



newsletter  
工作通讯  
19

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绿色增长

Sino-Italian Cooperation Program  
**Environmental Training Community**

中-意合作计划  
环境培训园地

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### Green Growth

Economic growth continues to be an aspiration for all of humankind. In large emerging economies such as China, economic growth has reduced poverty for millions of people. Developing countries will continue to ask for economic growth in the near future.

The new demand for growth at a global level, particularly by emerging countries, creates energy and ecological challenges.

In the last 250 years, the impact of economic growth on the environment has been largely negative, particularly in the first stages of the take-off process towards economic growth.

These negative impacts have reached a level at which they can threaten not only the global environment, but also economic and social development.

It is time to consider a new model for economic growth: green economic growth.

The idea of green economic growth responds precisely to this requirement of building a different economic growth model able to maintain sustainability and resilience in the relationship between human activity and the earth system.

The crucial driver of green economic growth is technological innovation aimed at more efficient use of natural resources. A crucial parallel role has to be played by way of changes to the pattern of consumption and production in order to sustain the demand for the required green technologies.

The challenge cannot be limited to developing countries, although it must be recognized that they will account for the larger share of future income growth.

Mature economies, with 16% of the world's population, account for more than 75% of consumption and they follow a model characterized by excessive pressure on the environment. Moreover, they still lead the way in R&D and innovation.

The two drivers able to ensure that the intensity of ecological resource use per unit of GDP declines more than the rate of positive growth of GDP are the composition of production and the rate of environmental innovation in individual productions.

The structure of demand should evolve to give increasing weight to production requiring a lower impact on the environment.

Technological progress should increasingly adopt environmentally-friendly technical innovations in every sector of the economy, particularly those whose relevance in the total output is larger.

Moving towards green economic growth is a very difficult challenge. The difficulty is increased due to the low growth in the world economy as a whole and the economic depression in some of the advanced areas of the world economy.

What can be done?

Which mechanisms and policies can be implemented to support green growth with a scarcity of financial resources? Policies should definitely play a key role in order to address the market barriers to the dissemination of green and low carbon technologies and to facilitate the availability of financial resources, also leveraging private investments.

International cooperation is fundamental but countries must also rethink the way to cooperate in the face of global challenges: the great international conventions, although they are fundamental for supplying common frameworks, turn out to be unsuitable for finding new solutions due to their complexity.

### 绿色增长

经济增长是所有人的愿望。中国等新兴经济体的经济增长减少了数百万贫困人口。近期发展中国家将继续实现经济增长。

全球范围对增长的需求，特别是新兴国家的需求，同时带来了能源和生态方面的挑战。

在过去的250年中，经济增长对环境造成的影响主要是负面的，特别是在经济腾飞的第一阶段。这些负面影响不仅威胁了全球的环境状况，而且已威胁到经济社会的进一步发展。

现在是到了考虑经济增长新模式的时候了：绿色经济增长。

绿色经济增长的思想，恰恰精确地响应了这一要求，即：在人类活动与地球系统之间构建另一种经济增长模式，这种模式可以维持经济的可持续性和可恢复性。

绿色经济增长的关键驱动是技术创新，从而更有效地利用自然资源。

改变人们的消费和生产模式，可以发挥持续推进绿色技术发展的关键和平衡作用。

虽管我们必须承认发展中国家将占据经济增长更大的份额，但毫无疑问这种挑战不仅局限于发展中国家。

成熟的经济体拥有世界人口的16%，占总消费额的75%以上，而且这种消费模式已对环境造成过度压力。此外，这些国家在研发和创新领域一直占据着领先的地位。

确保单位GDP消耗生态资源的强度低于GDP的增长速度的两个主要驱动力，是生产的组成和环境领域创新发展的速度。

应更加重视对需求结构的逐步调整以降低对环境产生的影响。

在每一个经济领域，特别是产值比较高的行业，应越来越多地采用环境友好的技术创新。

迈向绿色经济增长极具挑战。随着世界整体经济增速放缓，特别是当前在一些经济发达地区出现经济萧条，则更增加了挑战的严峻性。

我们可以做些什么呢？

在金融资源不足的情况下，采取什么机制和政策来支持绿色增长？政策应该发挥关键作用，以克服市场障碍，推动绿色、低碳技术的传播；同时促进更多金融资源给予支持，并吸引民间投资介入。

国际合作至关重要；但各国必须重新考虑在全球面临挑战下的合作方式：尽管伟大的国际公约提供了合作的框架，但由于其所固有的复杂性，已经不适应新形势下的合作要求了。

8 It is crucial to test models of cooperation among mature economies (that are leading the way in R&D and innovation but are in a phase of economic depression) and emerging economies (that are still in a phase of growth and have great technological potential). This would result in win-win relationships that would help develop and consolidate the green economies of both the emerging and the mature country. Fourteen years ago Italy and China launched the Sino-Italian Cooperation Program for Environmental Protection, with the vision that China and the other emerging economies are the areas where the challenge for a sustainable development has to be won, through the joint development, transfer and dissemination of environmentally-friendly technologies and the enhancement of environmental governance. In the same spirit, the Italian Ministry for the Environment Land and Sea and the Chinese Academy for Social Sciences, with the support of Venice International University and Cà Foscari University, organized the forum “Green Growth: A Joint Perspective from China and Italy” last November in Venice. The forum was intended to stimulate a high-level discussion between decision makers, academics and top managers on the challenges and opportunities within green growth as a possible answer to one of the largest economical crises ever. This issue of the Sino-Italian Cooperation Program for Environmental Protection Newsletter presents some contributions from the forum, thus sharing the reflections on Green Growth and the opportunities it brings for China, Italy and the world with the Environmental Training Community participants.

**Massimo Martinelli**

Italian Ministry for the Environment Land and Sea  
Minister's Advisor for International Cooperation

9 现在的关键是在成熟经济体（即在研发和创新领域处于领先地位，但其经济处于萧条阶段）和新兴经济体（仍处于经济增长阶段，有很大的技术潜力）之间寻找出一种合作模式。这种合作是一种双赢的合作，将有助于推动和巩固新兴经济体和成熟国家的绿色经济发展。

十四年前意大利和中国携手建立了“中意环保合作计划”，旨在通过转让和传播环境友好技术，改进环境管理，推动中国和其他新兴经济体有效应对可持续发展过程中遇到的巨大挑战。

本着同样的精神，在威尼斯国际大学和Cà Foscari大学的协助下，意大利环境、领土和海洋部与中国社会科学院于去年11月在威尼斯联合举办了高级别论坛——“绿色增长：从中国和意大利的角度看”。

论坛的目的是促进在决策者、学者和高级管理人员之间进行讨论，探讨绿色增长这一解决当前经济危机的法宝所面临的挑战与机遇。

本期《中意环保合作计划通讯》将该论坛的部分成果展现出来，以共同思考绿色增长及其带给中国、意大利和参与环境培训的其他国家学员们的机遇。

**Massimo Martinelli**

意大利环境、领土和海洋部  
国际合作顾问

### European Union Enforces New Customs Controls for Photovoltaic Imports from China

From March 2013, photovoltaic Chinese imports into Europe have to be registered with EU customs. The measure is a consequence of the investigation into possible dumping practices by Chinese producers and would pave the way for backdating duties in case the ongoing investigation establishes an unfair competition.

The regulation, officially published on March 5<sup>th</sup> in the Official Journal, has been largely anticipated since last February when an EU trade commissioner spokesman disclosed that the request for registration was filed and all Member States were consulted on the issue according to the standard procedure. The objective of this measure is also to stop importers bulk buying modules before any duties are applied, as happened in the US last year under similar circumstances. The obligation for registration applies to all crystalline silicon photovoltaic modules, panels, cells and wafers coming into the EU from China.

Thin film photovoltaic products, among



### 欧盟将对从中国进口的光伏产品采取新的进口控制措施

从2013年3月起，所有从中国进口的光伏产品都将在欧盟海关进行登记。这个措施是对中国光伏产品制造商可能的倾销案件进行调查的结果；一旦被确定为不平等竞争后，该措施将为追缴罚款铺平道路。

早在去年2月份欧盟贸易委员会发言人就指出：对在海关进行登记的要求已经记录在案，并根据程序正在与各成员国商榷。至此，在各方的期待下终于在今年3月5日欧盟官方发布了该规定。该规定的目的是禁止进口商在不支付任何税款的情况下大量购买光电板及组件，这种情况与美国去年发生的情况很类似。除薄膜光电品外，对从中国进口的所有光电池、晶片、电池板与组件将实施自动登记。

不过，欧盟委员会强调指出登记并不等于一定会收缴惩罚税款，这方



面的决定将取决于最终调查结果。欧盟委员将在6月6日前必须决定是否将征缴反倾销税。一旦决定征收反倾销税，世界贸易组织将从3月5日起追溯缴纳。

欧盟市场对欧盟企业生产的光伏产品需求已经出现上升态势，以避免被征缴追溯税款。



### 中国政府第七次机构改革方案发布

被称为中国内阁的国务院将开始30年来的第七次政府机构改革，旨在克服官僚主义作风，减少行政部门对市场和社会问题的干预。本次机构改革的结果是将27个部委削减为25个，并对一些部门进行重组。国务院要求在本次机构改革中将确保市场在配置资源方面的基本作用，并让更多的社会组织参与社会管理。

其中，为了削减能源领域的臃肿行政管理及执法体系，国家电监会的

others, are excluded from registration. However, the European Commission underlines that registration does not automatically mean that the duties would be collected retroactively. The decision will only be taken in light of the investigation results. The European Commission must determine by June 6<sup>th</sup> whether provisional anti-dumping duties should be applied, while a final decision will not be made before the end of the year. In case final duties are applied, the World Trade Organization (WTO) could backdate them to March 5<sup>th</sup>. The European photovoltaic market has already registered a rise in the demand of European manufacturers' modules in order to avoid any retroactive tariffs.

### Seventh Restructure Attempt of Chinese Government Launched

The State Council, China's cabinet, will begin its seventh restructuring attempt in the past three decades to roll back red tape and reduce administrative intervention in the market and on social issues. As a result, the number of ministries will fall from 27 to 25, while several departments and agencies will be reorganized. In the plan, the State Council has pledged to ensure the market's fundamental role in allocating resources and to let social organizations play a greater role in managing social issues.

Among the changes, the National Energy Administration will be adjusted to incorporate the functions of the State Electricity Regulatory Commission in order to streamline the administrative and regulatory systems of the energy sector. The main responsibilities of the consolidated administration will include drafting and implementing

职能将并入国家能源局。加强后的能源局将负责起草和执行能源发展战略、计划、政策，并对能源系统的改革和管理提出建议。

该方案还将调整国家最高海洋管理机构，以加强海洋法的执行，并更好地保护海洋资源。具体包括将目前分散在各部门关于海洋法律执行的责任统一集中在一个行政管理部，该部门的名称是国家海洋局 (NOA)，将负责管理公安部边防海警，农业部渔政管理，海关总署管理的海上缉私警察等。将成立国家海洋委员会，作为一个高级别的咨询与协调机构，负责制定海洋发展战略并协调重要海洋事务。

energy development strategies, plans and policies, advising on energy system reform and regulating the sector. The plan will restructure the country's top oceanic administration to enhance maritime law enforcement and better protect and use its oceanic resources. The move will bring China's maritime law enforcement body, currently scattered in different ministries, under the unified management of one single administration. The new agency, still named National Oceanic Administration (NOA), will have under its control the coast guard forces of the Public Security Ministry, the fisheries law enforcement command of the Agriculture Ministry, and the maritime anti-smuggling police of the General Administration of Customs. A high-level consultation and coordinating body, the National Oceanic Commission, will also be set up to formulate oceanic development strategies and coordinate important oceanic affairs, according to the report.

**Italian Environmental Performance Assessed in OECD Review 2013: Positive Results but still Room for further Improvement**

The independent OECD assessment of Italy's environmental performance was presented on March 8<sup>th</sup> in Rome by the OECD Environment Director, Simon Upton and the Italian Minister for the Environment, Corrado Clini. The report includes the analyses of policies and measures implemented in Italy over the last decade, an evaluation of their results and the identification of successes and shortcomings, to finally issue sector recommendations.

According to the experts' review, Italy has strengthened and harmonized its environmental policies and several initiatives have been taken to protect the country's natural resources and reduce the intensity of material and energy usage. These measures have yielded good results, including a significant reduction in the emission of air pollutants, the improvement of waste management and biodiversity conservation, and the upgrading of surface water quality. This has occurred in a period in which the relatively slow



**2013年经合组织对意大利政府的表现进行评估：取得积极进展，但仍有改进空间**

欧盟环境局局长阿普顿（音译，Simon Upton）和意大利环境部部长克里尼（音译，Corrado Clini）于3月8日在罗马宣布了经合组织（OECD）对意大利政府进行独立评估的结果。该报告分析了意大利在过去30年所执行的政策措施，对其效果进行了评估，指出所取得的成绩和存在的不足，并对今后工作提出了建议。根据该评估报告，意大利政府加强



economic growth followed by the recession caused by the global economic crisis in 2008-2009 have contributed to moderate economic pressures on the environment.

Environmental performance differs significantly among regions, and important challenges have yet to be faced in addressing the pressure that human activities are placing on the environment, the over-exploitation of water and soil resources, and the improvement of air quality in large cities. Although recent efforts have been made towards green growth, Italy's potential is still largely underexploited, due to the lack of a long-term strategy framework, the reduction of public expenditure and the consequent insufficient promotion of eco-innovation. Minister Clini has stressed the value of the work done by OECD independent experts and the importance of their recommendations, especially concerning the adoption of a long-term strategy to de-carbonize the economy and exploit the huge potential for employment and growth. He recalled that the government is moving in this direction, as the recent approval of the National Plan 2013-20 for a low carbon economy testifies. Nonetheless, he stressed the need to make environmental governance more effective (and coordinated from a national to local level) in order to ensure efficient and timely action.

**Shanghai Air Pollution: The Answer is Blowing in the Wind**  
Shanghai, like Beijing, has been experiencing a series of acute air pollution episodes in the past winter months.



