2017 CHINA PETROLEUM & CHEMICAL INTERNATIONAL CONFERENCE

中国国际石油化工大会

CPCIC

安全绿色　智造未来

Partnering for a Safer, Smarter & More Sustainable Chemistry Future

2017 CHINA PETROLEUM & CHEMICAL INTERNATIONAL CONFERENCE
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Concept and Practices, Technology and Trend of Green Building

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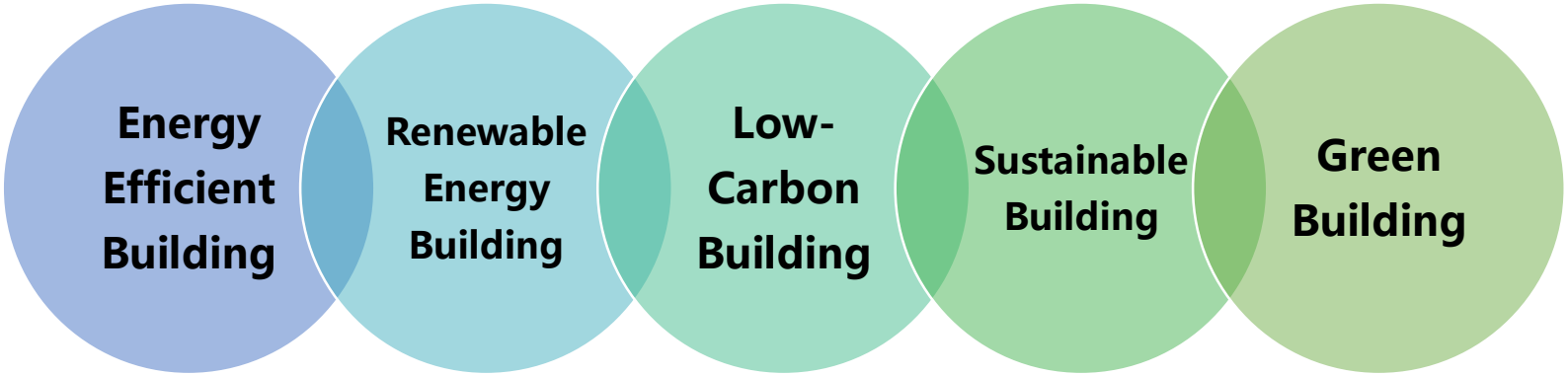
安全绿色 智造未来

Partnering for a Safer, Smarter & More Sustainable Chemistry Future

Considerable Environmental Footprint of Buildings

- Account for 40% of global energy consumption;
- Account for 25% of global water consumption;
- Account for 12% of soil resources;
- Generate 30% of solid wastes;
- Exhaust 33% of the global greenhouse gases.



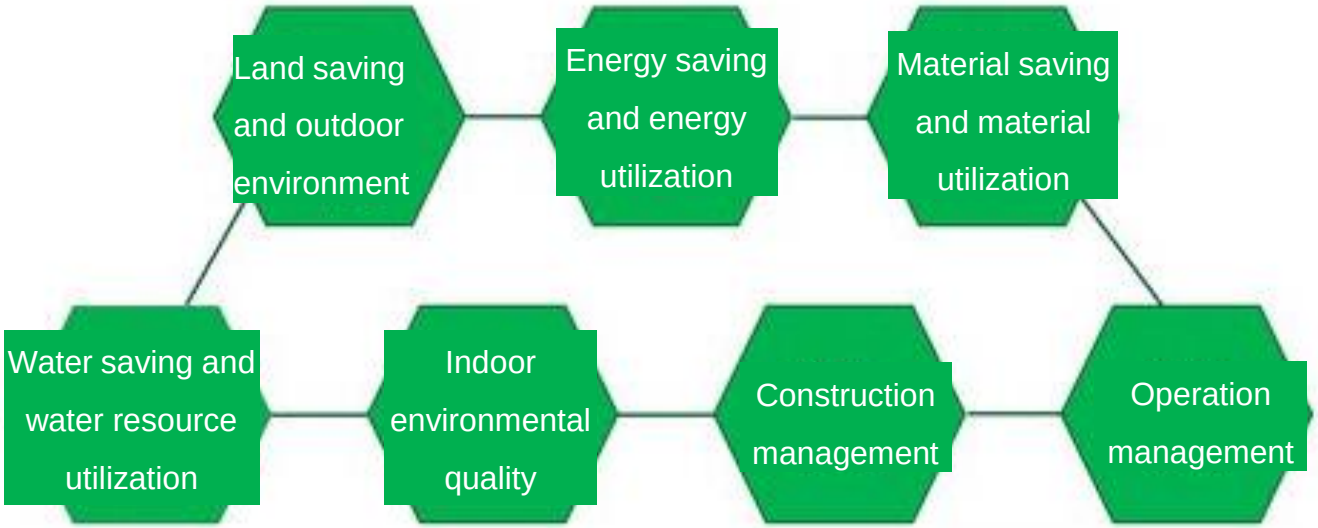
Green Building

- *Green Building Action Plan* （G.B.F [2013] No. 1)
- *New Urbanization Plan （2014-2020）* issued by the Central Committee of the Communist Party of China (CPC) and the State Council and *The State Council's Opinions on Further Promoting New Urbanization* （G.F. [2016] No. 8) issued by the State Council.
- *Several Opinions on Further Enhancing Administration of Urban Planning and Construction*（Z.F. [2016] No. 6) issued by the CPC.
- *Circular on Issuing the Guiding Opinions on Promoting Green Consumption* （ F.G.H.Z. [2016] No. 353) issued by Ten Ministries and Commissions.

