中国城市绿色建筑和建筑节能发展战略的思考

Strategy of Green Construction and Building Energy Efficiency Development in Urban China

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15-16 November 2007, Tianjin, China

中国当前正处于快速城镇化进程阶段

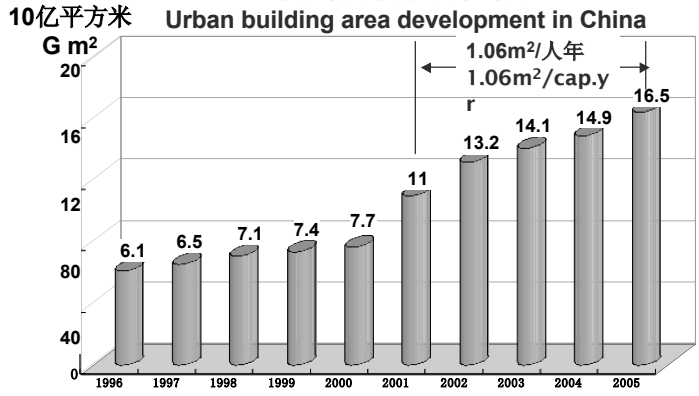
Rapid growth of urbanization in China

- 全国建筑面积 400亿平方米
- 2003年城镇化率已达到41%，并且还在迅速增长

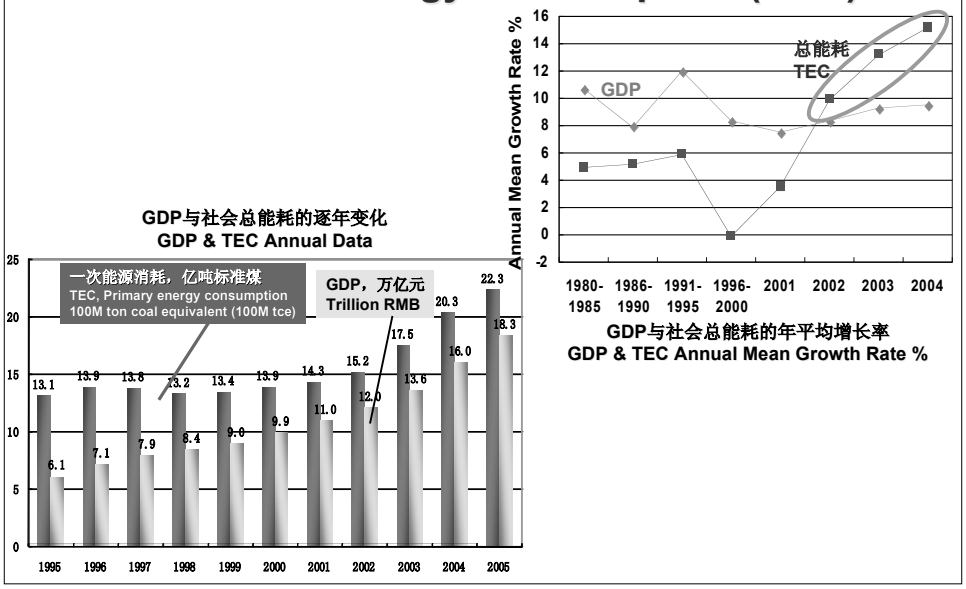
- Total floor area : 40 G m2
- Urbanization ratio of China at 2003 is 41% and still increasing

中国城镇建筑面积增长

Urban building area development in China



我国GDP与一次能耗的变化
GDP Vs. Total Energy Consumption (TEC)



现存有待明确的问题 Current issues

- 中国与发达国家相比城镇建设水平的真实差距究竟在哪里？
- 简单复制发达国家的模式是否可行？
- 建筑能耗、用地、用水和用材、人均住宅面积等方面是否符合中国可持续发展的需求？

- **What is the real difference in degree of urbanization between China and developed countries?**
- **Can China's problems be solved by duplicating the path of developed countries?**
- **Can per capita residential building area and building consumption of energy, land, water and materials meet the goal of sustainable development?**

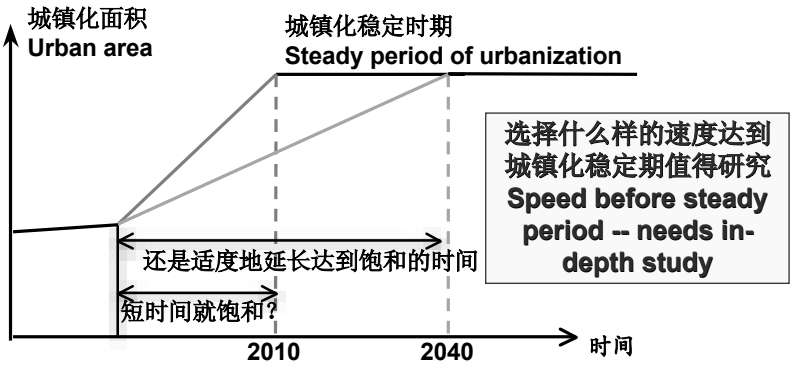
一. 城镇化规模、速度与建筑能耗、资源环境的关系

A. Relationship between the speed of urbanization and pressure on the environment & resources

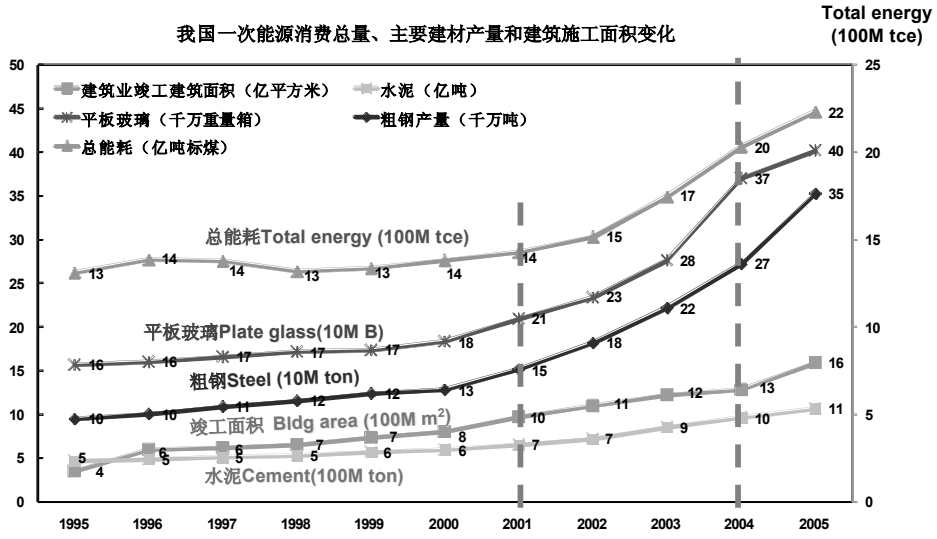
发达国家经验：城镇化速度过快对产业发展有负面影响

Lesson from developed countries: Excessive speed of urbanization negatively impacts industry

- 美国国内钢产量的变化就与城镇化发展速度密切相关，城镇化建设饱和后，钢产业萧条，钢材被迫出口
- **US : Accomplished urbanization led to stagnation in steel industry, and made it have to turn to overseas market**

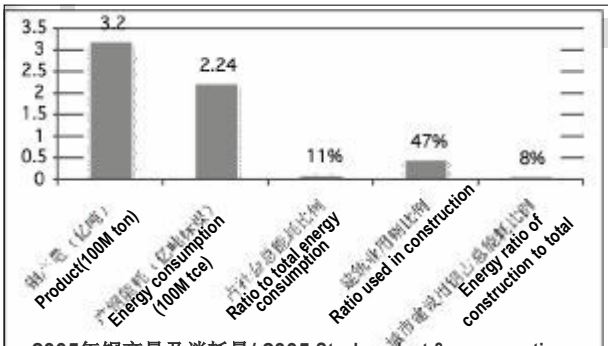


Primary energy consumption and production of main building materials

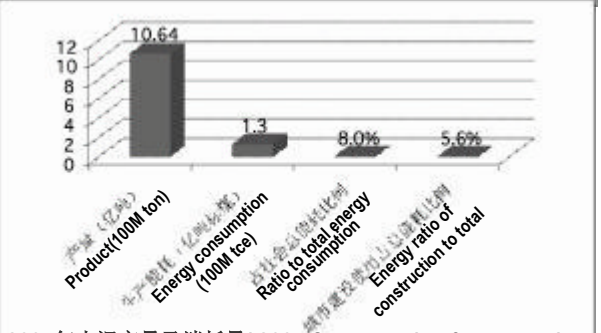


2001年后，我国城镇化快速发展拉动高能耗的建材生产快速增长

After 2001, rapid urbanization accelerated the development of the energy-intensive building materials industry



2005年钢产量及消耗量/ 2005 Steel product & consumption



2005年水泥产量及消耗量/ 2005 Cement product & consumption

□建筑用平板玻璃、陶瓷、塑料、有色金属等建材的生产能耗占全社会商品能耗的4-5%

□2005年由于城镇建设造成的直接和间接的能耗接近我国商品总能耗的20%

□如果建设规模降为一半，则总能耗可降低10%

□ Production of building materials consumers 5-5% of total commercial energy use

□ Direct and indirect building energy consumption was 20% of total commercial energy use in 2005

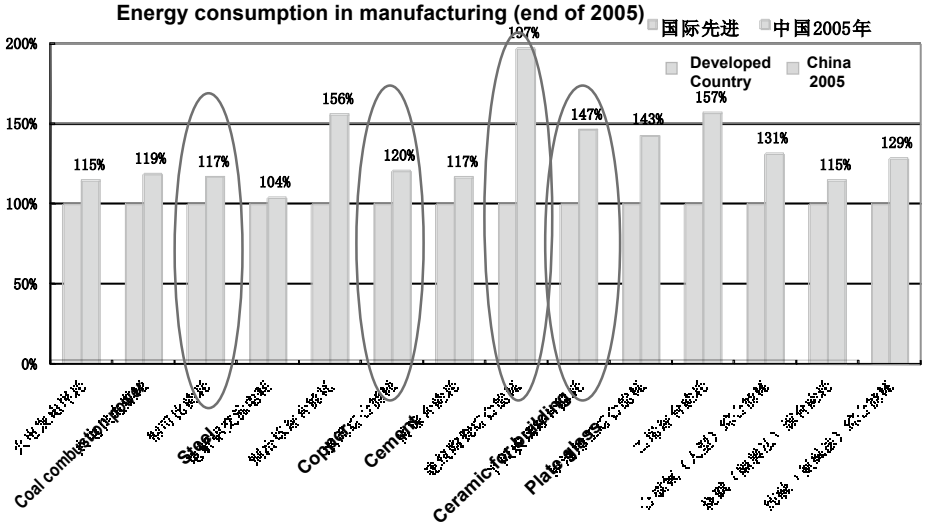
□ If the scale of construction falls by 50%, total energy consumption will decrease by 10%

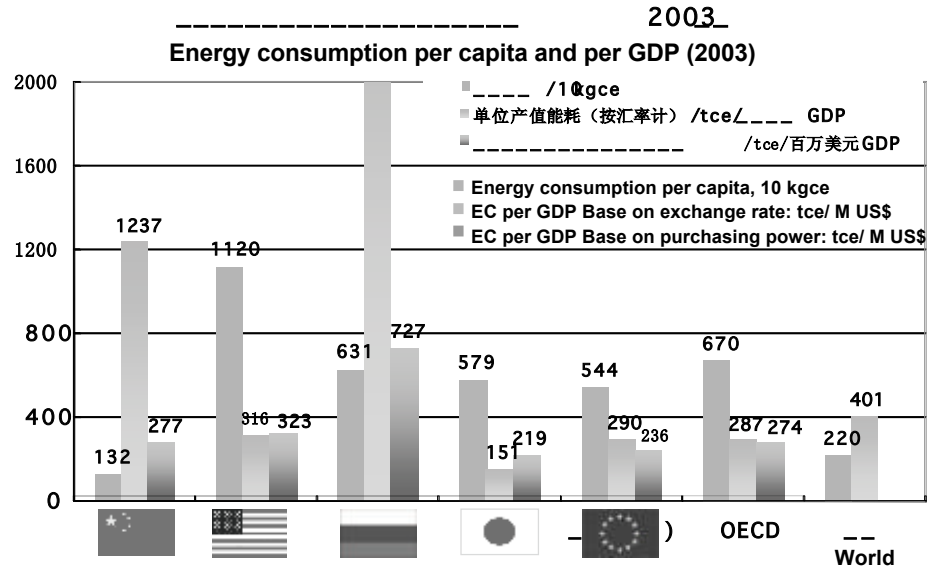
城镇建设过快拉动高能耗产业发展，导致我国单位GDP能耗过高

Rapid urbanization & construction causes high energy intensity

我国主要耗能产品与国际先进水平比较（2005年末）

Energy consumption in manufacturing (end of 2005)

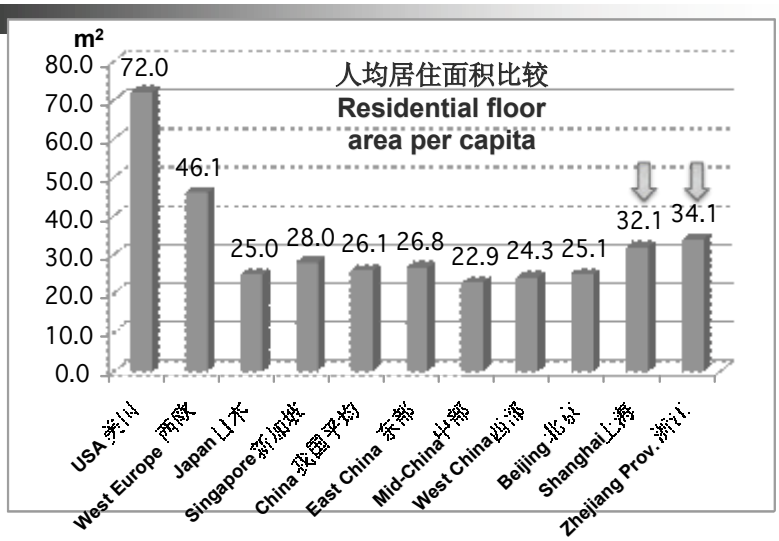




快速城镇化另外的问题
Other issues with rapid urbanization

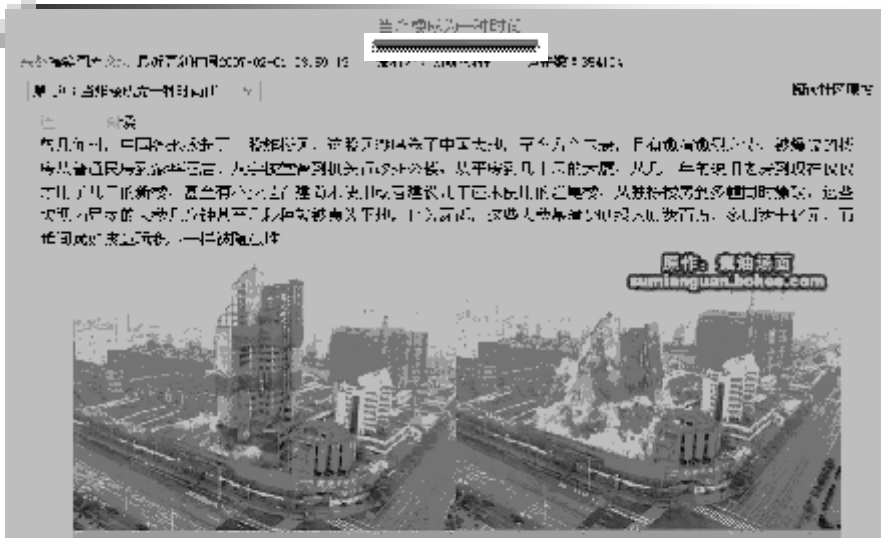
- 耕地减少，土地供应紧
  - 1996～2006年，减少耕地1270万亩/年
  - 如果2020年前保持18亿亩耕地红线不可动摇，则2007－2020，耕地最大净减少量不能超过2700万亩；
- 合理的建筑规模才能保证不超越红线
  - 但是，事实上我国许多地区的人均居住面积已经达到或超过部分 发达国家水平

- Loss of arable land
  - 1996-2006 loss of arable land: 847 k ha/a
  - If required to conserve 120 M ha arable land by 2020, the maximum depletion must be < 1.8 M ha 2007-2020
- The volume construction should be controlled
  - In some areas, average residential floor area has overrun that of developed countries



□ 应该加强控制我国每年新开工民用建筑规模，从目前的十多个亿平米，在五年内逐渐减少到6亿m²/年。

□ Areas of new construction should be reduced from over 1 billion m²/a to 0.6 billion m²/a



土地供应不足，导致部分省市“拆楼”“炸楼”频繁

In some regions, buildings have been demolished to make land available for new construction

总结 Summary

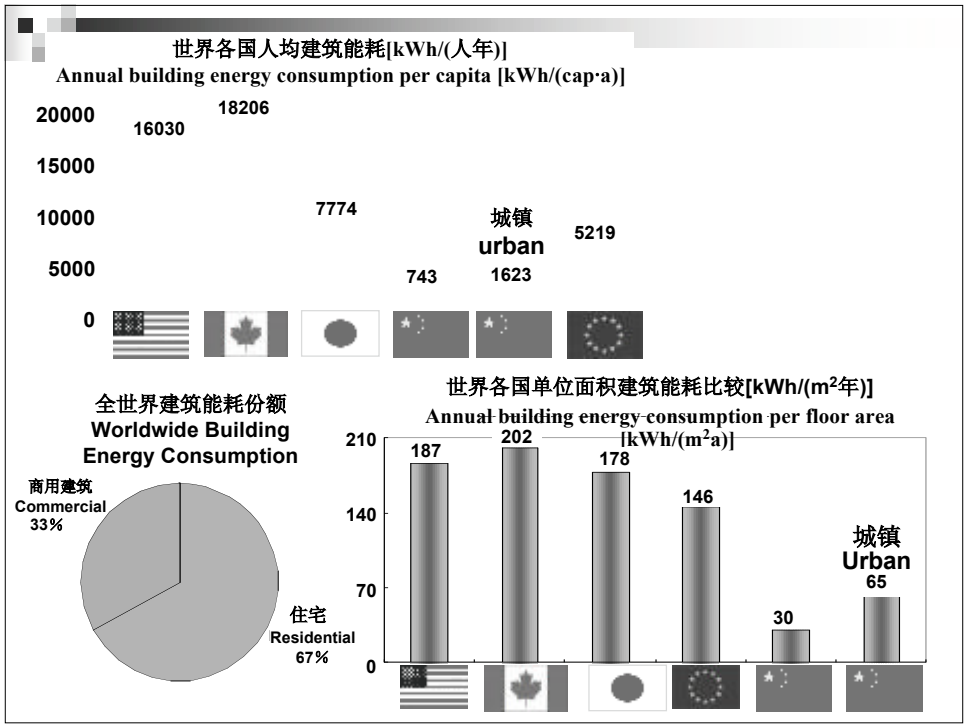
- 必须根据未来需要合理控制城市建设规模和速度，不仅是建设资源节约型社会的重要内容，也是按照科学发展观，实现我们城市建设的可持续发展的基本保证
- **Controlling the scale & speed of urban construction according to the plans of development is crucial to China’s sustainable development**

二. 中国城镇建筑节能工作

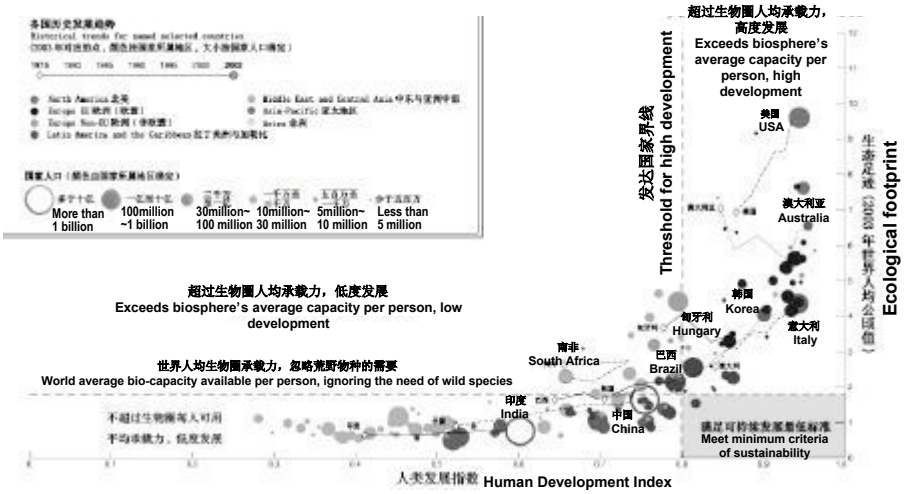
B. Building Energy Efficiency in Urban China

我国建筑能耗现状
Status of building energy consumption in China

	类别 Type		面积 亿m² Floor area 100M m²	年能耗 Annual energy consumption
农村住宅 Rural housing	仅统计商品能源		240	4000万吨标煤+900亿度电 40 M tce + 90 B kWh electricity
城镇民用建筑 Urban building	北方采暖 heating in north		65	1.3亿吨标煤 130 M tce
	除采暖外能耗 Building energy exclude heating	住宅用能 residential	95	2600 亿度电 260 B kWh electricity
		普通公建 Common commercial	50	1500 亿度电 150 B kWh electricity
		大型公建 Large commercial	5	900 亿度电 90 B kWh electricity
		总计 Total	150	5000 亿度电 500 B kWh electricity
总计 Total	标煤 1.7亿吨 ，约占煤产量的12% 170 M tce, 12% of coal production 电力5900亿度，约占电力总产量的27% 590 B kWh, 27% of power production 总能耗占我国商品能的20% 20% of total commercial energy production			



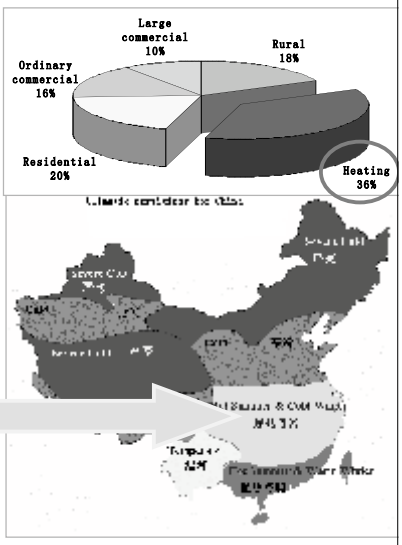
各国人类发展与生态足迹
Human development and ecological footprint



来源：世界自然基金会, 2006年 / Source: World Wildlife Fund, WWF, 2006

北方供热问题 Energy for Heating

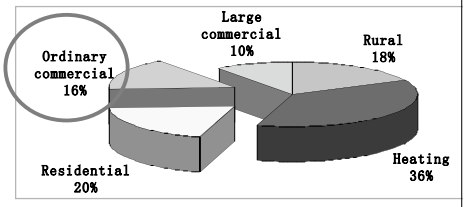
- 北方建筑采暖能耗高、比例大，为建筑节能的重点
- 系统效率低与建筑保温不良导致采暖能耗是北欧相同气候区的1.5-2倍
- 16.3% floor area ⇒ 36% energy
- Poor efficiency and insulation: consumers 1.5-2 times as much energy as northern Europe
- 长江流域大面积新增采暖需求，必须找到有效节能的解决方案，否则将带来沉重的能源负担
- Heating demand grows rapidly in Yangtze river area, urgent need for energy-saving solution.



