Building to last: Innovations for a sustainable future

发展创新 建设一个可持续未来

Informative comparisons
丰富的多方比较

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降低能源消耗

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CLEAN ENERGY perspectives 清洁能源观察

Clean Energy Perspectives is the quarterly newsletter of the Europe-China Clean Energy Centre (EC2). The newsletter is intended as a means of sharing updated information on clean energy with potential beneficiaries, announcing events and showcasing best practices and case studies.

It includes an overview of EC2 activities and the interdisciplinary contributions of high-level European and Chinese experts linked to the EC2 consortium.

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Achieving common goals

With the increasingly urgent need for a greener economy, how can EC2 use policy instruments as strategic pillars to promote low-carbon technologies in China?

By Marta Szigeti Bonifert

The main driver of European Union strategy on clean energy during recent decades has been growing concern about climate change. This concern forms the basis of European Union policy in the energy sector, including the European Energy Roadmap 2050 published in December 2011. From an international perspective, the climate change negotiations at the Conference of the Parties to the United Nations Framework Convention on Climate Change in Durban, South Africa, also highlighted how the European Union is linking its climate change activity at international level with targets at home, including the 20-20-20 goals and the cutting of greenhouse gas emissions by over 80 percent between now and 2050.

According to data supplied by the International Energy Agency in July 2011, China has become the world’s largest energy consumer. Securing energy supply is therefore key to providing the necessary conditions for increasing energy consumption and continuing to support rapid economic growth. Thus, in addition to its commitment to reduce greenhouse gas emissions, China places great emphasis on energy safety and the security of supply in the development and application of its clean energy policies. China’s 12th Five-Year Plan is expected to be one of the key drivers of China’s clean energy strategy. Like the 11th Five-Year Plan, and supported by the Medium- and Long-Term Development Plan for Renewable Energy, which was published in 2007, it presents energy as one of the main indicators for national targets, providing the policy instrument to implement actions for energy efficiency and energy supply.

Policy instruments in both Europe and China have made a concrete contribution to achieving the common goal of transition towards a low-carbon economy. They provide tangible guidelines for players in all related sectors, helping to identify areas for concrete activities that can benefit the development of clean energy in China and Europe and promote international cooperation.

Combining strengths

The need to accelerate, scale up and embed the transition towards a greener economy while maintaining economic growth is increasingly urgent. The main challenge driving EC2 strategy is to explore how China and Europe can support each other in the achievement of common goals, despite the differences in social, economic and environmental conditions.

Over the past two years, EC2 partners in Europe and China have successfully implemented various activities that have contributed to strengthening this collaborative effort. E-learning courses, trainings, workshops, high-level forums and study tours have been organised, and advisory reports, guidelines and recommendations have been developed jointly by European and Chinese experts with the aim of promoting clean energy technologies and best practices and creating a win-win situation in exchanges between Europe and China.

With the experience already acquired, EC2 will continue to support the development of a sound knowledge base that can serve as a bridge between China and Europe. Using the latest policy instruments as strategic pillars to refine its objectives, EC2 will strive to contribute to the development and deployment of low-carbon technologies in China, creating unique best-practice examples to benefit regions throughout the world.

Marta Szigeti Bonifert, REC executive director, chaired EC2’s Management Board from April 2011 to March 2012.
The building sector has undergone significant expansion in recent years, and energy conservation in buildings has become a pressing issue. The sector accounts for around 25 percent of total energy consumption in developing countries, and around 40 percent in developed countries—a clear indication of the significant role of building-related energy conservation in global energy security and greenhouse gas (GHG) emissions reductions. International comparisons of energy use in the building sector, with respect to technical innovation, social awareness and behavioural change, can make an important contribution to progress in this field.

**Contrasting consumption**

Both the intensity of energy use and total energy consumption are lower in rural buildings than in urban ones; and the level of energy use is far lower in urban China than in developed countries. Building energy consumption by floor area in urban China is around half of that in Asian developed countries, and around a third of that in American developed countries. The per capita level is even lower, at just a quarter of that in Asian countries and an eighth of that in American countries.
China uses only 40 percent of the energy used by the USA in the building sector, while the population is four times the size, making per capita building energy consumption in China just one-tenth of that in the USA.

Emerging solutions

The different statistical methodologies used in the various countries, and slight discrepancies in the definitions of energy use in buildings, make exact comparisons difficult. However, trends and overall quantities indicated in the available data for energy use in buildings do correspond, and the conclusion can be drawn that energy use in China’s building sector is lower than in developed countries.

Unit area energy use in buildings in Japan and Korea has reached similar levels. Both these countries have the same population density as China, and relatively limited resources, suggesting the possibility for China to take the same development route. Will China be able to narrow the gap between domestic and foreign energy in its emerging economy, as Korea and Japan did successfully last century? Or will energy use intensity in China’s building sector approach the level of developed countries, as China achieves its ambitious targets for urbanisation and modernisation? If the latter were to happen, the consequences for energy supply and security, in China and throughout the world, would be significant.