Green Building

- Green Building

During the service life of the building, save resources (energy saving, land saving, water saving and materials saving), protect the environment and reduce pollution to the maximum, so as to offer a healthy, suitable and efficient used space and building in harmony with nature. ---*Assessment Standard for Green Building*.



Green Building

- *Code for Green Design of Civil Buildings* JGJ/T 229-2010
- *Code for Green Construction of Building* GB 50905-2014
- Code for Green Maintainance of Building JGJ/T391-2016
- *Assessment Standard for Green Building* GB/T50378-2014
    - *Green Industrial Building* GB/T50878-2013
    - *Green Office Building* GB/T50908-2013
    - *Green Store Building* GB/T51100-2015
    - *Green Retrofitting of Existing Building* GB/T51141-2015
    - *Green Hospital Building* GB/T51153-2015
    - *Green Hotel Building GB/T51165-2016*
    - *Green Exhibition Hall GB/T51148-2016*
    - *Green School Campus and others more （On Drafting）*
- *Assessment Standard for Green Construction* GB/T 50640-2010
- *Local assessment standard of green building has been issued in 25 provinces (autonomous regions or municipals).*

Green Technology-residential building

- 项目环评报告通过批复
- 人均居住用地指标控制
- 日照、采光、室内通风满足相关要求
- 植物配植选择乡土植物
- 乔、灌、草复式绿化
- 围护结构节能符合地方要求
- 集中空调系统设温度调节装置
- 集中空调系统设热量计量装置
- 冷热源机组能效比符合公建节能要求
- 用电分户计量
- 风机、水泵满足公建节能要求
- 给排水系统设计完善
- 避免给排水管网漏损措施
- 用水分户计量
- 现浇混凝土采用预拌混凝土
- 建筑无结露现象
- 建筑构件隔声性能
- 物业管理制度健全
- 设备、管道设置便于维修
- 绿地率不低于30%
- 人均公共绿地面积不低于1㎡(新区建设)
- 公共服务配套
- 交通设施可达性
- 节水器具
- 雨水回用系统
- 室内背景噪声控制

Green Technology-residential building

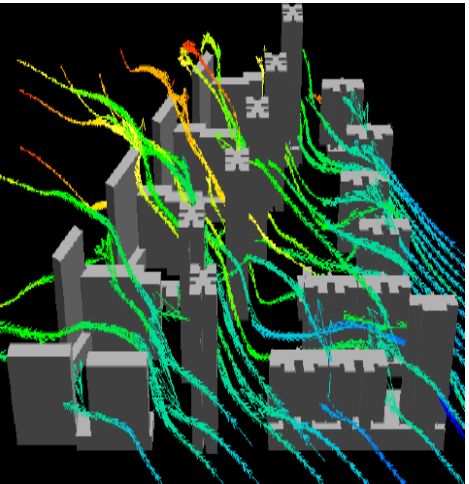
注：下述技术为在一星级技术体系基础上增加的技术

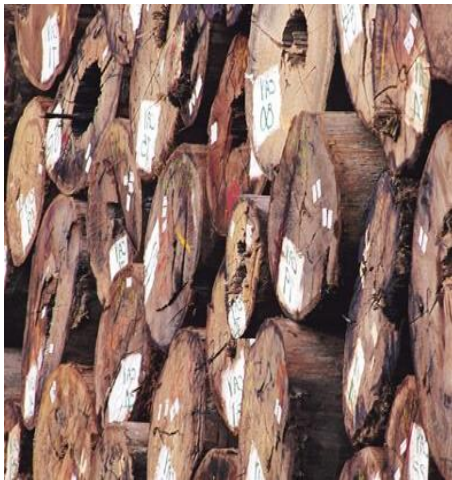
- 透水地面应用
- 照明功率密度达目标值
- 排风热回收系统
- 可再生能源应用
- 景观绿化节水灌溉
- 可再循环材料应用
- 土建与装修一体化设计
- 室内自然通风优化设计
- 建筑智能化设计

Green Technology-residential building

注：下述技术为在二星级技术体系基础上增加的技术

- 室外风环境满足舒适度要求
- 热岛强度
- 建筑能耗比地方标准低20%
- 合理利用地下空间
- 中水回用系统
- 高性能混凝土、高性能钢应用
- 可再利用材料应用
- 室内自然采光优化设计
- 可调节外遮阳系统
- 室内空气质量监测系统
- 物业通过ISO14001环境管理体系、ISO9001质量管理体系、能源管理体系认证



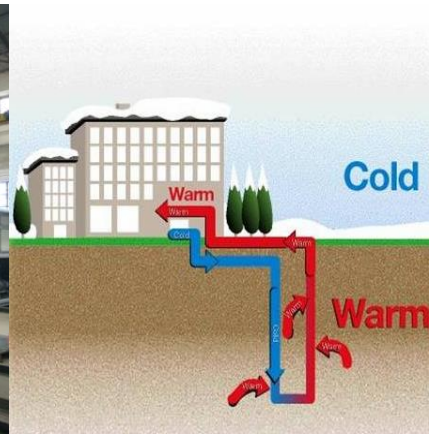


Green Technology-commercial building

- 项目环评报告通过批复
- 日照满足国家或地方相关要求
- 植物配植选择乡土植物
- 乔、灌、草复式绿化
- 交通组织便利
- 围护结构节能5%和10%
- 冷热源机组能效比符合公建节能要求
- 外窗可开启面积比达30%
- 外窗气密性达标
- 风机、水泵满足公建节能要求
- 给排水系统设计完善
- 避免给排水管网漏损措施
- 现浇混凝土采用预拌混凝土
- 集中空调系统室内参数符合公建节能标准
- 建筑无结露现象
- 建筑无障碍设施设计
- 物业管理制度健全
- 设备、管道设置便于维修
- 建筑智能化设计
- 室内照明达现行值
- 用电分项计量
- 建筑部分负荷的节能措施
- 节水器具
- 雨水回用系统
- 用水分项计量
- 土建与装修一体化设计
- 灵活隔断设计
- 室内背景噪声控制
- 空调末端调节方便