住宅与普通公共建筑能耗

- 36%面积消耗36%的建筑能源
- 与发达国家相比能耗尚处在较低水平，但随生活质量的提高呈增长趋势
- 36% of total floor area, 36% of energy consumption
- Lower energy consumption relative to developed countries, due to lifestyle and services, huge potential for increase

Residential & ordinary commercial buildings (heating excluded)



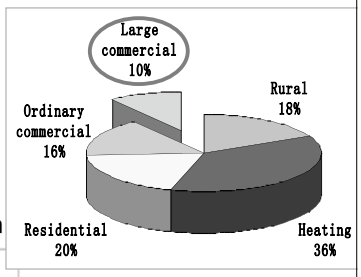
中美建筑能耗对比 US vs. China

kWh/m²a	住宅 Residential	普通公共建筑 Ordinary Commercial
中国 China	27	32
美国 US	97	260

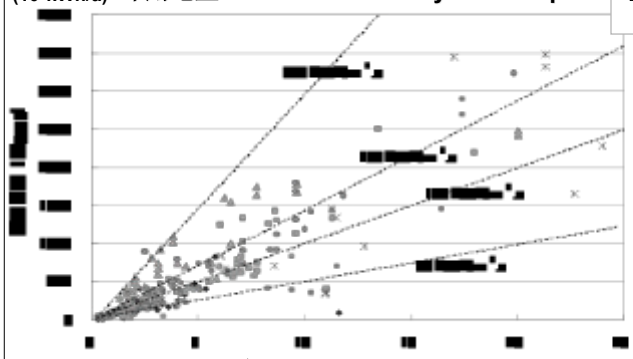
大型公共建筑 Large commercial building

- 大型公共建筑能耗浪费严重
- 节能潜力大
- 新建建筑中此类建筑的比例呈增长趋势

- Large savings potential
- High energy consumption: 1.25% floor area ⇒10% energy
- Proportion of new construction is rising



(万kWh/年)
(10⁴kWh/a) 年用电量 / Annual Electricity Consumption

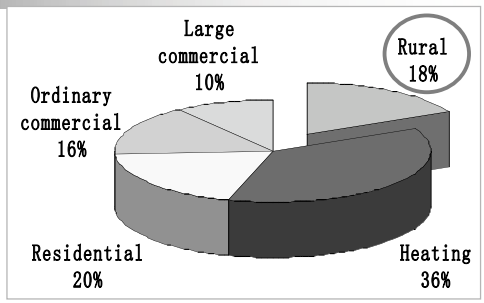


建筑面积(万m²) / Floor area (10⁴ m²)

- 追求所谓高新技术，注重贴标签和形象工程，造成高投资低收益
- Expensive 'high-tech' appliances: more label than benefit

农村建筑 Rural Buildings

- 农村建筑能耗低，非商品能源占70%；目前有被商品能源替代的趋势
- 必须寻求解决农村用能问题，且能保护生态环境的方法



- Trend: turn primary bio-energy into commercial energy
- Need to develop sustainable approaches for rural buildings
- 60% of floor area ⇒ 18% of energy
- 70% bio-energy (e.g. straw, firewood)

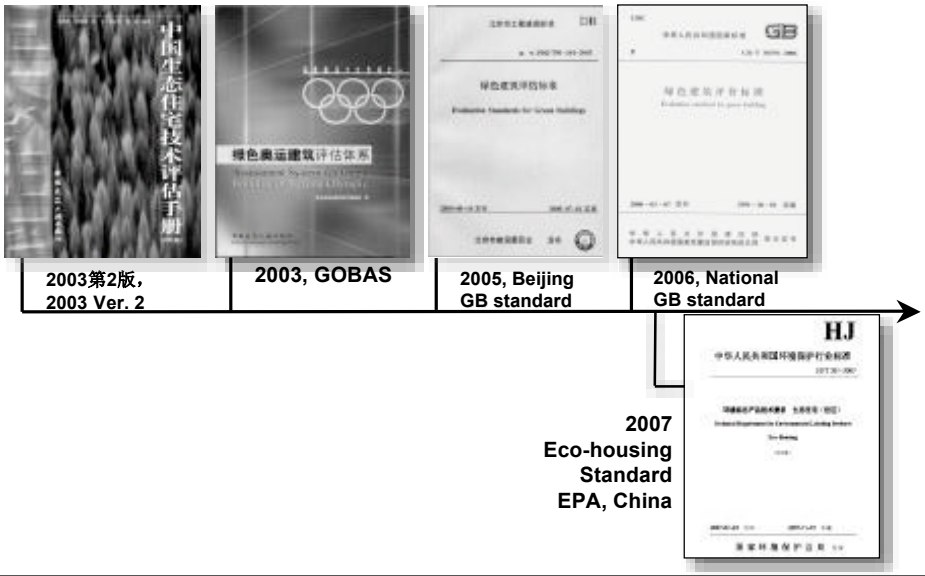
全面开展建筑节能工作的建议
Recommendations for further energy saving

建筑分类	节能重点工作	到2020年节能目标
北方城镇建筑采暖	新建建筑提高保温水平降低需热量；提高集中供热系统效率；	采暖建筑面积增加一倍采暖总的能源消耗不增加
农村	大力提倡和推广可再生能源利用	不实行由初级的非商品能源向常规商品能源的转换
长江流域	停止热电联产和热电冷三联供区域供冷热方式；发展热泵采暖空调方式	一般建筑采暖空调能耗控制在18kWh/m^{2}年 之内
住宅和一般公建采暖外能耗	推广节能灯具和高效电器 推广节能型生活热水制备方式 提倡行为节能措施	建筑能耗降低25%~35%
大型公建	应用成套低能耗大型公共建筑技术	新建建筑降低50%以上 既有建筑能耗降低30%

三. 关于绿色建筑标准体系

C. Development of Green Building (GB) assessment system in China

中国绿色建筑评估体系的发展
Development of Green Building Rating System



现状 Current Status

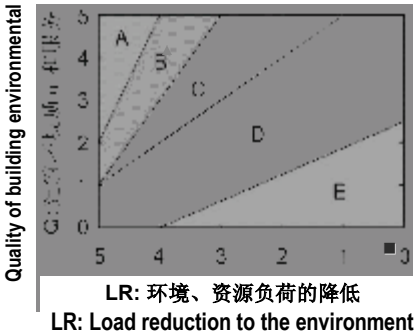
- 绿色建筑评价标准、体系的推动模式
  - 国际上多数评价标准是民间形式
  - 日本是政府推动
  - 纯市场的发展模式在当前中国国情下可能走偏，绿色建筑的发展应该是政府督管＋市场的方式，同时，第三方认证、奖励、惩罚机制有待健全
- **Systems for GB assessment**
  - **Most GB assessment systems are operated by NGOs**
  - **Japan: government-run**
  - **China: feasible system would combine government monitoring with market incentives, with verification by independent agencies and regulations**

绿色建筑发展策略 Strategy for GB development

- 我国绿色建筑发展水平参差不齐，应先在发达、典型省市试行，再逐步推开
- 采用Q/L的建筑环境负荷二维评价方法更适合中国国情

- **Practical pilot projects in developed areas**
- **Quality/Load 2-D evaluation system is appropriate to China**

$$B = \frac{Q}{S+H} = \frac{Q}{L}$$



LR: 环境、资源负荷的降低
LR: Load reduction to the environment

绿色建筑所追求的就是建筑收益B最大化

Q: 建筑环境质量

S: 占用和消耗的自然资源

H: 对环境的影响和破坏

Maximize B (benefit)

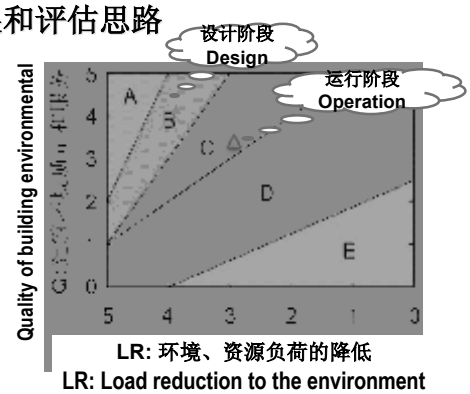
Q= building environmental quality

S= resources consumed

H= environmental impact

- 多个绿色建筑案例在设计阶段和运行阶段的目标差异大，表明了我国绿色建筑建设中经验不成熟，以及在施工和运行调试中存在制度性的欠缺
- 应该推动基于全过程管理的绿色建筑发展和评估思路

- **Implementation effects often fall far short of GB design targets, indicative of institutional shortcomings in the construction process**
- **Evaluation and monitoring should occur throughout the construction process**



LR: 环境、资源负荷的降低
LR: Load reduction to the environment

- 应避免高科技、高投资的发展思路，避免简单复制发达国家经验，避免技术和产品的堆砌展示
- 鼓励被动式、低成本发展道路，鼓励技术和建筑的有机集成

- Should not simply duplicate those high-tech but high-cost technologies from developed countries nor make building a hi-tech collection
- Should promote low cost, passive technologies, and integrated design

济南交通学院图书馆
（1.5万平米，2003建成）
2007绿色建筑创新奖一等奖
A library: 1st class award for Green building innovation 2007

建安成本：2150元/m²

拔风烟囱

湖水源空调

防西晒墙

中庭自然通风采光

谢谢！

Thank you for your attention!

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International Practices on Regulatory Systems and Incentives for Green Buildings Development

国际绿色建筑法规体系和经济激励政策研究

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Presented at the International Mayors' Forum on Sustainable Cities, November 15-16, 2007, Tianjin, China

国际环境可持续发展研究所

GREEN BUILDING CHANGES

Outline 大纲

大纲
Outline

- 绿色建筑和城市可持续发展
  Green Building and Urban Sustainability
- 发展绿色建筑的障碍
  Key Barriers of GB Progress
- 国际有效政策措施和解决方案
  Major Policy Instruments to Overcome Barriers
- 国际有效政策措施和解决方案
  International Best Practices and Solutions
- 经验教训
  Lessons Learned
- 总结
  Conclusions

GREEN BUILDING CHANGES

1. 绿色建筑和城市可持续发展
Green Buildings and Urban Sustainability

❖ 展示全球各地为发展节能建筑所采取的法规和激励政策

❖ What the global communities are doing in regulatory and financial incentive instruments and practices

内容 Content

❖The necessity of green building development for achieving urban sustainability

❖论述绿色建筑发展对中国实现城市可持续发展的必要性

❖Some best practices and appropriate policies to improve China's green building development

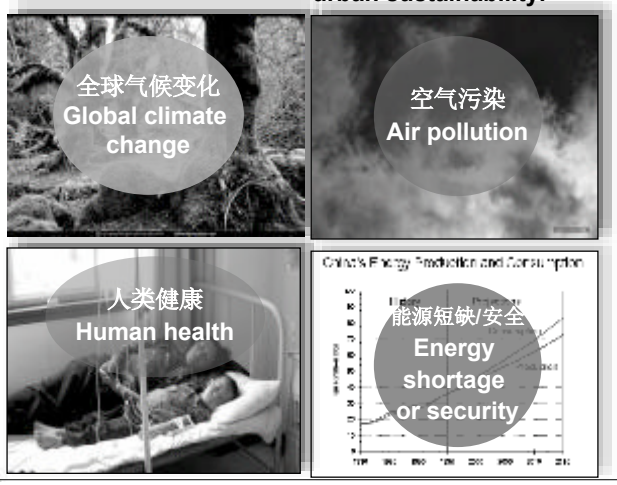
❖中国绿色建筑发展可以借鉴的优秀措施和适宜政策

GREEN BUILDING CHANGES

实现城市可持续发展的新挑战
New Challenges in Achieving Urban SD

我们的城市正面临着一系列环境、经济、能源方面的挑战。这些挑战相互联系，共同影响着城市可持续发展

Our cities are now facing a range of environmental, economic, and energy challenges. These challenges are interconnected in ways that influence urban sustainability.



GREEN BUILDING CHANGES

建筑和城市的不可持续发展
Buildings and Urban Un-Sustainability

- 多数国家，建筑消耗：
- **In most countries, buildings account for:**

❖建筑消耗的能源远比汽车和卡车多

❖主要的温室气体排放源

❖ **Buildings consume far more energy than cars and trucks (WBCSD, 2007)**

❖**The primary greenhouse gas (GHG) source (WBCSD, 2007; UNEP, 2006).**

GREEN BUILDING CHANGES

绿色建筑在城市可持续发展中地位重要（1）
Green Buildings Play a Key Role in Urban SD (1)

根据美国绿色建筑委员会
Based on the U.S. Green Building Council (USGBC)

新就业机会和商业机会
GB creates many new business opportunities and employments -economic SD

在欧洲
In Europe

GREEN BUILDING CHANGES

绿色建筑在城市可持续发展中地位重要（2）
Green Buildings Play a Key Role in Urban SD (2)

Based on the U.S. Green Building Council (USGBC)

- GB uses 30 - 60 percent less energy
- GB uses renewable, recycled and least-toxic building materials
- GB is located to minimize its environmental impact
- GB 's highly efficient with low operational costs
- GB 's resource-efficient, conserves water and produces little wastes
- GB provides a healthy indoor environment
- GB features protects the ecosystem

根据美国绿色建筑委员会资料

- 绿色建筑比普通建筑节约30％～60％的能源
- 绿色建筑使用可再生、可循环、最少毒性的建筑材料
- 绿色建筑选择在对周围环境影响最小的地方建设
- 绿色建筑高效低耗节省成本
- 绿色建筑高效利用资源、节水、产生垃圾少
- 绿色提供健康的建筑室内环境
- 绿色建筑有保护生态环境的特性

GREEN BUILDING CHANGES

绿色建筑在城市可持续发展中地位重要（2）
Green Buildings Play a Key Role in Urban SD (2)

在欧洲
In Europe

- •减少目前用能的1/5
- •到2010年，通过对新老建筑实行更加有效的标准，减少4500万吨二氧化碳排放 (UNEP, 2007).

- •Save more than one-fifth of present energy use
- •Reduce up to 45 million tons of CO2 per year by 2010 applying more effective standards to new and existing buildings (UNEP, 2007).

GREEN BUILDING CHANGES

2. 绿色建筑发展的障碍是什么
What are the Barriers of GB Progress?

节能建筑发展依然面临着市场、法规、经济、技术和其他方面的障碍

Energy efficient buildings' development are still facing market, regulatory, financial, technical, and other barriers

GREEN BUILDING CHANGES

节能建筑发展障碍
Barriers for promoting energy efficiency buildings

Barrier Type	Description
Technical	Technologies may not yet be available
Knowledge/ information	Stakeholders are not aware of the existing technologies
Institutional	There is a lack of well defined structure to facilitate energy efficiency investments

Source: Ecofys et al , 2007; UNDP, 2007

GREEN BUILDING CHANGES

障碍类型	简单描述
技术	技术也许无法获得，或者不被认同
知识/信息	缺乏新的信息，社会不关注已经存在的技术
经济	节能建筑的初始成本比较高
制度	机构协调问题，缺乏定义良好的框架来支持节能投资
投资者-用户	开发商将承担节能建筑投资的初始成本，而建筑的使用者则享受经济收益（低能耗支出）
兴趣不足	商业界并不把节能作为优先考虑的事情。节能依赖于建筑居住者的节能意愿。

来源: Ecofys et al , 2007; UNDP, 2007

GREEN BUILDING CHANGES

经济障碍：市场机制失灵
Economic Barrier: the market failures

❖开发商/用户的尴尬：建造者承担初投资但用户享受节能收益

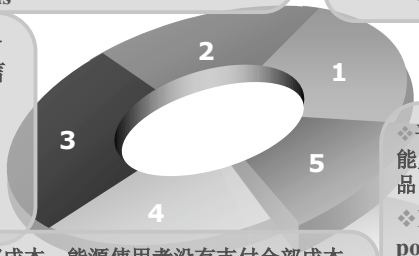
❖Developer/user dilemma: building constructors bear the first cost while the users collect benefits with lower energy bills

❖初投资：节能建筑投资较高

❖ First cost: energy efficiency buildings many have higher first costs

❖缺少成本信息：市场分配假设决策者有很好的信息

❖Lack of cost information: market allocation assumes that decision makers have perfect information



❖平均性：穷人没有能力投资新的节能产品

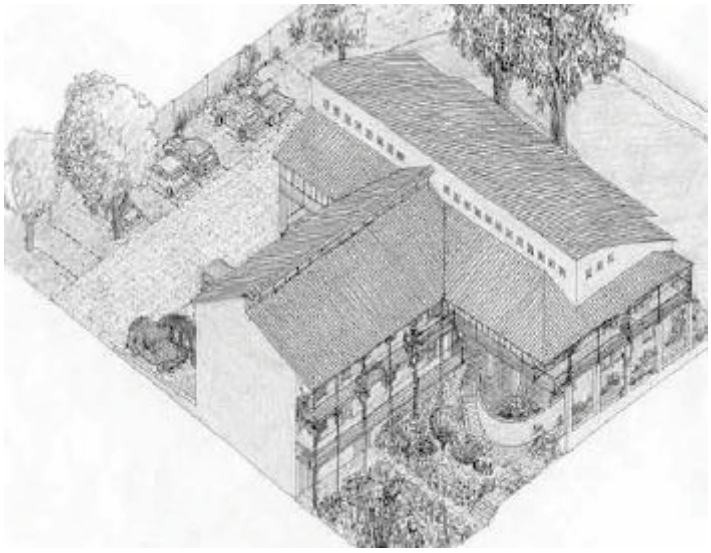
❖Equity issues: the poor people do not have the capability to invest new energy efficiency products

❖外部成本：能源使用者没有支付全部成本－环境污染，温室气体排放和能源安全

❖Externality costs: energy users do not pay the full cost – e.g., air pollution, GHG emission, and energy security

GREEN BUILDING CHANGES

3.怎么消除障碍？
How to Overcome Barriers?