了对环境领域政策的协调，并在保护自然资源、提高资源产出率等方面采取了积极的措施。这些政策取得了积极的效果，包括大幅度削减了污染物的排放，并改善了地表水质量。这些变化是在2008-2009年全球经济危机带来的经济增速放缓、经济发展对环境压力相对增大的情况下所取得的。

各地区的环境状况各不相同，最大的挑战来自于人对环境带来的压力、过度利用水和土壤资源、以及大城市空气质量的改善。

尽管采取了很多措施来推进绿色增长，但由于缺乏长期战略框架、公共支出削减、以及推动绿色创新乏



力等问题，意大利在这方面的潜力还很大。

克里尼部长对经合组织独立评估专家的工作价值予以充分肯定，特别是对于采取长期战略使经济发展

“脱碳”，同时增加就业和经济增长的机会。他指出旨在推动低碳经济发展的《2013-2020年国家规划》已经获得批准，这充分说明意大利政府正在向这个方向努力。

同时，他强调指出环境监管工作的有效性（以及国家与地方政府间的协调）有待进一步加强，以确保高效及时采取行动。

**上海空气污染：答案依然漂浮在风中**  
与北京一样，上海今年冬季也经历了严重的空气污染。

市政府立即采取行动向市民解释了这种污染现象对健康的影响，并通过现代传媒工具与公众进行沟通。

在中国所有的城市中，上海率先发布了PM2.5监测数据。在2012年2月公布的《国家空气质量标准》中对PM2.5提出了具体要求。此外，上海还每小时报告对人体肺功能造成影响的臭氧浓度情况。

上海市还运用iPhone程序，用吉祥物（类似于奥运会吉祥物）建立起空气质量指数（AQI）与污染物对健康造成影响之间的关系。AQI对于中国空气质量管理是一个新生物，它取代了过去的空气污染指标（指标采用平均浓度，而AQI反应了最高峰值）。与美国的AQI相似，它更直接地反映出暴露在6种不同程度污染水平时对人体健康所造成的风险。

尽管过去几个月空气质量很差，但解决这个问题却非常难。上海曾在一个月内二次启用应急预案：

当AQI达到限定值时，要求发电厂调整生产，只允许更高效、或天然气锅炉进行发电。

上海的空气质量问题靠上海自身努力是很难解决的，因为其污染物



The municipality reacted promptly in addressing the people's concerns about the health effects of these phenomena and has utilized modern tools to communicate with the public. Ahead of any other municipality in China, Shanghai published a comprehensive set of measurements of PM<sub>2.5</sub>, which has been included in the latest version of the National Chinese Air Quality Standards, released on February 2012. Additionally, it provides hourly updates on the ozone, a strong lung irritant. It has also released the first official iPhone app that uses a mascot (similar to the mascots of the Olympic Games) to convey the link between the Air Quality Index (AQI) and the health

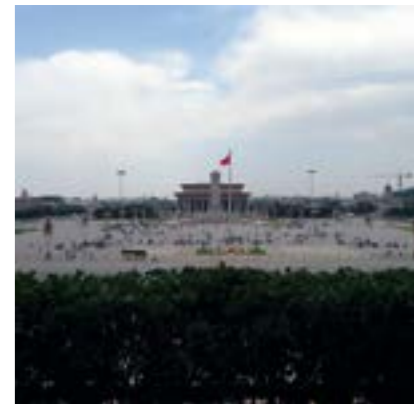


effects of the pollution it represents. This AQI is new to the scene of air quality management in China and it replaces the Air Pollution Index (which used the averages of concentrations, whereas the AQI uses maximum values). Like the American AQI, it gives a more direct indication of the health risks of exposure to six different levels of pollution. Air quality, however, has been quite severe in the last few months and it has been difficult to tackle the problem, and twice in just over a month the city has enacted emergency plans: one of these measures imposes that electricity companies rearrange production in such a way that only the more efficient or natural gas fuelled power plants are pumping energy when the AQI reaches its set threshold limit. The mix of air pollution that affects

Shanghai is such that it cannot be eased by the city alone, since a significant share of the pollutants (especially those responsible for photochemical smog) are being blown in by neighboring provinces (Zhejiang and Jiangsu), where much of the country's industrial, chemical and technological production is located. Therefore, only regional efforts can help to mitigate the air pollution problem in Shanghai. How to promote, encourage and empower such regional cooperation is up to the central offices of the Ministry of Environmental Protection. They must provide their local branches with funds, human resources and more comprehensive legislative sets for it to really work. Help on this last matter has been sought from the Sino-Italian Cooperation Program, which is ready to start a new phase in air quality management in China with its Chinese counterpart.



（特别是造成光雾化学的污染物）很大一部分是来自周边地区（浙江和江苏省）。这两个地区是中国很重要的工业、特别是化学工业的生产基地。因此，只有全区域共同采取行动才能够解决这个问题。如何推动、鼓励和加强区域合作，是摆在环境保护部面前的现实问题。环保部必须向地方环保部门提供资金、人力资源、更综合的法律法规政策才能够切实解决这个问题。《中意合作计划》将开启空气质量管理新一轮合作，以尽可能帮助中国解决这个问题。





# Green Growth, in the Context of Development 以发展的眼光看 待绿色经济增长

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## 中国环境保护的难点在于实现环境保护与经济增长的双赢

环境经济学产生于环境问题日益严峻的现实之中。工业革命以来,人们对自然环境的大规模开发在提高人们生活质量的同时,也导致了环境恶化等问题。特别是二战结束后,工业化与城市化在世界各地的普遍展开大大加快了自然资源的消耗,同时也使环境污染问题日益严重。虽然有理论研究 (Porter, 1991; Porter & Linde, 1995) 与实证研究 (Jaffe & Palmer, 1997; Newell, Jaffe & Stavins, 1999; Murthy & Kumar, 2001; Berman & Linda, 2001; Snyder, Miller & Stavins, 2003) 表明,环境管制在一定条件下可能实现环境绩效提高与企业竞争力提升的“双赢”结果。但在一定时期内保持经济稳定的前提下,一国产业所能承受的环境标准提升程度也将是有限的,“双赢”的结果并不容易实现;作为一个发展中国家,在相当长的时间第一要务仍旧是科学发展观指导下的快速发展。中国环境保护的难点就在于平衡资源环境管制改革与中国产业国际竞争力的关系,特别是平衡环境保护与经济增长的关系。

## 中国的高增长虽然付出了资源环境代价,但也提高了资源环境利用效率

改革开放30多年来,中国工业得到了长足的发展,成就令世界瞩目。资源的消费和环境的破坏是工业发展的代价,中国工业的高速发展在很大程度上经历了粗放式增长的过程,为此也付出了很大的资源和环境代价;但我们同时也应看到,中国工业环境效率不断提升,在很大程度上减弱了工业发展对环境的不利影响。以中国的能源效率为例,从1986年以来中国工业能源效率不断提升。1986年中国工业万元GDP的能耗为13.72吨标准

## The challenge of China's environmental protection lies in achieving a “win-win” situation for both environmental protection and economic growth

Environmental economics was born from the reality of increasingly serious environmental problems. Since the industrial revolution, the large-scale development of the natural environment has improved people's quality of life, but also led to the deterioration of the natural environment and other problems. Particularly after the end of World War II, the global spread of industrialization and urbanization greatly accelerated the consumption of natural resources, which resulted in the increasingly serious problem of environmental pollution. Theoretical studies (Porter, 1991; Porter & Linde, 1995) and empirical research (Jaffe & Palmer, 1997; Newell, Jaffe & Stavins, 1999; Murthy & Kumar, 2001; Berman & Linda, 2001; Snyder, Miller & Stavins, 2003) showed that environmental regulation, under certain conditions, may achieve “win-win” results in environmental performance enhancement and enterprise competitiveness improvement. However, under the premise of maintaining economic stability within a certain period time, a country's industry can only withstand limited elevation of environmental standards, and “win-win” results are not easy to achieve; China's top task, as a developing country, has for quite a long time been to achieve rapid development under the guidance of the scientific concept of development. The difficulty of China's environmental protection lies in balancing the relationship between resources and environment regulatory reform and the international competitiveness of China's industry, especially the relationship between environmental protection and economic growth.

## Though China's high growth is at the cost of the environment, it also improves the utilization efficiency of resources and environment

For more than 30 years of reform and expansion, China's industry has developed in leaps and bounds, and the achieved outcomes have attracted worldwide attention. Resource consumption and environmental damage is the price paid for industrial development. China's rapid industrial development has largely

experienced extensive growth, but at the expense of hefty resource and environmental costs. However, we should also note that Chinese industry's environmental efficiency has been consistently improved, which has considerably lessened the adverse impact of industrial development on the environment. Take China's energy efficiency for example. Since 1986, China's industrial energy efficiency has been continuously improving. China's industrial energy consumption per ten thousand Yuan GDP was 13.72 tons of standard coal in 1986 (calculated based on 1986 prices), and dropped to 4.63 tons of standard coal in 2000 (calculated based on 1986 prices). However, from 2001, China's industrial energy efficiency began to decrease (due to the new round of rapid development within China's heavy and chemical industries); China's industrial energy consumption per ten thousand Yuan GDP was 4.88 tons of standard coal in 2005 (calculated based on 1986 prices), decreased to an historic low; afterwards, energy efficiency continued to drop but increased to 3.84 tons of standard coal in 2010 (calculated based on 1986 prices). (Figure 1) Chinese industrialization practice shows that although Chinese industry itself consumes a lot of resources and damages the environment to a certain extent, it has also promoted the efficient utilization of resources and the environment.

**Industrialization can provide the material and technical basis for solving resource and environmental problems**

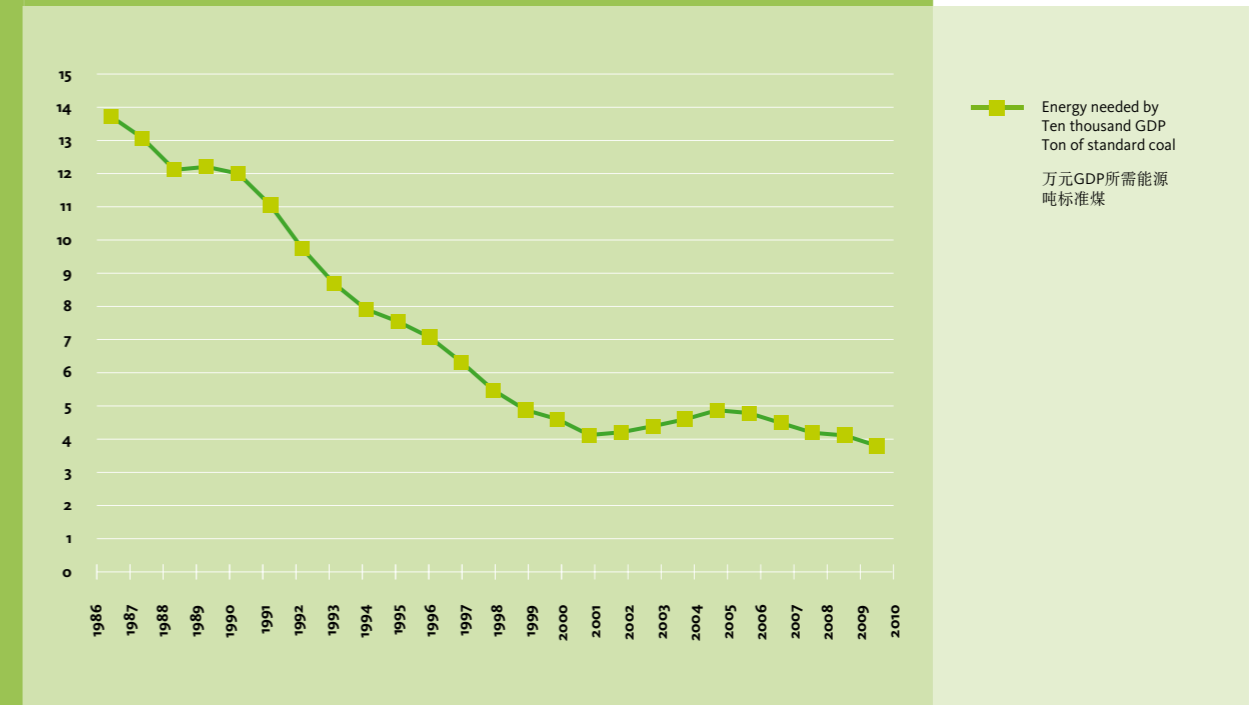
Seen from the perspective of industrial production, industry indeed has an adverse impact on the ecological environment industries. This is reflected in the following aspects: on one hand, industry needs to use large amounts of non-renewable resources, while on the other hand, some toxic substances (i.e., waste gas, waste water and solid waste) are generated in the industrial production process. However, we must see that it is impossible to stop the development of industrial entities for the purpose of avoiding resource and environmental problems. Instead, only the more advanced and powerful industry can cope with the pressure on resources and environment. Substances on the earth were not originally divided into "resources" and "waste". If there were no industry, most of the substances would be "waste" rather than a resource. As long as there is support from science and technology and advanced and developed industry, all substances can become resources, and "waste" can also benefit mankind. Industry has created our living environment, but also caused pressure on the environment. Inappropriate industrial development may result in damage to the environment; however, only the more advanced industrial technology can protect and improve the environment. Therefore, the fundamental problem is to improve the industry's green capacity, and to solve resource and environmental problems in China by

煤(1986年价格计), 到2000年下降为4.63吨标准煤(仍以1986年价格计)。但从2001年开始, 中国工业能源效率开始降低(这与新一轮重化工业快速发展有关); 2005年中国工业万元GDP的能耗为4.88吨标准煤(1986年价格计), 降到历史低点; 之后能源效率开始不断降低, 到2010年又提高到3.84吨标准煤(仍以1986年价格计)。(图1) 中国工业化实践表明: 中国工业本身虽然消耗了大量的资源, 对环境产生了一定的破坏, 但同时也推动了资源环境利用效率的提高。

**工业化可以奠定解决资源环境问题的物质技术基础**

从工业生产的环节来看, 工业的确会对生态环境产业一定不利影响。这一方面体现在工业要大量使用不可再生的资源, 另一方面体现在工业生产过程中会产生一些有害物质(即废气、废水、废物)。但我们必须要看到, 不可能以不发展实体经济的方式解决资源环境问题。相反, 只有更先进强大的工业才能应对资源环境压力。地球上的物质原本并不分为“资源”和“废物”。如果没有工业, 大部分物质都是“废物”而不是资源。只要有科学技术的支持、有先进发达在工业, 所有物质都可以成为资源, “废物”也可以造福人类。工业创造了人类可以生活的环境, 但也给环境造成压力, 不适当的工业开发可能导致环境破坏, 但只有更发达的工业技术才能保护和改善环境。所以, 根本的问题是要提高工业的绿色化程度, 并以更发达和更先进的工业来解决中国的资源环境问题。中国社会科学院工业经济研究所的研究人员最近对南水北调中线工业的水源地保护地西峡县进行了实地调研。西峡县环境保护取得了较大成绩, 2008年5月被国家环保部命名为国家级生态示范县。作为正处于在工业化中期阶段的中部地区山区县, 西峡县的环境保护取得了较大成绩。那么, 西峡县较为严格的环境保护是否影响了其经济发展特别是工业发展呢? 从调研情况来看, 事实并非如此。在取得环境保护巨大成绩的同时, 西峡县的经济(特别是工业)也快速增长。事实上, 西峡县环境保护取得成绩很大程度上是由于该县工业的快速发展所创造的条件。相反, 与西峡县相邻的淅川县与西峡县自然条件基本相同, 原来的生态环境也类似, 但目前两县的自然生态

Figure 1: China's industrial energy intensity changes  
图1: 中国工业能源强度变化情况



Source: China Statistical Yearbooks released in previous years  
资料来源: 历年《中国统计年鉴》

环境有了巨大的差异, 一个是青山绿水, 另一个却有成片的秃山。导致这两个县生态环境差异的原因之一是工业发展的差异。工业的发展一方面能够为社会较迅速地积累财富, 从而能够在较好的满足人们基本生活的前提下, 流出更多的财力, 用于环境保护; 另一方面也能够吸纳更多的原来依靠山林资源和土地资源为生的农业人口, 有利于减少农业面源污染。以工业发展所提供的财力为基础, 西峡县才有能力在生态工程建设、水污染防治、移民外迁安置、产业结构调整等方面投入了大量的资金。虽然县级政府每年能够得到一定的生态转移支付补偿, 但是有限的中央政府转移支付远远不能满足实际需要。西峡县生态环境保护的资金投入中, 有很大的比例要依靠当地政府的税收来支撑。而

relying on the more developed and advanced technology. Researchers from the Institute of Industrial Economics at the Chinese Academy of Social Sciences recently conducted field research in Xixia County, the water source protection region for the middle-route industry of South to North Water Transfer Project. Xixia County has made great achievements in environmental protection, and it was named "National Ecological Demonstration County" by China's Ministry of Environmental Protection in May 2008. As a mountainous county in the central region and in the middle stage of industrialization, Xixia County has made great achievements in environmental protection. Has more stringent environmental protection in Xixia County affected its economic development, particularly with regard to industrial development? Looking at the survey, the answer is no. While obtaining achievements in environmental protection, Xixia County's economy (especially industry) is also growing rapidly. In fact, Xixia County's environmental protection achievement is largely due to the conditions created by rapid



development of the county's industry. On the contrary, Xichuan County is adjacent to Xixia County and has basically the same natural conditions and a similar original ecological environment to Xixia County, but the two counties differ greatly with regard to the natural ecological environment: Xixia County has green mountains and rivers, while Xichuan County has many bald mountains.