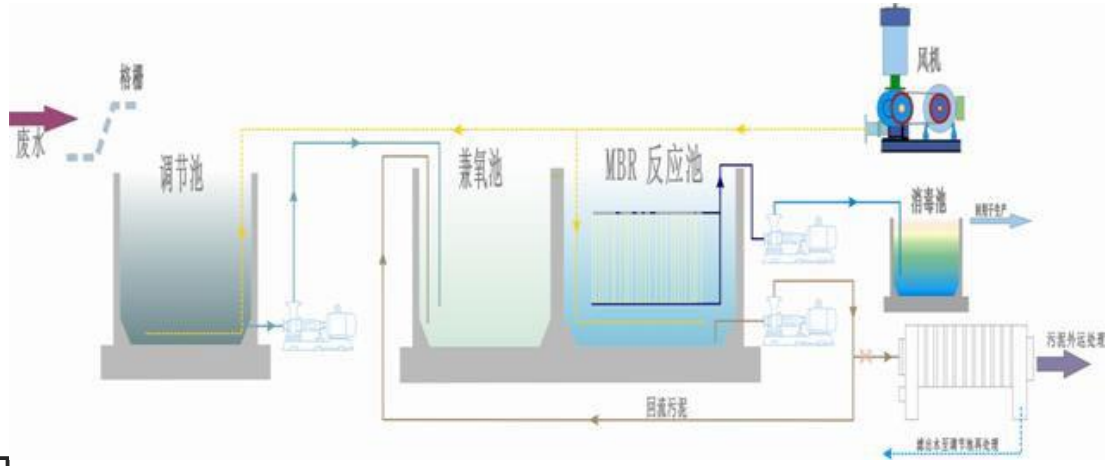
Green Technology-commercial building

- 屋顶绿化或垂直绿化
- 透水地面应用
- 主要功能空间采光达目标值
- 排风热回收系统
- 可再生能源应用
- 景观绿化节水灌溉
- 可再循环材料应用
- 合理利用地下空间
- 室内自然通风优化设计
- 室内自然采光优化设计
- 室内空气质量监测系统
- 导光筒或采光井等增强自然采光设计



Green Technology-commercial building

- 室外风环境满足舒适度要求
- 蓄冷、蓄热技术应用
- 建筑能耗节能
- 分布式热电冷联供技术
- 中水回用系统
- 高性能混凝土、高性能钢应用
- 可再利用材料应用
- 可调节外遮阳系统
- 通过ISO14001环境管理体系、ISO9001质量管理体系、能源管理体系认证
- 建筑通风、空调、照明等设备自动监控系统



Classic Green Building Cases

Renovation and Expansion Project of the National Museum of China

- **Green Building Innovation Prize in China in 2015 (Ministerial level) First prize**
- **Three-star design label**

Index name	Design value	Running value
Building energy saving rate	60.46%	——
Utilization rate of renewable energy	——	——
Utilization rate of non-traditional water resources	41.05%	——
Greening rate of residential area	Public building not evaluated	——
Ratio of recyclable construction materials consumption	10.30%	——
Concentration of indoor air pollutants	Design stage not evaluated	——
Property management	Design stage not evaluated	——

Classic Green Building Cases

Renovation Project of Shanghai Shendu Building

- **Green Building Innovation Prize in China in 2015 (Ministerial level) First prize**
- **Three-star running label**

Index name	Design value	Running value
Building energy saving rate	78.6%	78.6%
Utilization rate of renewable energy	3.00% of the building electric consumption	2.40% of the building electric consumption
Utilization rate of non-traditional water resources	20.45%	22%
Greening rate of residential area	Public building not evaluated	Public building not evaluated
Ratio of recyclable construction materials consumption	——	——
Concentration of indoor air pollutants	Design stage not evaluated	Conform to GB 50325
Property management	Design stage not evaluated	ISO 14001 Certified

Classic Green Building Cases

Prefabricated Assembly Housing of Nanjing Vanke Shangfang Prefabricated Indemnificatory Building 6-05

- **Green Building Innovation Prize in China in 2015 (Ministerial level) Second prize**
- **Three-star design label**

