaching an agreement, being able to reach an agreement among diverse sensibilities, what should be the parameters that convey, his rank and precedence. Worldwide, there are a lot of evaluation and certification systems that must adapt to the idiosyncrasies of each place and evolve over time, as the knowledge gained will discover new challenges that must satisfy, from a shared scientific basis.

Felipe Pich-Aguilera
Architect, OSA (Sustainable Architecture)

序言 1

重塑发展根基

站在能源问题的立场上，我认为我们的建筑仍然是低效的。并无他意，并且冒险地说一句，这已经是全球性的共识。一方面，自 20 世纪 90 年代中期，欧洲便出台了一系列减少能耗的指令，这也让欧洲成为了世界的参照。另一方面，以中国为代表的世界范围内的经济大国，正在重塑其能源基础以避免阻碍经济发展，并且意识到建筑作为能源消耗大户应在这一方面起到相当大的作用。

在我们的建筑生涯中，我们将这种新模式应用到欧洲及欧洲之外地区的实际项目中。我们惊讶地发现在全球性的浪潮中涌现出了广泛的共同特征，好像除文化历史特征外我们仍能识别彼此，其他普遍的、现有的、大量的力量意味着现今以及未来世界的建设将是可持续的。

让我感兴趣的是，切实可行的国际合作正在展开，希望能够提高能源效率、尊重环境并且巩固对此类常识的掌握。

何谓此类常识？鉴于前言只能是简单扼要的，我斗胆提出我认为最重要的几点：

建筑工程的城市尺度：我们不能将建筑作为独立的单元考虑，好像它们是与外界隔离的单体，只遵循自己的逻辑。我们所谓的基本单元并不是建筑单体，而是邻里环境，一组建筑群、开放空间与基础设施，将其相互连接组合，为社区与居民创建更舒适的生活环境。

建筑与机械：建筑是一种对室内环境的营造，按照人们的期待去创造适宜的自然或人工环境。我们可以将建筑看做一种生物气候学上的平衡体。而机械设备则仅仅是其中的组成部分，填补系统需求的缝隙。

我们知道如何减少运行中的能源需求。要将传统房屋的能耗由 100 kWh/m^2 降至 50 kWh/m^2，除扩大投资外，再无他法。

建筑需要对其所需能源进行自供给：现如今的欧洲，约 40% 的能源消耗来自房屋的建设，因此使用可再生能源满足能耗需求（建筑自身生产或与周边环境分散化生产）成为了建筑业的一项技术挑战与巨大改变。

对建筑性能进行参数化设计与评估：我们对建筑性能进行评估以对其进行改善。如果我们不这样做，那所有的一切都只是我们良好的愿景而已。

评估首先需要达成共识，而要在多样性之中达成共识，去衡量其优劣，就需要参数化的辅助。全世界有许多评估与认证体系，它们需要适应不同的地域特征并且不断更新，因为在共同科学依据之上，人们会不断发现并迎接新的挑战。

费丽尔·皮尔希·阿奎莱拉
OSA 建筑事务所建筑师

PREFACE 2

RESOURCE CONSERVATION

As the population of our planet expands, enabled by the inventions of science and engineering, the earth's once abundant and easily extracted resources such as concentrated minerals, easily obtained fuels, natural forests, arable land, bountiful oceans and potable water, are being depleted; some already to the point of exhaustion. Our biosphere is fouled.

Sustainability, that is, in an environmental sense, the ability to only use resources at no greater rate than they can be replenished, is nearly an impossible task, given the rate of population growth and consumption. Along with myriad of other environmentally impactful activities, especially generating power and transporting people, constructing new buildings rarely meets the strict edict of balancing use and replacement. The mere act of digging, a normal starting point in traditional construction, is not a sustainable activity and it only gets worse from there. Pouring concrete, erecting steel and placing glass are all unsustainable activities using finite materials and energy intensive manufacturing processes.