Energy conservation in the building sector therefore merits the increased global attention it is being given, and international comparisons are invaluable in achieving better scientific knowledge.

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Although the emerging economy and increasing urbanisation are expanding the civil building stock in China, per capita building floor area is still far smaller than in Western developed countries (2005 figures). There are also clear gaps between China and other Asian developed countries, such as Japan and Korea, which, like China, have a dense population and scarce natural resources.
Energy efficiency in buildings is influenced mainly by climate, building orientation, shape, envelope, equipment and the behaviour of the building occupants.

In the initial design phase, deciding on the location and orientation of a building is essential in order to reduce total energy consumption and improve energy efficiency. Correct exposure to the sun will maximise the use of natural light, while advantage can be taken of prevailing winds for ventilation/natural cooling, especially in northern China, providing that buildings and outdoor living spaces are adequately protected from winter winds.

Since the biggest solar heat gain in China during winter months, when the sun is low, is on south-facing vertical surfaces, energy consumption in buildings can be reduced by carefully planning the distribution of the internal living space, with rooms used in the daytime facing south, and rooms used at night, as well as service rooms, facing north.

Design solutions
The shape of a building also has a significant impact on its energy efficiency. During the winter, the building volume (V) is warmed, but heat is lost through the building envelope surface (S). Energy demand therefore depends on the compactness of the building — that is, the surface to volume ratio (S/V). The lower the value of this ratio, the less heat is lost. In cooler climates, buildings should ideally be more compact, while in warmer, damper climates buildings should be longer to facilitate the flow of air. However, compactness is not the ideal solution in terms of lighting, since there is less space available for windows.

The most efficient way to limit heat transfer between the external and internal environments is to ensure the appropriate insulation of the building envelope (walls and roof). Heat loss can also be minimised by avoiding critical thermal bridges, such as balconies and other projections, while windows can be fitted with low-emission film, inert gas, triple glazing or thermal break closures. Shading systems can be used to decrease energy consumption in summer, especially in warmer climate zones.

The use of energy-efficient lighting, air conditioning and heating systems can reduce energy consumption by 10 to 20 percent. Equipment efficiency will vary, depending on the technology used as
The construction of energy-efficient housing has become a priority in the quest to reduce global energy consumption and achieve an environmentally friendly energy sector. The EU, which has set itself the goal of reducing energy consumption by 20 percent by 2020, is responsible for 40 percent of global CO2 emissions and 30 percent of primary energy consumption.

The Department of Territorial Planning at the University of Calabria (UNICAL) is exploring practical ways to meet such ambitious targets. University researchers are currently focusing on the design of innovative eco-buildings in sustainable districts in order to optimise the management of energy consumption.

Researchers from the department are focusing on sustainable housing in southern Italy. This involves producing a set of innovative design models in which energy needs are significantly reduced while energy resources are fully renewable, with the goal of mitigating the environmental impact of residential buildings in the natural landscape.

An EU directive sets a deadline of 2020 for all new constructions to be “nearly zero-energy buildings”

By Francesco Rossi and Valentina Rocca

The construction of energy-efficient housing has become a priority in the quest to reduce global energy consumption and achieve an environmentally friendly energy sector. The EU, which has set itself the goal of reducing energy consumption by 20 percent by 2020, is responsible for 40 percent of global CO2 emissions and 30 percent of primary energy consumption.

The main European institutions are committed to investing in research and development activities for innovative energy-efficient technologies; and to establishing new regulatory frameworks that will allow the European building sector to reduce its CO2 emissions and energy consumption.

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Energy positive

Greater support must be given to this promising new generation of efficient buildings by introducing up-to-date sustainable principles and high quality control standards. The recast of the Energy Performance of Buildings Directive (EPBD, 2010/31/EC, www.eur-lex.europa.eu) was enacted by the EU to achieve this, as well as to improve the efficiency of existing buildings. In the coming 10 years, this will involve the promotion and endorsement of innovative, efficient technologies and of “nearly zero-energy buildings” (nZEB).
But what exactly is an nZEB? According to Article 2 of the EPBD, an nZEB is “a building that has a very high energy performance [...]. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby”. Designing an nZEB means coming up with an eco-model that has energy-efficient windows and insulation systems, as well as low levels of air infiltration and proficient heat recovery ventilation. The goal of near-zero CO₂ emissions is to be achieved by reducing the amount of energy used.

This represents progress in the concept of “energy-positive” housing, in which a combination of advanced technologies are combined with traditional approaches, and in which energy needs are met entirely by renewable and carbon-free local sources. This allows the creation of innovative and successful design solutions that are durable, energy efficient and environmentally sustainable.

Article 9 of the EPBD sets 2020 as the deadline for all new buildings to be nZEB, with the earlier deadline of 2018 for public buildings. The EPBD provides EU member states with great flexibility, encouraging the move towards sustainable living and looking to renewable sources (biomass, wind and solar) as the only way out of fuel dependency.

European energy players are now willing to draw up their own strategies and to combine their efforts to implement nZEB practices at national and local level. This kind of cooperation will lead to new methods and techniques for balancing energy in buildings and for adjusting future constructions to local climate conditions.