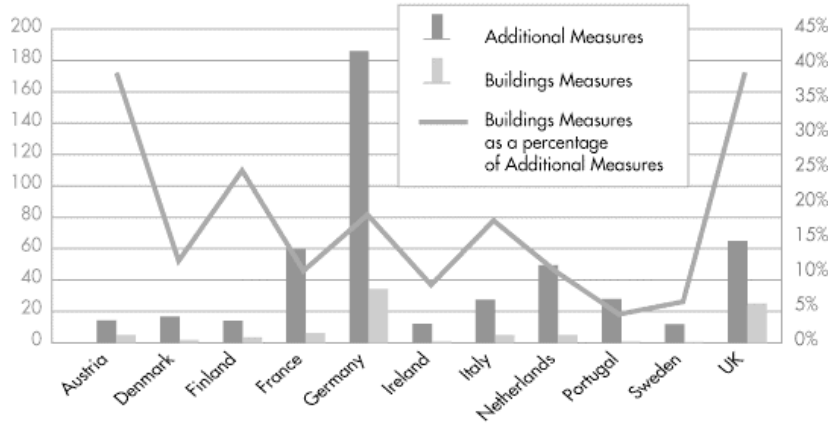
GREEN BUILDING CHANGES

建筑节能政策需求
Need Building Energy Efficiency Policies

高效节能措施需求－政策、法规和经济手段	1	Requires effective and efficient measures –policies, regulations, and economic instruments
主要是政府法规和财政激励手段	2	Focus on government regulations and financial incentive instruments
这些政策手段的侧重和缺点	3	The strengths and weaknesses of these policy instruments

GREEN BUILDING CHANGES

建筑节能政策需求
Need Building Energy Efficiency Policies



EU Member States Energy Efficiency improvements in buildings as a proportion of additional measures proposed under UNFCCC Third Communications

Source: An Assessment of EU Member States' Climate Change programs and the likely contribution to these from buildings related measures, UK Association for the Conservation of Energy, 2002

GREEN BUILDING CHANGES

法规和经济措施
Regulatory and Economic Instruments

节能法规和标准，包括强制性的	1	Energy efficiency codes and standards including mandatory ones
节能义务相关的强制性目标和要求	2	Mandatory targets or requirements with energy-efficiency obligations
通过经济措施降低节能初投资：补助、财政激励和软贷款	3	Fiscal instruments to lower the first costs: subsidies, fiscal instruments, soft loans
能源税和减税津贴，和各种经济激励措施以刺激更多节能方法的使用	4	Energy tax and tax credit, and various economic incentive instruments with the aim to stimulate more efficient energy use

GREEN BUILDING CHANGES

建筑节能法规和标准
Building energy efficiency code and standard

1. 法规和标准屏蔽了大部分非节能产品和设计 — Codes and standards remove the most inefficient products and design practices

2. 建筑标准是根据气候条件和建筑类型制定 — Building codes are based on climate conditions and are set for different building types

3. 大部分经合组织成员国有国家级、州级和市级建筑节能条例 — Most OECD countries have codes for energy efficiency in buildings at national, state and municipal level

4. 节能标准是推进家用电器和其他设备节能的有效工具 — Energy performance standards are an effective tool for improving the efficiency of appliances and other equipment

GREEN BUILDING CHANGES

经济激励措施
Economic incentive instruments

1. 在欧盟国家，经济政策被广泛应用，尤其是住宅部分 — In EU countries, economic instruments have been applied the most, and the residential sector is the main target

2. 在美国，课税津贴也应用在国家、州、市级的绿色建筑和其他建筑改善方面 — In the US, tax credits are also available for green building equipment and many types of home improvements at national, state and municipal level

3. 长久来看，经济激励比较有效 — Economic incentives are more effective in the long run

GREEN BUILDING CHANGES

4.国际实例 International Examples

GREEN BUILDING CHANGES

政策实例：欧盟－EPBD
Example of Policies: EU-EPBD

1	欧盟建筑节能指导委员会（EPBD）于2003年1月4日正式建立。	The EU Energy Performance of Buildings Directive (EPBD) was entered into force on 4th January 2003
2	提出四点要求促进建筑能源性能的提高	To promote the improvement of building energy performance with four requirements
3	在2006年1月4日，最低能源性能水平标准在EU成员国得到了法律支持。	On 4th January 2006, the minimum requirements for energy performance were legally binding in Member States
4	预计到2010将节省22%的能源消耗量。	An estimated cost-effective savings potential of around 22% of present energy consumption by 2010

GREEN BUILDING

EU-EPBD: Four Requirements
EU-EPBD: 四个要求

1. General framework for a methodology of calculation of the integrated performance of buildings
建构通用的整体能耗水平计算框架
2. Setting of minimum standards in new and existing buildings
为新建和既有建筑设置最低标准
3. Energy Certification of Buildings
建筑能效认证
4. Inspection and assessment of heating and cooling installations
供热制冷安装检测和评估

CHANGES

GREEN BUILDING

政策实例：美国能源政策法规
Example of Policies: The US Energy Policy Act

- 美国国会在2005年8月通过了能源政策法规
- 新的法律有两个重要的节能方案：
  - 不同的节能技术和措施有多种税收激励政策支持。
  - 针对多种应用节能产品和设备制定了一系列节能标准。

- US Congress passed the Energy Policy Act 2005 in August 2005.
- The new law has two significant energy efficiency provisions:
  - Several tax incentives for various types of energy efficiency technologies and practices.
  - A set of energy efficiency standards on several appliance and equipment.

CHANGES

GREEN BUILDING CHANGES

案例：加利福尼亚居民住宅法规
Example: The California Code for Residential House

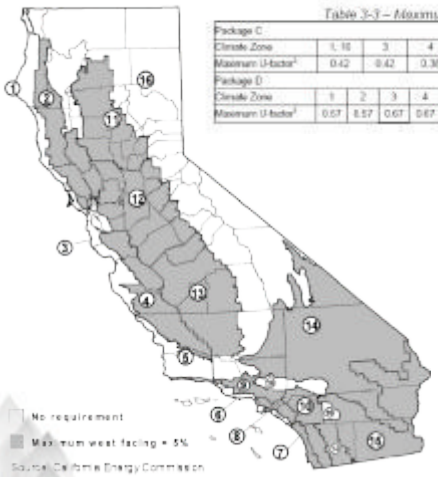


Table 3-3 – Maximum U-factors by Climate Zone in Packages C and D

Package C														
Climate Zone	1, 16	3	4	5	6	7	8, 9	10	2, 11-13	14	15			
Maximum U-factor[1]	0.42	0.42	0.38	0.42	0.42	0.38	0.38	0.38	0.38	0.38	0.38			
Package D														
Climate Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Maximum U-factor[1]	0.57	0.57	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.57	0.57	0.57	0.57	0.57	0.57	0.55

GREEN BUILDING CHANGES

案例：英国可持续发展建筑规定
Example: UK Code for Sustainable Homes

- 作为单一的国家标准，指导建筑部门在可持续建筑发展方面的设计和建造。
- 规定补充了2007年引入了EPBD建筑能源性能指导委员会制定的能源性能水平认证系统。

- **The Code is intended as a single national standard to guide the design and construction of sustainable homes.**
- **The Code complements the system of Energy Performance Certificates which was introduced in June 2007 under the Energy Performance of Buildings Directive (EPBD).**

能源/CO2	energy/CO2	污染	pollution
水	water	健康和福利	health and well-being
材料	materials	管理	management
表面水	surface water run-off	生态学	ecology

GREEN BUILDING CHANGES

Example: US Federal Tax Credits for Building Envelope Qualified Energy Efficiency Improvements

Measure Type	Qualifying Efficiency	Credit Amount
Insulation, vapor retarder, 10% of material infiltration seal	Must meet either 2001 Supplement to 2000 IECC or 2004 Supplement to 2003 IECC	cost not to exceed $500 total
Exterior window, 10% of material skylight, exterior door	The same as above, and ENERGY STAR -rated exterior windows and skylights are deemed to qualify under the special rule in IRS Guidance Notice 2006 -26	cost not to exceed $200 total
Storm window and storm door 10% of material	Must meet either 2001 Supplement to 2000 IECC or 2004 Supp lement to 2003 IECC . Storm windows are eligible if the existing window plus the new storm window meet the window efficien t requirements in the IECC	cost not to excee d $200 total
Metal roofs with Reflective , 10% of material , pigmented coatings	Must meet ENERGY STAR criteria	cost not to exceed $500 total

Source: American Council for an E nergy -Efficient Economy http://www.aceee.org

GREEN BUILDING CHANGES

案例: 关于建筑外壳合格的节能改进措施的美国联邦税务津贴

措施类型	标准要求	津贴额度
绝缘，蒸发，10%的物质渗透率	必须满足 2000 年 IECC 的 2001 年补充或者是 2003 年 IECC 的 2004 年补充	不超过 500 美元
内部窗户，灯，内部的门	同上，同时 ENERGY STAR 评价的内部窗和灯被认为是满足 IRS 指导通知 2006-26 里面的特别规定。	不超过 200 美元
御寒的外层窗，御寒的外层门	必须满足 2000 年 IECC 的 2001 年补充或者是 2003 年 IECC 的 2004 年补充如果现有的外层窗加上新的外层窗满足了窗户的 IECC 节能要求，这也是可以的	不超过 200 美元
能够反射的金属屋顶 一个 10%物质的无光表面	满足 ENERGY STAR 标准	不超过 500 美元

来源：American Council for an Energy -Efficient Economy http://www.aceee.org

GREEN BUILDING CHANGES

加拿大：公共建筑激励项目－新建公共和事业单位建筑
Canada: Commercial Building Incentive Program for new commercial and institutional buildings

根据1997年国家建筑能效标准设立，设定了最低能效值

CBIP is based on the 1997 Model National Energy Code for Buildings (MNECB) with minimum efficiency standards

Building permit issued between April 1998 and March 2007
建筑准许制度在1998年4月和2007年3月实施

Buildings must comply with all of the MNECB's mandatory provisions
建筑必须符合MINECB的强制性指标

Energy efficiency at least 25% higher than the MNECB
能效值比MINECB的标准高25％

GREEN BUILDING CHANGES

5. 经验教训Lessons Learned

GREEN BUILDING CHANGES

制度缺陷Institutional gaps

- **G** 用于部门职责分工和协调不当造成了政策不协调和不一致Uncoordinated and inconsistent Policies because of fragmented institutional structures and Constrained outlooks and actions
- **A** 政府机构是按照一定的经济划分来进行分工 Government agencies are organized based on definable economic sectors
- **P** 每个部委的政策目标是根据自身利益制定的 Policy objectives in each ministry are geared to the agency mandate
- **S** ……

GREEN BUILDING

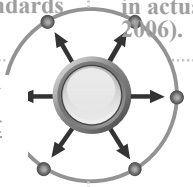
需要提高执法 Need for Enforcement

在英国，2007年国家审计办公室的调查结果显示80%的政府建筑没有达到规定

In UK, the National Audit Office (2007) indicated that 80 per cent would not have attained the required government sustainability standards

建设部最近的调查显示：在中国北方城市新建建筑中，尽管60%在图纸上达到了标准，实际只有30%

The level of energy code compliance in new buildings in northern Chinese cities: while 60% of the buildings complied on paper, only 30% complied in actual construction (Huang, Joe, 2006).



在美国，有些条例执法机构报告有1/3甚至更多的新建建筑不符合能源规定的要求

In the US, code agencies are usually; Some jurisdictions have reported that one-third or more of new buildings do not comply with critical energy code requirements (Alliance to Save Energy, 2005)

丹麦2000年的一项研究显示43%的家庭“忘记”了管道和水箱的绝缘

A 2000 study for Denmark showed that 43 % of households “forgot” insulation of pipes and water tanks (Laustsen, Jens H. 2006)

GREEN BUILDING CHANGES

其他经验教训Other Lessons

L E S S O N

Many policies and programmes do not have sufficient foundation supported by a barrier analysis, and thus have no clear focus on the most required instruments (Eurima, 2006)	Need to take consideration of low income households to meet their demands for energy efficiency equipment and products	Some tax incentive policies that are already widely implemented would be a waste of tax payers' dollars—free riders	Some economic incentive instruments are too complicated involving a large amount of effort and paper work
许多政策和项目没有进行足够的障碍分析，从而无法采取最有效的措施	需要考虑低收入家庭的节能设备和产品需求	有些已经应用的财税政策有可能是在浪费纳税人的钱	有些激励措施太过复杂，需要很多案头工作

GREEN BUILDING CHANGES

总结和建议
Conclusions and Recommendations

1. 根据具体和情况选择一系列合适的措施 — **A range of appropriate instruments should be selected based on specific targets and conditions**
2. 很明显，建筑节能措施政策应该融合城市可持续发展战略或规划 — **It is quite clear that building energy efficiency instruments or policies should be mainstreamed into sustainable urban development strategies**
3. 建筑标准应持续更新以反映新的建筑节能技术和实践 — **Building code must be updated continually to reflect advances in building technologies and practices**
4. 应加强标准的实施和审核，确保标准达到预期目标 — **More effort should be placed to encourage code enforcement and verification to ensure regulations are effective and meeting the standards**

International Practices on Regulatory Systems and Incentives for Green Buildings Development

BUILDING CHANGES

Your invitation and financial support to the Forum are greatly appreciated!

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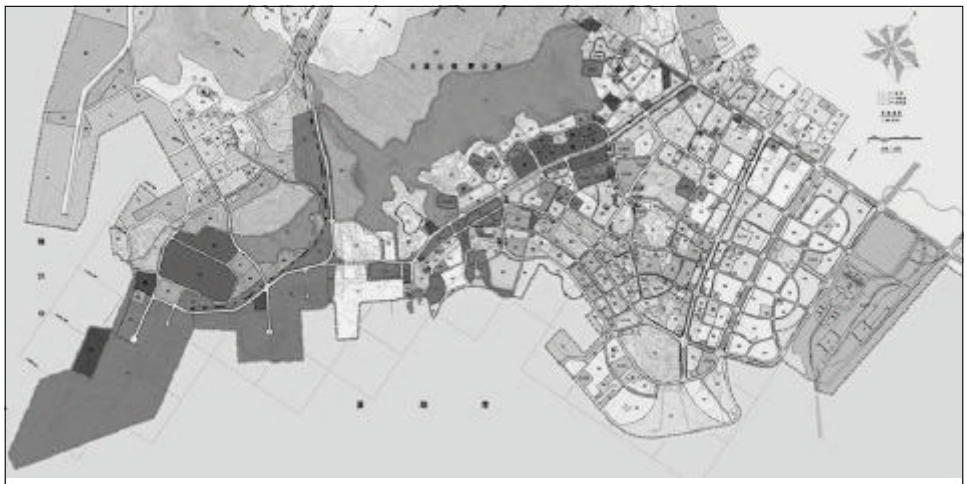
E-mail: yyin@forestry.ubc.ca

International Mayors' Forum on
SUSTAINABLE URBAN DEVELOPMENT

探索绿色地产之路
Towards Green Real Estate Development

JASON HU 胡建新
China Merchants Property Development Co., Ltd.
15 November 2007

China Merchants, headquartered in Hong Kong, was founded in 1872, has over 130 years of history and has been regarded as the "epitome of the century-long history of China's national enterprises."



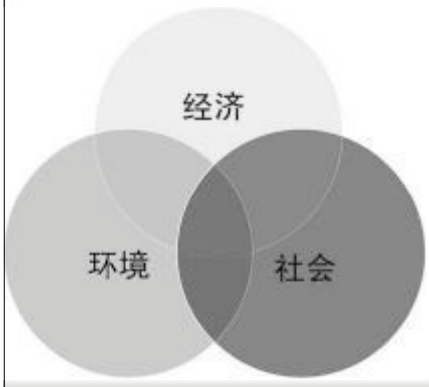
In 1979, China Merchants developed the 11 square kilometer Shekou Industrial Zone, China's first industrial park open to the world. Established in 1984, China Merchants Property Development is one of the core business sectors of China Merchants Group.

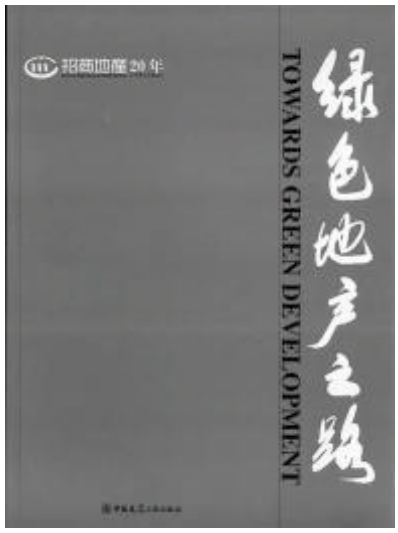
上世纪80年代，袁庚提出,“将蛇口建设成最适合人类生活的地方”

In the 1980's, Mr Yuan Geng, the founder of China Merchants Shekou Industrial Zone, initiated the concept “to make Shekou the most suitable place for people to living in”

绿色地产
—符合可持续发展理念的房地产活动。

Green Development
Sustainable Concept and Practices for Real Estate.





家在·情在 招商地产

招商人的绿色地产

家在·情在

园区开发商

绿色地产商

"Green Development" Concept by the China Merchants is a pursuit of sustainable development that integrates ecology, economy and the society.

Home is where the heart is

Business Park Developer

Green Estates Developer

家在·情在 招商地产

大纲

- 和谐社区开发模式－社区综合开发
- 绿色开发策略－适用、经济、美观
- 国际化人文氛围－视野、社区、合作

Contents

- Harmonious community development model—Integrated community development
- Green Development Strategy—applicable/ practical, economical, beautiful
- International cultural atmosphere —vision, community and collaboration

和谐社区开发模式－社区综合开发

Harmonious community development model—Integrated community development

招商地产之“园区开发商”

以产业、居住互动为核心的 社区综合开发模式

CMPD as Business Park Developer

Integrated community development model with the interaction between industry and residence as its emphasis

社区综合开发的概念

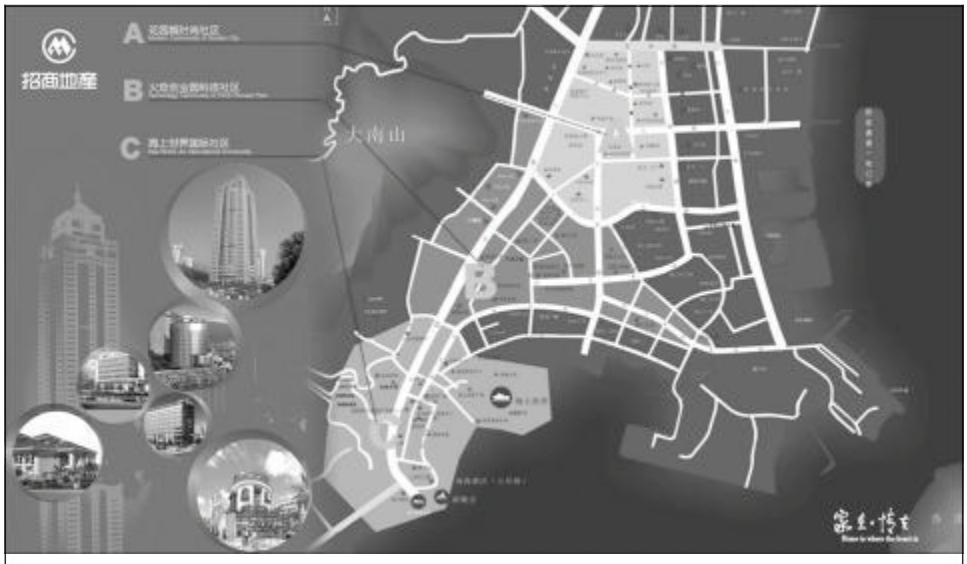
- 在房地产开发过程中，以整个生活社区为项目单元、对其中的各个功能组团（包括住宅区、商业区、交通体系、总体绿化、园林建设及景观体系、教育设施、信息化网络体系和其他生活服务设施等）进行综合规划并同步实施建设。

Definition of Integrated Community Development

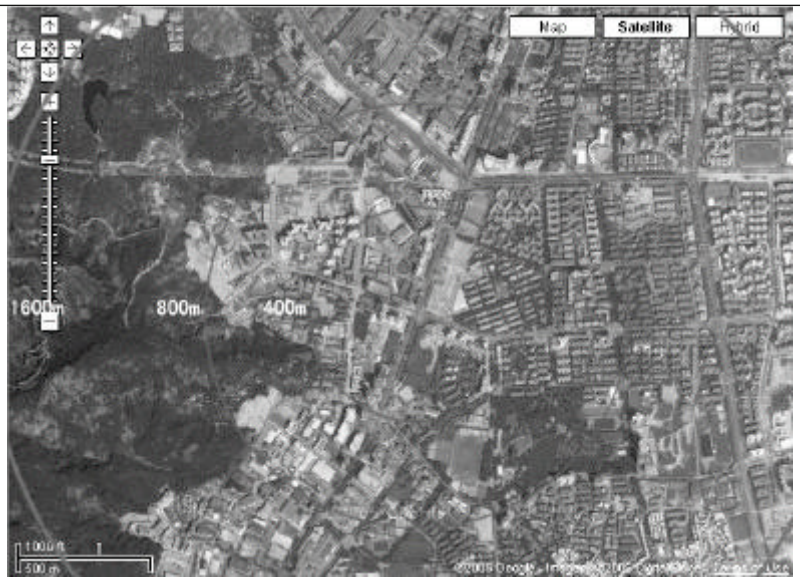
- Take the community as a whole during real estate development, and integrate the different functional elements of the community during planning and development, including: residential areas, industrial areas, business and office areas, entertainment and leisure areas, etc.