One of the reasons for the difference in the ecological environment of the two counties is the gap in industrial development. Industrial development is able to rapidly accumulate wealth for a society, thus more financial resources are allocated to environmental protection under the premise of better meeting people's basic living needs; on the other hand, industrial development can accommodate a greater agricultural population (that originally lived off forest and land resources), helping to reduce agricultural non-point source pollution. Only with financial resources provided by industrial development can Xixia County invest in ecological engineering construction, water pollution prevention, immigrant resettlement, industrial structure adjustment etc. Although the county governments obtain certain transfer payment compensation for ecology, the limited central government transfer payment is far from meeting the actual needs. A large proportion of Xixia County's fund investment in ecological and environmental protection relies on local government tax revenue. The government's main tax source is industry, especially large industrial enterprises.

Relatively ample financial input can support the development of green and efficient agriculture, so as to create conditions for reducing agricultural non-point source pollution. The difficulty in the prevention of environmental pollution in China has shifted from point source pollution to non-point source pollution. Point source pollution is mainly generated by industry, while non-point source pollution is produced by agriculture and domestic life. The development of efficient green agriculture can not only increase the income of farmers, but also can reduce the use of pesticides and fertilizers, thereby significantly reducing non-point source pollution caused by agriculture. For example, kiwi fruit, which is considered typically efficient in green agriculture, needs an investment period of three to five years from the time of planting to benefit; without government guidance and support, it is difficult for farmers to carry out long-term investment. The Xixia government actively guides farmers to develop less-polluting organic agriculture in order to reduce agricultural non-point source pollution and provides farmers with more infrastructure and technical support services. For example, in order to promote the cultivation of organic pollution-free kiwi trees, the government invested in establishing a kiwifruit production base and building cement piles and barbed wire for the growth of kiwi trees. It also purchased kiwifruit seedlings for farmers. The reason the Xixia

County government has been able to allocate funds to subsidize farmers for planting kiwi trees is that the industrial development of Xixia County has a strong financial capability. The development of local industry attracts a large labor force transferred from agriculture, which also creates the conditions for reducing agricultural non-point source pollution. Xixia's industrial development accommodates a large agricultural population that previously relied on forest and land resources for its livelihood. These transferred agricultural populations are no longer engaged in agricultural production and thus reduce agricultural non-point source pollution and deforestation; on the other hand, the employment income within the industrial sector is relatively high, which leads to the ability to consume cleaner energy. Neighboring Xixia County is Xichuan County, which has natural conditions equivalent to that of Xixia County, but its forest coverage rate is much lower than that of Xixia County; the main reason for this is that Xichuan County's underdeveloped industry makes it difficult to attract a large rural labor force which would reduce dependency on and the destruction of forest resources. In short, while industrial production may cause an adverse impact on the natural environment, from a general and long-term perspective, industrial development can also play a positive role in protecting and improving the environment.

#### Public opinion on environmental protection is growing increasingly strong in China

Under certain technical conditions, a trade-off relationship exists between environmental protection and industrial development: industrial development is at the cost of the environment to some extent and if environmental quality gained via environmental investment is regarded as a "product", then a trade-off relationship also exists between industrial products and a "quality environmental" product. Particularly in developing countries, inflated environmental standards can exceed their technical and economic capacity and hinder industrial development. Therefore, during the stage of economic underdevelopment, society tends to tolerate economic entities' low prices and free use of environmental resources. With increased economic development and improved material comforts, people will inevitably have increasingly high expectations of environmental quality. People, especially in the developed eastern regions in China, have changed their attitude towards the alternative relationship between material goods and environmental quality. In the initial stage of reform and expansion, people preferred to bear the cost of environmental damage in exchange for industrial achievements. Now they would rather give up a certain amount of economic growth in exchange for improvement in the quality of the environment (Jin Bei, 2009).

政府的税收主要来源是工业，尤其是大型企业。相对充裕的财政能力，可以支持发展绿色高效农业，从而为减少农业面源污染创造了条件。目前中国污染防治的难点已经从点源污染变为了面源污染。点源污染主要由工业产生的，而面源污染主要是由农业及生活产生。发展高效绿色农业不仅可以提高农民收入，而且可以减少农药及化肥使用，从而大幅减少农业所带来的面源污染。例如猕猴桃就是一种典型的高效绿色农业，猕猴桃从开始种植到产生效益要三到五年的投入期；若没有政府的引导及扶持，农民很难进行长期的投入。西峡政府为了减少农业面源污染，积极引导农民发展污染较小的特色有机农业。在这个过程中，政府为农民提供了较多的基础设施和技术支持服务。例如，为了推广有机无公害猕猴桃的种植，政府出资建设了猕猴桃生产基地，搭建了供猕猴桃树生长攀沿的水泥桩和铁丝网，并出资购买了猕猴桃树苗供农民种植。西峡县政府之所以能拿出资金对农民种植猕猴桃进行补贴，也是由于西峡县工业的发展提供了较强的财力。地方工业的发展，吸纳了大量农业转移劳动力，也为减少农业面源污染创造了条件。西峡工业的发展，吸纳了大量原来依靠山林资源和土地资源为生的农业人口。这些被转移出来的农业人口，一方面，由于不再从事农业生产而减少了农业面源污染和对森林的砍伐；另一方面，也由于工业部门就业收入相对较高，有能力消费更清洁的能源。与西峡县相邻的淅川县，自然条件与西峡县相当，但森林覆盖率远低于西峡；重要原因之一是淅川县工业不发达，难以大量吸纳农村劳动力以减少对山林资源的依赖和破坏。总之，虽然工业生产环节对自然环境可能产生不利影响，但从全局的和长远的眼光来看，工业发展可以发挥保护和改善环境的积极作用。

#### 中国正在形成环境保护越来越强的民意基础

在一定的现实技术条件下，环境保护与工业发展之间也确实存在一定程度的替代性（trade-off）关系：要发展工业就不得不在一定程度上付出环境代价。而且，如果把环境保护投资所形成的环境质量也看作一种“产品”，那么，工业产品和环境质量产品之间也具有一定程度的替代关系。特

In recent years, there have been many group events in China where local residents have opposed the construction of heavy chemical projects, reflecting the above change. In conforming to the requirements of the masses, in the *Outline of the 12<sup>th</sup> Five-Year Plan for National Economic and Social Development*, China also proposed that, in the face of intensifying resource and environmental constraints, it is imperative to address the sense of crisis and establish a green, low-carbon development concept, accelerate the construction of resource-saving, environment-friendly production methods and consumption patterns, and enhance the capacity for sustainable development. This outline also proposed to improve the environmental protection laws and regulations as well as a standards system, and to intensify environmental law enforcement. The Party Constitution, newly modified at the 18<sup>th</sup> National Congress of the Communist Party of China (CPC), specially proposed to build an ecological civilization. It appears that "public opinion" on environment protection has grown in China and will become stronger and stronger. This provides a firm foundation for China's environmental protection, so we have reason to be optimistic with regard to China's environmental protection and improvement.

### The EU and China have a broad cooperation space for promoting green economic growth

From the history of the world's industrialized countries, the relationship between industrial development and environmental protection are roughly divided into three cases: first, "destruction first, treatment later"; second, "treatment during destruction", and third, "no destruction, no treatment". The third case of course is the best. However, with many industrial production activities, particularly those carried out in developing countries, it is very difficult to achieve such an industrial technology roadmap and technical level. For the second case, where treatment is carried out during environmental damage caused by industrial production, if external environmental pollution is minimal, or if the industrial production activities lead to external environment pollution, timely control and treatment will be carried out. In this case, the restoration of the damaged environment depends on the environmental protection investment capacity of the economic individuals or society. For the first case, under which treatment is made after pollution occurs, there is much criticism, yet it is the most common phenomenon. It happened in early industrialized countries, and later developing countries followed suit. First of all, in order to pursue industrial growth and direct economic benefits, these countries carried out industrial production activities at the cost of destroying the environment, suffering the serious consequences of environmental pollution. They then had to invest more resources and pay a higher price for environmental governance. This is the Pyrrhic development path of

别是对于发展中国家，过高的环境质量标准会超过其技术和经济能力，阻碍工业发展。所以，在经济不发达的时期，社会往往容忍经济个体低价甚至免费使用环境资源。

随着经济发展水平的提高和物质生活的改善，人民对环境质量的要求必然越来越高。当前，人民群众，特别是东部发达地区人民群众，对于物质产品与环境质量的替代关系上已经明显地开始从改革开放初期的“宁可承受较大的环境污染代价来换取工业成就”，转变为为了环境质量的改善宁可放弃一定的经济增长（金碚，2009）。

近年来，中国出现了多次当地居民反对建设重化工项目案例的群体事件，就是对上述转变的突出表现。顺应于人民群众的要求，我国在《国民经济和社会发展规划纲要》也提出“面对日趋强化的资源环境约束，必须增强危机意识，树立绿色、低碳发展理念”，“加快构建资源节约、环境友好的生产方式和消费模式，增强可持续发展能力”；提出要“健全环境保护法律法规和标准体系”，“健全环境保护法律法规和标准体系”，“加大环境执法力度”。中国共产党十八大新修改的党章中特别提出要建设生态文明。可见，在中国保护环境的“民意”已经形成，而且将越来越强烈。这是中国环境保护的有力基础，所以，我们有理由对中国的环境保护和改善持有乐观的预期。

### 欧盟与中国具有推动绿色经济增长的广阔合作空间

从世界各国工业化的历史看，工业发展同环境保护的关系大致有三种情况：一是“先破坏，后治理”；二是：“边破坏，边治理”；三是“不破坏，不治理”。如果是第三种情况，即不破坏，也不须治理，当然是最理想的。但是，许多工业生产活动，特别是对于发展中国家，要实现这样的工业技术路线和技术水平是很困难的。对于第二种情况，即在工业生产导致环境破坏的同时就及时进行治理，尽可能不产生或少产生外部的环境污染，或者如果工业生产活动导致了外部环境污染，也能得到适时的控制和治理。在这种情况下，被破坏环境的恢复，取决于经济个体或社会的环境保护投资能力。对于上述第一种情况，即先污染，后治理，批评最多，但也恰恰是最普遍的现象。早期工业化国家是这样，后来的发展中

国家往往又步其后尘。先是为了追求工业增长和直接经济效益，不择手段，以破坏环境为代价进行工业生产活动，必然遭受环境污染的严重后果，然后，不得不投入更多的资源付出更大的代价来进行环境治理，对社会整体来说显然是一条得不偿失的发展道路。但这为什么偏偏会成为普遍存在的现象呢？历史的原因当然是在工业发展的早期，缺乏投资能力和技术条件，而且，当时首要的目标是治贫致富，环境目标居于其后。但更重要的原因是，发展观念的差距，加之工业化早期缺乏远见和对环境破坏后果切身的痛苦感受。尝受后果觉醒之后才知道环境保护的重要价值。当然，现实的重要原因是经济个体的社会责任心差以及环境保护制度的不够完善。可以说，随着经济发展与环境保护理念的发展，粗放式的发展道路已经越来越没有市场，对绿色发展的要求，不断深入人心。

过去我们认为，发达国家已经普遍进入可以为环境保护而放缓经济增长的时代，即环境的重要性已经压倒性地高于经济产出的重要性。但本轮金融危机说明，其实发达经济体对经济增长率也有最低的“底线”要求，如果经济长期衰退，国家财政困难，发展绿色经济也将缺乏支撑。但这决不表明欧盟可以再次走到可以忽视绿色经济的道路上。欧盟国家在绿色经济增长的技术储备上领先世界，财政困难并不会从根本上动摇绿色经济增长的基础。特别是，欧盟较先进的绿色经济增长的技术和经验，尤其是制度建设经验，是中国等发展中国家非常需要的力量。而中国等发展中国家具有运用绿色经济增长的技术和经验的广阔市场，有可能成为绿色技术的孕育和实践场所。所以，欧盟国家同中国的合作可以极大地推动绿色经济增长。这不仅有利于中国资源环境问题的解决，而且也有助于欧盟国家摆脱经济困境。

society as a whole. But why did this become a common phenomenon? The historical reason, of course, is lack of investment capacity and technical conditions in the early stage of industrial development, and as the primary goal at that time was to cast off poverty get rich, environmental objectives came second. However, the fundamental reason is the lack of concept development, combined with a lack of vision in the early stage of industrialization and a lack of awareness of the consequences of environmental damage. After the consequences were felt, countries began to recognize the value of environmental protection. Of course, the main reason is poor social responsibility by the economic sector and a flawed environmental protection system. It can be said that, with economic development and environmental protection, extensive development gradually loses ground, and green development requirements constantly win popular support. In the past we thought that developed countries had generally entered the era of environmental protection and economic growth slowdown, or that the importance of the environment had overwhelmingly surpassed the importance of economic output. However, this round of the financial crisis shows that, in fact, developed economies have the lowest "bottom line" requirements on the economic growth rate. Given the long-term economic recession and the state of financial difficulties, the development of a green economy lacks support. However, this does not mean that the EU can once again ignore the green economy. EU countries lead the world with regard to technical reserves for boosting green economic growth and financial difficulties will not fundamentally undermine the growth of the green economy. The EU's advanced technology and experience on green economic growth - especially its institution building experience - are the tools particularly needed by China and other developing countries. China and other developing countries have a broad market for applying this technology and experience towards green economic growth and are likely to develop and practice green technologies. Therefore, the cooperation between EU countries and China can greatly promote the growth of the green economy. This not only helps China solve environmental and resource problems, but also helps the EU countries get out of their economic difficulties.