So what are architects to do? As choreographers of the built environment, we architects should look beyond politically correct labels and placating, but less-than-forthright words (i.e. "sustainable"). We should not redefine well understood words to benefit manufacturers and politicians by lulling the well-intentioned into believing that the environment is a top priority. Population is expanding. Potable water is disappearing. Generating power does pollute. Instead of the unobtainable and misdirected, we must offer our expertise in the pursuit of the doable; resource conservation. Resource conservation, an action involving slowing the depletion of resources and reducing the degradation of the environment to rates that consider the viability of future generations, will extend our finite treasures and allow time for technological breakthroughs to be developed (alternative energy, alternative transportation, etc.) that along with changes in human behavior (population control, economic reforms, education, etc.) will lead to a sustainable future.

Line and Space, the Tucson, Arizona architecture firm, contributes to reducing the use of resources by going beyond the normal "checklists" of sustainable thinking. Diminishing interior conditioning requirements by proper solar orientation and thoughtful positioning of glass, incorporating non-visual aesthetic as well as the visual, recognizing the joy of bringing the outside into a building and extending the usability of outside space through creation of tempered microclimates all play crucial roles in resource conservation beyond the fundamental necessity of increasing efficiencies (power, water and material choices) and educating resource users.

Interesting examples of thinking further than the checklist (i.e. LEED) include intense problem definition with clients. Often Line and Space, when setting upon the building site, spends days defining and redefining project needs and goals. How does this conserve resources? In the case of the Red Rock Canyon Visitor Center, it was decided that a large area of planned conditioned interior space, the heart of the building dedicated to exhibits and encouraging land stewardship, could be located in outside pavilions, where the climate has been slightly and economically modified to extend its usability well beyond the norm, thus saving tremendous amounts of energy over the life of the facility. Clearly this demonstrates a message of conservation. Reduction of conditioned interior space, while still meeting functional requirements, through the creation of tempered microclimates is a transferable and valuable idea that will lead to substantial resource savings.

Hand in hand with architectural programming (problem definition), developing a deep understanding of the building site, particularly climate and geography is part of, and inseparable from, developing the project concept. What does this understanding have to do with resource conservation? During site analysis for a headquarters building for the US Fish and Wildlife Service it became apparent, that the site's proximity to the habitat for an endangered bird, the Clapper Rail, posed a conflict between the desire to maximize day lighting and the need to prevent birds from flying into the glass. The solution found through research was to angle the window glass to reflect the ground instead of the sky. Saving birds; protecting the environment.

Considered by the American Institute of Architect's as one of America's top 10 green buildings in 2008, the case study included here, Cesar Chavez Library, incorporates aspects mentioned above. For example, in the desert, west facing glass, typical on all symmetrical construction, adds tremendous heat loads to the interior. This in turn requires a substantial amount of air conditioning. Our resource conserving approach was to totally eliminate west windows and use the structure itself to exclude the sun. Further, at Cesar Chavez, in addition to task lighting, day lighting, water harvesting and other "checklist" considerations, an understanding of non-visual aesthetic (an aesthetic based upon senses other than sight) as an important element in resource conserving architecture led to creation of a tempered microclimate as the setting for an exterior reading patio. In this case the shaded area was cooled below ambient temperatures utilizing recycled building exhaust air. Usable building space was added at minimal extra expense, with no environmental detriment and with maximum utility.

In conclusion, we believe it is essential to instill an ethic of resource conservation among architects and engineers; to abandon misleading terminology (such as the word "sustainability") that when applied to building design lulls us into complacency, and to apply our critical thinking and problem solving skills to conserving resources for the betterment of future generations. This approach will give scientists and engineers time to develop environmentally sound technologies and, along with educators and economists, develop models of living that will lead to a truly sustainable ecology.