**EU prospects**

The EU strategy encourages the adoption of highly efficient technologies. Annex I of the EPBD, for example, stresses that the Common General Framework for calculating the energy performance of buildings must take into account the thermal characteristics of the building: passive heating, cooling elements and thermal bridges, heating installations and hot water supply, air conditioning equipment, natural and mechanical ventilation, the design, positioning and orientation of the building, outdoor climate, passive solar systems and solar protection, indoor climatic conditions and internal loads.

But how can these guidelines be translated into practice?

In southern Europe, an nZEB could use a generic passive design, while in northern Europe, thermal comfort could be achieved by the post-heating or post-cooling of the fresh air mass. Materials such as hemp and cork obtained from plants, or recycled materials such as cellular glass and cellulose flakes, could contribute to the sustainability of an nZEB. In other words, nZEBs must be characterised by a well-insulated building envelope, airtightness, the absence of thermal bridges and the use of sustainable local materials.

The final cost of an nZEB might appear relatively expensive, due to the high price of the components. In order to stimulate investments in energy efficiency, the EU is committed to supporting member states’ efforts with grants and is introducing new funding opportunities for research and development in the field.

Since, in order to be “nearly zero energy”, buildings must produce as much energy as they use, the high initial costs will be written off over the years: an nZEB with zero consumption can eventually mean zero additional living costs.

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.LOCAL SOURCES: A housing complex in Liaoning province powered by wind and solar energy. PHOTO: REUTERS/SHENG LI
EC2 update

Capacity building
Workshop on Energy from Biowaste and Biofuels
Date: December 18, 2011
Location: Beijing, China
This workshop was organised by EC2 at its premises as a follow-up to last year’s activities in the biomass sector and was an opportunity to share experiences and knowledge concerning new approaches to the production of biogas and biofuels from biowaste and other bio-resources. Over 40 high-level experts attended the roundtable and discussed the related policy frameworks and development perspectives. Technical presentations were given by Chinese and European specialists, illustrating the pros and cons of biomass-to-energy technologies, how to improve their efficiency, and how to identify possible bottlenecks and best applications to improve the current regulations.

A policy seminar on biomass energy will follow in March.

Awareness raising
ECOMONDO 2011 “Sustainable Cities” exhibition
Date: November 9–12, 2011
Location: Rimini, Italy
At ECOMONDO 2011, Italy’s biggest expo of green technologies and lifestyles, EC2 showcased its contribution to sustainability by presenting the Guidelines and Recommendations for Low-Emission Technology Options in the Building Sector, and by introducing its activities at the “Sustainable Cities” exhibition. A special initiative of ECOMONDO, organised by eAmbiente, “Sustainable Cities” presented new concepts for the quality of urban life. As a forum for the discussion of innovation, clean technologies and new approaches to urbanisation and sustainability, the initiative was a fruitful occasion for presenting EC2 and its goals to institutional stakeholders, trade associations, local/central governments, NGOs, industries and manufacturers from the worldwide environmental sector.

WWF “Climate Solver” project – China launch event
Date: November 24, 2011
Location: Beijing, China
EC2 witnessed the launch of the “Climate Solver” project by the Worldwide Fund for Nature (WWF) and the signing of its cooperation framework in China.

As a result of this initiative, which was launched in Sweden in 2009, WWF in China is now committed to strengthening the development and widespread use of transformative technologies with great potential to reduce global CO₂ emissions.

Professor Shi Dan, co-director of EC2, chaired the panel discussion, stressing EC2’s commitment to promoting the transfer of low-carbon technologies and assisting Chinese policy makers in improving the related regulatory frameworks.

Participants included government agencies, research institutions, private and public companies, SMEs and representatives from financial institutions.

EC2 fourth Management Board meeting
Date: March 8–9, 2012
Location: Szentendre, Hungary
The Regional Environmental Center for Central and Eastern Europe (REC) hosted the fourth EC2 Management Board meeting, concluding the second year of EC2 activities. Representatives of the Chinese and European partners in the EC2 consortium reviewed the accomplishments of the second year and exchanged ideas on the main directions for the third Annual Work Plan and multiannual activities.

Following the strategy workshop held at EC2’s premises in January 2012, and after broad consultation with project stakeholders and beneficiaries, the final draft of the EC2 Strategy Development Plan 2012–2015 was presented to the board for approval.

The meeting was also attended by representatives of the European Commission’s Directorate General for Energy; China’s National Energy Administration; and the Italian Ministry for the Environment, Land and Sea. All parties congratulated the board on the latest project developments and reaffirmed the commitment and support of their respective institutions.

Taking over from Marta Szigeti Bonifert, executive director of the REC, Han Wenke, director general of the Energy Research Institute of China’s National Development and Reform Commission (ERI/NDRC) was appointed chair of the board as of April 2012.
Project generation

EC2 interviews Segree Dai, chief executive officer of the China-based EU Project Innovation Centre (EUPIC). Following the launch of the Enterprise Europe Network West China in October 2011, she is keen to cooperate with EC2 on clean energy issues.