## 24 Greening the Economic Growth Model: a European Perspective 经济发展方式绿色化：欧盟视角

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Worldwide economic growth has resulted in improved living standards and a substantial reduction in poverty. However, inequality has substantially increased in recent decades not only in emerging countries such as China, but also in the US and most of Europe. Moreover, the experience shows a negative impact of economic growth on the environment, particularly in the first stages of the take-off process. Clearly, economic growth cannot be growth of matter: this would conflict with the laws of thermodynamics. In fact economic activity cannot make matter grow; it can only transform matter: to be sustainable this process must maximize recycling potential and minimize entropy (energy losses). There is no reason, however, to exclude that the value of economic activity can grow in real terms (not only in monetary terms) provided that it fulfills these sustainability requirements. Demand for economic growth at a global level implies additional pressures on the environment. Fulfilling this increasing worldwide demand by using the 250 year-old growth model of current mature economies would lead to unsustainable outcomes. It would both threaten growth prospects for future generations and the progress achieved by social indicators. The need to combine economics with preserving a clean and safe environment is the basis of the concept of "green growth". It is not a substitute for sustainable development, but a way of achieving it. The theoretical possibility of green growth is associated with the concept of "decoupling" economic growth from its pressure on resources. Relative decoupling means that the intensity of ecological resource use per unit of GDP must decline; but what is important for green growth is "absolute decoupling": the intensity of ecological resource use per unit of GDP must decline at a rate higher than the rate of the positive growth of GDP. Economic growth is simply considered an increase in the scale of economic activity, and without any change to the structure of the demand and production and without any change in the direction of technological progress, will not favor decoupling. This scale effect should be compensated by a change in the structure of demand more oriented to environmentally-friendly goods and services, such as non-material goods, and by environment-oriented technological progress. The interaction between the various factors necessary

25 世界范围经济发展的结果是提高了生活水平，大幅度削减贫困。但与此同时，最近几十年来不仅在新经济体如中国，而且在美国和欧洲大部分国家贫富悬殊都大大加剧了。而且，经验表明这种经济发展对环境带来了负面影响，特别是在经济起飞的第一个阶段，这种负面影响尤为明显。显而易见，经济发展不意味着物质的增长，否则就与热力学第一定律相违背了：为了实现经济增长这个过程可持续，就必须最大程度地提高回收利用的可能性，并减少能量损失。但与此同时我们必须看到：只要经济活动能够满足可持续性的要求，经济活动的价值则可以实实在在地增长（不仅以货币形式增长）。对全球经济发展的需求意味着对环境的压力增大。利用过去250年的落后发展方式来满足当今世界不断增长的需求，意味着不可持续的发展。这种发展不仅对我们的后代带来威胁，而且也会对所取得的社会进步带来挑战。将经济发展与清洁健康的环境相结合，这种需求是绿色增长的基础。绿色增长不是替代可持续发展，而是实现可持续发展的手段。理论上，绿色增长的可能性存在于经济增长对资源压力“脱钩”。相对脱钩意味着单位GDP消耗生态资源的强度必须下降；但对绿色增长来说，必须实现绝对脱钩，即：单位GDP消耗生态资源强度的下降速度必须高于GDP的增长速度。经济增长主要是指经济活动的规模扩大。但对供需结构不作调整则无法实现脱钩。这种规模效应应该与对环境友好的产品和服务的需求结构相协调，例如：非物耗产品、环境友好的技术工艺等等。实现“脱钩”所必须的各种要素间的关系非常复

杂，无法自动保证脱钩现象一定能实现。因此，绿色经济增长是一个极具挑战性的任务，不仅要求改变生产技术，而且要改变消费模式。

从技术变革的角度来看，人们有理由变得乐观些，在一些领域已经开始出现技术变革了，例如：绿色化学、提高能效、新能源技术等等。

将新能源技术领域的创新和投资与信息化技术相结合，建设“低碳经济”。

从目前的现状过渡到绿色增长模式还存在很多问题。

这里所要求的技术变革是不可能通过市场行为自动催生的，而必须依靠文化的深远变革来推动消费模式改变，并进而让人们有支付意愿。

这是因为这种推动技术变革的需求增长与环境质量，即：公共产品的质量有关，而公共产品的特征是受益非排他性，取得方式为非竞争性的。

作为个体的人没有内在驱动力去为公共产品质量而做出贡献，这是因为如果有人为此做贡献，其他人仍然可以享受到这种贡献所带来的结果。

这就解释了为什么作为公共产品的环境质量出现市场失灵。因此，需要有公共政策来进行规制，尽管这方面也面临着很多挑战。

第一项要开展的工作就是确保制度的具体实施和执行有效性。制定准确计算环境成本的制度对于能够在供需结构方面作出调整发挥着至关重要的作用。

然而，由于对污染产品高定价（碳价格）所带来的回归效应对供需结构调整给GDP和就业所带来的短期负面影，这些环保制度在执行中会遇到很大的困难，很难达成共识。

环境政策和经济生产可能存短期权衡的问题。

用于削减污染的支出在短期内对生产造成负面影响。一种负面影响就是将采用落后技术的有形资产提前进行淘汰。环境政策会造成供应结构与满足需求之间出现问题，出现了高生产能力与低需求之间（私家车交通）和高需求与低生产能力之间的矛盾（公共交通）。

这种短期权衡的结果是造成环境政策执行困难的主要原因之一。通常来讲，与长期收益相比，特别是当这种收益具有一定不确定性的情况，人们对短期成本更为敏感。因此，大家普遍认为环境政策带来的是损失，而不是一种避免环境损失的、具有一定不确定性的收益。

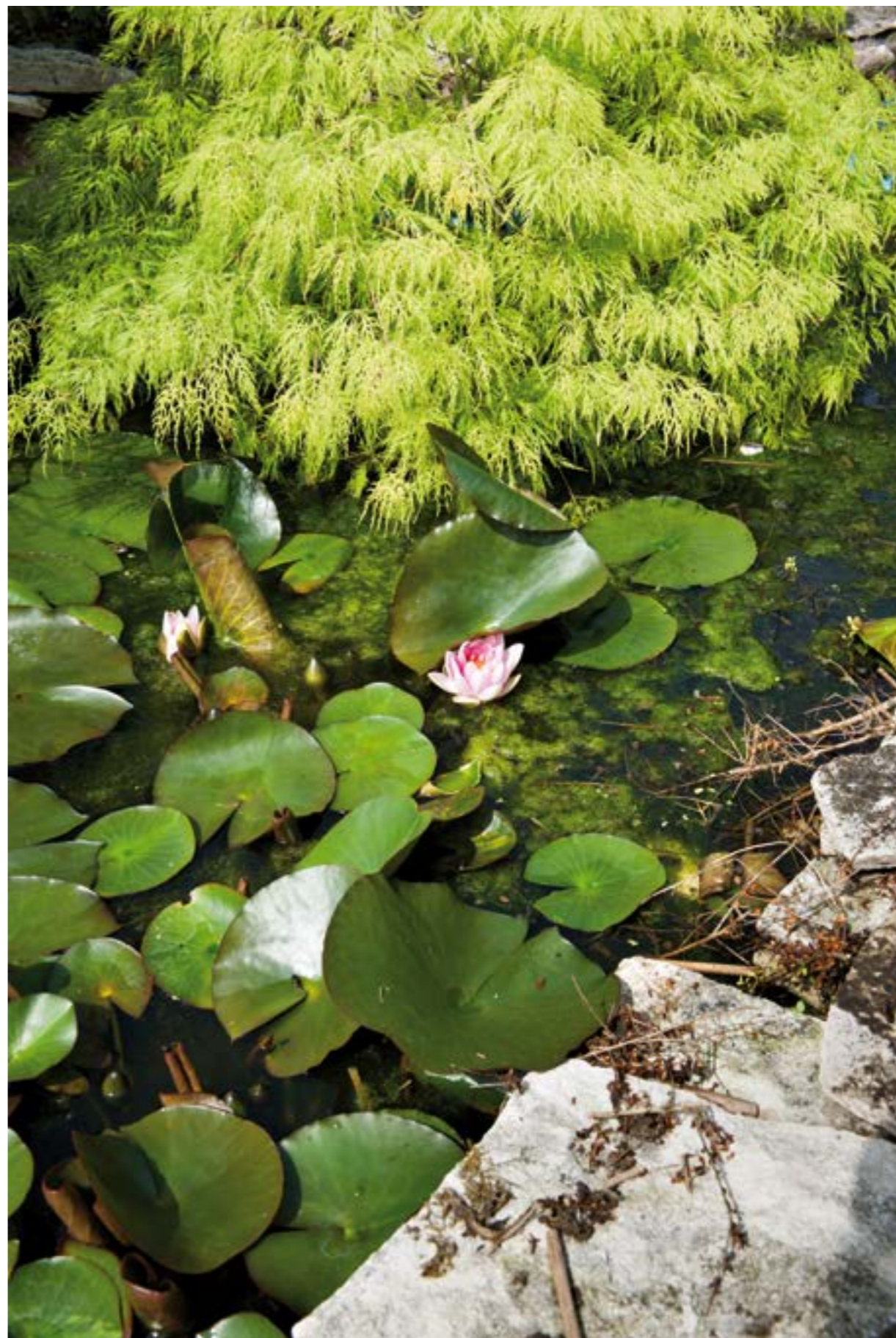
to achieve “decoupling” is so complex that there is no automatic guarantee that it will effectively take place. Green economic growth is therefore a very demanding task: it requires transforming the nature of technological change and the consumption model.

From the point of view of technological change, there are reasons to be optimistic. Positive changes are occurring in the areas of chemical processing (greening chemistry), energy efficiency and new energy technologies. One should also consider the positive potential of linking innovation and investment in new energy technologies to ICTs, to build a “low carbon economy”. There are problems transitioning from the current situation to a greener growth model.

The required technological change is unlikely to spontaneously emerge from market behavior, unless there is a profound change in the culture driving the consumption model and the citizens' willingness to pay. This is because increased demand to motivate technological change concerns the quality of the environment, i.e. a public good. A public good is non rivalrous (one person's enjoyment of the environment does not prevent another person from also enjoying it) and non-exclusive (there is no way to exclude somebody from enjoying the environment). Individuals do not have the incentive to contribute to environmental quality as a public good because if others do so they can still enjoy it. On the other hand, those who do contribute do not always benefit from their contribution. This explains why environmental quality as a public good is typically not covered by market mechanisms. Hence public policies are necessary, although they face a number of challenges.

The first has to do with their practical implementation and effectiveness. Environmental regulation to accurately determine environmental costs is fundamental in implementing and promoting the appropriate change within the structure of production and demand. However its implementation is difficult with regard to consensus, because of distributive issues deriving from the regressive effect of higher prices for polluting goods (carbon prices) and because of short-term negative effects on GDP and employment due to lags in adjusting the structure of production. There may be short-term trade-offs between environmental policies and economic production. Expenditure to abate pollution may negatively affect production in the short term. A negative effect can derive from the early retirement of physical capital embodying old polluting technologies. Environmental policies may create problems in the structure of production and its ability to adjust to meet demand, leading to lower demand in sectors with high production capacity (private road transport) and to higher demand in sectors where the production capacity is limited (public transport). These short-term trade-offs are one of the main reasons it is difficult to implement environmental policies. People are usually more sensitive to current short-term costs than to long-term future benefits, particularly

to consensus, because of distributive issues deriving from the regressive effect of higher prices for polluting goods (carbon prices) and because of short-term negative effects on GDP and employment due to lags in adjusting the structure of production. There may be short-term trade-offs between environmental policies and economic production. Expenditure to abate pollution may negatively affect production in the short term. A negative effect can derive from the early retirement of physical capital embodying old polluting technologies. Environmental policies may create problems in the structure of production and its ability to adjust to meet demand, leading to lower demand in sectors with high production capacity (private road transport) and to higher demand in sectors where the production capacity is limited (public transport). These short-term trade-offs are one of the main reasons it is difficult to implement environmental policies. People are usually more sensitive to current short-term costs than to long-term future benefits, particularly



被不投资的人所共同享受。这挫伤了企业投资研发和新技术的积极性。绿色创新和技术就处于这种境地。

投资总是具有不确定性，但在技术创新方面的投资回报率则更具不确定性：高价值产出往往概率更低。环境创新的不确定性则更高，特别是那种进行彻底改变的创新，一般来讲困难更大、过程更长，具有潜在风险收益。

政府部门必须在这个领域进行投入，部分来源可以是环境税收益或者是拍卖的、可交易的排放许可（前提是这是可执行的）。

另一方面，需要有充分的资金投入来完成能源系统的改变，实现低碳经济。根据国际能源局报告，在未来25年需要投入15万亿美元来减排二氧化碳，以实现“450情景方案”（主要是建筑和交通领域的减排）。

根据欧盟建设低碳经济的路线图，到2050年在1990年的基础上削减80%的二氧化碳，至少需要投资1万亿美元。这意味着欧盟必须在现今的投入基础上（19%）再增加1.5个百分点。

鉴于当前困难的经济形势和欧债危机，需要更加坚定的政治决心将有限的资金优先投入到有助于绿色发展的领域。

没有任何一个国家能够单独持续作出这种努力。需要建立广泛的合作关系来推动技术合作并整合资源（例如欧盟债券）。

技术合作至关重要——不仅在欧盟成员国范围内，而且应与新经济体（例如正积极推动绿色经济发展的中国）加大合作力度，说服欧盟委员会以及全欧盟密切跟踪他们投资战略的优先领域，并推动恢复性增长更加绿色化。

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who do not incur costs. This gives firms less incentive to invest in research and new technologies. This is true also for green innovation and technologies. Investments are always characterized by uncertainty, but the uncertainty associated with returns on investment in innovation is particularly high: often very high value outcomes are associated with very low probability. Uncertainty proves particularly problematic for environmental innovations, especially the radical ones that alter the technological regime and are usually characterized by difficult and lengthy processes with potentially risky profitability. Governments must invest in this area. This, however, requires resources that can only partly come from revenue derived from environmental taxes or auctioned tradable emission permits (provided they can be implemented). On the other hand, adequate financial resources are required to support investment to change the energy system and achieve a low carbon economy. According to the IEA, an investment of more than 15 trillion US dollars is required in the next 25 years to achieve the CO2 emission reduction compatible with the so-called 450 Scenario (mostly in building and transport). According to the European Road Map to a Low Carbon Economy, investments of more than one trillion euros are required to reduce CO2 emissions by 80% in 2050 compared to 1990. This represents an additional investment of 1.5% of EU GDP per annum on the current share of investment on GDP (19%).

With the current difficulties in economic performance and public finances in the European Union, a very strong political pull is required to use scarce financial resources to prioritize the restoration of growth in a green direction. No country will be able to sustain the required effort alone; joint programs are required to foster technological cooperation and to mobilize resources (e.g. EU project bonds). Technological cooperation is crucial - not just among European countries. Joint technological cooperation between Europe and emerging countries like China, who are also engaged in greening their economic growth model, is very important to convince European governments and the EU as a whole to follow the required priorities in their investment strategies and orient growth recovery in a greener direction.