社区综合开发－蛇口的部份知名企业

Some of the Famous Corporations in Shekou

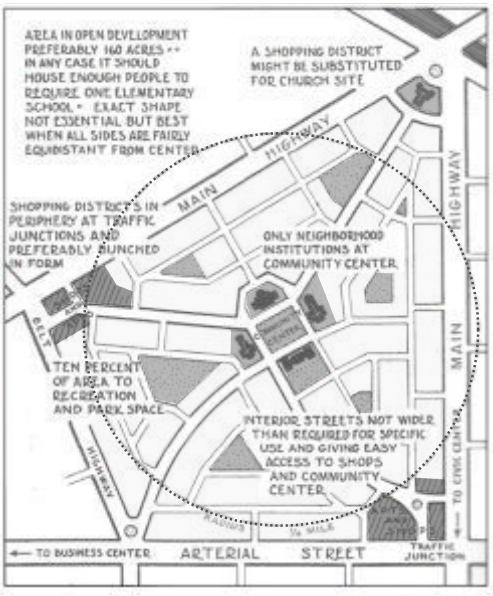


蛇口片区物业分区图 Distribution of properties in Shekou



花园城片区 Garden City Area

海上世界片区 The Sea World Area



新城市主义开发模式

住区内步行解决生活所需
- 公园（步行3分钟）
- 小学
- 多功能商业用途

减少开车必要性10-40%

New Urbanism

Critical mass of Pedestrian Destinations
- Park (3 minute walk)
- Elementary School
- Mixed commercial uses

10-40% Trip Capture

“理性增长”

（1）加强并鼓励在现有社区中发展；

（2）鼓励“可以步行的”、紧密连接的社区；

（3）充分利用现有的社区资源；

（4）保护空地、农田、自然景观和重要的环境保护区；

（5）提供多种交通选择；

Smart Growth

1) Strengthen and encourage growth in existing communities.
2) Foster “walkable”, close-knit neighborhoods.
3) Take advantage of existing community assets.
4) Preserve open space, farmland, natural beauty, and critical environmental areas.
5) Provide a variety of transportation choices.

“理性增长”

（6）混合使用土地；
（7）提供多种档次房屋；
（8）提倡有特色、有吸引力的社区建设；
（9）有关开发的决策不能多变、要公平、并具成本效益；
（10）鼓励公众和利益相关方参与开发决策。

Smart Growth

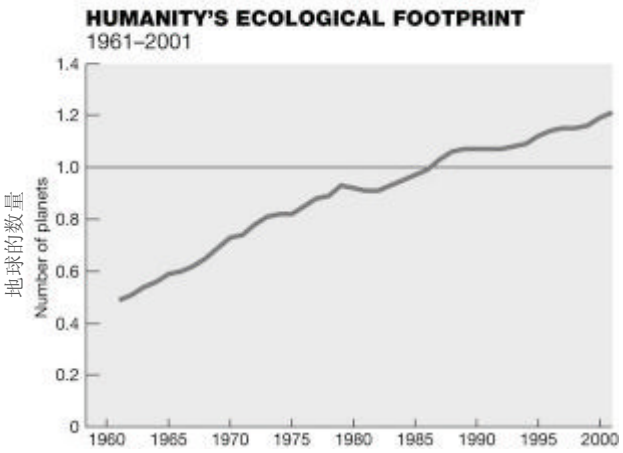
6) Mix land use
7) Create a range of housing opportunities and choices.
8) Promote distinctive, attractive communities.
9) Make development decisions predictable, fair, and cost-effective.
10) Encourage citizen and stakeholder participation in development decisions.

从绿色建筑 From Green Building

到绿色社区 To Green Neighborhood

生态足迹 – 全球生物容量对消耗量

Ecological Footprint – Global Biocapacity vs. Consumption

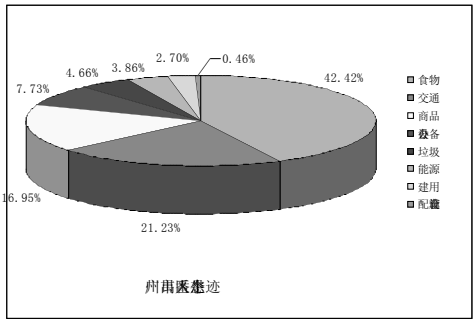


资料来源：WWF”我们生存的星球2002年报告”

Source: WWF Living Planet Report 2002

金山生态足迹研究

- 番禺区的人均生态足迹是4.1公顷/人，相当于2.2个地球的生活方式。



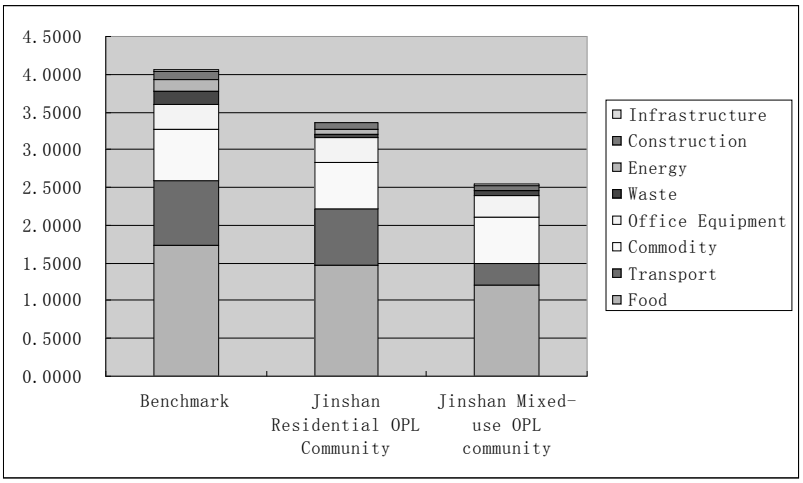
Ecological Footprint Study in Jishan, Panyu Guangzhou

- The per capita EF in Panyu is 4.1 hectares, equal to 2.2 planets

Component	EF	%
Food	1.7249	42.42
Transport	0.8632	21.23
Commodity	0.6893	16.95
Office	0.3141	7.73
Waste	0.1893	4.66
Energy	0.1570	3.86
Construction	0.1096	2.70
Infrastructure	0.0185	0.46
Total	4.0659	100.00

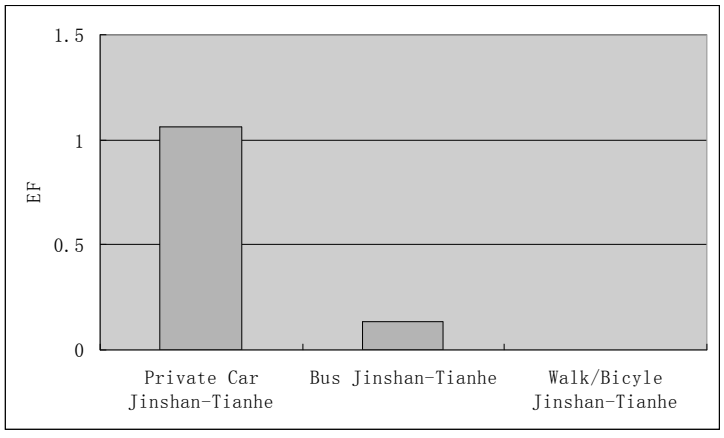
金山不同社区开发模式的生态足迹比较

EF for different development model in Jinshan



金山不同交通方式的生态足迹比较

EF for different transport pattern in Jinshan



绿色开发策略－适用、经济、美观

Green development strategy – applicable/ practical, economical, beautiful

招商地产之“绿色地产商”

- 保护生态环境，提高生活品质，降低资源消耗，降低污染排放；
- 绿色理念与实践贯穿于项目开发全过程。

CMPD as Green Estates Developer

- Protect the environment, increase living quality, reduce resource consumption, reduce polluting emissions.
- Green development concept was practiced through out the whole development process.

泰格公寓

- 服务性公寓
- 土地面积
- 建筑面积
- 共7栋楼（A-G），分别为4，6，25层；
- 232户
- 绿化率45.8%

Taige apartment

- Service apartment
- Land area:17,300m²
- Building area:43,000m²
- 7 buildings in total, named A-G respectively, 4/6/25floor
- 232 units in total
- Fraction of building coverage:26.47%
- Fraction of vegetation coverage:45.8%

家在·博士 招商地產

Geographic position

深圳及周遍相關交通示意圖:

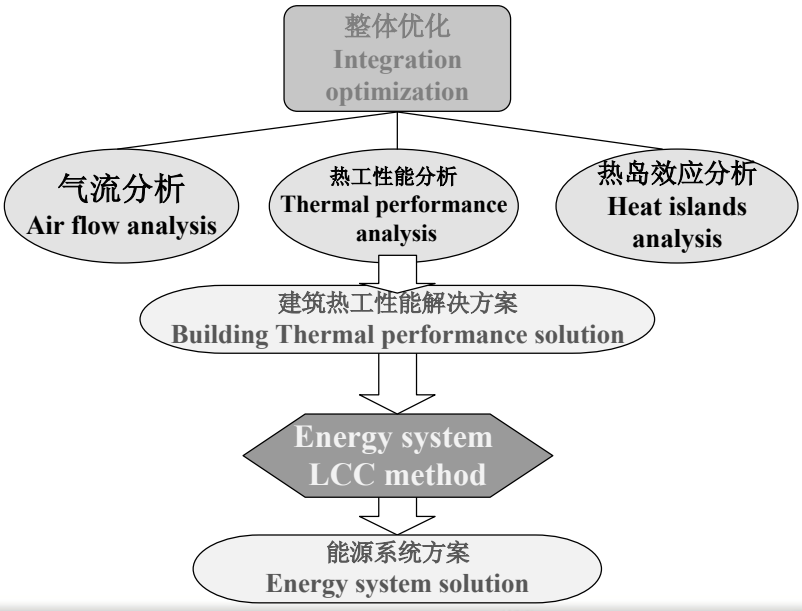
家在·博士 招商地產

节能优化设计

- 室外环境优化设计
- 建筑围护结构优化设计
- 能源系统优化设计

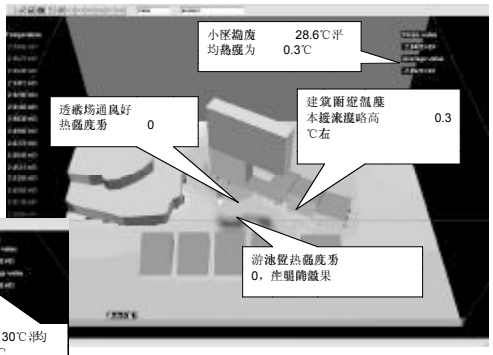
Optimize Energy Performance

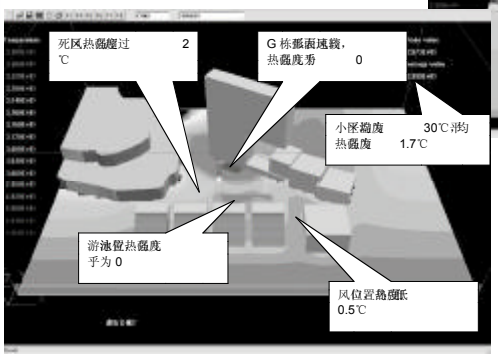
- Exterior environment design
- Building Envelop thermal performance
- Energy system



室外热岛强度分析

- 室外热岛强度降低1 ℃ 可减少制冷能耗3%。





Heat islands analysis

- Reduce heat islands by 1℃ can cause the energy consumption for cooling to reduce by 3%.

遮阳设计
Shading design

- 能源系统
  - LCC手段
  - 具体措施：
    - 高效制冷机，COP=5.6 ，采用环保制冷剂134a，分户计量冷量
    - 空气源热泵户用热水器
    - 照明控制系统，节能灯/感应灯/光电灯
    - 节能电梯

- Energy system
  - LCC method
  - Measures:
    - High efficient refrigerator, COP=5.6 , adopted environment friendly refrigerant 134a, cooling metering for reach unit/cooled water pump frequency conversion
    - Air source heat pump domestic water heater
    - Lighting control system, energy-saving lamp/sense light/Photovoltaic lighting system
    - Energy saving elevator

优化设计效果

Effect of thermal performance optimization
—compared with typical scenario

Item	Typical scenario	Taige apartment
COP of central HVAC system	2.8~3.5	3.77
Installed electric power for HVAC system	For typical unitary air conditioner:40～70w/m^2	24.4w/m^2
Installed electric power for lighting	Limit for energy efficient building in China:6w/ m^2	4.23w/m^2
Electricity consumption for domestic water heating	Electric heater: 37kwh/ton	11.3kwh/ton

泰格公寓设计节能率

Predicted energy cost reduction for cooling and heating at design stage
—Evaluated according to local design standard for building energy efficiency(JGJ75-2003).

Item	A～D	E	F	G
Cooling Area (square meter)	5778.5	2424.8	4817.1	21926.4
Energy Saving	37.2 %	59.5 %	**61.9** %	**71.6** %
Weighted Average Value	**63.7 %**			

节水
Water efficiency

- Waste water reuse for lavatory flush and landscape
- Water saving sanitary installation
- Urinal without water use in public toilet
- Local vegetation
- Roof vegetation without irrigating
- Wet land system

节材

- 高强度预应力混凝土梁
- 钢结构和就地取材可再生材料，
- 竹地面和藤家具；

Materials and resources

- High-intensity and pre-stress concrete beam
- Steel structure and local materials
- Renewable materials, bamboo floor board and rattan furniture

健康环保

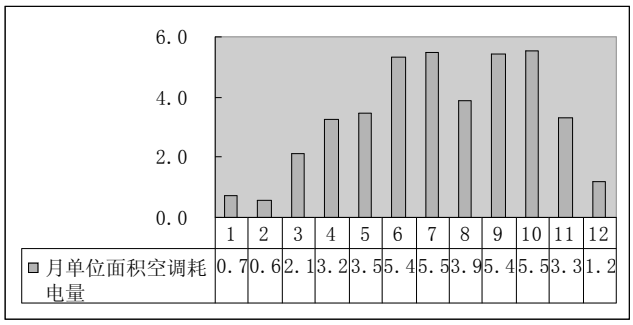
- 新风系统
- 可变压风管
- 铜水管
- 环保材料 全装修
- 原始植被的保护
- 施工中的水管理
- 等等

Healthy and environmental protection

- Fresh air system
- Pressure variable air duct
- Copper water pipe
- Environment friendly materials
- Whole fitment
- Protection of original vegetation
- Waste management during construction
- Etc.

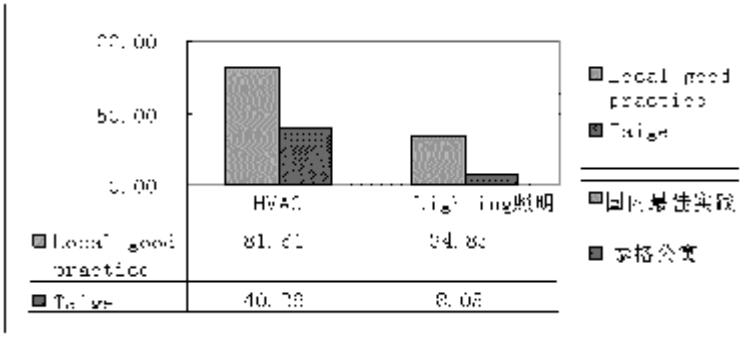
LEED 认证－2005银奖　　LEED-NC SILVER 2005

- G和F建筑暖通空调系统一年耗电量－40.26kWh/m2
- HVAC system electricity consumption in one year for building G and F—40.26kWh/m2

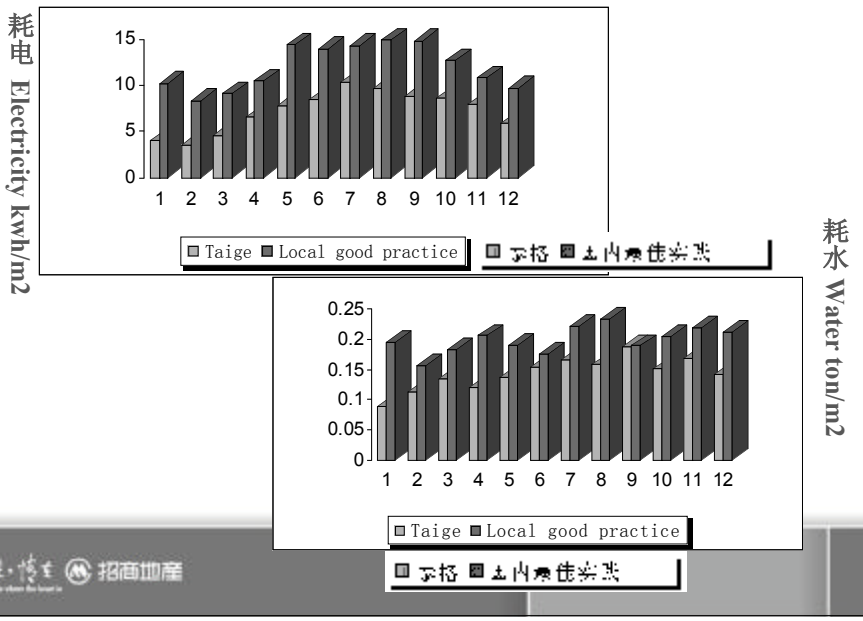


每平米月耗电量(Kwh/m2)
Monthly electricity consumption per square meter(Kwh/m2)

泰格公寓和同一地区优秀实践暖通空调和照明系统的耗电量
HVAC and lighting electricity consumption of Taige and local good practice (kwh/m2/yr)

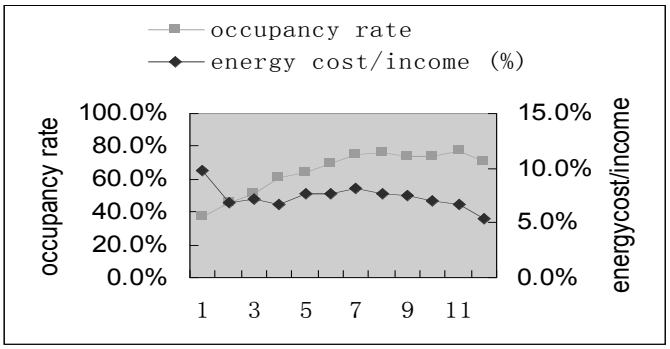


月耗水电量与同一地区优秀实践的对比
Monthly electricity and water cost with local good practice



Energy cost/income

- Local good practice is above 8%.