EC2: How does EUPIC support EU–China business and technology cooperation? What projects does EUPIC manage, both in general and specifically in the field of clean energy?

Segree Dai: EUPIC is an independent organisation, established under the Asia Invest II Project funded by the EU, which promotes cooperation between the EU and China, especially western China, in the areas of business, technology innovation and technology transfer. In order to better fulfill its mission, EUPIC and other partners requested EU approval for the creation of Enterprise Europe Network (EEN) West China and became lead partner of the network in 2011.

EUPIC’s mission is threefold. It is firstly an incubation centre, helping EU SMEs to establish and develop in West China by offering soft landing services. Secondly, it helps EU and Chinese SMEs to achieve technology and business collaboration by introducing the most appropriate partners and providing assistance. Lastly, EUPIC implements private sector projects and projects supported by the Chinese and EU governments.

In line with world trends, our focus has recently shifted towards clean technology and environmental responsibility. Out of the total incubated EU companies, 40 percent are now related to green building, emissions treatment devices, energy saving and water treatment. We are also organising more and more events related to green technology and low-carbon economy, and we are managing projects that focus on clean energy. With Sichuan Provincial Environmental Protection Department and related organisations, for example, we are co-establishing an integrated platform to offer advanced environmental protection technology to local players, and to build the capacity of local governments in these areas. With the formal inauguration of EEN West China, we believe that many projects in the clean energy sector between EU and China will be generated in the future.

EC2: The goal of EC2 is to promote the increased use of clean technology in China by supporting the Chinese Government and Chinese and European energy sector players. What will be the added value for our beneficiaries of collaboration between EUPIC and EC2?

Segree Dai: West China has been playing an increasingly important role in the Chinese Government’s strategy since the “Go West” policy was first formulated. With the opening up, local governments in these territories are eager to promote internationalisation in various sectors, and especially the energy sector. West China has abundant natural resources, including water and mineral reserves, but energy utilisation is not very efficient, indicating great potential for the development of the clean energy sector in this large region.

Given the current economic situation and the trend towards environmental protection worldwide, more EU companies are keen to cooperate with Chinese companies and to export their advanced technology and know-how in the clean-tech field. China is a large market, in need of these technologies to upgrade its industry and improve energy efficiency. Cooperation between the EU and West China in the energy sector is therefore inevitable. However, West China is a large geographical territory covering 10 provinces and accounting for more than half the total land area in China. In order to promote the use of clean technology in such a vast territory and to support cooperation between the EU and West China, EC2 needs to find a qualified partner that understands European culture, has large networks in West China, and shares the same values. EUPIC is a perfect counterpart.
为共同的目标而努力

针对全球对绿色型经济越来越迫切的需求，EC2如何更好地运用在政策咨询领域的优势，来促进低碳经济在中国的应用？

作者：Marta Szigeti Bonifert

近几十年来，欧盟的清洁能源战略的制定主要是源于对不断增加的气候变化的担忧。这种担忧已经成为欧盟在能源领域制定政策的基础，其中就包括2011年发布的欧洲2050年能源路线图。从国际视角上看，在南非德班召开的联合国框架下的气候变化缔约方大会，也着重强调了欧盟将在国际社会中所履行的，在气候变化方面的义务与其国内的控制目标相联系。比如20–20–20目标以及从现在到2050年将温室气体排放降低80%。

根据2011年7月国际能源署提供的数据，中国已成为世界第一大能源消费国，因此确保能源供应是保证能源消费持续增长和保持经济快速增长的关键。因此，中国政府在承诺减少温室气体排放的同时，更重视能源安全和清洁能源政策的制定和应用。中国的“十二五”规划将制定清洁能源战略最主要的驱动力。与“十一五”规划相同，“十二五”规划和2007年发布的可再生能源中长期发展规划将能源作为国家战略目标中的主要指标，要运用政策导向，采取多项措施，以提高能源效率，保证能源供应。

欧洲和中国在为实现向低碳经济转变这一共同目标中，政策工具将起到了十分重要的作用。它能够为相关领域中的参与者提供明确的行动指南，并协助确定重点领域中的具体活动。这些活动会得益于中国和欧洲清洁能源的开发，促进国际间合作。

优势互补

在保持经济增长的同时加快向绿色经济的转型已经刻不容缓。EC2发展战略面临的主要挑战是双方经济、社会和环境等方面存在差异的情况下，探索中欧双方相互支持、实现共同目标的有效途径。

在过去的两年里，EC的欧盟和中国合作伙伴成功的举办了诸多活动，强化了双方的合作关系。这些活动包括远程教育课程、培训、研讨会、高级论坛以及出国考察等。中欧专家还联合编写了多项咨询报告、政策指南和方法借鉴，旨在推广清洁能源技术和最佳实践，在欧洲和中国的交流中达到双赢。

EC2在这一领域已经获得了一些经验，它还将继续支持清洁能源知识平台的开发建设和使其成为中国和欧洲沟通的桥梁。EC2将运用最先进的政策工具，将其作为战略支柱，完善自身的战略目标，不断追求，为低碳技术在中国的应用做出更大的贡献，创建独特特色的示范项目，造福于遍布世界的目标区域。