Les Wallach
Line and Space, LLC, FAIA

序言 2

资源保护

地球人口急剧增长，科技发明越来越多，那些曾经储量丰富易于采集的资源如浓缩矿物质、燃料、天然森林、耕地、大洋与饮用水等都日益匮乏，有些甚至到了枯竭的边缘。我们的生物圈被污染了。

可持续性，从环境的角度来说，是一种资源使用速率低于其再生成速率的能力，然而考虑到人口的增长与消费水平，这几乎是个不可能完成的任务。与其他能够对环境造成巨大影响的人类活动如发电、交通运输等类似，房屋建设也很难满足平衡资源使用与再生的严格条件。常规工程的出发点——小范围挖掘，并不具有可持续性而且是环境恶化的源头。浇灌混凝土、架设钢材、装玻璃等，这些都是使用有限材料的能源密集型生产过程，是非可持续性的活动。

因此，我们建筑师该做些什么？作为人工环境的缔造者，建筑师应该抛开政治立场或者中庸之道的模糊性词语（例如“可持续性”）。建筑师不该重新定义那些通俗易懂的词语以使开发商或者政治家从中获益，不能阻碍人们将环境作为当务之急。人口急剧增长，饮用水在不断枯竭，发电会带来污染。我们必须将专业知识应用到对可开采资源的保护中而非那些不可利用资源。资源保护，一项减缓资源消耗与环境退化速率而为子孙后代考虑的措施，会拓展我们有限的资源，给我们留出足够的时间随着人类行为的变化（人口数量、经济形态、教育等）实现技术突破（替代能源、替代交通等），去创造一个永续性的未来。

美国亚利桑那州图森市的 Line and Space 建筑事务所，致力于可持续性设计以减少资源消耗。通过适当的建筑朝向、窗户位置、视觉与非视觉的美学设计以及将室外空间引入室内以创建舒适微气候等多种方式减少室内的设备需求。这些都是除设置高能效基础设施（电力、水源与材料）与教育资源使用者之外的最有效措施。

周密程度超越相关标准（如 LEED 绿色建筑评估体系）的案例还包括与甲方之间的博弈。Line and Space 建筑事务所常常在用地中花费大量时间，定义或重新定义项目需求与目标。这样如何保护资源呢？在红峡谷游客中心的案例中，原规划的中心室内空间装有空调设备，用作展示与管理，但为在运行期间更多地节约能源，这些空间被移至外部展馆中，那里的环境条件已被改善，具有超越当地标准的舒适性，因此在设备的使用寿命期内节约了大量能源。这便是资源保护的典型案例。在能够满足功能需要的条件下减少配备空调系统的室内空间数量，使用创造性的方法塑造舒适环境可以节约大量资源。

与建筑策划一样（提出问题），对基地的深入理解，尤其是对特定气候与地形的分析是项目理念不可分割的一部分。这些理解与资源保护有什么关系呢？美国野生动物局总部大楼设计的场地分析即是一例。大楼毗邻濒危野生动物长嘴秧鸡的栖息地，矛盾由此产生，建筑既需要最大面积接收自然光，又要防止鸟飞入窗户。最终，大楼将开窗角度进行调整，使其能够反射地面而非天空，这样既保护了鸟类又保护了环境。

塞萨查维斯图书馆是美国建筑师协会认证的 2008 年全美前十个绿色建筑之一，也是一个很好的案例。建筑在沙漠中西立面开窗，尤其是对称式结构，会为室内带来大量热量，也因此需要大量空调设备。我们的资源保护方法即避免西向开窗，利用结构自身进行遮阳。除此之外，该图书馆不仅使用工作照明、自然照明、水回收以及其他规定事项，还使用了一些非视觉美学（以感觉而非视觉为基础的美学）作为资源保护型建筑的要素，为室外的阅读平台提供宜人的微气候。在这个项目中，遮阳区温度低于使用回收废气的室内温度。用最少的额外费用建造加建的使用空间，用最小的环境破坏得到最大的使用价值。

因此，将这种基本理念渗透给建筑师与工程师具有相当的必要性，使人们摒弃具有误导性的术语（如：可持续性），避免我们在建筑设计中自鸣得意，而是进行批判性思考去解决资源保护的问题，造福子孙。这样可以给科学家与工程师留出时间研发环境友好型的技术，而教育学家与经济学家则可以发展新的生活模式以达到真正的可持续性生态。

莱斯·瓦拉赫
Line and Space 建筑事务所，美国建筑师协会会员

PREFACE 3

SENSIBLE SUSTAINABILITY

Every year that passes, humanity exerts more and more pressure on the planet. However true theories about global warming might be, it does seems clear that the rising tendency of CO_2 emissions can't lead us to anything good. Furthermore, it can drive us towards a total environmental and vital disaster.