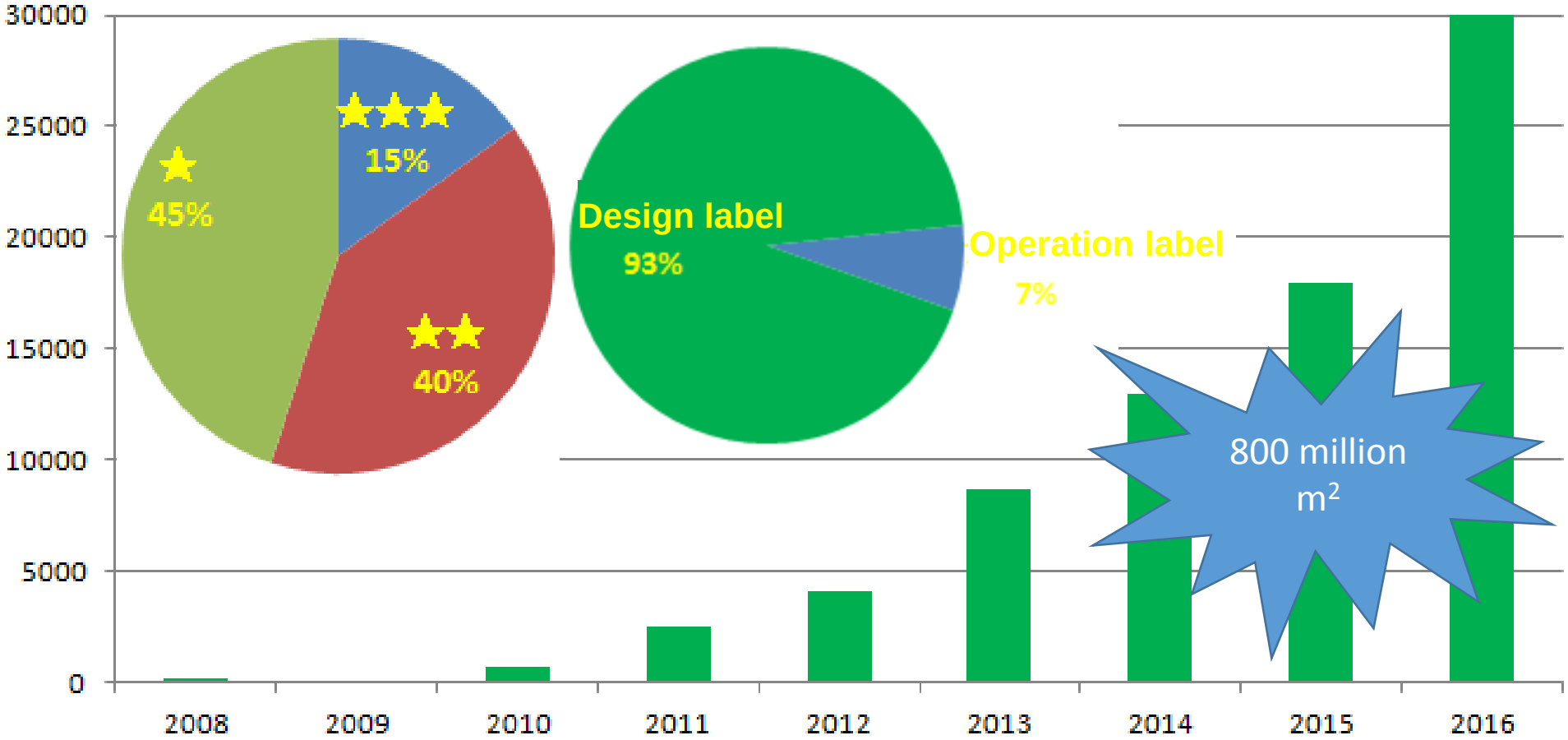
Index name	Design value	Running value
Building energy saving rate	50%	——
Utilization rate of renewable energy	100% of households use solar hot water system.	——
Utilization rate of non-traditional water resources	10.14%	——
Greening rate of residential area	48.54%	——
Ratio of recyclable construction materials consumption	——	——
Concentration of indoor air pollutants	Design stage not evaluated	——
Property management	Design stage not evaluated	

Green Building Generalization

- Green building standard started to be comprehensively implemented in the indemnificatory housing building, public welfare building invested by the government and large public buildings in the cities of provincial level and above across China.
- In Beijing, Tianjin, Shanghai, Chongqing, Jiangsu, Zhejiang, Shandong and other areas, efforts have been further intensified to comprehensively implement green building standard in the newly built building in cities and towns.

Green Building Generalization

Building Area of Awarded Green Building Assessment Labels (10k m²)



Development Trend of Green Building

- 13th Five-Year Plan for the Development of Building Energy Efficiency and Green Building issued by the the Ministry of Housing and Urban-Rural Development of the People's Republic of China (MOHURD):
  - The area proportion of green building in the newly built building of the towns and cities is more than 50%, and the application proportion of green building materials is more than 40%.
  - MOHURD: Among the projects that have been awarded the green building assessmentlabel, those entitled with two-star and above are over 80% and those awarded maintainance label are over 30%.
- Local:
  - Development Plan for Energy Conservation of Civil Building in Beijing in the 13th Five-Year Plan: The area of green building will accounts for more than 25% of the total civil buildings in the cities and towns and the proportion of green building materials applied in new buildings will reach 40%. The newly built public warfare buildings invested by the government and large public buildings will comprehensively implement two-star and above standards. The proportion of three-star green building in the sub-central municipal administrative areas in Beijing shall be exceed 70%.