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when these benefits are uncertain. Hence they weigh heavily on environmental policy as a loss rather than an uncertain gain by way of averted environmental damage. Policies can be organized in a way that makes them more acceptable. It is important that environmental policies are considered part of a larger social goal. By framing environmental protection as a social project, policy makers can help individuals to think in terms of social and collective goals. A change in the social norms is also required to steer the consumption model and the structure of demand in an environmentally-friendly direction. These social norms cannot be imposed through a paternalistic approach. They must be the result of a cultural change freely accepted by the majority of society. Some claim that this change of behavior implies the adoption of a model which includes lower consumption and more frugality. More than reducing the quantitative level of consumption, however, the issue at stake is the changing quality and nature of the consumption model. Moreover, environmental regulation should be accompanied by a policy aimed at promoting technological innovations, particularly the radical ones. An innovation policy is justified by a market failure deriving from knowledge, which is a public good. A firm that invests in research and is successful in implementing new technology creates benefits for others

可考虑将政策组合起来以更易于社会接受。让人们充分认识到环境政策会带来更大的社会效益这一点非常重要。

政策制定者们应将环境保护政策作为社会管理的一部分，帮助公众认识到其将带来的社会和集体效益。

对社会规约也需要进行改变，使得消费模式和需求结构向更为环境友好的方向转变。这种社会规约不能通过家长式的方式强制要求执行；而必须是由社会大多数自由接受的结果。

有人抱怨这种行为方式的改变意味着降低消费水平和生活变得更简朴。这里强调的是：不仅是消费数量水平的降低，而是消费模式的质量和性质的改变。

此外，环境制度还应配套旨在推动技术创新、特别是根本性技术创新的政策。

创新政策会遇到市场失灵，这是因为这里的创新知识是一种公共产品。一个企业投入大量研发资金，并成功实施了新技术，但其所带来的收益却

# A Study on the Green Transformation of Chinese Industry 中国工业绿色转型研究

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## 工业绿色转型的内涵与战略意义

经过30余年的快速工业化，中国已成为世界工业大国，国际竞争力不断提高。然而，迄今为止，中国工业化道路远未走完，仍有大量农业人口未能充分享受工业化的成果。在未来相当长的时期，工业仍是保持中国经济稳定增长的基础和提供就业岗位的重要部门，也是我国应长期发展的主体产业。长期以来，中国经济增长和工业化发展主要依靠资源型增长路线，以“高投入、高消耗、高污染、低质量、低效益、低产出”和“先污染，后治理”为特征的发展模式主导着工业发展。面对应对气候变化的国际压力和日益加大的资源环境约束，中国工业迫切需要加快绿色转型升级。

作为绿色经济的重要组成部分，工业绿色转型是指以资源集约利用和环境友好为导向，以绿色创新为核心，坚持走新型工业化道路，实现工业生产全过程的绿色化、可持续发展，获得经济效益与环境效益的双赢。从其内涵来看，工业绿色转型是工业迈向“能源资源利用集约、污染物排放减少、环境影响降低、劳动生产率提高、可持续发展能力增强”的过程。同时，工业绿色转型也是对工业革命以来人类近300年工业化实践的否定之否定。与传统的“黑色”、“褐色”或者“灰色”工业发展模式相比，工业绿色转型的内涵是动态的，覆盖工业价值链的各个环节。在绿色转型过程中，应积极谋取工业发展与资源消耗、环境恶化脱钩。同时，实现工业绿色转型，必须在理念、技术、制度等各个层面探索全方位、开放式的创新道路。

绿色转型是新型工业化道路的根本要求，也是促使“中国制造”由大转强的必由之路。工业绿色转型不仅有利于加快结构调整，转变发展方式，实现中国经济可持续发展，而且工业绿色转型也

## Connotation and Strategic Significance of Industrial Green Transformation

After 30 years of rapid industrialization, China has become one of the world's major industrial powers, with increasing international competitiveness. However, so far, the industrialization in China is far from being complete, and there are still a large number of the agricultural population who are unable to fully enjoy the fruits of industrialization. In the long-term future, industry will continue to be the basis of China's steady economic growth and an important sector for providing jobs, and so it should be developed as its main industry. For a long time, China's economic growth and industrial development have relied mainly on the resource-based growth mode, and industrial development has been guided by the development mode characterized by "high input, high consumption, high pollution and low quality, low efficiency, low output" and "pollution first, treatment second". In the face of international pressure to address climate change and the growing resource and environmental constraints, Chinese industry urgently needs to accelerate and upgrade green transformation. As an important part of the green economy, **industrial green transformation, guided by the intensive use of resources and environmental friendliness, takes green innovation as the core, adheres to new industrialization, achieves green and sustainable development throughout the whole industrial production process, and achieves a win-win situation regarding economic and environmental benefits.** Seen from this context, industrial green transformation is a process in which industry develops in the direction of "intensive use of energy resources, reduced polluting emissions, reduced environmental impact, improved labor productivity, and sustainable development ability". Meanwhile, the industrial green transformation is also a negation of industrial practices nearly 300 years since the industrial revolution. Compared with the traditional "black", "brown" or "gray" pattern of industrial development, the concept of industrial green transformation is a dynamic one and covers various aspects of the industrial value chain. During the green transformation process, it is imperative to actively seek the separation of industrial development from resource consumption and environmental degradation.





At the same time, in order to achieve green industrial transformation, the path of comprehensive and open innovation should be explored at philosophical, technological, systemic and other levels. Green transformation is a fundamental requirement on the new road to industrialization, and the only way of promoting China as a manufacturing power. Green industrial transformation not only helps speed up restructuring, changes the mode of development and achieves the sustainable development of China's economy, but it also serves as an important measure against global climate change and an important means for guaranteeing the security of China's energy resources. At the same time, as the industry's main body of the Chinese economy and the sector facing the strongest international competitiveness and highest degree of expansion, the industrial sector takes the lead in achieving green transformation that is not only operational but also serves as a positive example for promoting green economic development in China, with great strategic significance.

#### China's Potential in Industrial Green Transformation and the Structural and Institutional Obstacles Facing China

From the point of view of energy efficiency and SO<sub>2</sub> emission per unit of output, five industries - the mining industry, the papermaking and paper product industry, the chemical raw materials and chemical products manufacturing industry, the ferrous metal smelting and rolling processing industry, and the non-ferrous metal smelting and rolling processing industry - show the greatest potential for energy saving and emission reduction. Thus, these industries should be listed as key national industries for energy saving and emission reduction. The industrial development trend for the next 5-10 years sees China continue the process of rapid industrialization, urbanization and industrial modernization. The rapid industrial growth will continue to be an important force in the rapid growth of the Chinese economy in which the labor-intensive industries are very affected by rising labor costs, raw material prices and RMB exchange rates. These industries have transferred the power to the central and western regions; iron, steel, chemical and other traditional industries will be fully upgraded under the high-tech transformation, maintaining high-speed growth. With the increase in independent innovation ability, the equipment manufacturing industry will also continue to maintain the momentum of rapid expansion, with growing international competitiveness; promoted by the national strategy, emerging strategic industries will gradually become an important force for promoting industrial development, but it will be very difficult for them to become leading industries in various regions in the near future. At the same time, under the tough constraints of energy saving indicators, the industry will accelerate the transformation of development mode, "clean production", "energy saving"

是应对全球气候变化的重要举措和保障我国能源资源安全的重要手段。同时，作为中国经济的产业主体以及国际竞争力最强、对外开放程度最高的领域，工业部门率先实现绿色转型不仅更具有可操作性，而且对促进中国绿色经济发展将产生积极的示范效应，具有重大战略意义。

#### 中国工业绿色转型的潜力及面临的体制机制障碍

从能源效率和单位产值的SO<sub>2</sub>排放量衡量，采矿业，造纸及纸制品业，化学原料及化学制品制造业，黑色金属冶炼及压延加工业，有色金属冶炼及压延加工业等5个行业的节能减排潜力较大。因而，应将这些行业列为国家节能减排的重点行业。再从未来5-10年工业发展趋势来看，中国继续将处于快速工业化、快速城镇化和工业现代化快速的过程中，工业快速增长仍将是推动中国经济较快增长的重要力量。其中，劳动密集型产业受劳动力成本上升、原材料价格上涨、人民币汇率变动影响较大，这些行业向中西部地区转移的动力增强；钢铁、化工等传统产业在高新技术的改造下将全面升级，并将会以较快速度增长；而随着自主创新能力增强，装备制造业也将继续保持快速扩张、国际竞争力不断提高的发展态势；在国家战略推动下，战略性新兴产业将逐渐成为推动工业发展的重要力量，但近期还很难成为各地区的主导产业。同时，在“节能减排”指标的硬约束下，工业将加快转变发展方式，“清洁生产”、“节能减排”、“精致制造”将成为中国工业发展的重要特征。基于以上判断，可以预见，通过绿色转型，中国工业结构升级具有巨大潜力。然而，尽管中国已成为仅次于美国的世界第二大制造国，但进入工业化中后期，中国工业的结构性矛盾日益突出，工业自主创新能力不足，低水平重复建设和大规模落后产能制约着工业可持续发展。目前，中国工业绿色转型仍面临着一系列体制和机制矛盾，主要表现在：要素价格体系不完善、要素跨行业、跨地区流动存在诸多障碍；资源利用和环境补偿机制不健全；绿色GDP核算体系尚未建立，地方政府官员晋升制度不合理；工业绿色技术创新、转让和应用存在障碍；政府决策的科学性有待提高，社会监督机制需进一步完善。

and “exquisite manufacturing” will become an important feature of the Chinese industrial development. Based on the above judgment, one can predict that, by virtue of the green transformation, Chinese industrial structure upgrading has great potential. However, although China has become the world's second largest manufacturer after the United States, in the middle and late stage of industrialization, Chinese industry's structural contradictions have become increasingly prominent, the industrial capability of independent innovation is weak, the low-level redundant construction and large-scale backward production capacity restrict sustainable industrial development. Currently, the green transformation of Chinese industry is still facing a series of institutional and systemic contradictions, which is mainly reflected in the following problems: the elements price system is imperfect, there are many obstacles against cross-industry and cross-regional element flow; resource utilization and environmental compensation mechanisms are not perfect; a green GDP accounting system has not yet been established, the promotion system of local government officials is unreasonable; there are obstacles against industrial green technology innovation, transfer and application; the science of government decision-making needs to be improved, social supervision mechanism needs to be further improved.

### Goal and Cost-benefits of Green Transformation of Chinese Industry

Combined with China's ecological environment status quo and the ecological environment requirements fully building a well-off society, in the 12<sup>th</sup> Five-Year Plan period, China should set the following total quantity control and restructuring objectives concerning energy consumption, greenhouse gas and pollutant emissions: primary total energy consumption is controlled at 3.5 billion tons of standard coal; the proportion of coal in a primary energy consumption structure should decrease by 2-3 percentage points from 2010, and the proportion of oil and natural gas will remain unchanged. The proportion of non-fossil energy will increase by 2-3 percentage points to reach about 12%; energy efficiency needs to be further improved, energy consumption per 10,000 yuan GDP will decrease by about 20% within five years; major pollutant control will be strengthened. The total emissions of sulfur dioxide and nitrogen oxides will decrease by about 10% within five years, and the carbon dioxide emission intensity per 10,000 yuan GDP will decrease by over 20% within five years (reduced by more than 33% compared to 2005). By 2020, total quantity control and structure adjustment objectives concerning energy consumption, greenhouse gas and pollutant emission should be as follows: total primary energy consumption is controlled at about 4 billion tons of standard coal; the proportion of coal in the primary energy consumption structure will decrease

### 中国工业绿色转型的目标及成本收益

结合我国生态环境现状及全面建成小康社会对生态环境的要求, “十二五”时期, 我国能源消耗、温室气体和污染物排放的总量控制及结构调整目标应为: 一次能源消费总量控制在35亿吨标准煤左右; 一次能源消费结构中煤炭的比重比2010年下降2-3个百分点, 石油和天然气的比重维持不变, 非化石能源的比重上升2-3个百分点, 达到12%左右; 能源效率进一步提高, 万元GDP能耗5年下降20%左右; 主要污染物控制再上一个台阶, 二氧化硫和氮氧化物排放总量5年内下降10%左右, 万元GDP的二氧化碳排放强度5年内下降20%以上(较2005年降低33%以上)。到2020年, 能源消耗、温室气体和污染物排放的总量控制及结构调整目标应为: 一次能源消费总量控制在40亿吨标准煤左右; 一次能源消费结构中煤炭的比重较2015下降3个百分点, 石油和天然气的比重基本保持不变, 非化石能源的比重上升3个百分点, 达到15%左右; 万元GDP能耗较2015年再下降20%左右, 达到0.66吨标煤/万元GDP; 二氧化硫和氮氧化物等主要污染物排放总量均比2015年降低10%左右, 万元GDP的二氧化碳排放强度较2015年下降8%左右, 较2005年降低40%-45%。

工业是中国经济的主体产业, 工业绿色转型势必会对经济社会发展产生重大影响。一方面, 在推动工业向绿色经济转型的动态过程中, 需要付出一定的代价。工业绿色转型的成本既包括因为推行节能环保技术而引起的增量投资, 又包括潜在的宏观经济损失, 还包括高耗能、高排放行业的岗位流失, 以及对贫困人口的补贴等; 另一方面, 实现工业绿色转型目标后, 也能产生显著的效益, 其中既有工业企业能源成本降低等直接效益, 又有避免在工业部门中出现高耗能、高排放的技术锁定现象, 还有促进节能环保产业发展、创造绿色就业机会, 改善制成品贸易条件, 以及由于污染物和温室气体排放减少而带来的健康等方面的积极效应。

综合工业绿色转型的成本和效益分析结果, 尽管推动工业向绿色经济转型需要进行数额庞大的节能环保投资, 也会产生一定的宏观经济损失, 并导致高耗能、高污染工业行业及相关行业就业岗位减少, 但其在节约能源成本、改善制成品贸易环境和贸易条件, 促进节能环保产业等绿色产业

发展、创造绿色就业岗位、提升国民健康水平等方面都有重要的积极影响。从整体上看, 工业绿色转型的效益远高于成本, 这将成为中国工业绿色转型的根本动力。

### 工业绿色转型的主要任务、机制创新与政策支撑

按照新型工业化道路的总体要求以及绿色经济发展的指导思想, 以工业绿色转型目标为指导, 明确中国工业绿色转型的主要任务: 推进工业能源利用绿色转型; 实现工业技术绿色转型; 加快工业结构绿色转型; 促进工业产品出口绿色转型; 推动区域布局绿色转型; 积极引导消费结构与方式绿色转型, 使工业绿色转型深入到工业资源开发利用、生产研发、物流消费等各个环节。

中国工业绿色转型需要加快机制创新。应充分借鉴工业转型升级和绿色发展的国际经验, 以政府战略法规为支撑, 市场化推进, 鼓励产业界积极响应、企业自主行动和公众广泛参与, 建立涵盖环境规制、节能减排机制、绿色技术研发和产业化应用机制、国际协调机制的综合性、开放式绿色转型机制创新体系。完善环境规制和节能减排约束性指标的同时, 在技术、资金、交易机制、国际合作等方面不断丰富绿色转型的政策, 采取以下措施, 着力推进工业绿色转型:

加强领导, 统一规划; 进一步淘汰电力、钢铁、焦化、建材、电石、有色金属等行业的落后产能; 以技术升级改造和淘汰落后为切入点, 推进企业兼并重组, 加快推进传统产业绿色转型; 加大绿色投资力度, 大力发展战略性新兴产业; 大力开发利用清洁能源和可再生能源, 优化能源结构, 提高资源利用效率; 鼓励绿色工业技术的研究开发, 尽快建立绿色技术、绿色设计、绿色产品的技术标准和管理规范; 完善出口配额、出口退税等调节手段, 继续严格控制稀有资源以及高耗能、高污染、高排放等“三高产品”出口, 促进贸易方式转变和出口效益改善; 实行进口多元化策略, 加大海外资源和能源开发利用, 大力引进先进的绿色技术和关键设备; 着力推进产业梯度转移, 形成工业发展的绿色布局; 改革政绩考核体系, 进一步落实环境责任制, 完善环境规制, 加强环保执法力度; 着力消除工业绿色转型的体制机制障碍, 深化资源和能源体制改革, 完善财政税收支持政策体系; 引导金融机构加

by 3 percentage points compared with 2015, the proportion of oil and natural gas will remain unchanged, the proportion of non-fossil energy will rise by three percentage points to reach about 15%; the energy consumption per 10,000 yuan GDP will decrease by about 20% compared to 2015 to reach 0.66 tons of standard coal/ per 10,000 yuan GDP; the emissions of sulfur dioxide, nitrogen oxides and other major pollutants will be reduced by about 10% compared to 2015, the carbon dioxide emission intensity per 10,000 yuan GDP will decrease by about 8% compared with 2015 and reduced by 40%-45% compared to 2005. Industry is the main sector of the Chinese economy, and the industrial green transformation is bound to have a significant impact on the economy and social development. On one hand, during the dynamic process of industrial transformation into a green economy, a certain price needs to be paid. Industrial green transformation costs include the incremental investment of the implementation of energy conservation and environmental protection technology, which also includes potential macroeconomic loss, job loss in high-energy-consumption and high-emission industries, as well as subsidies for the poor, etc. On the other hand, after industrial green transformation goals are achieved, significant rewards are generated, which is reflected in the following aspects: direct benefits brought about by the reduced energy cost of industrial enterprises, avoiding the technology lock-in of the high-energy-consumption and high-emission industrial sector, promoting the development of the energy-saving and environmental-protection industry, creating jobs in green industry, improving the terms of trade for manufactured goods, and the positive effects on health because of reduced emissions of pollutants and greenhouse gases. A huge amount of energy-saving and environmental protection investment is needed to promote the industrial transition to a green economy, which also causes certain macro-economic losses and results in the reduction of jobs in high-energy-consumption, high-pollution and related industries, but the transition exerts a significantly positive impact on reducing energy costs, improving the trade environment and trade conditions for manufactured products, promoting the development of green industries (such as energy-saving and environmental-protection industries creating green jobs) and enhancing the level of national health. On the whole, the benefits of industrial green transformation far exceed the cost, and this will become the fundamental driving force for the green transformation of Chinese Industry.