Marta Szigeti Bonifert为中东欧区域环境中心（REC）执行董事，EC2管理委员会主席（2011.4 – 2012.3）
国际比较

国家统计在确定建筑行业内减少能耗方式中

有一定作用

作者： 燕达，胡珊

全球一次能源使用量

建筑能耗

能源信息署（EIA）的统计数据显示，2005年全球人类一次能源使用量是147亿吨标煤。

作为世界能耗的重要组成部分，建筑能耗达到了45亿吨标准煤，占全球一次能源使用总量的31%左右。发展中地区的建筑行业在使用总量中所占份额少于发达国家。

在过去几年中，建筑节能引起了越来越多的关注，并有显著的增长和发展。在发展中国家建筑领域

的能耗占其能源使用总量的25%左右，而在发达国家建筑领域能耗占其能源使用总量的40%左右。这一

事实表明建筑节能在未来全球能源安全和温室气体（GHG）减排中起着重要作用。因此，有必要从技术

发展、日益提高的公众意识及不断变化的公民生活方式等角度对建筑

领域能耗进行国际间的比较。

与众不同的能耗

无论是在能耗的强度还是总量上，中国农村的建筑能耗都低于城市建筑。而中国城市的能耗水平又远低

于发达国家。确切地说，中国城市单位建筑面积能耗分别只有亚洲及美洲

发达国家的1/2和1/3。人均水平更低，仅有亚洲和美洲相应国家的1/4

和1/8。
利用资源：使用家用太阳能热水器水箱有助于满足日益增长的山东省能源需求

照片来源：REUTERS

中国拥有四倍于美国的人口，而与其相比，中国建筑的能耗总量仅为美国的40%。由此类推，中国的人均建筑领域能耗只有美国的1/10。

新兴解决方案

由于各国的统计方法和体系存在差异，建筑能耗的定义略有分歧，这给横向比较带来了极大的困难。然而，建筑能耗的现有数据表明发展趋势与总量水平是一致的。所以可以得出如下结论：中国建筑领域的能耗低于发达国家水平。

日本和韩国的单位面积建筑能耗已达到了相当接近的水平。鉴于这两个国家都有与中国一样稠密的人口和相当有限的资源，中国也有可能走同样的发展道路。实际上这才是问题的关键。中国会像韩国和日本在上个世纪那样，随着其经济的腾飞，缩小国内外的能耗差距吗？或者，随着中国实现城市化和现代化的宏伟目标，中国建筑领域的能耗强度会接近发达国家的水平吗？如果答案是肯定的，未来的中国乃至世界的能源供给和能源安全至关重要。

因此，建筑领域的节能问题应该引起全球越来越多的关注。与此同时，有必要对建筑领域正在发生的诸多变化进行科学分析，而这有赖于对各国建筑领域能耗的分析比较。

燕达，清华大学建筑学院建筑能源研究中副教授
胡军，清华大学建筑学院建筑科学系硕士生

2005年一次能源使用量的产业份额：建筑领域（住宅和商业）的能耗在发展中国家和地区，如非洲、巴西、中国和印度，所占比重约为20%～25%，而在发达国家是30%～40%。

2005年建筑领域一次能源使用量：人均、单位建筑面积以及总使用量（以百万吨标准煤为单位）都是根据各国的国家统计年鉴及相关调查和报告结果计算出来的。中国的城市和乡村之间存在差异，所以对其进行分别进行计算。图中颜色为各国的总年度建筑领域能耗（显示在国家名称后面的数值是以mtce为单位）。

2005年人均建筑面积：虽然经济的发展和城市化的扩大提升了中国民用建筑的总量，但中国的人均建筑面积仍远低于西方发达国家，中国与亚洲其它发达国家和日本在少数区域也存在明显的差距，尽管他们与中国同样受到了人口稠密和自然资源稀缺的限制。
改变对能耗的理念

提高建筑物的能源效率

作者：燕达和Francesco Reda

建筑节能受几个因素的影响，主要有气候、建筑朝向、外形、围护结构、设备和居民行为。在设计阶段，考虑建筑选址和朝向是减小总能耗和提高能效的核心要求。建筑物朝向可以最大限度地增加自然光的照射，同时利用自然风解决建筑物通风问题并自然降温。尤其是在中国北方地区，可以利用冬季自然风的风向为建筑物和户外生活区提供足够的屏障。

在中国冬季期间朝南的外墙会受到最多的太阳照射。基于太阳照射规律设计的室内房间布局（如日间使用的房间朝南和使用于夜间和休闲的房间朝北）而设计的建筑可以减少建筑能耗。

设计解决方案

建筑物能效也取决于其外形。冬季建筑物的内部容积（V）开始升温时，热量也通过围护结构表面（S）消散。因此，能源需求受制于建筑结构的紧凑程度，也就是表面和容积（S / V）之间的比率。这个比率越低，热转移也就越低。在凉爽的气候条件下，建筑外形应更紧凑；而在温暖和湿润的气候条件下，建筑外形应更加延展，要特别为气团流动创造条件。结构紧凑有利于节能，但不利于照明，因为表面紧凑，为窗户留下的空间就较少。