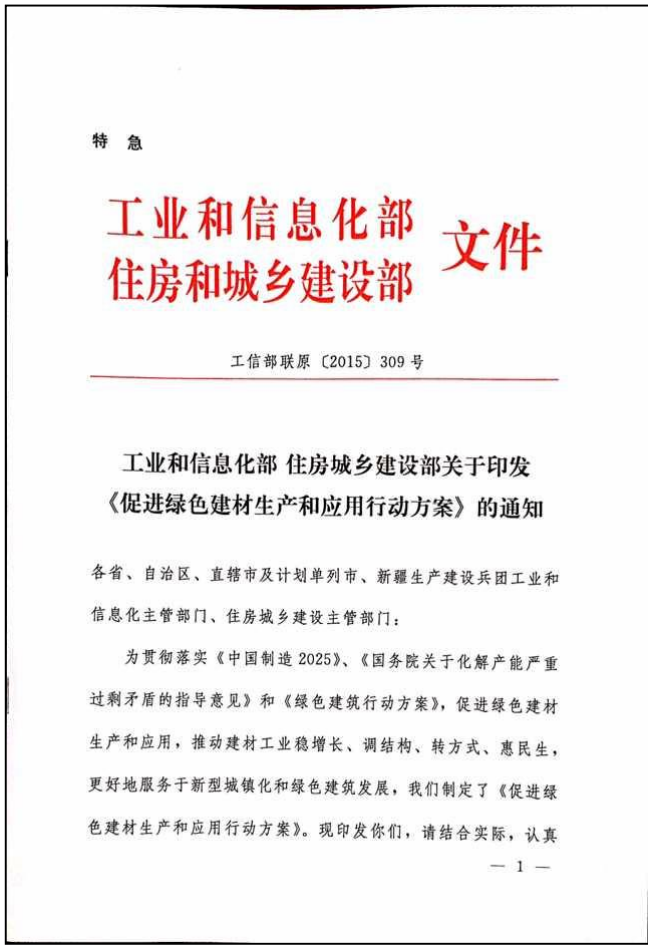
Development Trend of Green Building

- By 2030, the three-star green building will account for more than 80% of the total buildings.
- It aims to optimize from individual green building to overall ecological communities and infrastructures.
- People's pursuit for living environment transforms from green residential space to integrated optimization and promotion of ecological city.
- It aims to realize transformation from the generalization of energy saving and green technology hardware to the establishment of new culture trend of green ecological society.
- It aims to realize transformation from construction of new green building to transformation of renovation green building.

--Mr. Qiu Baoxing (Counselor of the State Council & Former deputy minister of the MOHURD

Action Plan for Promoting Production and Application of Green Construction Materials (Ministry of Industry and Information Technology of the People's Republic of China (MOIIT) L.Y.〔2015〕 No. 309)

- The application proportion of green building materials in newly built buildings reaches 30%.
- The application proportion of green building green building reaches 50%.
- The application proportion of green building in pilot and demonstration projects reaches 70%.
- The application proportion of green building materials in existing buildings is improved to 80%.



特 急

工业和信息化部
住房和城乡建设部 文件

工信部联原〔2015〕309号

工业和信息化部 住房城乡建设部关于印发《促进绿色建材生产和应用行动方案》的通知

各省、自治区、直辖市及计划单列市、新疆生产建设兵团工业和信息化主管部门、住房城乡建设主管部门：

为贯彻落实《中国制造2025》、《国务院关于化解产能严重过剩矛盾的指导意见》和《绿色建筑行动方案》，促进绿色建材生产和应用，推动建材工业稳增长、调结构、转方式、惠民生，更好地服务于新型城镇化和绿色建筑发展，我们制定了《促进绿色建材生产和应用行动方案》。现印发你们，请结合实际，认真

— 1 —

Action Plan for Promoting Production and Application of Green Construction Materials (Ministry of Industry and Information Technology of the People's Republic of China (MOIIT) L.Y.〔2015〕 No. 309)

I Green Manufacturing Action for Building Materials

II Action for Green building Materials AssessmentSign

III Performance Improvement Action for Cement and Cement Products

IV Promotion Action for Steel Structure and Wood Structure Buildings

V Promotion Action for Sheet Glass and Energy-saving Doors and Windows

VI Innovation Action for New Wall Body and Energy-saving Thermal Insulation Materials

VII Upgrading Action for Ceramic and Chemical Building Materials Consumption

VIII Go-to-countryside Action for Green Building Materials

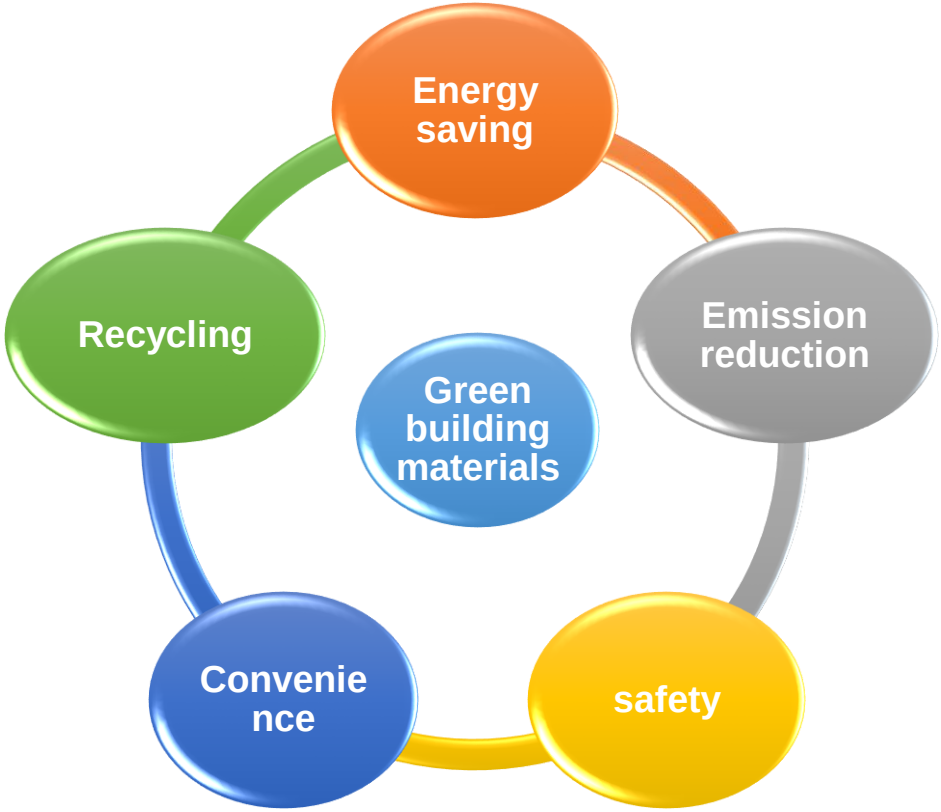
IX Action for Pilot and Demonstration Guidance

X Strengthening organization implementation action

Green Building Materials

Definition

The building material products that can reduce the natural resource consumption and alleviate the influence on ecological environment during the whole life, with features of "energy saving, emission reduction, safety, convenience and recycling".