### Main Task, Mechanism Innovation and Policy Support of Industrial Green Transformation

In accordance with the general requirements of the new path of industrialization and the guiding ideology of green economic development (led by green industrial transformation goals), the main tasks of the green

transformation of Chinese industry are clarified as follows: to promote green transformation of industrial energy use; to achieve green transformation of industrial technology; to accelerate the green transformation of industrial structure; to promote the green transformation of industrial product export; to promote the green transformation of regional distribution; to actively guide the green transformation of the structure and mode of consumption, and to make industrial green transformation penetrate into all areas, such as industrial resource development and utilization, production and R&D, logistics and consumption, etc. Chinese green industrial transformation needs to accelerate the innovation mechanism. It should fully draw on the international experience with regard to industrial transformation, to upgrade and promote green development, supported by government strategies and regulations as well as marketing promotion, encourage positive industry response, independent enterprise action and broad public participation, establish a comprehensive and open green transformation mechanism innovation system which covers an environmental regulation mechanism, energy saving mechanism, green technology R&D and industrial application mechanism, and an international coordination mechanism. While perfecting the environmental regulation and obligatory targets on energy saving and emission reduction, the green transformation policies will be constantly enriched in terms of technology, funds, trading mechanism, international cooperation and so on; the following measures should be adopted in the effort to promote industrial green transformation: Strengthen leadership and unify planning; further eliminate the backward production capacity of the electric power, iron and steel, coking, building materials, calcium carbide, and non-ferrous metals industries; promote the technical upgrading, transformation and elimination as an entry point, promote corporate mergers and acquisitions, and accelerate the green transformation of traditional industries; increase investment in green transformation, vigorously develop strategic emerging industries; develop and use clean energy and renewable energy, optimize energy structure, improve resource energy efficiency; encourage green industrial technology research and development, establish technical standards and management practices on green technology, green design and green products as soon as possible; improve export quotas, export tax rebates and other means of regulations, continue to strictly control the export of scarce resources and "three high" products (high energy consumption, high pollution and high emission), and promote the transformation of the mode of trade and the improvement of export benefits; achieve import diversification strategies, increase the use of overseas resources and energy development, vigorously introduce advanced green technology and key equipment; and strive to promote the industrial gradient transfer to form a green industrial development layout; reform the performance evaluation system and further implement an environmental

responsibility system, improve environmental regulation, strengthen environmental law enforcement; make efforts to eliminate the structural and institutional obstacles against the industrial green transformation, deepen resource and structural energy reform and improve the fiscal and tax support policy system; guide financial institutions to increase the credit support of emerging green industry and encourage all kinds of domestic and foreign capital owners to participate in the industrial green transformation;



strengthen the construction of personnel training systems and provide human resources guaranteed for industrial green transformation; give full play to the role of industry associations, improve the enterprises' environmental responsibility system, promote green operation and management innovation within companies; actively promote global cooperation and international coordination in the field of energy, environment, addressing climate change, etc, and create a favorable external environment.

大绿色新兴产业的信贷支持，鼓励国内外各类资本和主体参与工业绿色转型；加强人才培养体系建设，为工业绿色转型提供人力资源保障；充分发挥行业协会的作用，完善企业环境责任制度，促进企业绿色经营管理创新；积极推进能源、环境、应对气候变化等领域的全球合作与国际协调，营造良好的外部环境。



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# Green Economy: a Chance for SMEs An Italian Experience

## 绿色经济: 中小企业的机会 意大利经验

Gianluigi Angelantoni, CEO Angelantoni Industrie  
首席执行官, 安吉拉通力工业集团  
Federica Angelantoni, CEO Archimede Solar Energy  
首席执行官, 阿基米德太阳能公司

The Angelantoni Group has always distinguished itself by investing in innovation. Though the global crisis is affecting the world economy and it is especially challenging for SMEs, new sectors and trends for business development are emerging, creating interesting opportunities for those ready to take a chance on innovative solutions and new markets. This is the case for the Angelantoni group, which, even though suffering the restrictive effects of the crisis on its business, can proudly display a growing "green" revenue, thanks to its vision of environmental technologies developed at a global level.

Green Growth and Green Economy has given the group a chance to create new business opportunities, even in these historic times, since the strategy doesn't require a large investment, but intelligence.

Significantly, emerging economies are leading this trend. China, which plans to move into Concentrated Solar Power (CSP) with 3000 MW by 2020, is a natural and promising market for our best technologies.

### Archimede Solar Energy

Archimede Solar Energy (ASE) is a young and dynamic Italian business set up to become a power-force as the unique supplier of a revolutionary receiver tube for the Concentrated Solar Power (CSP) plant's market. Officially established in 2007 as a subsidiary of the Angelantoni Group and in partnership with the Japanese Group Chiyoda, ASE's history goes back to the year 2001 when ENEA (The Italian National Agency for New Technologies, Energy and Environment) commissioned Angelantoni the production of a CERMET thin film coating sputtering Machine.

Already renowned as a world leading group operating within the testing and life science sectors, after a collaboration with ENEA, Angelantoni began its new journey in the renewable energy field.

On March 26<sup>th</sup> 2007, ENEA and the Italian utility ENEL signed an agreement to build "Archimedes", a CSP plant in Priolo Gargallo, near Syracuse in Sicily. Due to the previous collaboration, ENEL asked Angelantoni to produce receiver tubes for the CSP plant in Sicily and, after accepting the job, the group's top management founded "Archimede Solar Energy" which was named after its connection with the "Archimedes" plant.

安吉拉通力集团（音译，Angelantoni Group）的最鲜明特点之一是投资于技术创新。尽管全球经济危机影响世界经济，对中小企业尤其具有挑战性，但业务发展新领域和新趋势正在出现，并为那些愿意尝试创新技术和新市场的企业提供了有趣的机会。对安吉拉通力集团来说情况正是如此，尽管这个企业也正遭受着经济危机带来的不利影响，但得益于其在全球范围内开发的环境技术，该企业正自豪地赢得越来越多的“绿色”收入。

由于实施这样战略需要的是智力，而不是大量的投资，因此即使在当前这种特殊的历史时期，绿色增长和绿色经济仍然为该集团提供了新的商业机会。

很明显，新兴经济体正引领这一趋势。中国将大量使用聚光太阳能发电（CSP），并计划在2020年使用量达到3000MW。这对于我们的最佳技术来说是最自然、也是最有前景的市场。

### 阿基米德太阳能

阿基米德太阳能（ASE）是一个年轻而充满活力的意大利企业，将成为CSP市场的旋转型接收管的唯一供应商。

作为安吉拉通力集团的下属子公司，它正式成立于2007年，与日本集团千代田合伙。ASE的历史可追溯至公元2001年，当时意大利国家新技术、能源和环境局（ENEA）正组织对安吉拉通力生产CERMET溅射涂膜机进行验收。

作为在测试与生命科学领域的一家著名的世界级龙头企业，在与ENEA公司合作后，安吉拉通力在可再生能源领域开始新的旅程。2007年3月26日，ENEA公司和意大利电力公司ENEL签署了一项协议，在西西里岛锡拉丘兹附近的Priolo Gargallo建立了生产CSP的企业“阿基米德斯”。得益于以前的合作，Enel邀请安吉拉通力为西西里岛的CSP厂生



产接收管。安吉拉通力的高管在接受新任务后，决定成立了“阿基米德太阳能公司”（ASE），从名称上显示了与“阿基米德斯公司”的渊源。ASE自2011年9月动工建设，到2012年初其崭新、熠熠生辉的工厂已经能够生产CSP接收管。今年的年生产能力将达75000个接收管，以满足150MW发电量的需要；2014的生产能力预计将增加一倍至140000个接收管。

#### 技术

阿基米德太阳能公司是唯一一家生产这种独特产品的公司，它所生产的接收管能够在熔盐环境下工作。与CSP配套的抛物槽技术可以通过聚光设施将太阳能转换成热能。这种聚光设施表面带有反射层，可以追随太阳光线并将其集中到接受管上。导热液体流经接收管，吸收聚光热量，然后在标准涡轮发电机上进行蒸汽发电。这种导热液体是一种熔盐混合物，工作温度可达550°C，而且无毒、不易燃，经常作为化肥用于农业生产。考虑到太阳能具有不稳定的特性，可将这种导热液体储存在罐子里，以备夜间或阴天使用。该设施应安装在平整的地面上，最好靠近海岸（使用海水）或在有河流或湖泊的地方。抛物槽通常是在一条南北走向的纵轴上，可全方位转动以便每天追踪太阳照射光线。如果该设施安装靠近大海，则可直接利用热能进行海水淡化而不必转化成电能。淡化后的海水可以用于农业生产（例如沙漠项目等等）。

#### 中国市场

抛物槽CSP发电设备，由于其特定的技术特点，采用熔盐工作，在高太阳辐射地区，如中东地区、南北非洲，拉丁美洲、印度和中国等地区具有很强的市场竞争力。此外，据最新消息，到2020年中国计划引入发电量为3000MW的CSP，这更说明了太阳能市场的重要性，并且会催生新的生产线。2013年3月，阿基米德太阳能公司与中国一个重要的合同能源管理公司签署了生产32000个熔盐管的合同。该公司将在中国北部建立第一个50兆瓦的熔盐CSP发电装置。该项目刚刚获得国家能源局的最后批准，将采用意大利技术和部件，由中国工程和建筑公司具体负责承建（由ENEA负责监督施工）。

Launched in September 2011, ASE's gleaming new factory began producing receiver tubes for CSP plants in early 2012. The annual capacity of 75,000 tubes will be enough to build 150MW this year and in 2014 the production capacity is expected to double to 140,000 tubes.

#### Technology

Archimede Solar Energy is a unique company that produces a unique product and it is the only company able to supply receiver tubes operating with molten salts. Parabolic trough CSP technology converts solar radiation into thermal energy through a concentrator made of reflecting surfaces that are designed to follow the apparent movement of the sun and focus sun rays onto receiver tubes situated at its focal point. Heat transfer fluid runs through receiver tubes absorbing concentrated sunlight which then heats steam in a standard turbine generator. The fluid - a mixture of molten salts - can reach a working temperature of 550°C. It is non-toxic and non-flammable and is commonly used in agriculture as a fertilizer. As solar energy is inconstant by nature, the hot fluid can be stored in an isolated tank and used overnight or on cloudy days. The plant should be installed on flat ground, preferably near the coast (to use sea water) or where there are rivers or lakes. The trough is usually aligned on a north-south axis and rotated to track the sun as it moves across the sky each day. If the power plants are installed close to the sea, it is possible to use the heat not converted into electricity during the process to produce a considerable quantity of desalinated water, applied for example, to agriculture (like the Desertec Project).

#### Chinese Market

Parabolic trough CSP power plants that, due to specific technical features, work with molten salts, are a very attractive option in countries with high solar irradiation such as the Middle East, North and South Africa, Latin America, India and China. Moreover, according to the latest announcement, China plans to move into CSP with 3000 MW by 2020, highlighting the solar market and pushing for new production lines. In March 2013, Archimede Solar Energy signed a supply contract for 32,000 molten salt tubes with an important Chinese EPC (Energy Performance Contract) company to build the first 50 MW molten salt CSP power plant in northern China. The project has just received the final approval from the National Energy Commission and will be completed using Italian technology and components and Chinese Engineering and Construction capability (with ENEA supervision).

## VIU training program echo from participants 威尼斯国际大学培训计划 学员回音

This section is written by the Chinese participants in the trainings in Italy. We hope hereby to provide the Newsletter readers with an authentic flavour of the training experience.

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### Beijing Municipal Environmental Protection Bureau and Shanghai Municipal Environmental Protection Bureau Low Carbon Economy

Italy, June 3-14, 2012

41 participants

In June 2012, 41 of us from Beijing and Shanghai's Municipal Environmental Bureaus were honored to participate in the Advanced Training Program on "Low Carbon Economy". The program included 12 lectures on EU environmental legislation and policies, "20-20-20" low carbon targets and measures, low carbon urban construction, the role of energy and environmental organizations on GHG emission reduction, low carbon and smart communities, industrial GHG emission control cases, etc., as well as four site visits: a green coal-fired power plant, a green cement company, a low carbon building, and Turin City Hall. The trip, which covered Rome, Florence, Venice, Bergamo and Turin, was not only a fruitful training trip, but also an intensive cultural trip. We were very impressed by the staff from Venice International University, who elaborately arranged lectures, handouts and traveling schedules, putting special care into every detail. We were also very impressed by the excellent speakers from government, universities and enterprises, who proved their professionalism and responsibility through their lectures.

Through the program, we became acquainted with Italy and the EU's strategies and practices on low carbon economy. We also gained some advanced environmental management experience in Italy, e.g., emphasis on practicability and cost effectiveness of technologies, combination of environmental protection and natural/cultural heritage conservation, basic environmental research by different sectors in society, etc.

We witnessed the good natural environment in Italy, the emphasis on environmental protection and low carbon economy, and the scientific and responsible attitude of people in the workforce, all of which was valuable for us to reflect on how to build low carbon and smart cities within megacities such as Beijing and Shanghai.

For the next step, if possible, we hope to continually receive email newsletters on environmental and low carbon information from the EU and Italy. For future training programs, more site visits may be helpful, making the most use of on-site communication; more topics would be welcomed, such as Europe's advanced experiences on air pollution control, river treatment, biomass energy use, and new knowledge such as the relationship between biomass energy use and PM<sub>2.5</sub>, etc.

We also hope to strengthen our friendship with our Italian colleagues and have more training and cooperation in future.