限制内外部环境间热转移的最有效的方法是为建筑外壳（墙壁和屋顶）提供足够的隔热层。此外，为避免能耗提高，如阳台和其他突出部位，需要尽量减少热量流失。可使用低传热性的薄膜、惰性气体、三层玻璃和绝热装置，使窗户具有低传热性。

为了减少夏季能耗，要使用遮阳系统，尤其是在气候温暖地区。

使用节能照明、气候调节、供暖等设备可以减少至少10-20%的建筑能耗。取决于所使用的技术和其运行和维护，这些系统的节能可能会有所不同。

### 太阳照射

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<td>60%</td>
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中国地区垂直表面（如建筑外墙）的总辐射值占水平表面辐射值的百分比。

### 不同采暖方式的能耗

东京以家庭为单位的不同采暖方式的每年用于采暖和降温的一次能源消耗量。
能源成本的增加、污染和能源供应的重新分配已经迫使建筑设计师在设计中采用新的环境策略：遵循生物气候原则的创新技术与传统的设计策略相结合，才能创造出有可能成功的设计解决方案。

不同的生活方式和建筑使用模式可以解释建筑能耗的巨大差异。

追求平衡

尽管热泵系统采用高效节能模式，但由于其全天候和全空间运行集中式热泵系统供热的能耗仍为最高。用于部分空间和全空间运行模式的八种类型的技术，如供暖、通风和空调（HVAC）设备，有不同的能效特征，但它们的能耗比在全天候模式下运行的集中式热泵系统要低。在部分时间和部分空间的运行模式下，安装于每个家庭中每个房间的采暖降温设备，只有当房间有人时才对其进行供能。与其他运行方式相比，这种方式的能耗低得多。

建筑节能是多种因素相互作用、保持平衡的结果。这些因素包括设计、建筑管理者和使用者，但使用者最为重要。只有真正理解这些相互作用，才能实现建筑领域的真正节能。

新生活方式理念：在法国南特市完全由回收城市垃圾组成的“废物别墅”是可持续性典范。

新的生活方式：在法国南特市完全由回收城市垃圾组成的“废物别墅”是可持续性典范。来源：REUTERS/STEPHANE MAIER

可持续生活方式

欧盟将2020年视为所有新建建筑达到“近零能耗建筑”标准的最后期限。

作者：Francesco Rossi 和 Valentina Rocca

为了减少全球能耗，设立新的目标和建立一个环境友好型能源行业，建造高能效房屋成为要务之一。目前分别占全球二氧化碳排放量40%和一次能源消费量30%的欧盟已经设立了到2020年能耗减少20%的目标。

目前欧洲主要机构正致力于投资创新节能技术的研发，协商设立新的监管框架，减少欧洲建筑领域的二氧化碳排放和能耗。

卡拉布利亚大学（UNICAL）国土规划系正在探索实现这些远大目标的切实可行的解决方案。目前UNICAL的研究核心是设计创新型生态建筑。这些生态建筑主要集中在可持续示范地区，以有效优化能耗管理。特别值得一提的是，大学的研究小组正在为意大利南部的新建可持续房屋制订一套规范。为了减少住宅对自然景观的环境影响，设计了一套全部利用可再生能源来显著减少能源需求的创新设计方案。

良性趋势

为了支持这一有望成功的新一代节能减排建筑，引进最新的可持续发展原则和更高的质量控制标准，要做标的工作还有很多。为实现这一主要目标，同时也为了改善现有建筑的能效，欧盟修订了“建筑能效性能指标体系”（EPBD - 2010/31/CE1-www.eur-lex.europa.eu）。展望未来十年，随着创新节能技术的推广和应用，以及“近零能耗建筑”（nZEB）标准的日益普及，这一目标有望实现。
然而究竟何为“近零能耗建筑”？EPBD第2条将其定义为“具有较高能源性能的建筑物”。其能耗几乎为零或者非常低，并且尽量采用可再生能源，包括现场或附近生产的可再生能源。设计“近零能耗建筑”意味着要深思熟虑才能设计出这样一个生态模型。该模型在具备水平空气过滤和高效热能回收通风系统的同时，必须使用节能窗户和隔热系统。通过减少能耗实现“几乎为零的二氧化碳排放目标”。

这是为更好地理解“Energy positive”而迈出的一大步。结合先进技术和传统规范，将能源需求完全由可再生和无碳排放的清洁能源来满足，这样就使建筑更容易打造成为耐用、节能并能适应环境的创新性设计。

EPBD的第9条制定2020年新标准近零能耗建筑达到“近零能耗建筑”标准的最后期限。对于所有公共建筑甚至更早，要求不晚于2018年年底。EPBD将向欧盟成员国政府提供尽可能大的灵活性，推动了全新可持续生活方式的发展路线，但将可再生能源（生物质能、风能和太阳能）被视为燃料供应的唯一出路。