Approximately 40% of total CO_2 atmospheric emissions can be put down to buildings. Contrary to what happens with transport or industry, nearly all emissions produced by buildings can be directly and easily avoided. The European Union is clear on this and has published its 2010/31 Directive on energy performance of buildings which states that new buildings or those undergoing major renovations must be energy neutral (near zero consumption) by the year 2018. A true challenge.

Interestingly, the bulk of the building industry, formed, in the first place, by its developers and then by the majority of its designers (architects and engineers), its executers (builders and fitters) and suppliers (auxiliary industry) haven't got the faintest idea, at least in Spain, of how to achieve what the regulation is already setting as mandatory in just a few years. The reason for such ignorance is none other than the lack of comprehensive training in all the fields involved, including architecture and engineering. And this is far from new and therefore, if it is to be corrected, it's going to need a relatively long time. Additionally, they each have expertise independent from one another. Architects don't know enough about energy whilst engineers don't know enough about building.

The Spanish architectural design model has been based on studios filled entirely by architects. Even the most prestigious studios with great projects on their portfolio have had a structure based solely and exclusively on architects, without any other professionals on staff with knowledge of any other subject. Therefore, the designs that have resulted from these studios have been based on the addition of specialities or the global concept. The architect designs the building and the engineer adds the building services. Neither one takes the other into account beyond the need to adapt his reality to allow for the other's existence. It is not possible to get to zero consumption with this approach. In other words, generally, the building designed in this manner is a complete energy disaster. 95% of our buildings are designed this way. We could have a building that has very efficient elements when analysed independently, but that is a total disaster when considered as a whole.

A new paradigm is required. A new way must be sought to confront architecture, by high profile multidisciplinary teams, working under a same roof, where qualifications are of little importance and knowledge is what counts. In Anglo-Saxon countries they long ago understood that that was where the problem laid. Design experts worked together with, and from the beginning, experts in energy, structural systems, acoustics, materials, chemistry, ecology and biology, all of which were highly specialized in building and therefore, with great knowledge in the fields of others. This is the only way in which the designed entity, whether it be a building, neighbourhood or city, will truly be a complex organism that will make the most of the possibilities in its surrounding environment. This is the only way the building will behave really making the most of all its components, which as a matter of fact, don't have to necessarily be hi-tech or very expensive. They just have to get along with each other. The technology of the elements is replaced by intelligence when bringing those parts together. The building will cease fighting itself and will go on to be a true organism working quietly and harmoniously. That is sensible sustainability, which doesn't have to cost more. On the contrary, it will cost less, and it should lead us realistically towards having zero consumption buildings.

Antonio Villanueva
Director of the Group of sustainability and
energy efficiency in IDOM

序言 3

明智合理的可持续性

这些年来，人类不断给地球施加压力。然而关于全球变暖的相关理论表明，二氧化碳排放量的持续增长对我们有害无益，并将给我们带来重大生态环境灾难。

约 40% 的二氧化碳排放来源于建筑。与交通、工业排放不同，几乎所有建筑排放的二氧化碳都可以避免。欧盟对此十分清楚，并且出台了 2010/31 号条例，规定建筑的能源要求。条例规定：至 2018 年，所有新建与在建房屋都需达到能源中性（即接近零耗能）。这着实是一项挑战。

有趣的是，大部分建筑工程从开发商到主体设计师（建筑师与工程师）、施工人员（建筑工与装配工）和供应商（辅助工业），都没有想出好的方式在短短几年内达到条例的规定，至少在西班牙是如此。这方面的缺失源于缺少相关领域的综合培训，包括建筑与工程。而在这个新兴的范畴，若要使其得到纠正则需要相当长的时间。除此之外，不同领域之间相知甚少。建筑师对于能源不够了解，工程师对于建筑亦是如此。