“学员回音”由在意大利参加培训的中方学员们供稿的。希望通过刊登学员们的“回音”，能够让“培训园地”的广大读者们多少有些“身临其境”的感受。

### 北京市环境保护局和上海市环境保护局 低碳经济

意大利, 2012年6月3日至14日

41位学员

2012年6月, 我们北京、上海两市环境保护局的41名同志有幸参加了意大利“低碳经济高级培训计划”, 聆听了12场讲座, 包含欧盟环境立法及政策、欧盟“20-20-20”低碳目标和措施、低碳城市建设理念、能源与环境机构在减少温室气体排放中的作用、低碳与智能社区、工业企业碳排放控制案例等主题, 并赴绿色燃煤发电厂、水泥厂、低碳建筑、都灵市政厅进行了4次实地考察。地域覆盖罗马、佛罗伦萨、威尼斯、贝加莫和都灵, 不仅是一次成果丰硕的学习之旅, 也是一次内涵丰富的文化之旅。

威尼斯国际大学精心策划讲座、预备教材、安排行程, 每一环节都考虑得周到细致, 体现了组织方对培训的充分重视; 来自政府、学校、企业的优秀讲员认真负责、准备充分, 教学生动务实。

通过培训, 我们对欧盟和意大利低碳经济的策略、实践及相关技术有了一定的认识, 我们看到意大利很多优秀的环境管理经验, 如重视环境工程技术的实用性和经济性, 将环境保护与自然、文化遗产的保护有机结合起来, 以及依靠社会力量开展环境基础研究等。我们也亲身感受到意大利良好的自然生态环境和全社会对环境保护和低碳经济的重视, 以及工作中严谨和认真的态度, 有很多方面值得我们学习和借鉴, 使我们对北京、上海这样两千万人口的中国特大型城市如何发展低碳经济、建设智能城市有了更深入的思考。

我们希望能继续通过电子邮件定期获取培训方有关欧盟及意大利环保低碳的最新信息。我们建议今后的培训适当增加实地考察环节, 充分利用考察现场的交流讨论; 建议介绍欧洲在大气污染控制、河流污染治理、生物质能源高效利用途径等方面取得的成功经验, 以及生物质能源利用与大气细颗粒物的关系等新知识。我们也希望进一步巩固中意环保工作者的联系和友谊, 拓展类似培训, 加强环保合作。

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**Ministry of Science and Technology  
High-Technology and Science Parks for Sustainable Development**  
Italy, October 20 - November 1, 2012

40 participants

44 Trainees from the MOST-IMELS Training Program of High-Technology and Science Parks for Sustainable Development attended a series of training sessions and site visits in Italy between October 20 and November 1, 2012. Lectures were given by officials and experts from IMELS, VIU, Acque del Chiampo, AREA Science Park, H-Farm, VEGA (Venice Gateway for Science and Technology), Kilometro Rosso, Mario Negri Institute and the Environment Park, on a wide range of topics from science park management and green innovation policies to emerging solar technologies, biomedicine technologies, nano-technologies, etc. The trainees showed great interest in these topics and had in-depth exchanges and discussions with the lecturers. This training program integrated case studies and site visits into the lectures, giving the trainees a more vivid understanding of the topics while facilitating more interaction between the lecturers and the trainees.

During the training program, the trainees were greatly impressed by the fine scenery, rich culture and art history of Italy. The trainees were especially impressed by the efficiency of the Italian organizers and enlightening presentations of the lecturers. Based on this training program and the current challenges facing China, the following points were key topics for thought for the trainees:

1. How to develop a green economy and develop new energy technologies in China to protect the environment and reduce pollution;
2. How to improve current innovation policy systems to foster green innovation science parks with more variety and more functions;
3. To learn from Italian experiences and, on the basis of our local conditions and characteristics, to foster science parks with more regional features.

It is our hope to further expand cooperation and exchange from this training program. For the coming training programs, we suggest the above topics be emphasized, especially those on technical application and policy implementation. The interactive way of teaching is encouraged to engage more vigorous involvement from the trainees.



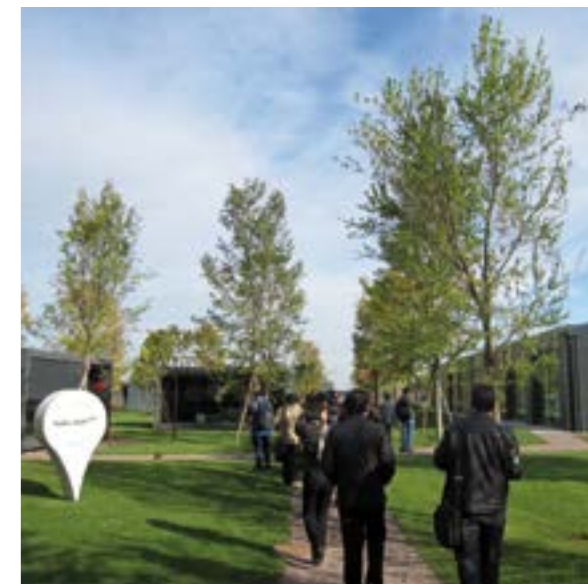
**中国科学技术部  
可持续发展角度下的高科技园**

意大利, 2012年10月20日至11月1日

40位学员

中-意高技术与科技园区能力建设培训班中方学员于2012年10月20日-11月1日在意大利参加了一系列学习和参观, 听取了来自意大利环境国土与海洋部、威尼斯国际大学、Acque del Chiampo公司、AREA科技园、H-Farm科技园、VEGA (Venice Gateway for Science and Technology) 科技园、Kilometro Rosso科技园、Mario Negri医疗研究中心、Environment Park环境科技园区的官员、专家、学者及企业代表的介绍, 了解到从科技园区的建设和管理及绿色创新体系政策, 到新型太阳能技术、生物医药技术、纳米表面处理技术等丰富内容, 同时学员们也结合中国国情与意方专家展开了深入的交流和讨论。这种专题讲座、案例分析与实地考察相结合的培训形式便于学员更深入理解授课内容, 便于学员与授课者间的互动, 成效良好。培训过程中, 意大利的优美环境和丰富深厚的文化与艺术积淀给我们留下美好的印象, 特别是意方认真的工作作风和风趣优雅的待人接物贯彻始终, 培训安排高效紧凑, 授课老师的授课内容大多具有启发性。经这轮培训, 结合中国发展面临的迫切问题, 我们深深体会到须在以下几方面需做进一步的学习:

1. 发展绿色经济, 保护环境和减少污染, 大力发展新能源技术及其应用。
2. 完善现有的创新政策体系, 构建形式更多样、功能更丰富的绿色创新科技园。
3. 吸收意大利各类园区的建立及管理经验, 根据我们自己的区域特点和条件, 结合实际打造具有区域特色的科技园区。我们希望今后在本轮培训基础上在以上领域有进一步拓展合作和交流。在今后的培训中, 希望能进一步加强这些方面内容, 特别是增强有关技术应用和政策实施案例方面的授课内容。另外, 部分授课老师采取的生动互动教学值得提倡, 对提高学员参与积极性和活跃度有益。



### Ministry of Environmental Protection of China Environmental Protection Supervision and Inspection

Italy, November 25 - December 6, 2012

38 participants

From November 25<sup>th</sup> to December 6<sup>th</sup>, 2012, I participated in the second phase of the Sino-Italian Environmental Protection and Sustainable Development Training Program on "Environmental Protection Supervision and Inspection". Thirty-eight participants from the Ministry of Environmental Protection, environmental protection bureaus from 19 provinces, autonomous regions and municipalities participated in the program. The training program was a great chance for us to gain knowledge on environmental protection and sustainable development, and to exchange opinions with Italian experts and professors from the Italian Ministry for the Environment, Land and Sea, Venice Province's Department of Environment Protection, and Venice International University. We learned of advanced ideas, environmental technology, management policies and measures, and visited a typical cement enterprise.

The training was not only unique but also effective. Firstly, the training content was rich, involving international environmental protection trends, the latest environmental protection policies in Italy, economical, technological and administrative measures for protecting the environment, and case studies etc. Secondly, the training content was inspiring and forward-facing; for example, it covered some new environmental problems facing Italy and other developed countries as well as some solutions to the problems in those countries. Although the national conditions of China are different to those of developed countries, the fresh experiences of developed countries and practical exploration into environmental protection have the power to enlighten and inspire the Chinese unique environmental protection strategy. Thirdly, all training courses involved one session for discussion. We were encouraged to share views and ideas on a specific topic related to environmental problems or solutions, which prompted everyone's enthusiasm to discuss and learn.

The students were very appreciative of this training because we gained knowledge, broadened our vision and fostered a friendship between with the Italian professors and the participants. During the training period, we actively studied and understood the science of Italy's environmental philosophy and environmental policy, discussed the practical problems regarding China's environmental supervision and inspection methods, and analyzed the feasibility of the specific approach used in China. After class, all the students were invited to discuss the experience and consolidate the knowledge acquired. Finally, I have made two suggestions for the training program. Firstly, continue to expand the scale and scope of the training content on environmental protection. Secondly, during the training period, it would be a good idea to add one session to introduce the experiences and unique technology of China's environmental protection work to promote two-way communication.



### 中国环境保护部 环境监督和监察

意大利, 2012年11月25日至12月6日

38位学员

2012年11月25日至12月6日, 我参加了中意合作-环境管理与可持续发展项目环境监察专题第二期培训。我们这个培训班共有38名学员, 分别来自环保部、环保督察中心及全国19个省、自治区、直辖市的环保部门。我们在意大利学习和考察期间, 与意大利环境、领土与海洋部、威尼斯省政府环保部门、威尼斯国际大学等单位专家进行面对面的交流, 了解了欧盟和意大利先进的理念、环保技术和管理措施, 参观了意大利水泥公司。培训非常有特色, 而且效果很好。首先, 培训内容丰富, 涉及国际环保合作发展趋势、意大利环保保护法律、经济、技术和行政手段、具体案例分析等内容。其次, 培训课程启发性和前瞻性很强, 比如意大利和其他发达国家在环境保护方面面临的新问题和新的解决方案。这些创新的手段和管理方法能够为探索中国环保新道路有益借鉴。虽然我国和发达国家的国情存在差异, 但发达国家的新鲜经验和实践探索可以为中国的环保人启迪思路, 开拓视野。第三, 所有培训课程都安排了讨论环节, 学员有机会分享自己对某一具体问题的观点和想法, 这极大地调动了大家讨论的积极性。

学员都非常喜欢这样的培训, 因为不仅收获知识、开拓了视野, 而且增进了友谊。培训期间, 我们研究意大利的环保理念和环保政策的科学性, 并结合中国的环境监察中的实际问题, 分析将政策移植到中国的可行性。课后, 带团领导组织全体学员继续讨论学习体会, 巩固学习的知识, 相互交流心得体会。最后, 我个人对培训提两点建议。一是希望继续扩大培训规模和领域。二是培训期间增加学员介绍中国环境保护工作经验和技术的环节, 促进双向交流。





**Sustainable Development: Innovation of Science, Technology and Management for Ecological Environment, TSTC**  
Italy, September 2-13, 2012  
39 participants

The 2012 Advanced Training Course, organized by VIU in collaboration with the Tianjin Science and Technology Committee (TSTC), was devoted to the *Innovation of Science, Technology and Management for Ecological Environment*. Innovation and Sustainability were put on the same level: High-Tech Innovation, the Development of SMEs, the Scientific Park, and the Green District were some of the key topics scheduled into the agenda.

The implications of innovation and technology were analyzed in different fields of development: energy, eco-building and European Trading Scheme (ETS), with great attention on sustainability. Not only were the industry and its processes the focus of the course, but also the quality and safety of the products.

The training commenced in Rome, with lecturing sessions provided by IMELS' representatives on the role of the ministry in the innovation policies. In Venice, the delegation had a meeting with the Venice Chamber of Commerce and Treviso Unindustria - two important organizations representing the local productive sector - in order to discuss the current role of SMEs in the innovation process. One entire day of lectures was then devoted to different aspects of the increasingly important issue of quality certification, both compulsory and voluntary, at the Italian and EU level. Finally, the topic of food safety was covered in Turin, the last location of this course.

During the entire course program, discussions and field visits offered the chance for the delegation - composed of 40 people selected by the Tianjin Science and Technology Committee - to see, in real terms, good practices and positive experiences from Italy. As with each training course, the sharing of knowledge and networking was encouraged.



**可持续发展: 科技创新与生态环境管理,**  
天津市科技委员会  
意大利, 2012年9月2-13日  
39名学员

威尼斯国际大学与天津市科技委员会2012年再度联手, 联合组织了主题为科技创新与生态环境管理的高级培训班, 将创新与可持续发展提高到同一个高度: 高科技创新、中小企业发展、绿色园区等是本期培训的重要内容。

对技术创新在不同领域的意义进行了分析: 能源、生态建筑、和欧盟交易计划, 并对其可持续性给予了极大的关注。本次培训不仅关注产品的生产及工艺过程, 而且还讲解了关于产品的质量 and 安全问题。

培训从罗马开始, 由意大利环境部代表就环境部在创新管理政策方面所发挥的作用进行了介绍。在威尼斯, 代表团与当地两个重要机构——威尼斯商会和特莱委索工业联合会(音译, Treviso Unindustria)进行了会谈, 双方就中小企业在技术创新过程中所发挥的作用交换了意见。然后又安排了一整天时间用来讲授关于质量许可的各个方面, 包括意大利和欧盟执行的强制性和自愿性政策。这个话题在当今中国正日益变得越来越重要。在都灵, 为学员们讲授了有关食品安全方面的内容。都灵也是本次培训之旅的终点。

在整个培训过程中, 为天津市科委挑选的近40名学员安排了交流互动和现场考察, 使学员们能够亲临成功案例现场, 深刻领会意大利的成功经验。与每期培训班一样, 鼓励学员们共享知识, 并与意方建立起网络与合作关系。



### Climate Change: Policy, Conventions, and Statistical Systems, NDRC

Italy, September 9-20, 2012

40 participants

In order to better address climate change issues and to draft sound laws and regulations on this matter, policy makers need to rely on the findings of statistics and data analysis on GHG emissions and potential impacts linked to their increase.

While climate change has always been the key subject in the cooperation with the National Development and Reform Commission, the focus was traditionally on adaptation and mitigation measures.

One of the two training courses held in 2012 requested a more specific focus in order to address a very important issue, namely the reliability of emissions data to which climate change impacts are strictly related. As most of the participants selected were coming from municipal or provincial statistics bureaus, the overall objective of the training was to offer a general overview on climate change before analyzing data collection, accounting and statistics in detail.

Representatives from important institutions such as the Italian National Institute of Statistics (ISTAT) and the High Institute for Environmental Protection and Research (ISPRA) were invited to present their work and discuss with the participants some selected topics. The lectures focused not only on GHG emissions data analysis, but also on statistics-based models to research and possibly predict the environmental (e.g. in regard to temperature and precipitation), economic and social impact of climate change.

### Sustainable Urban Development and Eco-building, CASS

Italy, November 18-29, 2012

42 participants

An urban development that guarantees a healthy lifestyle for its citizens and the protection of the environment is still very high on China's sustainable development agenda.

As a country with some of the most populated cities in the world, China is still facing the huge challenge of finding solutions to provide its citizens with a safe urban environment. Despite being mostly tailored to suit the local needs, case studies and best practices from around the world could prove to be a valuable starting point if adapted to the very unique characteristics of Chinese cities.

This was the main aim of the lectures and site visits planned during the training course organized in cooperation with CASS and focusing on "Sustainable Urban Development and Eco-building".