Monthly occupancy rate and energy cost/income

国际化人文氛围－视野、社区、合作

International cultural atmosphere - vision, community and collaboration

欧洲“三个地球生活”带来的挑战
Europe’s three planet challenge

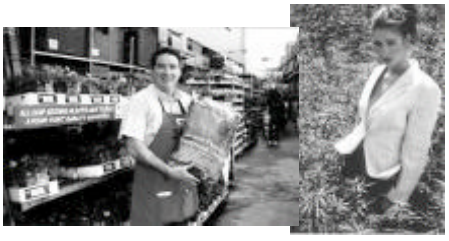
Food 食物	Transport 交通	Energy & Water 能源&水	Waste 废物	Shared Services 共享服务	Shared Infrastructure 共享设施

Adapted from 'Taking Stock' - An Ecological Footprint of the South East, 2003, SEI et al

“一个地球生活”（OPL）是由
BioRegional 和 世界自然基金会
联合发起的项目
A joint initiative by Bioregional and WWF

BioRegional
www.bioregional.com

WWF



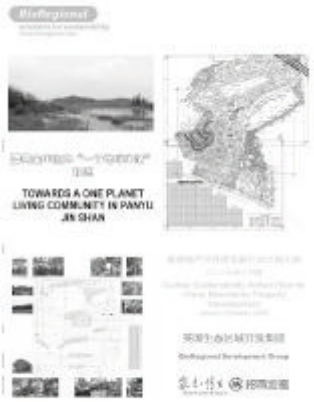
“一个地球生活”原则
One Planet Living Principles

1. 零碳 Zero Carbon	6. 可持续发展用水 Sustainable water
2. 零废物 Zero Waste	7. 保护自然生态环境和野生动植物 Natural habitats and wildlife
3. 可持续发展交通 Sustainable Transport	8. 传承文化 Culture and heritage
4. 当地和可持续发展材料 Local and sustainable materials	9. 公正与公平贸易 Equity and fair trade
5. 当地和可持续发展食品 Local and sustainable food	10. 健康和愉快的生活 Health and happiness

“一个地球生活”与金山
One Planet Living and Jishan

制定可持续行动计划

Development of Sustainability Action Plan (SAP)



可持续行动计划范例

Sample of SAP

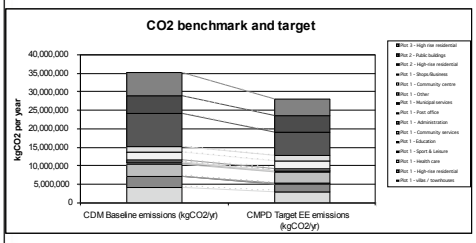
原则名称Principle Name	
对共同国际目标的响应	
国家基准	
OPL 项目关键执行指标（KPIs）和达到OPL2020年目标的时间表	(如果可能的话做摘要总结和/或插入分开的表格如果之后获得详细资料)
主要策略	
设计阶段	
建设阶段	
创造工作机会	
市场、营销、沟通交流机会	
长期物业管理	
规章政策问题	
更广的社区和市政结合/合作	
关键障碍	
关键合作伙伴	
交叉主题	

招商地产与Bioregional签署战略合作协议

Letter of Intent for Strategic Collaboration Between BioRegional and China Merchants

零碳研究

Zero Carbon Study



碳减排目标

番禺资源调查

- 生物质能
- 生物气（沼气）
- 垃圾填埋气
- 垃圾焚烧发电
- 风力发电

确定可再生能源开发策略

碳融资补充（CDM交易）

Carbon Target

Panyu Resource Study

- Biomass
- Biogas
- Landfill Gas
- Waste-to-energy
- Wind

Evaluation of renewable energy development opportunities

More on Carbon Finance

International Mayors' Forum on
SUSTAINABLE URBAN DEVELOPMENT
15 – 16 November 2007 Tianjin, China

城市可持续发展
国际市长论坛
2007 年 11 月 15 – 16 日 中国天津

Design of High Performance Green Buildings

高效绿色建筑的设计

Khee Poh LAM PhD, RIBA
Professor of Architecture
Center for Building Performance and Diagnostics
School of Architecture
Carnegie Mellon University
Pittsburgh, Pennsylvania, USA

林棋波 教授 博士生导师
Khee Poh LAM 博士，英国皇家建筑师协会
建筑物性能与诊断中心
卡内基梅隆大学建筑学院
皮兹堡，宾夕法尼亚州，美国

Ecological Design – City Scale

生态设计 – 城市规模

Ecology: the scientific study of systems of living organisms and the interactions among organisms and between the organisms and their environment.

生态：科学研究生物体系、活生物体系中及之间以及与它们的环境的相互作用。

Ecological Design – Neighborhood Scale

生态设计 — 间距

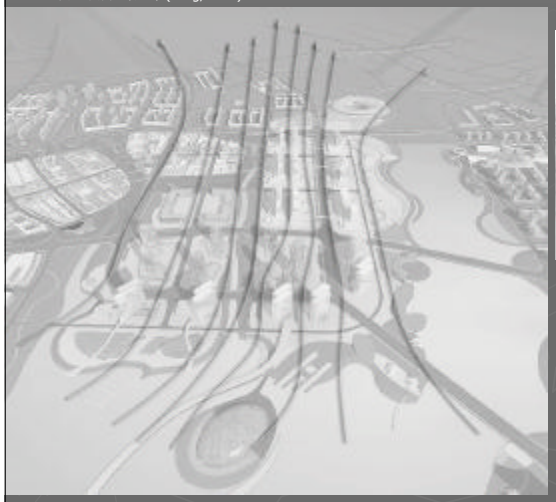
Ecological Design – Building Scale

生态设计 — 建筑物规模

Eco-flows and Patterns
生态流和样式

Maluan Bay, Xiamen, China (Yang, 2007)

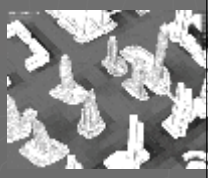
中国 厦门 马銮湾 (Yang, 2007)

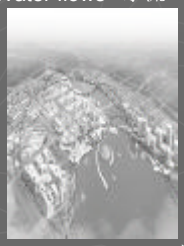


Air Flows 气流

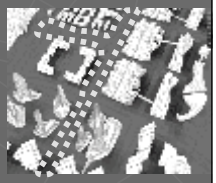
Patch elongation driven by natural forces, (Forman, 1995)
大自然力量造成的斑块伸长 (Forman, 1995)

Water flows 水流





Wildlife Flows 野生生物流



Solar Availability
太阳能可用性

Stakeholders' Traditional Motivation

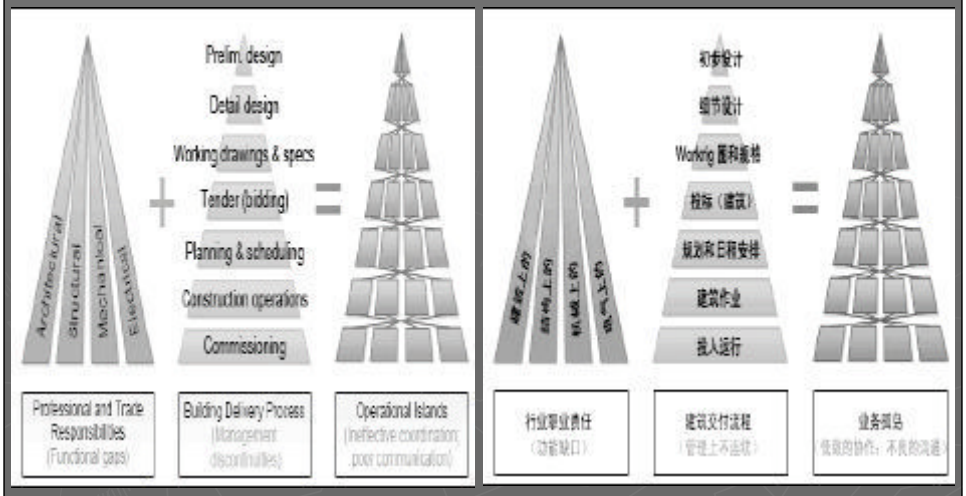
利益相关人的传统动机

Developer	Maximize return on minimum investment in shortest time
Consultant	Fame and profit with minimum resource input
Contractor	Win contract with lowest bid and maximize profit (change orders!)
Facilities Manager	Minimize operation and maintenance cost and maximize user satisfaction

开发商	在最短的时间内以最小的投资获得最大的回报
顾问	以最小的资源投入来获取名利
承包商	以最低的出价来赢得合约，并使利润最大化（变更单！）
设备设施管理者	使营运和维护成本最小化，使用户满意度最大化

Building Industry Infrastructure

建筑行业基础结构

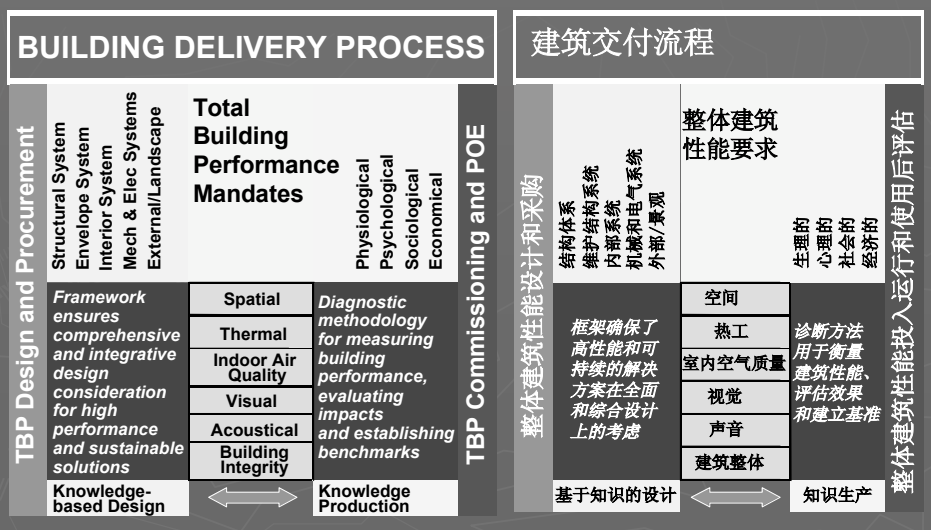


Mattar S.G. **"Buildability and Building Envelope Design".** Proceedings, Second Canadian Conference on Building Science and Technology, Waterloo, Nov. 1983.

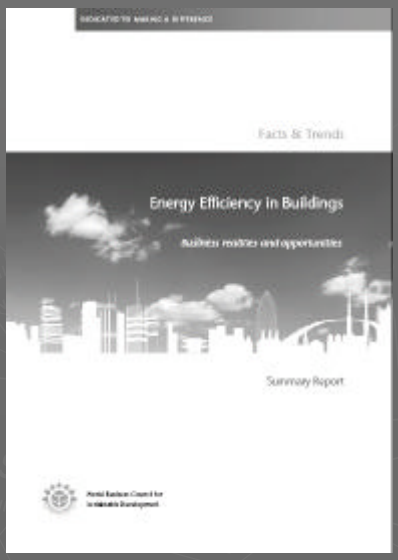
Mattar S.G. **的"可建造性和 建筑物维护结构设计"。《建筑科学和技术第二次加拿大会议汇编》**（沃特卢，1983 年 11 月）。

Total Building Performance & Diagnostics

整体建筑性能与诊断

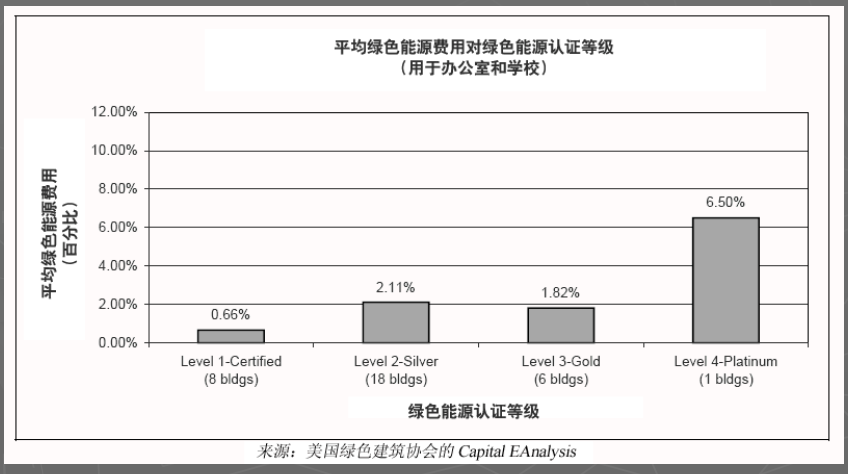


Cost of Building Green
绿色建筑的成本



- Key players in real estate and construction misjudge the costs and benefits of green buildings
- Global survey estimated the additional cost of building green at 17 % above conventional construction, which is more than 3 times the true cost difference of about 5%
- 房地产和建设商的主要人员错误地判断了绿色建筑的成本和收益
- 全球调查结果为估计绿色建筑的额外成本高于传统建筑 17 %，这高出真正的成本差异值 5 % 三倍多。

USGBC – LEED Rating System Cost Premium
美国绿色建筑委员会 — 节能与环保设计导引 (LEED) 等级系统 成本费用



来源：美国绿色建筑协会的 Capital EAnalysis

Kats, Greg (2003). The Costs and Financial Benefits of Green Buildings

Kats, Greg (2003). 绿色建筑的成本和财务收益

Building Investment Decision Support (BIDS and e-BIDS)

建筑投资决策支持（BIDS 和 e-BIDS）

http://cbpd.arc.cmu.edu/bidstrial
http://cbpd.arc.cmu.edu/bids

http://cbpd.arc.cmu.edu/bidstrial
http://cbpd.arc.cmu.edu/bids

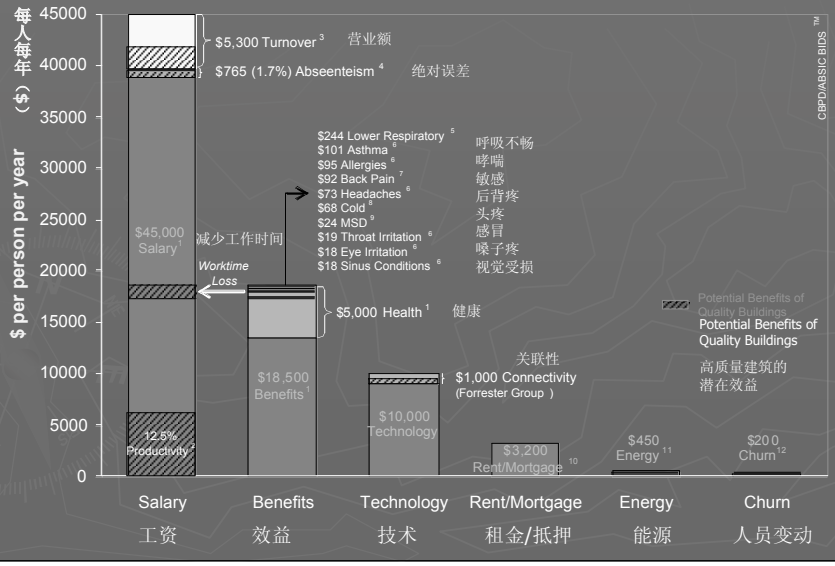
http://cbpd.arc.cmu.edu/ebids

http://cbpd.arc.cmu.edu/ebids

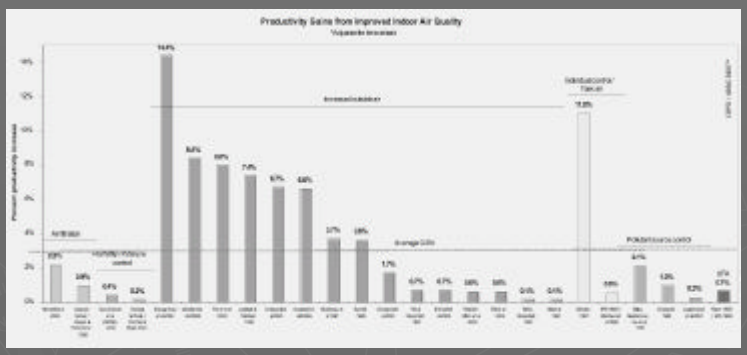
Cost-Benefit tools to promote high performance components, flexible infrastructures and systems integration for sustainable buildings and productive organizations.
为可持续性建筑和富有生产力的组织促进高性能组件、灵活的基础构架和系统集成的成本 - 效益工具。

Financial Cost/Benefits Indices/International Baselines

财务成本/效益指数/国际基准线



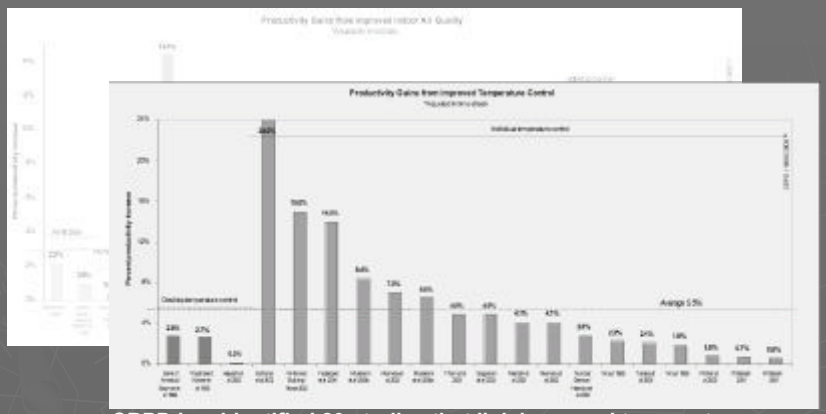
Health-related Productivity Costs
与健康相关的生产力成本



CBPD has identified 25 studies that link indoor air quality improvements to productivity gains, with an average 3.3% productivity increase and a range of improvement between 0.1% and 14.4%.

建筑物性能与诊断中心已确定了 25 项室内空气质量改善同生产率提高相联系的研究，平均为 3.3% 的生产率增长和 0.1% 至 14.4% 之间的改善范围。

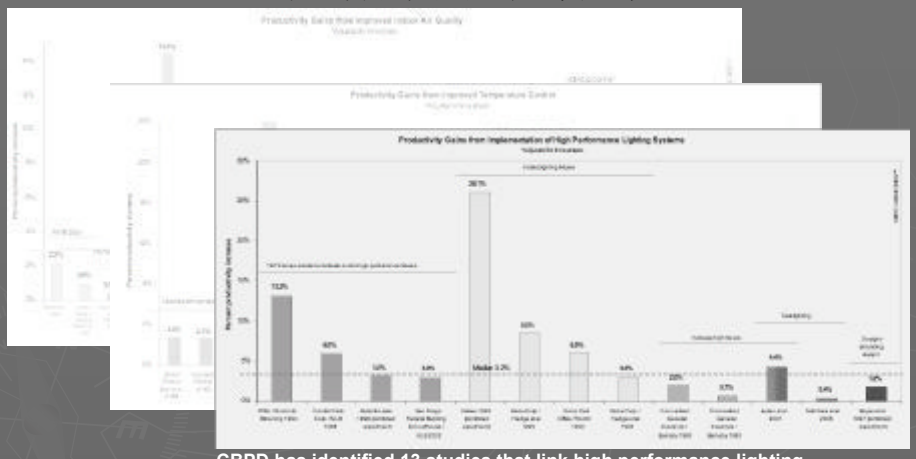
Comfort-related Productivity Costs
与温度相关的生产力成本



CBPD has identified 20 studies that link improved temperature control to productivity gains, with an average 5.5% productivity increase and a range of improvement between 6.2% and 24%.

CBPD 建筑物性能与诊断中心已确定了 20 项改善后的温度控制同生产率提高相联系的研究,平均为 5.5% 的生产率增长和一个在 6.2% 至 24% 之间的改善范围。

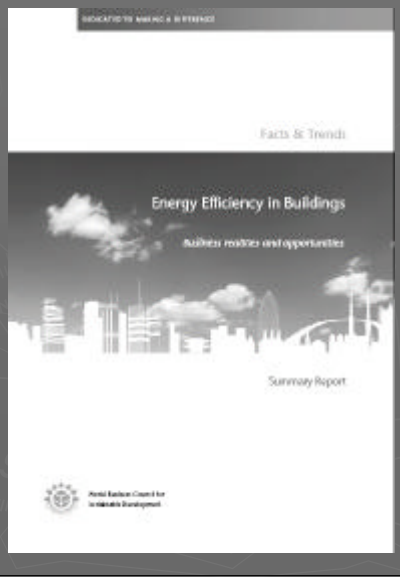
Lighting-related Productivity Costs
与照明相关的生产率成本



CBPD has identified 13 studies that link high performance lighting systems to productivity gains, with a median 3.2% productivity increase and a range of improvement between 0.4% and 26.1%.