西班牙的建筑事务所前身均为完全由建筑师组成的工作室，即使那些做过许多大项目的著名事务所也完全由建筑师组成，几乎没有其他领域的专业人士。因此，出自这些事务所的建筑作品往往融合专业与整体的意见。建筑师完成设计而工程师添加设备。双方都不会考虑到彼此，而又不得不接受对方的存在。这样的运作方式是不可能达到零耗能的。换言之，这种方式只会带来能源灾难。而 95% 的建筑是这样建成的。我们的建筑局部分析都具有良好的能源效率，然而整体分析则一无是处。

我们需要一种新模式，一种可以缓解建筑业尴尬处境的新模式。我们需要综合性的工作小组相互合作，看重知识而非所谓的资格认证。在盎格鲁撒克逊时代的国家，他们早已发觉了问题所在。专业的设计师从项目之初便与能源、结构、声学、材料、化学、生态学与生物学等领域的专家合作，涉猎其他领域的知识。这可以说是建筑单体、建筑群与城市设计可以真正成为一个综合有机体的唯一方法，使其更好地适应周围环境。这也是建筑中各部分能够高效配合的唯一方法，不需要高科技或者高造价。各部分只需相互配合，而这种配合所需要的智慧取代了高技术的必要性。建筑将不再自相矛盾而成为可以安静有序运转的真正有机体。这便是明智合理的可持续性，不会花费大量金钱。相反，它会节约资金并带领我们走向零耗能建筑的时代。

安东尼奥·维拉纽瓦
IDOM 建筑事务所可持续和节能团队主管

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CULTURAL
文化

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VOL.3 CULTURAL+MEDICAL+RESIDENCE

SUSTAINABLE & GREEN BUILDING

节能建筑（下）

文化 + 医疗 + 住宅

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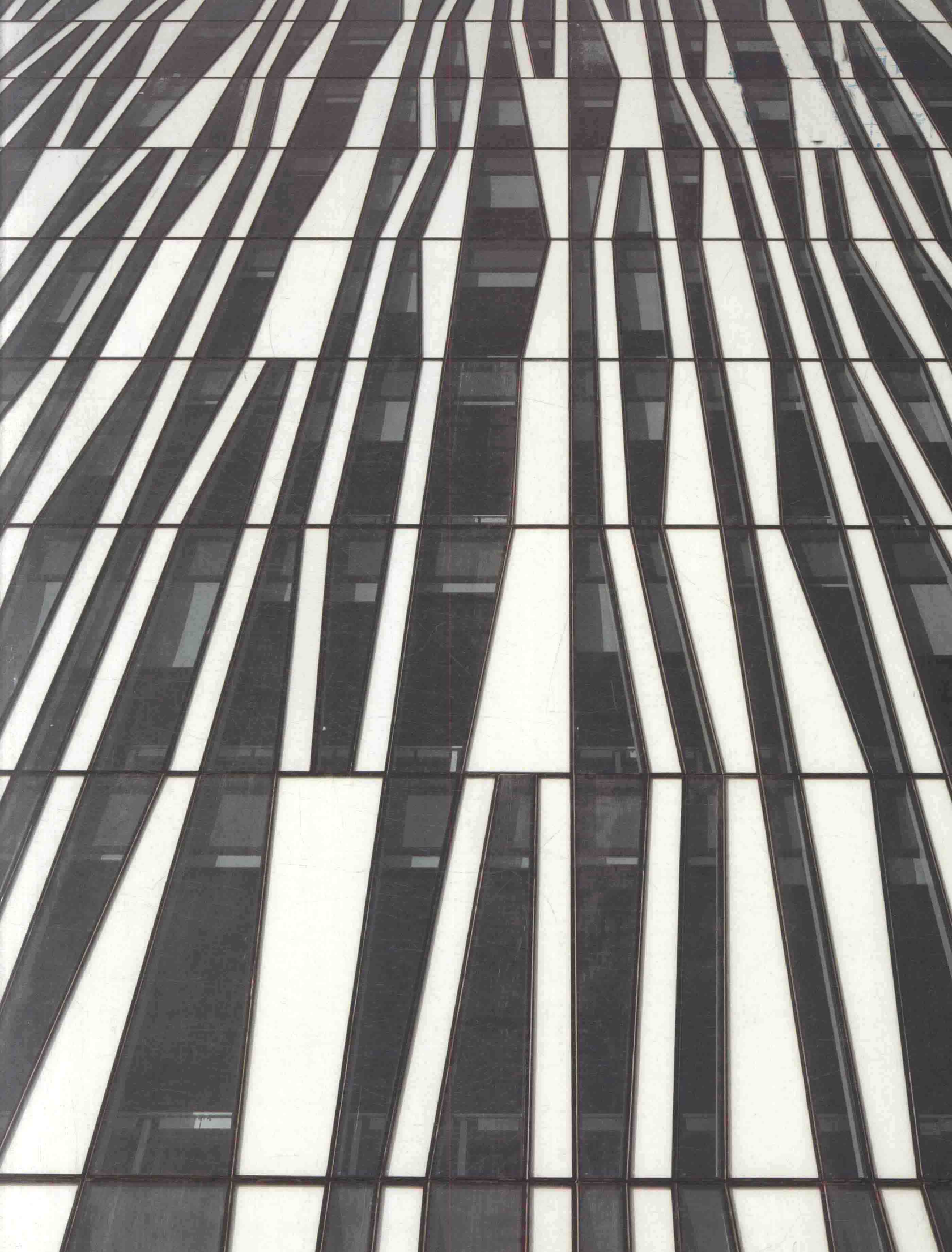