A general introduction on the main policies and law provisions regarding urban planning and buildings was the starting point for the course, as they are the backbone for every action taken at both the Italian and European level. In order to underline the diversity of environmental issues each city could face, delegates were presented with examples from a few Italian cities: Venice and the protection of its lagoon, Padua's energy efficiency plan, and Rome and Milan's sustainable mobility.

Since eco-building is one of the main aspects of urban development addressed by the course, technical aspects were discussed and presented through site visits to the TiFS building in Padua and to i.lab, the new Italcementi research center in Bergamo; these included the certification of energy performance, the best available techniques for eco-building, and the energy sources and materials used to lessen the impact on the environment.



### 气候变化：政策、公约和统计系统

国家发改委

意大利，2012年9月9-20日

40名学员

为了更好地应对气候变化问题，拟定更有效的政策法规制度，政策制定者们需要温室气体排放的准确数据和不断增加的温室气体可能带来的潜在影响的分析报告。一直以来气候变化问题都是与国家发改委合作的主要领域，围绕适应性与温室气体减排等问题安排了培训内容。2012年将安排2期培训班，其中一期培训内容非常具体，即关于排放数据的可靠性，这个问题与气候变化影响密切相关。由于大部分学员来自于各省市统计局，本期培训首先向学员们介绍了气候变化的总体问题，然后又讲解了气候变化数据收集、计算和统计等具体内容。

两个重要机构——意大利国家统计局和环境保护与研究院的代表应邀向学员们介绍了他们的工作，并围绕选定议题进行了深入交流。本期培训不仅介绍了温室气体排放数据分析，而且还介绍了基于统计数据的模型，以便开展研究和预测气候变化对环境（例如：气温和降水）、经济及社会所带来的影响。

### 可持续城市发展和生态建筑

中国社会科学院

意大利，2012年11月18-29日

42名学员

在中国政府推动可持续发展的议程上，城市发展非常重要，因为它为百姓的健康生活和环境保护提供了保障。

作为全世界人口最多的城市，中国仍面临着为其百姓提供安全城市环境之挑战。尽管各地情况不一，需要因地制宜找出有针对性解决办法；但世界各国的一些成功经验仍是非常有益的，在中国解决其城市问题过程中具有一定的参考价值。

这是与中国社科院联合组织本期培训的主要目标，即：可持续城市发展与生态建筑。培训班首先向学员们介绍了城市规划的主要政策和管理规定，这是意大利和欧盟采取所有行动的政策依据。为了强调每个城市所面临的问题各不相同，本期培训介绍了几个不同类型的城市：威尼斯与泻湖保护、帕多瓦的能效规划、罗马和米兰的可持续交通系统。

生态建筑是本期培训的主要内容之一，安排学员们考察了帕多瓦的TiFS建筑、Bergamo的新研究中心和实验室，并向学员们讲解了能效认证、生态建筑的最佳技术、旨在减少对环境影响的新能源新材料技术等具体问题。



### International Workshop “Air Quality & Mobility in World Cities”

Within the context of the first year “World City Environmental Target” Study Program, the international workshop, “Air Quality & Mobility in World Cities: Experiences, Lessons Learnt and Targets” was organized at the end of 2012 in Genoa. The event aimed to discuss the current status of air pollution in world cities, the main transportation modes and trends over time, and to analyze the impact of acts and policies that have been put into force. World cities’ experiences and case studies have been illustrated and compared, with the final goal being to identify the most important lessons learnt and key environmental targets for the near future.

Mr Massimo Martinelli (Italian Ministry for the Environment, Land and Sea) and Mr Shi Hanmin (Beijing Environmental Protection Bureau) opened the workshop, highlighting the goals and the achievements of the Sino-Italian Cooperation Program for Environmental Protection.

Beside keynote speakers from IMELS and Beijing EPB, a number of international experts with recognized expertise in air quality and sustainable mobility sectors presented case studies and experiences on addressing the issue in other world cities. During Session 1 - following the technical insight into the project, provided by Mr Marco Cremonini (D’Appolonia) - Mr Fabio Casiroli (Politecnico di Milano), Mr Ivo Allegrini (IMELS’ advisor for environmental issues) and Mr Gianluca Saba (Municipality of Genoa), highlighted important topics regarding urban mobility and air quality in city management. Session 2 analyzed the impact of acts and policies regarding air pollution and mobility in London,

### “世界大城市空气质量与交通运输”国际研讨会

在“世界城市环境目标”研究项目实施的第一年，在2012年末在热那亚召开了主题为“世界城市空气质量和交通运输：经验、教训与目标”的国际研讨会。这次活动的目的是讨论世界大城市空气污染的现状，主要的交通运输方式和变化趋势，并分析所采取的行动和政策产生的影响。对世界城



市的经验和案例进行了介绍和比较，旨在找出最重要的经验教训和近期最主要的环境目标。

意大利环境、领土和海洋部的代表马特奈力先生（音译，Massimo Martinelli）和北京市环保局的史捍民先生致开幕词，高度评价了中国-意大利环境保护合作项目的目标和所取得的成就。

在继意大利环境部和北京市环保局代表做主旨发言之后，由空气质量和可持续交通领域的著名国际专家

Milan, Bologna and Beijing, with talks by Ms Liz Halsted from Transport for London, Ms Silvia Moroni from Agenzia Mobilità Ambiente Territorio, Mr Cleto Carlini from the Municipality of Bologna and Ms Lu Jianru from Beijing EPB. The International Workshop facilitated the exchange of experiences, to achieve the objective of opening a global think-tank on world cities and on the “Air Quality and Mobility” topic; moreover it provided new inputs for the development of the Beijing Environmental Action Plan.

### International Forum on Green Growth: A Joint Perspective from China and Italy

The International Forum on Green Growth took place at VIU Campus in Venice from November 26<sup>th</sup> to 27<sup>th</sup>, 2012, promoted by the Italian Ministry for the Environment, Land and Sea and organized by the Chinese Academy of Social Sciences, in collaboration with Venice International University and Cà Foscari University. The forum opened a discussion among international experts on the chances and challenges in establishing a new alliance for green growth between China and Italy.



们介绍了世界一些大城市的案例研究和经验。在会议第一节，Marco Cremonini (D’Appolonia)首先对项目技术部分进行了深入的介绍；然后由 Fabio Casiroli (Politecnico di Milano), Ivo Allegrini (意大利环境部环境问题顾问)和Gianluca Saba (来自热那亚市)分别发言，他们从不同角度阐明城市交通对空气质量影响至关重要。会议第二节分析了在



伦敦、米兰、博洛尼亚和北京等城市采取的行动和政策所产生的影响，发言专家包括伦敦交通部的Liz Halsted女士、来自Agenzia Mobilità Ambiente Territorio的Silvia Moroni女士、博洛尼亚的Cleto Carlini先生、和北京市环保局的卢建茹女士（音译，Lu Jianru）。本次国际研讨会促进了经验交流，达到了开启“世界城市和空气质量与交通”全球智囊团的目的，并为《北京环境行动计划》提供了新的思路。

Over 60 high level officers, academics and top managers participated in the forum and addressed topics related to government, academia and market perspectives.

A welcome gala dinner was held at Ca' Foscari University, with an introduction and background information on the forum. Giorgio Orsoni, Mayor of Venice, H.E. Corrado Clini, Italian Minister for the Environment, H.E. Wu Xiaoqing, Vice-Minister of Environmental Protection, P.R. of China, Prof. Carlo Carraro, President, University of Ca' Foscari, Prof. Jin Bei, Director General, Institute of Industrial Economics, CASS, and other experts attended the presentation. The forum was held on November 27<sup>th</sup> at Venice International University, on the island of San Servolo, Venice and included the following five sessions: Green growth, a common political perspective; Can the Green Economy bring world economy back to a healthy track?; The role of governments, policies and measures to facilitate the green economy; The role of enterprises in the green economy - cases and experiences, difficulties and barriers; Perspectives



for the cooperation and business links between Europe (Italy) and China. The panelists acknowledged that moving towards green growth may be challenging, with the increased constraints imposed as a result of the low growth in the world economy as a whole, and by the economic depression in some of the more advanced sections of the world economy. Nonetheless, they noted that the most promising opportunities come from new strategic

### “绿色增长国际论坛”在威尼斯举行：从中国和意大利的角度看

“绿色增长国际论坛”于2012年11月26-27日在威尼斯举行。该论坛由意大利环境、领土和海洋部、中国社会科学院、威尼斯国际大学和Ca Foscari大学联合举行。论坛围绕在中国-意大利两国间建立新联盟，合力推动绿色增长所面临的挑战与机遇进行了广泛交流。60多位资深官员、学者和高级管理人员参加了论坛，并从政府、学术界和市场前景等角度进行了研讨。

在Ca Foscari大学举行了欢迎晚宴上，介绍了论坛和相关背景信息。威尼斯市长奥索尼先生（音译，Giorgio Orsoni）、意大利环境部部长克里尼（音译，Corrado Clini）先生、中国环境保护部副部长吴晓青先生、Ca' Foscari大学校长卡若罗（音译，Carlo Carraro）先生、中国社科院工业经济研究所所长靳倍（音译，Jin Bei）教授等参加了晚宴。

该论坛于11月27日在威尼斯国际大学圣塞尔沃洛岛（音译，San Servolo）上举行，会议内容包括以下五部分：绿色增长——一个共同的政治观点；绿色经济能否将世界经济带回到健康轨道；政府部门和政策在促进绿色经济发展方面的作用；企业在绿色经济中发挥的作用——案例和经验、困难和障碍；中欧（意大利）合作领域和具体的合作环节。

专家们承认转向绿色增长具有很大的挑战性，特别是在当前世界经济整体增速降缓，并且在一些世界经济较先进的领域也出现了萧条现象，因此挑战更为严峻。不过尽管如此，专家们还是指出，最大的机会来自于新的战略合作伙伴关系，即在成熟经济体（即在研发和创新领域领先、但当前处于经济萧条阶



partnerships among a mature economy (that have leadership in R&D and innovation but are in a phase of economic depression) and emerging economies (that are still in a phase of growth and have great technological potential), able to establish win-win relationships, which would help the development and consolidation of a green economy, both in emerging and developed countries.

### SICP Supports China on Industrial Sites Decontamination

The “Technical Support for Contaminated Site and Soil Remediation Management” project was recently closed successfully in Beijing with the attendance of government officers, academics and industry representatives. The project was jointly implemented by Chinese and Italian experts under the Sino-Italian Cooperation Program for Environmental Protection, with the aim of providing support to the Chinese authorities involved in the prevention and management of soil contamination, with a focus on an applicable system of standards and guidelines for the cleanup of contaminated soils. The first national set of Threshold Level Concentrations for contaminated sites screening was proposed through research and pilot work for testing and calibrating standards. On the basis of European and Italian experiences, technical specifications and guidelines for Environmental Site Investigations, Risk Analysis, Ambient Background Management, Contaminated Site Management, Contaminated Soil Management and Re-use, Management of Environmental Emergencies and Technical and Administrative Audit Procedures were established. The project has been regarded as a good demonstration case for introducing western methodology and experiences to support China's capacity building and addressing environmental protection problems. Institutional partners, IMELS and MEP, expressed their satisfaction with the project results and their willingness to continue cooperation in this field, following up from this phase of outcomes.

段）和新兴经济体（仍处于增长阶段，有很大的技术潜力）之间能够建立起双赢的合作关系，这将帮助新兴市场和发达国家逐步转向绿色经济。



### 中意环保合作计划支持中国开展工业污染场地清理

“污染场地和土壤修复管理技术支持项目”近日在北京成功结束，政府官员、专家学者和企业代表参加了项目总结会。该项目得到了中意环保合作计划的支持，由中意两国专家共同完成。通过实施该项目，为中国当局提供了土壤污染的预防与管理方面的技术支持，并提出一套可实施的土壤清理标准和技术导则。

该项目还首次提出识别污染土壤的国家级浓度阈值建议。结合欧盟和意大利的经验，建立了污染场地调查、风险分析、背景环境管理、污染场地管理和再利用、环境应急管理、技术和管理核查程序等方面的技术规范和导则。

该项目被视为引进西方方法和经验、支持中国能力建设解决环境保护问题的典范。意大利环境部和中国环保部都对该项目成果表示满意，并愿意在此基础上进一步开展合作。





Everything is ready for the start in May of the 2013 Sino-Italian Sustainable Development and Environmental Management Advanced Training Program at VIU. As with last year's program, the Sino-Italian course will consist of 15 training sessions in Italy and 4 sessions in China. Eco-cities, including pollution control and innovation management, will be the focus of the 2013 training program arranged in cooperation with the three participating Chinese municipalities, Beijing, Shanghai and Tianjin. Integrated Water Management and Biodiversity will be the focus of the three training sessions, which will be attended by representatives of the Chinese Ministry of Environment (MEP). The topic of Sustainable Industry, including energy efficiency, innovation and science parks, will be investigated by delegations of the Chinese Ministry of Science and Technology (MOST). Climate Change is the main focus in 2013 of the National Development and Reform Commission (NDRC). The Chinese Academy of Social Sciences has just

到2013年5月, 即将在威尼斯国际大学开展的“中国—意大利可持续发展与环境管理高级培训计划”所有准备工作全部就绪。与去年培训计划类似, 今年将在意大利安排15期培训, 在中国安排4期。生态城市, 包括污染控制和管理创新, 是与北京、上海和天津市合作开展培训的重点领域。中国环保部将派员参加三期主题为水资源综合管理和生物多样性保护的培训。中国科学技术部代表团将参加可持续发展培训, 包括能源效率, 创新和科技园区培训。气候变化是2013年国家发展和改革委员会培训的重点。ENEL (意大利能源公司) 基金会确认将支持2013年中意培训合作计划, 主要在能源、创新与气

concluded two sessions on Waste Management and Water Pollution Prevention and Control and will start its training activity again next fall. The ENEL Foundation has confirmed its participation in the Sino-Italian training program 2013 and will contribute with speakers and site visits to a number of training activities focusing on energy, innovation and climate change. Sustainable Development is also the main topic of the 2013 spring edition of the VIU Globalization Program, which will be attended by 13 Tsinghua and Tongji students, along with students from all over the world. Tsinghua is also a partner with VIU, the University of Siena and the ENEL Foundation in a research project devoted to Emission Trading Scheme (ETS), *The Future of Carbon Trading Regulation in the Post-2012 International Climate Change Negotiations*. The research, headed by Siena University's Environmental Legal Team, will investigate the possibility to create a connection between the EU Emission Trading Scheme (EU ETS) and other existing domestic and regional Emission Trading Schemes, and with the New Market Mechanisms (NMMs).



候变化等领域提供授课老师并安排现场考察参观等。中国社会科学院刚刚结束了废物管理和水污染防治与控制两期培训, 并将在今年秋季继续开始相关培训。可持续发展仍然是“全球化2013春季计划”的主题, 13位来自清华大学、同济大学以及其他世界各地的学生将参加这个教学计划。清华大学将与威尼斯国际大学、锡耶纳大学和ENEL基金会合作, 在碳排放交易计划(ETS)领域开展合作研究。ETS将成为“后气候变化谈判的未来碳排放交易机制”。该研究项目由锡耶纳大学的环境法律团队牵头, 将在欧盟排放交易计划(EU ETS)与其他现有的排放权交易计划和新市场机制(NMMS)间建立起联系。



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E DELLA TUTELA DEL TERRITORIO E DEL MARE



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