Green Building Materials

Green building material assessment label of MOHURD, and MOIIT

September 2013

- Both ministries established the coordination group of green building material promotion and application.

May 2014

- Both ministries issued the *Management Measures for Assessment Sign of Green Building Materials*.

September 2014

- Both ministries prepared the Management Measures for Assessment Label of National Green Building Materials.

August 2015

- Both ministries issued *Action Plan for Promoting Production and Application of Green Construction Materials*.

October 2015

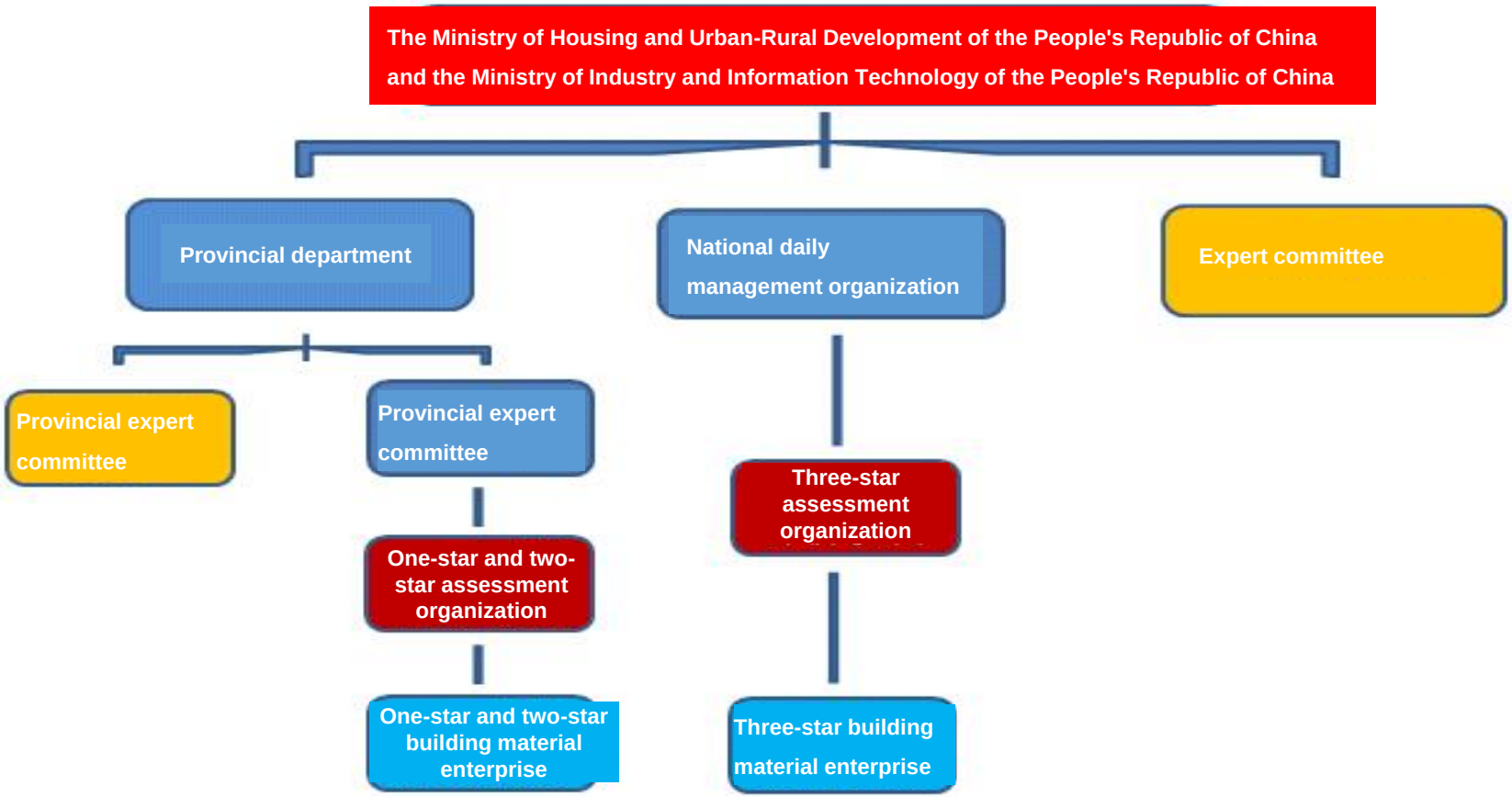
- Both ministries issued *Implementing Rules and Technical Guidelines for Assessment of Green Building Materials*

April 2016

- Approved national three-star qualification to four organizations, and carried out evaluation.

Green Building Materials

Green building material assessment label of MOHURD, and



Green Building Materials

Overall structure of guidelines

Assessment index system

- Control items (one-vote veto)
  - Mainly include the basic requirements of pollutant emission, occupational health, and safety production and management system, and production performance.
- **Rating items (100 points)**
  - Evaluate the service life of building material products from five aspects (namely energy saving, emission reduction, safety, convenience, and recycling).
- **Bonus Items (5 points)**
  - Focus on considering the advancement in building materials production process, environmental influence level and the technology innovation and performance of products, etc.