PREFACE 1

RESHAPING OUR BASES OF GROWTH

I'm not discovering anything when I state that our buildings are still inefficient from an energy standpoint, I venture to say that there is an international consensus in this regard. On the one hand, Europe, and since the mid-90s, launched a set of Directives in order to reduce consumption, which has placed Europe as a reference, on the other hand, worldwide, all major economies, with China leading the way, are reformulating their energy base to not stifle their growth, aware that the building is one of the key parts, because it is the area that gets the bulk of demand.

Throughout our careers, in Europe and beyond, we have worked to implement in the project reality and applied this new paradigm. We are impressed to perceive broadly common characteristics to this global initiative, as if beyond the cultural-historical characteristics we identify each other, there were others, common, current and full force of what means to be sustainable in the construction of the contemporary world and the future.

What interests me to relation is that a major international effort of concreteness is being done to bring to reality the intentions related to energy efficiency and the respect for the environment, to consolidate a sort of shared knowledge.

What is this common knowledge? Recognizing that a preamble can only be schematic, I will dare to mention those starting points that I think are most important:

THE URBAN DIMENSION OF THE CONSTRUCTION: We cannot understand the buildings as independent units, subjected to its own logic as if they were isolated in themselves. We know that the basic unit is not the building but rather the neighborhood or set of buildings, open spaces and infrastructure that when linked can build up a living environment that provides a good management of the needs of the community and individuals.

ARCHITECTURE AND MACHINES: The architecture is in itself the construction of an indoor climate and some natural/artificial conditions best fitted to the expectations of our habitation. We can conceive architecture as a bioclimatic envelope that filters and manages natural conditions in order to obtain a new and comfortable balance. The mechanical installation should work only as a complement, equipment sizing to meet the ends of the system.

We know how to make buildings with much less energy demand for operating. There is nothing extraordinary in lowering the demand of 100 kWh/m^2 of a standard conventional housing, up to 50 kWh/m^2, without incurring a higher cost.

THE BUILDINGS WILL HAVE TO PRODUCE THE ENERGY THEY CONSUME: Currently in Europe, about 40% of the energy consumed is applied to build and inhabit the buildings, so that meeting this consumption with renewable production near the point of consumption (integrated in the building itself, raised in neighborhoods decentralized production,..) is a technological challenge and a substantial change in the current model.