CBPD 建筑物性能与诊断中心已确定了 13 项高性能的照明采光系统同生产率提高相联系的研究，平均为 3.2% 的生产率增长和一个范围在 0.4% 至 26.1% 之间的改善范围。

Global Building Energy Status
全球建筑物能源状况

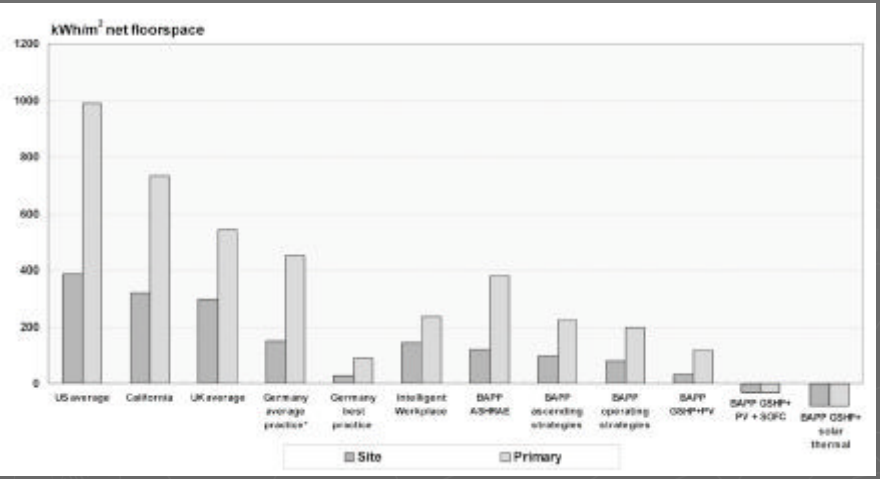


- Buildings are responsible for at least 40% of energy use in many countries, mostly by consuming energy derived from fossil fuels
- Energy use is increasing by an annual rate of more than 3% in the U.S. alone, and is growing rapidly in countries such as China and India
- Worldwide energy consumption by buildings is expected to grow 45% over the next 20 years.

- 在许多国家建筑物至少占用 40% 的能源使用，大多数是通过消耗从化石燃料得来的能源。
- 能源的使用在美国以高于每年 3% 的速度在增长，并在中国和印度这类国家迅速增长。
- 全世界的建筑物能源消耗预计在未来 20 年将 增长 45%。

Annual Site/Primary Energy Consumption in Office Buildings

办公建筑物年度地点/一次性能源消耗



Data source:

EIA, Commercial Building Energy Consumption Survey 1995; PG&E, Commercial Building Survey Report 1999; UK National Statistics

* Germany average practice is calculated based on the energy consumption measurements of 15 German office buildings built between 1990 and 2002 (with primary energy consumption ranging from 180kWh/m² to 1,000kWh/m²).

数据来源：

能源信息署《商业建筑物能源消耗调查 1995》； PG&E 公司《商业建筑物调查报告 1999》；
英国国家统计局

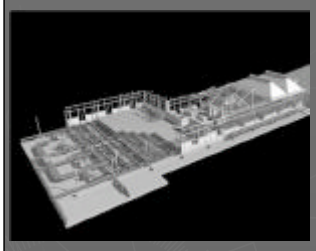
* 德国平均使用是基于衡量 15 个构建于 1990 至 2002 年之间的能源消耗来计算的（一次性能源消耗范围在 180kWh/m² 至 1,000kWh/m² 之间）。

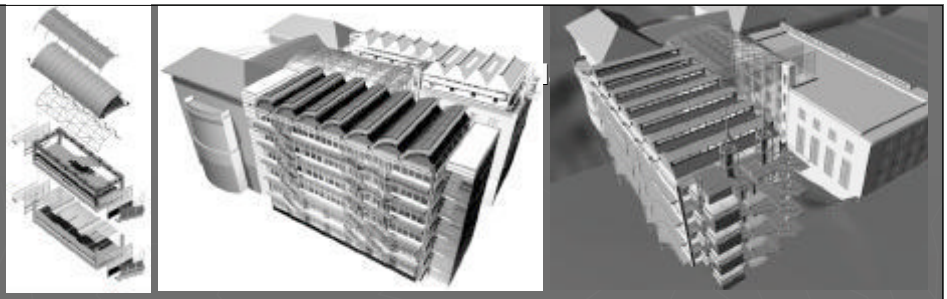
Center for Building Performance & Diagnostics

Robert L Preger Intelligent Workplace

建筑物性能与诊断中心

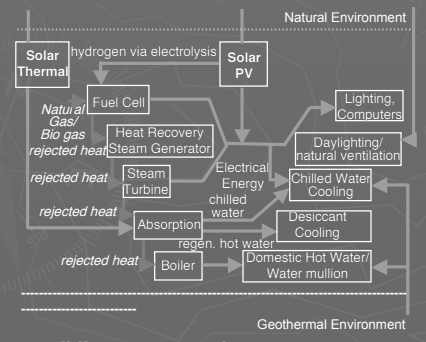
Robert L Preger 智能工作区间



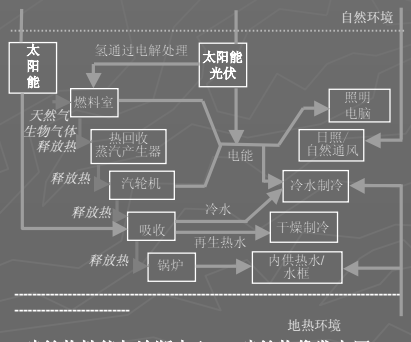


Innovative Energy Systems: Ascending-Descending Strategy

创新的能源系统：递增-递减战略



CBPD - Building as Power Plant



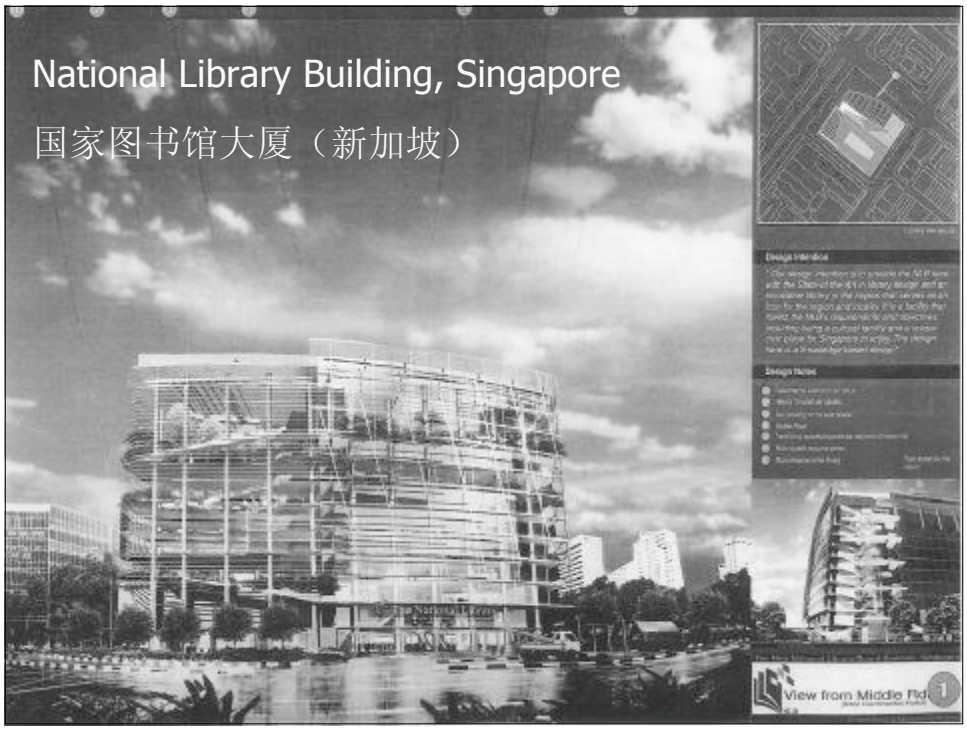
建筑物性能与诊断中心 — 建筑物像发电厂

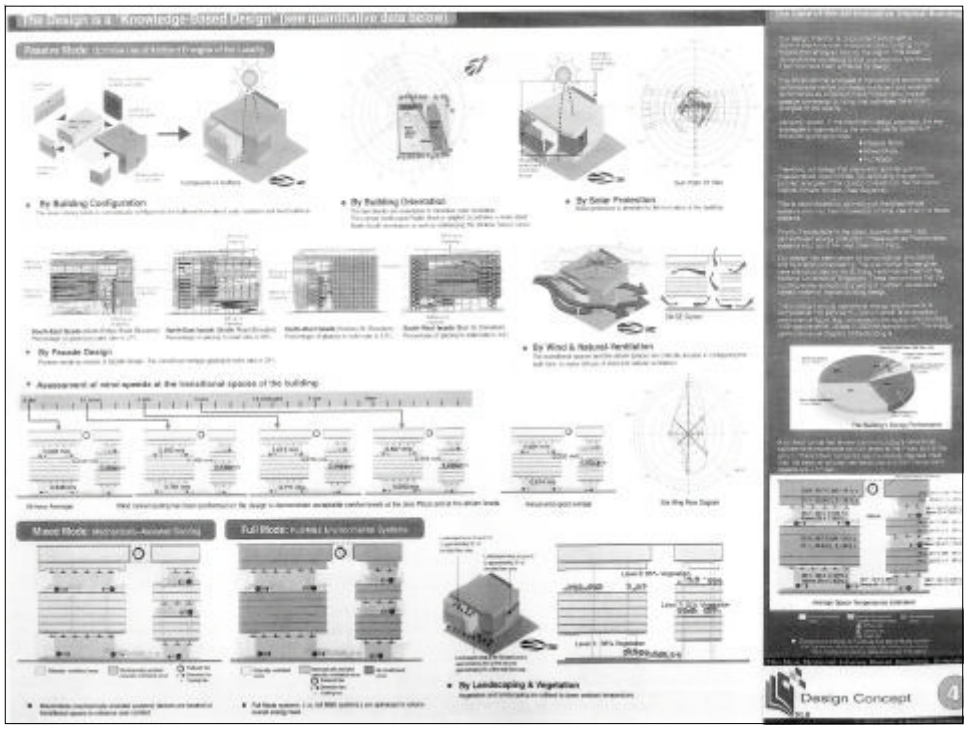
Urban Redevelopment Authority Centre Singapore

城市再开发管理中心（新加坡）

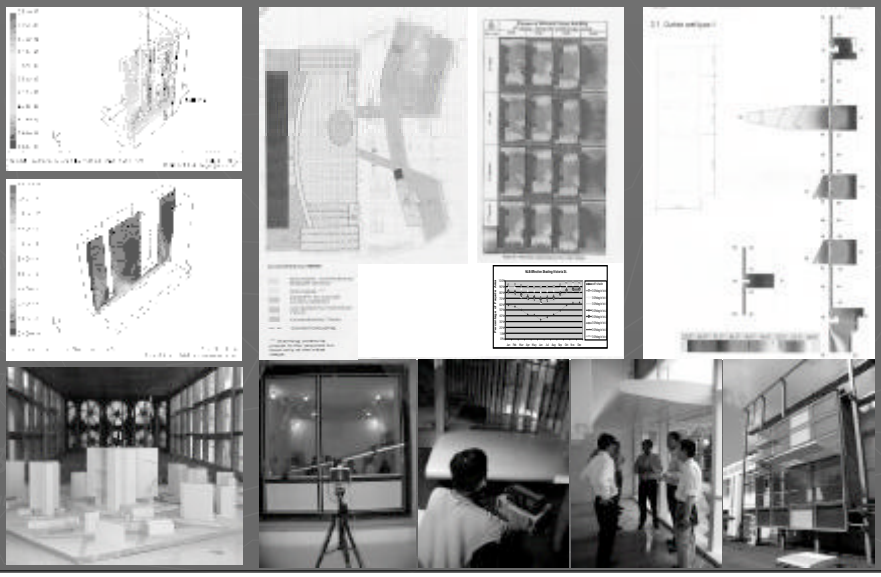
ASEAN Energy Efficient Buildings
Runner-up Award 2001

东盟节能建筑
银奖 2001


National Library Building, Singapore
国家图书馆大厦（新加坡）
View from Middle Rd


Design Concept

National Library Building
TBP in Action
国家图书馆大厦
行动中的整体建筑性能 (TBP)



NLB - Garden in the Sky
国家图书馆大厦 — 空中花园

BCA – Green Mark Award 2005 - Platinum

建设局 – 绿色建筑标志奖 2005 – 白金奖


国家图书馆新大厦
传达环保意识

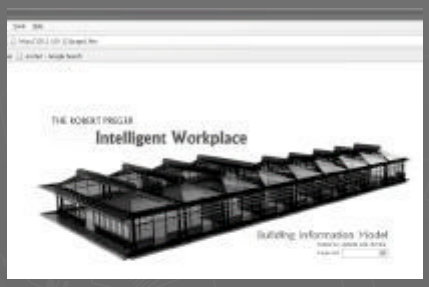

BCA'S GREEN MARK AWARDS

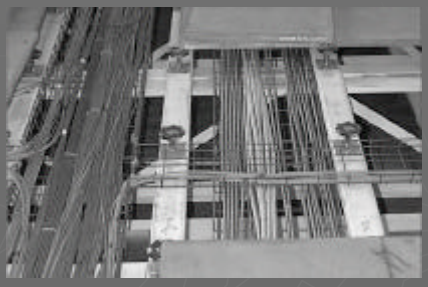
National Library bid to save power rewarded

Building gets top Platinum rating; savings of up to 25% expected

Latest News....
Winner - ASEAN Energy Award 2007
最新新闻....
获奖者 — 东盟能源奖 2007

Future Challenge:
Integrative Information Management
未来挑战：
综合信息管理





Sustainable Building Information Model
可持续的建筑信息模型

Virtual
虚拟

Real
真实

In Summary…….

总结…….

- Total Building Performance and Diagnostics
  - Universal, comprehensive, consistent and objective design and procurement framework for different building types
  - Performance mandates and benchmark criteria – qualitative and quantitative measurement and evaluation at different project phases, including post-occupancy
  - A knowledge-based approach
- Future Challenge
  - Integrative information management system – Dynamic Life Cycle Building Information Model

- 整体建筑性能与诊断
  - 通用、全面、一致和客观的设计和采购框架，用于不同建筑类型
  - 性能要求和基准标准 — 项目不同阶段定性和定量的衡量和评估，包括入住后
  - 基于知识的方法
- 未来挑战
  - 综合信息管理系统 — 动态生命周期构建信息模式

International Mayors' Forum on

SUSTAINABLE URBAN DEVELOPMENT

15 – 16 November 2007 Tianjin, China

城市可持续发展

国际市长论坛

2007 年 11 月 15 – 16 日 中国天津

Thank you
谢 谢

林棋波 博士 教授 英国皇家建筑师协会 注册建筑师

Khee Poh LAM 博士，英国皇家建筑师协会，建筑师注册管理局

以绿色思维
创新绿色建筑设计的实践

The practice of innovative green building design on the basis of green conception

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院长

November 2007

Ye Qing

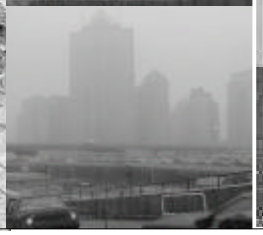
Vice Dean, Executive Chief Architect
Shenzhen General Institute of
Architectural Design
and Research Dean
Shenzhen Institute of Building Research
November 2007

概要

1, 背景
2, 什么是绿色建筑
3, 一个观点
4, 一个实例

Outline

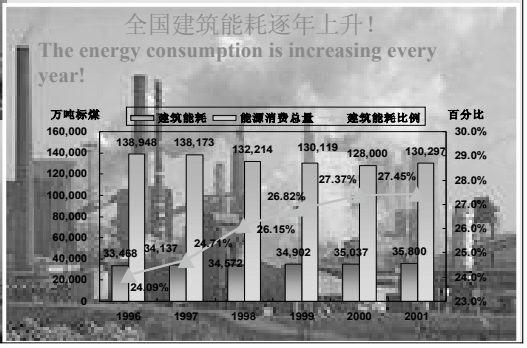
1. **Background**
2. What is Green building?
3. An opinion
4. A case



建设活动消耗人类从自然界获得的资源的一半，产生约一半的固体垃圾，消耗绝大多数饮用水。
中国每年有几十万公顷土地被开发。森林和农田正在被开发项目占用……

Construction activities consume one-half of the total natural resources, most of the portable water and produce about one-half of total solid waste.
Every year there are tens of thousands acre land being used, and forest and farmland are being taken for developed projects in China.

全国建筑能耗逐年上升！
The energy consumption is increasing every year!



以绿色思维创新绿色建筑设计的实践
The practice of innovative green building design on the basis of green conception
1、背景 Background

绿色建筑的误区

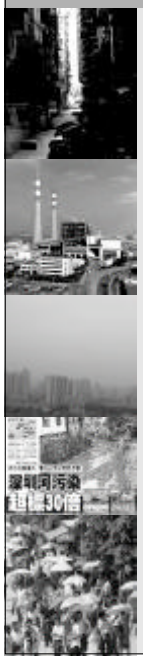
1. 为绿而绿的建筑定位
2. 技术“冷拼”
3. 忽视成本
4. 忽视建筑的艺术性

Wrong opinions of green building

1. Doing the work only for the “green” prize
2. Inappropriate combination of many techniques
3. High cost
4. Neglecting the art of a building

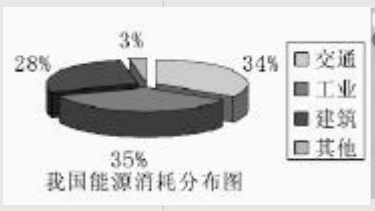
不合理的设计等于更大的浪费！
Irrational design means more waste

1、背景 Background



在城市化进程中，可持续发展成为核心追求。
发展循环经济已成为我国的发展战略。
绿色建筑作为建设领域循环经济的具体体现，是建设行业的发展方向。

Sustainable Development
Green Building
Cyclic Economy



Industry: 35% **Transport: 34%**
Construction: 28% **Others: 3%**

以绿色思维创新绿色建筑设计的实践
The practice of innovative green building design on the basis of green conception

1. **背景**
2. 什么是绿色建筑
3. 一个观点
4. 一个实例

1. **Background**
2. What is Green building?
3. An opinion
4. A case

一个概念

绿色建筑：在建筑的全寿命周期内，最大限度地节约资源（节能、节地、节水、节材）、保护环境和减少污染，为人们提供健康、适用和高效的使用空间，与自然和谐共生的建筑。

Definition

A green building can be defined as any building that is sited, designed, constructed, operated, and maintained for the health and well-being of the occupants, while minimizing the use of resources and impact on the environment during the life cycle of a building.

以绿色思维创新绿色建筑设计的实践
The practice of innovative green building design on the basis of green conception
2. 什么是绿色建筑？
2. What is a green building?

两个全面性

空间上的全面性：建筑对生态环境的响应从能源方面扩展到全面审视建筑活动对全球生态环境，周边生态环境和居住者所生活的环境的影响；

时间上的全面性：审视建筑的“全寿命”影响，包括原材料开采、运输与加工、建造、使用、维修、改造和拆除等各个环节。

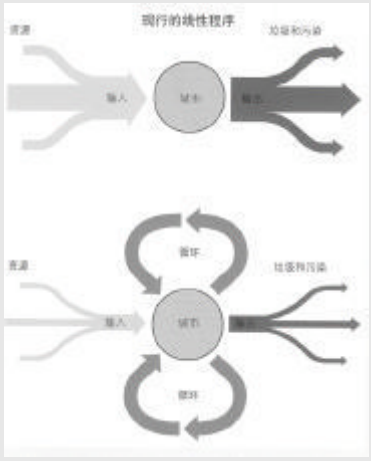
Two Integrations

Integration of Space: The impact of building on the ecological environment should be expanded from energy field to all the construction activities.

Integration of Time: Every stage of a building’s life cycle counts: including raw material exploring, transportation, construction, occupying, maintaining, and demolishing.

三个目标

Three Objectives



舒适健康的人居环境
Comfortable living environment

最少的消耗自然资源
Minimum resources consumption

最少的影响外界环境
Minimum environmental impact

绿色建筑包括哪些要素？

通过不同的评估体系来获得答案！

不同的评估体系侧重点不同，但核心内容基本一致

世界范围内绿色建筑评价体系

- 德国《可持续发展建筑导则》
- 英国《生态住宅环境评估
- 加拿大
- 《环境共生住宅A-Z》
- 《绿建筑解说与评估手册》
- 香港
- 《中国生态住宅技术评估体系》
- 《绿色奥运建筑评估体系》
- 日本
- 国家《绿色建筑评价标准》

Which elements constitute green building?

The conclusion can be obtained from different assessment systems.

Different emphases, but similar objectives.