欧洲能源机构现在正准备制定出各自的政策，并合乎争取在国家和地方政府都能实现“近零能耗建筑”的目标。这种共同的努力将推动平衡建筑物内能耗的方法和技术的开发，促使未来建筑根据当地气候条件设计方案。

欧盟前景

欧盟战略鼓励采用高效节能技术。尤其是EBPD附件1中强调，用于计算建筑物能耗性能的共同通用框架必须考虑建筑物的绝热特性，被动加热、降温因素和热桥，采暖和热水供应，空调设施，自然和机械通风，建筑设计，位置和朝向，室外气候，被动太阳能系统和太阳能的保护，室内气候条件和内部载荷等。但如何才能将这些规则转化为实际应用呢？

在南欧，“近零能耗建筑”可以采用一个通用的被动式设计。而在北欧，可以通过新气流交换循环后再温的方式来实现舒适性。不考虑植物纤维和从植物或再生材料中提取的软木材料，如泡沫玻璃和片状纤维素的材料，都可以帮助一个“近零能耗建筑”实现其可持续性。换句话说，“近零能耗建筑”实施过程中必须具有良好的隔热建筑围护结构、气密性，无热桥及使用当地生产的可持续性材料等特性。

“近零能耗建筑”总花费可能会因组件的高昂价格让人觉得相对昂贵。为了鼓励在能效方面的更多投资，欧盟正致力于用补贴支持成员国在该领域的投资，并为在该领域的研发介绍新的筹资机会。

无论如何，为了实现“近零能耗”目标，建筑物需要产出其能耗等量的能源，较高的初始成本将随着多年的使用变大得以抵销，生活将变得更加舒适。零能耗的“近零能耗建筑”可能意味着零额外的生活成本。

Francesco Rossi卡拉布利亚大学（UNICAL）国土规划系主任
Valentina Rocca卡拉布利亚大学国土规划系博士生

当地能源：在辽宁省采用风能和太阳能供电的住宅区域

照片来源：REUTERS/SHENG LI

clean energy perspectives ISSUE 4 清洁能源观察 第四期
EC2快讯

能力建设
EC2 “生物废物能源化和生物燃料”研讨会
时间：2011年12月18日
地点：中国北京

此研讨会由EC2主办并在其驻地召开，是继生物质能源领域首年活动之后的后续活动。

40多位高级专家参加了圆桌会议，会议不仅为企业家们探讨相关政策框架和发展前景提供了一个平台，也是专家们就生物废料和其他生物原料中提取沼气和其它生物燃料的最新技术和途径方面分享经验和知识的大好时机。

中国和欧洲业内专家就了专题技术介绍，阐述了生物质能源技术的利弊、如何提高效能及如何找出可能的瓶颈和最佳应用方式，也对现行法规进行了研讨。

提高认知
ECOMONDO 2011 “可持续城市”展览
时间：2011年11月9-12日
地点：意大利利里尼市

EC2参加了意大利最大的绿色技术和新生活方式展览会ECOMONDO 2011。EC2介绍了其专家小组写的《建筑领域的低排放技术导则与建议》咨询报告，并在“可持续城市”展会上介绍了其在能效和其它关注领域的相关活动，展示了EC2在可持续性发展方面的贡献。“可持续城市”展是在ECOMONDO的特别倡议下由eAmbiente组织的，目的是为大家呈现了体验“都市生活质量”的新构想。作为一个讨论创新、清洁技术以及实现城市化和可持续性的新途径的专门论坛，本次活动取得了很好的效果，将EC2及其目标展现给了各机构负责人、行业协会、中央/地方政府、非政府组织、以及世界环境领域的诸多产业代表和制造商。

WWF “气候先行者”项目 - 中国启动仪式
时间：2011年11月24日
地点：中国北京

2011年11月24日，EC2参加了世界自然基金会（WWF）“气候先行者”项目在中国的启动和合作签字仪式。

2009年诞生于瑞典的世界自然基金会（WWF），借此举措，目前正中国致力于加强转化技术的开发和广泛使用，有望大幅减少全球二氧化碳的排放。

EC2联合主任史丹教授主持了小组讨论，强调EC2的重要作用。因为EC2正在全面致力于促进低碳技术的技术合作，致力于协助中国政策制定者改善相关监管框架。

参会者包括政府部门、研究机构、私营和公共事业单位、中小企业及金融机构代表。会上，代表纷纷指出当前急需建立一个平台，完善监管制度，以便在中国推广低碳技术创新，为产业的最佳发展提供支持。

第四届EC2管理委员会会议
时间：2012年3月8-9日
地点：匈牙利圣安德烈

中东欧区域环境中心（REC）组织了第四届EC2管理委员会会议。在会上，EC2合作伙伴联盟的中方和欧方代表总结了EC2第二年度的活动，及取得的成就，同时，就第三年度工作计划交换了意见，并确定了跨年度活动的主要方向。