PARAMETERIZE AND EVALUATE THE PERFORMANCE OF BUILDINGS: We measure the performance of buildings in order to improve them. If we do not, all can be in good intentions.

Measure means first of all reaching an agreement, being able to reach an agreement among diverse sensibilities, what should be the parameters that convey, his rank and precedence. Worldwide, there are a lot of evaluation and certification systems that must adapt to the idiosyncrasies of each place and evolve over time, as the knowledge gained will discover new challenges that must satisfy, from a shared scientific basis.

Felipe Pich-Aguilera
Architect, OSA (Sustainable Architecture)

序言 1

重塑发展根基

站在能源问题的立场上，我认为我们的建筑仍然是低效的。并无他意，并且冒险地说一句，这已经是全球性的共识。一方面，自 20 世纪 90 年代中期，欧洲便出台了一系列减少能耗的指令，这也让欧洲成为了世界的参照。另一方面，以中国为代表的世界范围内的经济大国，正在重塑其能源基础以避免阻碍经济发展，并且意识到建筑作为能源消耗大户应在这一方面起到相当大的作用。

在我们的建筑生涯中，我们将这种新模式应用到欧洲及欧洲之外地区的实际项目中。我们惊讶地发现在全球性的浪潮中涌现出了广泛的共同特征，好像除文化历史特征外我们仍能识别彼此，其他普遍的、现有的、大量的力量意味着现今以及未来世界的建设将是可持续的。

让我感兴趣的是，切实可行的国际合作正在展开，希望能够提高能源效率、尊重环境并且巩固对此类常识的掌握。

何谓此类常识？鉴于前言只能是简单扼要的，我斗胆提出我认为最重要的几点：

建筑工程的城市尺度：我们不能将建筑作为独立的单元考虑，好像它们是与外界隔离的单体，只遵循自己的逻辑。我们所谓的基本单元并不是建筑单体，而是邻里环境，一组建筑群、开放空间与基础设施，将其相互连接组合，为社区与居民创建更舒适的生活环境。

建筑与机械：建筑是一种对室内环境的营造，按照人们的期待去创造适宜的自然或人工环境。我们可以将建筑看做一种生物气候学上的平衡体。而机械设备则仅仅是其中的组成部分，填补系统需求的缝隙。

我们知道如何减少运行中的能源需求。要将传统房屋的能耗由 100 kWh/m^2 降至 50 kWh/m^2，除扩大投资外，再无他法。

建筑需要对其所需能源进行自供给：现如今的欧洲，约 40% 的能源消耗来自房屋的建设，因此使用可再生能源满足能耗需求（建筑自身生产或与周边环境分散化生产）成为了建筑业的一项技术挑战与巨大改变。

对建筑性能进行参数化设计与评估：我们对建筑性能进行评估以对其进行改善。如果我们不这样做，那所有的一切都只是我们良好的愿景而已。

评估首先需要达成共识，而要在多样性之中达成共识，去衡量其优劣，就需要参数化的辅助。全世界有许多评估与认证体系，它们需要适应不同的地域特征并且不断更新，因为在共同科学依据之上，人们会不断发现并迎接新的挑战。

费丽尔·皮尔希·阿奎莱拉
OSA 建筑事务所建筑师

PREFACE 2

RESOURCE CONSERVATION

As the population of our planet expands, enabled by the inventions of science and engineering, the earth's once abundant and easily extracted resources such as concentrated minerals, easily obtained fuels, natural forests, arable land, bountiful oceans and potable water, are being depleted; some already to the point of exhaustion. Our biosphere is fouled.

Sustainability, that is, in an environmental sense, the ability to only use resources at no greater rate than they can be replenished, is nearly an impossible task, given the rate of population growth and consumption. Along with myriad of other environmentally impactful activities, especially generating power and transporting people, constructing new buildings rarely meets the strict edict of balancing use and replacement. The mere act of digging, a normal starting point in traditional construction, is not a sustainable activity and it only gets worse from there. Pouring concrete, erecting steel and placing glass are all unsustainable activities using finite materials and energy intensive manufacturing processes.