Worldwide Green Assessment Systems

- **LEED**
- UK **EcoHomes**
- **Canada Green Building Challenge**
- **2000 EEWH**
- **HK-BREAM**
- **China Ecological Building Technology Assessment System**
- **Green Olympic Building Assessment System**
- **CASBEE**
- **Green Building Assessment Standard**

“美国绿色建筑协会” USGBC

LEED-NC 新建和大型改造项目
LEED-EB 既有
LEED-CI 商业建筑室内装修
LEED-CS 主体结构
LEED-ND 周边环境开发
LEED-H 住区

- New Commercial Construction and Major Renovation projects
- Existing Building Operations and Maintenance
- Commercial Interiors projects
- Core and Shell Development projects
- Neighborhood Development
- Homes

以绿色思维创新绿色建筑设计的实践 2. 什么是绿色建筑？
The practice of innovative green building design on the basis of green conception 2. What is a green building?

《绿色建筑评估体系》

一、合理的建筑选址
先决条件：侵蚀和沉降控制得分
得分1：建筑选址
得分2：城市改造
得分3：褐色地块开发
得分4：可选择的交通设施
得分5：减少施工影响
得分6：地表径流的管理
得分7：景观和室外设计以减少热岛效应 得分8：减少光污染

二、节水
得分1：节水的园林绿化
得分2：创新的废水回用技术
得分3：节约用水

Leadership in Energy＆Environmental Design Building Rating System

1. Sustainable Sites
Prerequisite: Construction Activity Pollution Prevention
Credit1: Site Selection
Credit2: Development Density & Community Connectivity
Credit3:Brownfield Redevelopment
Credit4: Alternative Transportation
Credit5: Site Development
Credit6: Stormwater Design
Credit7: Heat Island Effect
Credit8: Light Pollution Reduction

2. Water Efficiency
Credit1: Water Efficient Landscaping
Credit2: Innovative Wastewater Technologies
Credit3:Water Use Reduction

三、能源和大气环境

先决条件1：建筑设备系统委托设计、施工和验收
先决条件2：满足节能标准
先决条件3：减少暖通空调和制冷设备的氟氯烃

得分1：优化能源利
得分2：可再生能源
得分3：设备系统除外的其它委托
得分4：禁止使用含氟氯烃和卤盐的产品
得分5：计量和核准
得分6：绿色电力供应

3. Energy & Atmosphere

Prerequisite1: Fundamental Commissioning of the Building Energy Systems
Prerequisite2: Minimum Energy Performance
Prerequisite3: Fundamental Refrigerant Management

Credit1: Optimize Energy Performance
Credit2: On-Site Renewable Energy
Credit3: Enhanced Commissioning
Credit4: Enhanced Refrigerant management
Credit5: measurement & Verification
Credit6: Green Power

以绿色思维创新绿色建筑设计的实践 2. 什么是绿色建筑？
The practice of innovative green building design on the basis of green conception 2. What is a green building?

四、材料和资源
先决条件：可回收物资的收集和贮存

得分1：现有建筑的改造
得分2：施工废弃物管理
得分3：资源再利用
得分4：物资的可循环利用
得分5：地方/地区材料
得分6：快速再生材料
得分7：允许使用的木材

五、室内环境质量
先决条件1：满足室内空气质量最低标准
先决条件2：吸烟控制

得分1：二氧化碳监测
得分2：提高通风效率
得分3：施工期IAQ管理
得分4：低挥发材料
得分5：室内化学物和污染源控制
得分6：设备系统的可控制性
得分7：热舒适
得分8：天然采光和景色

4. Materials & Resources
Prerequisite: Storage & Collection of Recyclables

Credit1:Building Reuse
Credit2:Construction Waste Management
Credit3:Materials Reuse
Credit4: Recycled Content
Credit5:Regional Materials
Credit6:Rapidly Renewable Materials
Credit7:Certified Wood

5. Indoor Environmental Quality
Prerequisite1: Minimum IAQ Performance
Prerequisite2: Environmental Tobacco Smoke (ETS) Control

Credit1: Outdoor Air Delivery Monitoring
Credit2: Increased Ventilation
Credit3: Construction IAQ management Plan
Credit4: Low-Emitting Materials
Credit5:Indoor Chemicals & Pollution Source Control
Credit6: Controllability of Systems
Credit7: Thermal Comfort
Credit8:Daylight & Views

英国建筑研究中心《生态住宅环境评估》

2000年4月

能耗
CO2 排放量、建筑热工性能
提供晾衣 、使用有生态标签节能产品、节能照明系统

交通
便捷地到达公共交通站点、生活和商业服务点

污染
没有使用可破坏臭氧层的物质、锅炉使用低氮氧化合物排放的燃料

材料
使用木建筑构件、按可持续发展的原则使用木装修
垃圾储存 、建筑构件符合《住宅绿色导则》要求

水: 降低用水量

土地利用和生态学
土地的生态学价值
改变建筑场地的生态学价值

健康和舒适
提供必要的自然采光
改进建筑的噪声防护
提供私密或半私密的室外空间

April 2000

Energy consumption
CO2 emissions, building thermal performance
Using energy-saving products, energy-efficient lighting systems

Transportation
convenient transportation for residents

Pollution
reduce the use of fossil fuels

Materials
Choose wood for decorating
solid waste recycling

Water
Water Use Reduction

Land use and ecology
The ecological value of the land
Change the ecological value of building sites

Health and comfort
Provide enough natural daylight
Improved the noise protection of building
Provide private or semi-private outdoor space

以绿色思维创新绿色建筑设计的实践
The practice of innovative green building design on the basis of green conception
2. 什么是绿色建筑？
2. What is a green building?

日本建设省住宅局住宅生产课监修，环境共生住宅推进协会编集《环境共生住宅A-Z》

评价流程分为：
1. 规划设计的综合评价（定性的评价）;
2. 基本性能评价（定量的评价）；
3. 建筑全寿命周期环境冲击评价;
4. 事后的检证。

Revised by Construction Institute of Japan Environment Symbiosis Residential Building A-Z

Evaluation Process:
1.Comprehension evaluation of lay out design (qualitative evaluation)
2.Basic performance evaluation (quantitative evaluation)
3.Evaluation of environmental impact of a building's life cycle
4.Validation

台湾内政部建筑研究所
“七大评估指标系统”
1. 绿化指标（CO_2固定量）
2. 基地保水指标（保水率λ）
3. 日常节能指标
4. CO2减量指标
5. 废弃物减量指标
6. 水资源指标
7. 污水、垃圾改善指标

Construction institute of ministry of internal affairs, Taiwan
Seven Assessment Indexes System
1. Greening Index (CO2 fixation)
2. Base Retention Index (Retention Rate λ)
3. Daily Energy Saving Index
4. CO2 reduction Index
5. Waste reduction Index
6. Water Resource Index
7. Sewage, Garbage Improvement Index

以绿色思维创新绿色建筑设计的实践
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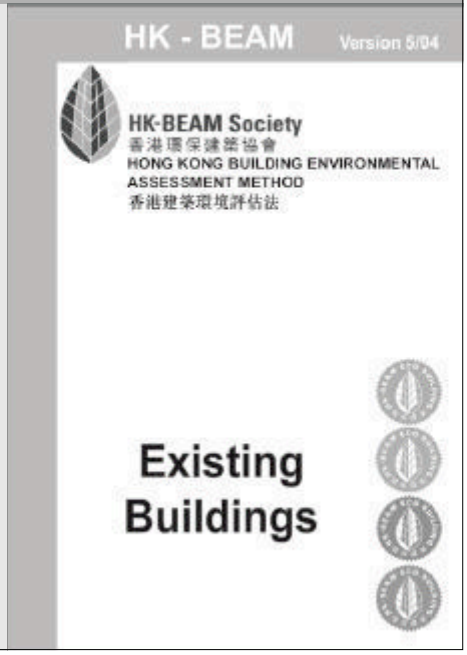
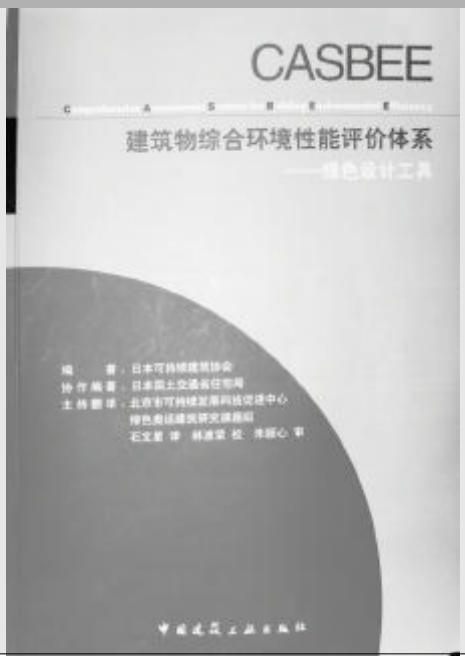
1框架	1 Framework
2选址	2 Site Aspects
2.1场地位置	2.1 Site Location
2.2场地设计	2.2 Site Design
2.3场地排放物	2.3 Emissions From The Site
2.4场地管理	2.4 Site Management
3材料	3 Materials Aspects
3.1材料的有效利用	3.1 Efficient Use Of Materials
3.2材料的选择	3.2 Selection Of Materials
3.3污染物管理	3.3 Waste Management
4能耗	4 Energy Use
4.1年能耗	4.1 Annual Energy Use
4.2节能系统	4.2 Energy Efficient Systems
4.3节能设备	4.3 Energy Efficient Equipment
4.4能源管理	4.4 Provisions for Energy Management
5水	5 Water Use
5.1水质	5.1 Water Quality
5.2节水	5.2 Water Conservation
5.3排水	5.3 Effluent
6室内环境质量	6 Indoor Environment Quality
6.1安全	6.1 Safety
6.2卫生	6.2 Hygiene
6.3室内空气质量	6.3 Indoor Air Quality
6.4通风	6.4 Ventilation
6.5热舒适	6.5 Thermal Comfort
6.6照明质量	6.6 Lighting Quality
6.7声学与噪声	6.7 Acoustics And Noise
6.8建筑便利性	6.8 Building Amenities
7创新与附加	7 Innovations And Additions





2. 什么是绿色建筑？
2. What is a green building?

三大主题：

节约资源、减少污染

创造健康、舒适的居住环境

与周围自然环境相融合

五个方面：

小区环境规划设计

能源与环境

室内环境质量

小区水环境

材料与资源

Three Major Themes

Resources Conservation, Pollution Reduction

Create a Healthy, Comfortable Living Environment

Environment friendly

Five Aspects

Community Environment Planning and Designing

Energy and Environment

Indoor Environment Quality

Water

Materials and Resources

《绿色奥运建筑评估体系》
2003年8月

以绿色思维创新绿色建筑设计的实践
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2. 什么是绿色建筑？
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绿色建筑技术有哪些？

常用技术100多项，

1, 节地与室外环境
2, 节能与可再生能源的利用
3, 节材与材料资源的利用
4, 节水与水资源的利用
5, 室内环境控制
6, 运行维护与管理

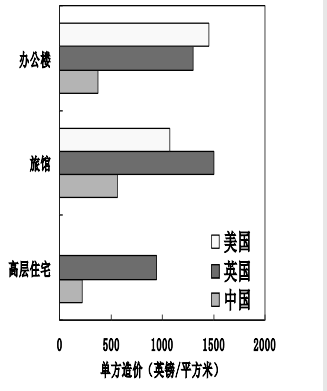
Green Building Techniques

There are more than 100 common technologies

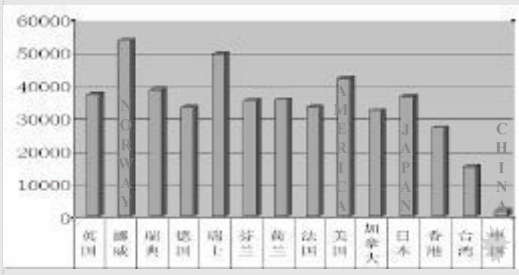
1. Saving Space and Outdoor Environment
2. Energy Conservation and the Use Of Renewable Energy
3. Saving Materials and the Use Of Material Resources
4. Water Conservation and the Use Of Water Resources
5. Indoor Environmental Control
6. Operation, Maintenance and Management

1, 背景
2, 什么是绿色建筑
3, 一个观点
4, 一个实例

1. Background
2. What is Green building?
3. An opinion
4. A case

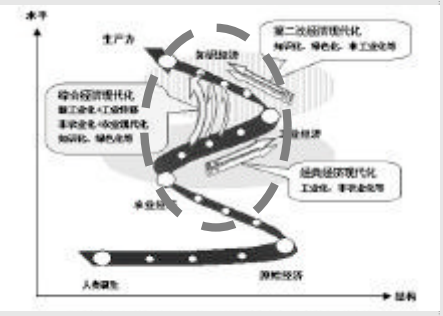


绿色建筑，富国的游戏?高造价的代名词？
一个不容忽视的对比:2005年人均GDP（美元）
中国一年约有20亿平方米以上的基本建设量（2005年），平均造价约为770元/m2。



Green buildings, a game between the rich? high costs?

Comparison of average GDP in 2005 (dollar)



经济发展的运河理论

中国面临的问题、可能的解决方法和所能凭借的现实条件都决定了我们不能简单照搬发达国家既有经验。

当今处在一个设计“大跃进”时代，超短的工期，粗糙的施工，限额的造价，我们如何设计市场化运作下的“绿色建筑”？

Canal theory

We can’t simply copy other’s experience.

What we often see now are: short time, limited cost and bad quality.

How can we solve all these problems?

中国现阶段需要怎样的绿色建筑？

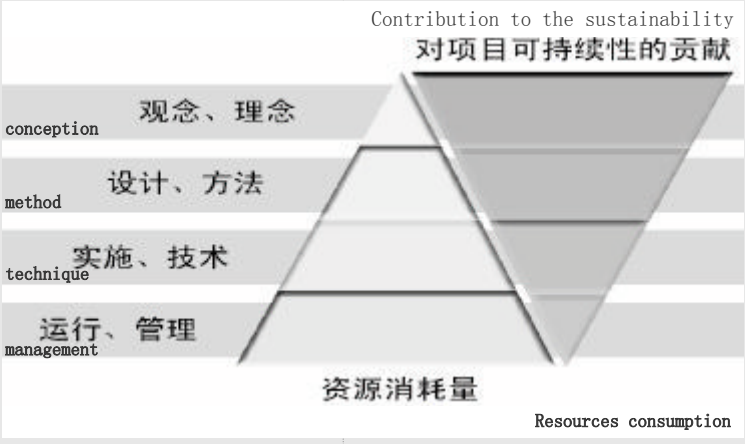
1、少量发达地区可以作适量高端的，具有国际领先性的绿色建筑。
2、大多数城市更需要建立在低成本，适宜技术基础上的大众型绿色建筑。

What kind of green building do we need in the current stage of China?

1. Some high-tech and leading green building can be built in a few developed regions .

2. Most of other cities rather need general green building with low cost and suitable techniques.

建设有中国特色的绿色建筑，需要首先建立绿色思维上的设计观
In order to establish the green building with Chinese unique characteristics, we should fist build up a green conception.



以绿色思维创新绿色建筑设计的实践
The practice of innovative green building design on the basis of green conception
3. 一个观点
3. An Opinion

绿色思维

从人性关怀 ，资源节约，环境友好的角度，思考人类的建设活动，使城市能在与自然和谐共生的前提下持续发展。

它建立在尊重人性和环境的前提下，以**“创新为魂”，“平衡为本”**。

限于种种条件，我们不一定能建设完整意义上的绿色建筑，但我们可以也应该以绿色思维去从事每一项建筑设计工作。

Green Conception

We should consider the construction activities from the aspect of human caring, resources conservation and friendly environment, so that the city can develop sustainably on the premise of natural harmony.

Two factors of the green conception: Creativity, Balance

Maybe we cannot build a real green building, but we can, and should design every piece of work on the basis of green conception

创新—绿色建筑设计之魂

平衡—绿色建筑设计之本

观点、技术、方法等方面的创新，是 绿色建筑设计之魂。

在需求、资源、环境、经济等因素之间如何平衡是绿色建筑设计之本。

建立在绿色思维上的设计观是建筑师社会责任感的体现。

观点本身是无形的，却往往最大程度地决定了一个项目最终的效果。

Two important factors in designing green building:

Creativity

Balance

The innovation of the concept, technology, and method is the key of green building design.

The balance between requirement, resource, environment, and economics is the key to balance in green design.

How to design in the green based is the responsibility of the architecture.

We are not able to see the concept itself, however, to a large extent, it decides the final result of a project.

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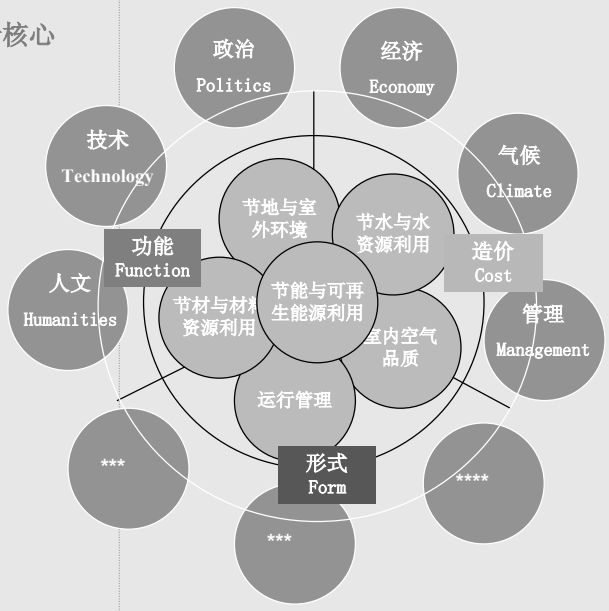
平衡—绿色建筑设计核心

Balance



创新—绿色建筑设计之魂
Creativity

观点更新
内涵增加
方法改变
体系变化
Renew the conception
Enhance the connotation
Change the way
Systematic change

⇒ 软性部分 **Software**

新技术
新材料
新设备
新工艺
New technology
New material
New equipment
New industry

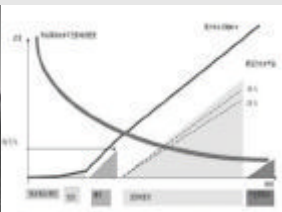
⇒ 硬性部分 **Hardware**

价值观的改变、审美观的变化及设计者对职业的再理解

高度重视软技术的创新！

Which means the change of value, aesthetic conceptions, and the re-understanding of a designer's career

The most important thing is creative thoughts.



以绿色思维创新绿色建筑设计的实践
The practice of innovative green building design on the basis of green conception
3. 一个观点
3. An Opinion

绿色思维给建筑设计带来什么？

观念更新
内涵增加
方法改变

What does a green conception bring us?

Renews the way of thinking
Enhances the connotations
Changes practices

观念更新

价值观的改变

从人性关怀的角度考虑（人类健康、邻里关系、人文资源、文化艺术…）

从环境友好的角度考虑（自然资源、人工环境、地域气候…）

审美观的变化

绿色建筑是丑的吗？

摒弃多余的装饰元素，引领“少就是多”的审美潮流，将艺术、功能和技术有机的结合。

对职业的再理解

在矛盾中挣扎

再学习和知识更新

凸显社会责任和历史使命

Renew the conception

Value

- We must consider and care about other people’s thoughts
- Environmentally-friendly considerations

Aesthetic conception

- Does a green building have to be ugly?

Re-understanding of the career

- Struggling in the climate of contradiction
- Restudying and renewing the knowledge
- Highlighting the social responsibility and historical mission

以绿色思维创新绿色建筑设计的实践
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内涵增加

全寿命周期的设计、施工、运营、拆除的内容

高新技术含量增加，涉及新型学科增多

方法改变

不同的设计方法与经济和文化发展形式相联系

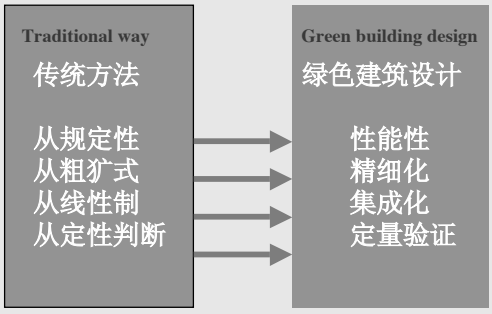
Enhance the connotation

All process of design, construction, operation, demolish through the life cycle

There is a large increase of high-tech, and related new disciplines.

Change the way

Various designs go along with the economy and culture development.