继2012年1月份在EC2办公室召开的战略研讨会和与项目利益相关者和受益者进行广泛磋商后，EC2的战略发展规划2012-2015的最后草案提交给了管理委员会。

欧洲委员会能源总局和中国国家能源局和意大利环境的代表也出席了此次会议，并向管理委员会表示了对项目最新的祝愿，也重申了各自机构对EC2的承诺和支持。

中国发展与改革委员会能源研究所所长韩文魁研究员从2012年4月起担任EC2管理委员会主席，替代中东欧区域环境中心执行董事Marta Szigeti Bonifort女士。
生成项目

EC2采访了位于中国西部地区成都市的欧盟项目创新中心总裁代伊伶女士。在2011年10月推出的中国西部欧洲企业网的基础上，她看重在清洁能源领域上与EC2加强合作。

**EC2：** EUPIC可为欧盟和中国间的企业和技术合作提供哪些具体服务？EUPIC一般管理哪类项目，在清洁能源领域又有哪类具体项目？

**代伊伶总裁**：欧盟项目创新中心（EUPIC）是一个独立组织，位于中国西部的中心——成都市。中心源于由欧盟资助的“亚洲投资2期”项目。自成立以来，EUPIC一直致力于推动欧盟和中国之间的合作，尤其是与中国西部在商务、技术创新和技术转让方面的合作。为了更好地完成其使命，2010年EUPIC连同其它合作伙伴，申请设立了中国西部欧洲企业网（EEN），并于2011年成为中国网的主要合作伙伴。

EUPIC有三重使命。首先，EUPIC是一个孵化中心，通过提供必要的软着陆服务，帮助欧盟中小企业在中国西部建立和发展业务。其次，通过推介最合适的合作伙伴并提供必要的扶持，促进欧盟和中国的中小企业开展技术和商务合作。最后，同样重要的是，EUPIC不仅提供由中国和欧盟成员国政府支持的项目，同时也提供针对私营企业项目。

追随世界潮流，近年来我们的工作重点已更多地转向清洁技术和环保领域。目前，所有孵化中的欧盟企业，40％与绿色建筑、排放处理设备、节能减排和水处理相关。我们还组织越来越多与绿色科技和低碳经济和清洁能源管理相关的项目活动。例如，我们正与四川省环境保护厅和相关组织共同建立一个合作平台，为本土企业提供先进的环保技术，帮助这些地区的地方政府提高建设能力。随着EEN的正式启动，我们相信，欧盟和中国未来将在清洁能源领域推出更多的项目。

**EC2：** EC2的目标是通过为中国政府以及中国和欧洲能源机构提供支持，促进清洁技术在中国的更多使用。对您而言，EUPIC和EC2间的合作将给我们受益者带来怎样的附加值？

**代伊伶总裁**：自“西部大开发”政策制定以来，在中国政府的发展战略中，中国西部一直发挥着越来越重要的作用。随着对外开放，这些地区的地方政府都渴望促进各领域，尤其是能源领域的国际化。中国西部拥有丰富的自然资源，如水能，和矿产储量，但能源利用效率不是很高。这就预示着这一广大地区的清洁能源产业有着巨大的发展潜力。

鉴于当前的经济形势和世界环保趋势，越来越多的欧盟企业都热衷于与中国企业合作，出口其清洁技术领域的先进技术和方法。中国是个大市场，需要这些技术去进行产业升级和提高能效。因此，欧盟和中国西部在能源领域的合作是不可避免的。中国西部地域广阔，覆盖10个省，占中国土地总面积的一半以上。在这样一个幅员辽阔的区域推广使用清洁技术，促进欧盟和中国西部在该地区的合作，EC2需要寻找一个理解欧洲文化、在中国西部拥有巨大网络、与之拥有共同价值观念、有资质的合作伙伴。就此而言，EUPIC是完美的合作对象。
EC2 Clean Energy Alliance membership programme

The membership programme offers the following benefits:

- access to the latest data on clean energy policies and technologies through free downloads of EC2 advisory reports and studies;
- invitations to relevant events and networking opportunities;
- capacity-building opportunities in China and Europe;
- support for cooperation projects between the EU and China;
- institutional and logistical support for awareness-raising initiatives on clean energy;
- a highly efficient platform for exchange among members through a dedicated social network (the EC2 Forum will soon be available on the website); and
- opportunity to increase online and offline visibility within a targeted group (the EC2 Clean Energy Alliance members directory will soon be available on the website).

For more information, and to register, please visit http://www.ec2.org.cn/member-area
EC2 is a hub of excellence, providing support to the Chinese Government and key players in the energy sector, both Chinese and European. By supporting technological cooperation, providing policy advisory services, building capacity and raising awareness, the ultimate goal of the prestigious partners in the EC2 consortium is to promote the increased use of clean energy in China, thus contributing to global sustainable development.

宋欧清洁能源中心是为中国政府及中欧能源企事业单位提供支持的卓越中心。中欧清洁能源中心的合作伙伴联盟旨在通过协助技术合作、提供政策咨询和能力建设服务、以及提升认知来推广清洁能源的使用，实现全球可持续发展。