Green Building Materials

Sign and class separation

Star level	★	★★	★★★
Score Range	$60 \le Q_{general} < 70$	$70 \le Q_{general} < 85$	$Q_{general} \ge 85$

Green Building Materials

The score item structure: for example, the wall painting (under checking)

Class I index	Weight	Class II index	Weight
Energy saving	0.26	5.1.1 Production energy consumption of the unit product	0.14
		5.1.2 Transport energy consumption of raw materials	0.08
		5.1.3 Certification of energy management system	0.03
Emission reduction	0.52	5.2.1 Emission of the air pollutant materials, pollutant water, semi-solid wasted silt in the operation area	0.25
		5.2.2 VOC content of the painting products	0.16
		5.2.3 The improvement to indoor environment from the products	0.06
		5.2.4 Product certificate or evaluation, environment product declaration (EPD), and carbon footprint report	0.05
Safety	0.02	5.3.1 Safety production standardization level	0.02
Convenience	0.15	5.4.1 Strain resistance of products	0.05
		5.4.2 Washability of products	0.05
		5.4.3 Applicability and cost-effectiveness	0.05
Recycling	0.05	5.5.1 Recycling use rate of industrial waste water produced in production process	0.03
		5.5.2 Painting package materials and recycling after construction	0.02

Green Building Materials

Bonus Items

13.0.1 Adopt the advanced production process or production equipment in building material production process, and the environment influence is clearly lower than the industry level on average. The general score is 2 scores, scored by the expert.

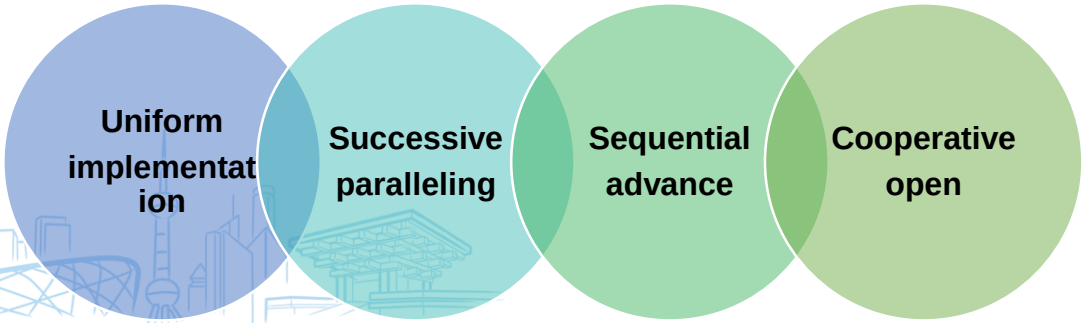
13.0.2 The building materials have prominent innovation and the performance is clearly superior to the industry level on average. The general score is 3 scores, scored by the expert.

Green building materials

China green product certification

On September 18, 2015, in Integrated Reform Plan for Promoting Ecological Progress (Z.F. [2015] No. 25) issued by the CPC and State Council, Article XLVI proposes:

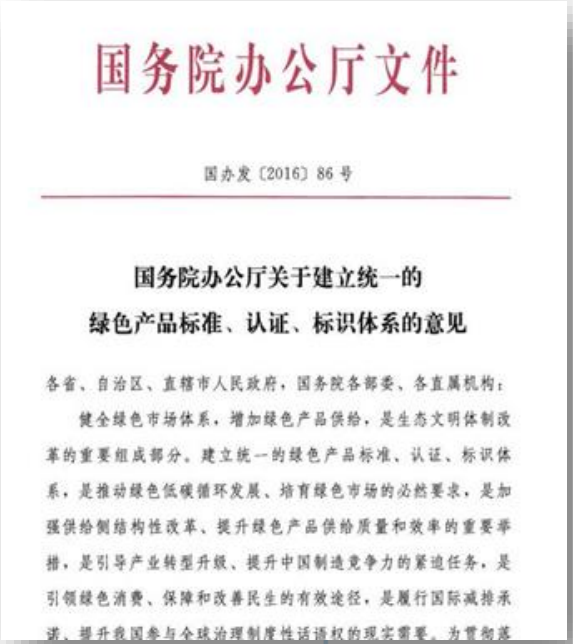
Establish the uniform green product system. Unify the established respectively products in environmental protection, energy saving, water saving, recycling, low carbon, reproduction, organic aspect, etc. into the green products, and establish uniform green products standard, certification, label system, etc. The work was listed in *core task of the Central Committee for Deepening Comprehensively the Reform of the Leading Group in 2016*, and it is the only task listed in the Central Committee reform for the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China in 2016



Green building materials

China green product certification

On November 22, 2016, Opinions of the General Office of the State Council of the People’s Republic of China, on Establishing a Uniform System for Standards, Certification and Labeling of Green Products (G.B.F. [2016] No. 86)



国务院办公厅文件

国办发〔2016〕86号

国务院办公厅关于建立统一的
绿色产品标准、认证、标识体系的意见

各省、自治区、直辖市人民政府，国务院各部委、各直属机构：

健全绿色市场体系，增加绿色产品供给，是生态文明体制改革的重要组成部分。建立统一的绿色产品标准、认证、标识体系，是推动绿色低碳循环发展、培育绿色市场的必然要求，是加强供给侧结构性改革、提升绿色产品供给质量和效率的重要举措，是引导产业转型升级、提升中国制造竞争力的紧迫任务，是引领绿色消费、保障和改善民生的有效途径，是履行国际减排承诺、提升我国参与全球治理制度性话语权的现实需要。为贯彻落

CHINA GREEN PRODUCT

中国绿色产品

Green Building Materials

The state green product assessmentstandardization general group is established.