集成化的工作模式
数字化的辅助手段
科学化的逻辑判断
持续化的效能验证

多角色集成：建设方、设计者与使用者等的共同参与。

多学科集成：从“独奏”走向“合奏”。

多技术集成：避免为戴“绿”，“而进行技术“冷拼” 。

Integrated working pattern
Digital assistance means
Scientific logic judgment
Continuous efficiency verification

Multi-stakeholders: builder, designer, occupier

Multi-Disciplines: from ‘solo’ to ‘tutti’;

Multi-Techniques: avoiding the inappropriate combination



创新、平衡之下的绿色建筑设计“精宜之道”：

精：常规技术精细化
宜：四新技术适宜化

Elegant: to use the common technology elegantly
Appropriate: to use the new technology appropriately

精细化：

具体项目具体分析；
分类分级分层；
定性定量验证；
从经验中挖掘、提升常规技术的效能，减少资源的浪费。

适宜化：

风险管理下、与项目定位匹配的四新技术应用。

1, 背景
2, 什么是绿色建筑
3, 一个观点
4, 一个实例

1. Background
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一个实例：龙岗·体育新城安置小区

制约条件：
投资受限
工期紧张
需求特殊

如何在制约条件下完成绿色建筑设计目标？

项目为政府投资建设的拆迁安置房，建筑造价受到严格限制。

项目为配合大运会场馆的建设，工期紧张。

原住居民自用和出租物业混杂的小区，功能需求复杂。

项目目标

1. 通过规划与设计阶段的精细化设计，利用低成本技术实现节能与绿色目标。

2. 获得国家《绿色建筑评价标准》认证，建设成为市、省、甚至全国安置小区 的示范工程。

The case: Longgang · New Sport Town

Challenges:
lack of investment
lack of time
special requirements

How to accomplish the objective faces with these challenges?

Object：

1. Accomplishing the energy efficiency and sustainable objective using low-cost technique.

2. Obtaining the certification of national ‘green building assessment standard’

详细内容将在讲座中介绍。

More details please see presentation.

工地照片 Site Photo

工地照片 Site Photo

思维决定行动；
观念决定出路；
以绿色思维创新绿色建筑设计！

What you think decides what you do;
Conception determines the way out;
The creative green building should be designed on the basis of green conception!

为了未来的需要和当今的高密度发展，而设计良好的生态环境。

For the current high-density development and fulfilling the future needs, we should design a benign ecology environment.

——杨经文(Kenneth Yeang)

Thank you!

叶　青 Ye Qing

Tel：0755-83786005

E-mail：yeqi998@163.com

2007.11

规划环评
与城市的可持续发展

EIA and Urban Sustainable Development

国家环境保护总局环境工程估中心

Appraisal center for Environment＆Engineering, State Environmental Protection Administration (ACEE,SEPA)

陈　帆　　研究员

CHEN　FAN，Professor

提　要

Outline

- 一、环境问题与城市总体规划
- 二、城市规划环评与生态城市规划
- 三、城市规划环境影响评价技术导则
- 四、实现城市可持续发展，需要各部门共同努力

- Environmental Problems and General Urban Planning
- Environmental Impact Assessment (EIA) of urban planning and eco-cities
- EIA guidelines for urban planning
- Sustainable urban development requires effort from each department.

环境问题与城市总体规划

- 城市规划是城市发展之纲

是对一定时期内城市性质、发展目标、发展规模、土地利用、空间布局以及各项建设的综合部署和实施措施。

Environmental Problems and General Urban Planning

- **Urban planning is the blueprint of urban development**
- It synthesizes disciplines and requires the implementation of measures within a certain period, relating to city characteristics, development objectives, land use, and spatial layout.

国家环境保护总局环境工程评估中心

环境问题与城市总体规划

- 环境保护篇章

对于城市的生态功能、生态空间与生态用地、生态与资源承载力、环境容量、生态适宜度等环境问题考虑不足。

Environmental Problem and General Urban Planning

- **The chapter on Environmental Protection**

Does not give enough attention to environmental problems, such as environmental resources, space and land-use, and carrying capacities of the ecosystem and resources.

国家环境保护总局环境工程评估中心

环境问题与城市总体规划

- 环境问题

  粗放型土地资源开发利用模式（整体资源配置效率和综合开发效益不高）导致土地利用结构和环境本底质量恶化

Environmental Problems and General Urban Planning

- **Environmental Problems**

  Excessive growth of land exploitation has led to the deterioration of soil and baseline environmental quality.

国家环境保护总局环境工程评估中心

环境问题与城市总体规划

- 环境问题

  水资源浪费与水资源短缺并存，严重制约城市发展

Environmental Problems and General Urban Planning

- **Environmental Problems**

  Waste of water resources and water shortages combine to prevent the development of cities.

国家环境保护总局环境工程评估中心

环境问题与城市总体规划

- 环境问题
- 传统产业结构（重化工、加工组装工业）和能源（煤炭为主）结构使城市环境问题更加突出

- **Environmental Problem and General Urban Planning**

- **Environmental Problems**
- Environmental problems are exacerbated by conventional industrial structure and resource structure

国家环境保护总局环境工程评估中心

环境问题与城市总体规划

- 环境问题
- 传统城市交通结构挤占了大量的资源环境空间

- **Environmental Problem and General Urban Planning**

- **Environmental Problems**
- Conventional urban transport structure occupies vast land and environmental resources.

国家环境保护总局环境工程评估中心

环境问题与城市总体规划

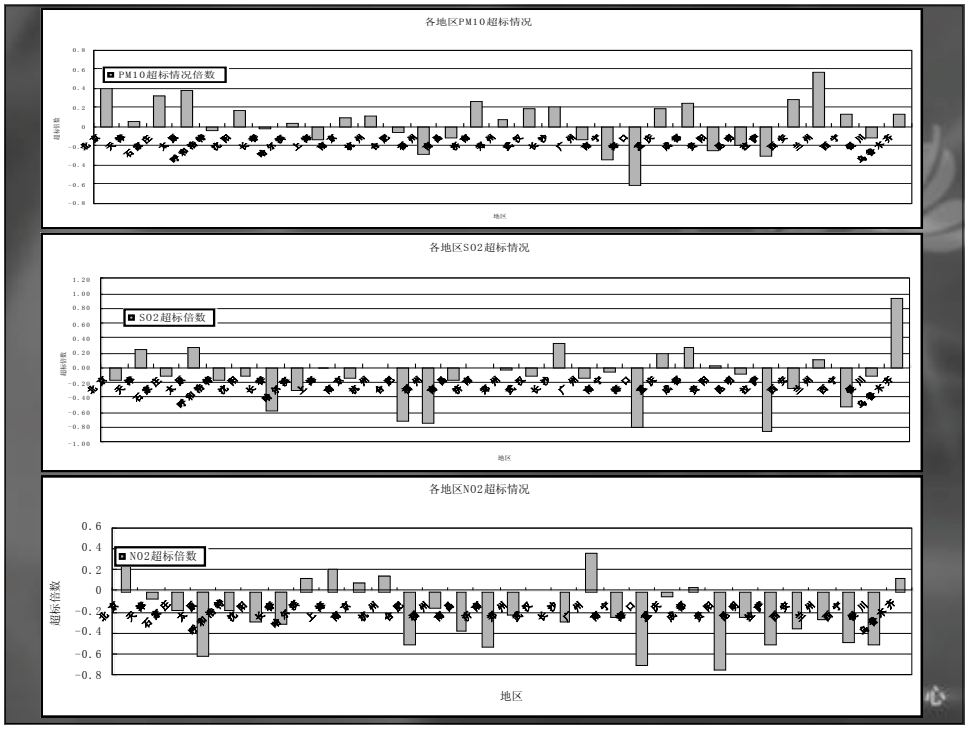
- 环境问题
- 城市土地开发强度梯度分布对城市的可持续发展留下难以消除的后患

Environmental Problem and General Urban Planning

- **Environmental Problems**

  The degree of intensity of urban land development is a fundamental problem for sustainable development.

国家环境保护总局环境工程评估中心



- 国内外大城市环境质量对比

Comparing Environmental Quality of Large Chinese and Overseas Cities

国家和地区	城市	城市人口	TSP微克/m³	SO2微克/m³	NO2微克/m³
		2004年	1999年	1995-2001	1995-2001
中国	上海	1267	87	53	73
	北京	1085	106	90	122
	天津	935	149	82	50
印度	孟买	1834	79	33	39
	德里	1533	187	24	41
	加尔各答	1430	153	49	34
印度尼西亚	雅加达	1319	103		
菲律宾	马尼拉	1043	60	33	
土耳其	伊斯坦布尔	976	62	120	
埃及	开罗	1115	178	69	
巴西	圣保罗	1833	46	43	83
	里约热内卢	1147	40	129	
墨西哥	墨西哥城	1901	69	74	130
美国	纽约	1849	23	26	79
	洛杉矶	1215	38	9	74
	芝加哥	871	27	14	57
法国	巴黎	985	15	14	57
俄罗斯	莫斯科	1067	27	109	
加拿大	多伦多	506	26	17	43
	蒙特利尔	351	22	10	42
	温哥华	212	15	14	37
德国	法兰克福	67	22	11	45
	柏林	333	25	18	26
	慕尼黑	232	22	8	53
意大利	米兰	401	36	31	248
	都灵	97	53		
	罗马	263	35		
西班牙	马德里	515	37	24	66
	巴塞罗那	442	43	11	43
英国	伦敦	762	23	25	77
	伯明翰	222	17	9	45
	曼彻斯特	219	19	26	49
澳大利亚	悉尼	439	22	28	81
	墨尔本	366	15	0	30
	帕斯	148	15	5	19
新西兰	奥克兰	115	15	3	20

国家环境保护总局环境工程评估中心

城市规划环评与生态城市规划

- 可持续发展需求
- 选择合理的城市化进程与发展模式，要求城市的总体战略部署符合可持续发展原则，满足环境承载力的需要。

EIA of urban planning and eco-city

- **Sustainable development demands**

For the sake of promoting the sustainable urban development, reasonable measures should be selected. There needs to be evaluation of whether strategies align with sustainable development and environmental carrying capacity.

国家环境保护总局环境工程评估中心

城市规划环评与生态城市规划

- 城市规划作用
- 主要从城市经济、社会和环境的如何协调发展和可持续发展入手，其中的生态规划或环保规划主要是为满足城市社会、经济目标而采取的措施。

EIA of urban planning and eco-city planning

- **Effects of urban planning**
- It's aim is the harmonious and sustainable development of the economy, society and environment. Eco-planning and environmental planning reflect the intentions of the society and economy.

城市规划环评与生态城市规划

- 城市规划环评作用

主要是基于区域资源环境承载力、自然条件和发展现状，评价现状发展水平，分析区域发展潜力和可持续发展能力。

EIA of urban planning and eco-city planning

- **Effects of urban planning EIAs**

The effects are based on regional carrying capacity of materials, energy conditions, and development status.

Analyze the development potential and the sustainable development capacity of the region.

城市规划环评与生态城市规划

EIA of urban planning and eco-city planning

- 城市规划环评作用
- 可从决策源头考虑其可能的环境影响并采取减缓措施，保证城市总体规划的编制与实施符合可持续发展原则。

- **Effects of urban planning EIA**
- To provide sufficient information on the impacts of implementing a strategic decision and to allow adopting of mitigation measures.
- This ensures that planning is in line with sustainable development .

国家环境保护总局环境工程评估中心

城市规划环评与生态城市规划

EIA of urban planning and eco-planning

- 二者关系
- 规划环境影响评价能够优化和完善生态城市规划，生态城市规划可为规划环境影响评价提供基础数据。

- **Relationship**
- EIA of urban planning optimizes and completes eco-planning;
- Eco-planning provides basic data for the EIA of urban planning .

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 我国的城市规划环境影响评价技术导则（征求意见稿）已编制完成

The EIA guidelines for urban planning

- **The EIA guidelines for urban planning (for discussion) has been completed.**

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 城市规划环境影响评价的类型划分与工作重点

  城市总体规划全过程包含规划方案建设的提出、规划方案制定、规划实施、规划调整或修编，以及编制新一轮的城市规划等环节。

The urban planning EIA guidelines

- **Types and the emphasis of EIA of urban planning**

Urban planning encompasses the proposal, drafting, compositions, implementation, amendments, and composition of a new urban plan.

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 环境影响评价介入城市规划的3个契机
- 城市规划编制阶段
- 规划实施过程中
- 城市规划的编制或调整

The guidelines for urban planning EIAs

- 3 suitable stages for EIAs to intervene in the process of urban planning
- Drafting
- Implementation
- Modification

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 3种形式的环境影响评价
- 预测型
- 监控型（或跟进型）
- 回顾型

The urban planning EIA guidelines

- 3 types of EIAs for urban planning
- Prediction
- Monitoring/Follow-up
- Retrospective

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 城市规划环境影响评价的基本任务
- 1、评价城市及区域环境质量现状，明确生态功能区划、环境功能区划、环境敏感区、主要环境保护目标，识别规划主要环境影响因素和城市及区域主要环境问题，明确城市发展面临的主要资源、环境制约因素。

The urban planning EIA guidelines

- **Basic tasks of urban planning EIAs**
- 1.Evaluate the environment quality, define the ecological function area, environmental function area, environmentally-sensitive area, major environmental protection targets and environmental issues, and determine the resources and environmental factors that restrict development

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 城市规划环境影响评价的基本任务
- 2、从环境保护角度，论证城市的功能定位、发展目标、发展规模和产业结构、城市空间结构和总体布局、基础设施建设规划以及资源利用规划等的合理性。

The urban planning EIA guidelines

- **Basic task of Urban planning EIAs**
- 2.With regard to the environment, demonstrate the rationality of the following: city functions, development targets, size, industry structure, spatial structure, and general distribution, and resources utilization plan.

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 城市规划环境影响评价的基本任务
- 3、提出规划调整建议和减缓环境影响的对策与措施。

The urban planning EIA guidelines

- **Basic task of Urban planning EIA**
- 3. Propose countermeasures to adjust the plan and reduce the environmental impact.

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 城市规划环境影响评价的技术要点
- 1、规划区域环境状况调查及评价
- 调查内容应包括环境、社会和经济三个方面。环境质量现状调查应包括环境空气、地表水、噪声和振动、土壤、地下水、生态环境，并以重点区域（如大型工厂、主要居住区或其他生态敏感区/生态脆弱区）为主要调查范围，注重规划区域长期历史监测资料收集。分析对规划目标和规划方案实施的环境限制因素。评价区域环境状况、环境问题的主要发展趋势。

- **The guideline of EIA for urban planning**
- **Essential Technical points of EIA for urban planning**
- 1.Investigation and assessment of regional baseline environment

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- **城市规划环境影响评价的技术要点**

2、规划的环境影响因素分析和预测

- 分析城市的功能定位、发展目标、发展规模和产业结构、城市空间结构和总体布局、基础设施建设以及资源利用等可能引起的环境影响，预测实施城市总体规划所需要的资源、能源总量，污染物排放总量等，分析资源利用方式。

- **The guideline of EIA for urban planning**
- **Essential Technical points of EIA for urban planning**
- 2.Analyses and prediction of environmental

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- **城市规划环境影响评价的技术要点**

- 3、规划区域资源承载能力分析
- 通过分析城市及所在区域土地资源、水资源和能源等的开发现状和开发潜力，以及区域水环境和大气环境容量，以及水环境功能区划、大气环境功能区划和城市定位等对水环境和大气环境质量的要求，综合确定城市合理的发展规模（包括人口规模、用地规模、产业规模等）和空间布局。

- **The guideline of EIA for urban planning**
- **Essential Technical points of EIA for urban planning**

- 3.Analyses of Regional carrying capacity of material and energy

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 城市规划环境影响评价的技术要点
- 4、规划方案的环境影响分析与评价
- （1）城市功能定位与发展方向的环境影响分析
- （2）城市发展规模和产业结构的环境影响预测与分析
- （3）市空间结构与布局的环境影响分析
- （4）城市重大基础设施建设的环境影响分析
- （5）环境保护措施的环境影响分析

- **The guideline of EIA for urban planning**
- **Essential Technical points of EIA for urban planning**
- 4.Analyses and assessment of Environmental impact of a plan
- Environmental impact analysis on city function orientation and development direction
- Environmental impact prediction and analysis on urban development scope and industry structure
- Environmental impact analysis on city spatial structure and allocation
- Environmental impact analysis on city fundamental establishment
- Environmental impact analysis on environmental protection measures

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 城市规划环境影响评价的技术要点
- 5、环境容量与污染物总量控制
- 城市规划区域环境容量计算因子：环境空气为SO_2,PM_{10}；水环境为COD_{Cr}，NH_3-N。根据环境容量计算结果，结合规划方案和污染控制措施分析，提出城市规划区域大气和水污染物排放总量控制建议。提出对城市区域各主要功能分区的污染物总量分配方案的建议。

- **The guideline of EIA for urban planning**
- **Essential Technical points of EIA for urban planning**
- 5.Environmental capacity and the control of gross contamination

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 城市规划环境影响评价的技术要点
- 6、规划的环境合理性综合分析
- 比较分析城市总体规划与上一级相关规划的协调性。分析规划提出的环境控制目标、上一级政府环境功能区划对规划地区的规定、规划区域环境功能区划的合理性，分析环境空气、地表水、噪声、固废处理处置、生态绿化环境目标可达性。

- **The guideline of EIA for urban planning**
- **Essential Technical points of EIA for urban planning**
- 6.Comprehensive Analyses of environmental reasonableness of plan

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 城市规划环境影响评价的技术要点
- 7、公众参与和专家咨询
- 公众参与的主要内容包括：通过公众参与掌握重要的、为公众关心的环境问题；规划的环境影响减缓措施；公众对规划实施过程中的跟踪评价及监督的要求；公众对规划的调整建议和要求。

- **The guideline of EIA for urban planning**
- **Essential Technical points of EIA for urban planning**
- 7.Public participation and professional consultation

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 城市规划环境影响评价的技术要点
- 8、规划的调整建议和环境影响减缓措施
- 根据前述各章的分析评价结果，综述科学、合理的对规划方案的调整建议。提出环境影响减缓环境影响措施和环境保护对策。提出减缓措施实施的阶段性目标、指标及可行性分析。

- **The guideline of EIA for urban planning**
- **Essential Technical points of EIA for urban planning**
- 8.Advice of modification and mitigation measures for Environmental impacts

国家环境保护总局环境工程评估中心

城市规划环境影响评价技术导则

- 城市规划环境影响评价的技术要点
- 9、规划实施的跟踪评价

- **The guideline of EIA for urban planning**
- **Essential Technical points of EIA for urban planning**
- 9.Monitoring, tracking and auditing the Environmental impacts

国家环境保护总局环境工程评估中心

各部门共同努力实现可持续发展

- 国土资源部、交通部等部门启动了行业性规划环境影响评价规范的研究和制订。
- 上海、河北、天津、山东、陕西、内蒙古、大连、深圳、杭州等21个省（区）、市出台了规划环评地方法规。

Working together to realize sustainable development

- The Ministry of Soil and Resources and the Ministry of Communications have started to research and write Planning EIA criteria
- 21 Provinces and cities have issued local EIA regulations: Shanghai, Hebei, Tianjin, Shandong, Shanxi, Shan'xi, Inter Mongolia, Dalian, Shenzhen, Hangzhou

国家环境保护总局环境工程评估中心

各部门共同努力实现可持续发展

- 已完成上海市的松江新城、临港新城和嘉定新城，营口市、邢台市等城市总体规划环境影响评价。
- 以大连、武汉、宁波为试点，对三市的“国民经济和社会发展‘十一五’规划”进行环境影响评价。

Working together to realize sustainable development

- The following areas have completed planning EIAs: Songjiang New city, Lingang New city, Jiading New city, Yingkou City, Xingtai City.
- Pilot cities have carried out EIAs for their “11th five year plan”

国家环境保护总局环境工程评估中心

各部门共同努力实现可持续发展

- 国外经验
- 美国《国家环境政策法》经历了“遭遇坚决抵触”、“部分程度的接受”、“全面积极的参与”三个阶段。
  达成共识：通过战略环评可完善本部门的政策、规划，既符合本部门利益，也符合国家整体利益。

Working together to realize sustainable development

- International experiences
  “National environmental policy act” had three stages: rejection, part acceptance and active participation.

  Common agreement: EIAs can perfect policies and plans to meet national interests.

各部门共同努力实现可持续发展

- 实现可持续发展的战略目标是所有决策部门共同的责任。
- 规划环评能否被大力推广和开展，必须得到相关部门的认同与支持。

Working together to realize sustainable development

- Sustainable development is the common responsibility of all decision-making departments.
- Support from related departments determines the successful development of Planning EIAs.