So what are architects to do? As choreographers of the built environment, we architects should look beyond politically correct labels and placating, but less-than-forthright words (i.e. "sustainable"). We should not redefine well understood words to benefit manufacturers and politicians by lulling the well-intentioned into believing that the environment is a top priority. Population is expanding. Potable water is disappearing. Generating power does pollute. Instead of the unobtainable and misdirected, we must offer our expertise in the pursuit of the doable; resource conservation. Resource conservation, an action involving slowing the depletion of resources and reducing the degradation of the environment to rates that consider the viability of future generations, will extend our finite treasures and allow time for technological breakthroughs to be developed (alternative energy, alternative transportation, etc.) that along with changes in human behavior (population control, economic reforms, education, etc.) will lead to a sustainable future.

Line and Space, the Tucson, Arizona architecture firm, contributes to reducing the use of resources by going beyond the normal "checklists" of sustainable thinking. Diminishing interior conditioning requirements by proper solar orientation and thoughtful positioning of glass, incorporating non-visual aesthetic as well as the visual, recognizing the joy of bringing the outside into a building and extending the usability of outside space through creation of tempered microclimates all play crucial roles in resource conservation beyond the fundamental necessity of increasing efficiencies (power, water and material choices) and educating resource users.

Interesting examples of thinking further than the checklist (i.e. LEED) include intense problem definition with clients. Often Line and Space, when setting upon the building site, spends days defining and redefining project needs and goals. How does this conserve resources? In the case of the Red Rock Canyon Visitor Center, it was decided that a large area of planned conditioned interior space, the heart of the building dedicated to exhibits and encouraging land stewardship, could be located in outside pavilions, where the climate has been slightly and economically modified to extend its usability well beyond the norm, thus saving tremendous amounts of energy over the life of the facility. Clearly this demonstrates a message of conservation. Reduction of conditioned interior space, while still meeting functional requirements, through the creation of tempered microclimates is a transferable and valuable idea that will lead to substantial resource savings.

Hand in hand with architectural programming (problem definition), developing a deep understanding of the building site, particularly climate and geography is part of, and inseparable from, developing the project concept. What does this understanding have to do with resource conservation? During site analysis for a headquarters building for the US Fish and Wildlife Service it became apparent, that the site's proximity to the habitat for an endangered bird, the Clapper Rail, posed a conflict between the desire to maximize day lighting and the need to prevent birds from flying into the glass. The solution found through research was to angle the window glass to reflect the ground instead of the sky. Saving birds; protecting the environment.

Considered by the American Institute of Architect's as one of America's top 10 green buildings in 2008, the case study included here, Cesar Chavez Library, incorporates aspects mentioned above. For example, in the desert, west facing glass, typical on all symmetrical construction, adds tremendous heat loads to the interior. This in turn requires a substantial amount of air conditioning. Our resource conserving approach was to totally eliminate west-windows and use the structure itself to exclude the sun. Further, at Cesar Chavez, in addition to task lighting, day lighting, water harvesting and other "checklist" considerations, an understanding of non-visual aesthetic (an aesthetic based upon senses other than sight) as an important element in resource conserving architecture led to creation of a tempered microclimate as the setting for an exterior reading patio. In this case the shaded area was cooled below ambient temperatures utilizing recycled building exhaust air. Usable building space was added at minimal extra expense, with no environmental detriment and with maximum utility.

In conclusion, we believe it is essential to instill an ethic of resource conservation among architects and engineers, to abandon misleading terminology (such as the word "sustainability") that when applied to building design lulls us into complacency, and to apply our critical thinking and problem solving skills to conserving resources for the betterment of future generations. This approach will give scientists and engineers time to develop environmentally sound technologies and, along with educators and economists, develop models of living that will lead to a truly sustainable ecology.

Les Wallach
Line and Space, LLC, FAIA