- The standardization Administration of the People's Republic of China (SAC) organizes the experts and representatives related to industrial association, consumer organization, standardization organization, technology organization, certification inspection organization etc., to establish the national green product assessment standardization general group, and the establishment conference has been held on February 16, 2017.
- GB/T 33761-2017 *the General Principles for Green Product Assessment* has been issued and implemented on May 12.

Green building materials

National standards for Green Product assessment promote on fast track

- On August 10, 2017, official website of SAC seeks public opinions to 16 green product assessment standards.

No.	Product type	No.	Product type
1	Ceramic tiles (slabs)	9	Plastics
2	Sanitary wares	10	Articles for washing
3	Building energy efficient glass	11	Artificial slabs and wooden floor
4	Thermal insulation materials	12	Paper and paper products
5	Wall materials	13	Household appliances
6	Waterproof and sealing materials	14	Textile products
7	Solar heat water system	15	Furnitures
8	Wooden plastic products	16	Coatings

Green building materials

- China Building Material Test & Certification Group Co., Ltd(CTC) ,The CNCA building material group leader unit (of "China green product qualification assessment project" is responsible for proposing the first production catalog and formulating the implementation rules.

中国建材检验认证集团
China Building Material Test & Certification Group

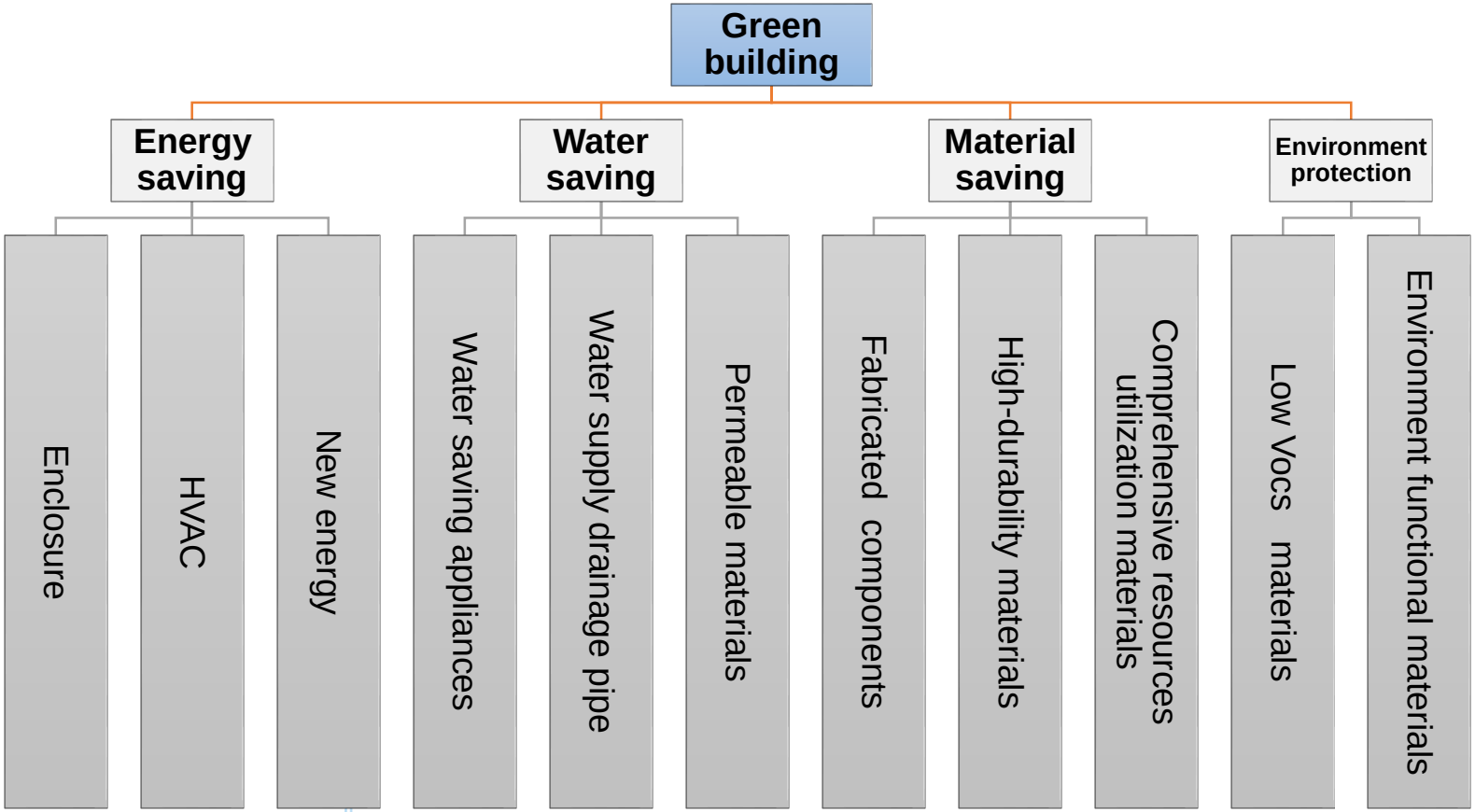
Green Building Materials

Select and use the production certification trademark for green building

- The certification mark refers to a mark that is controlled by an organization capable of inspection and supervision of a type of goods or service used in respect of goods or services by other individuals who do not belong to the said organization, with a view to certify the origin, raw material, mode of manufacture, quality, precision or other special characteristics of the goods or services.
- The National Construction Material Testing Center, through the approval and registration of Trademark Office of the State Administration for Industry and Commerce, can certificate the mark, validity, and authority of building material product meeting building function requirements shall be protected by laws.

Green Building Materials

Materials under Assessment : Targeting on green building goals



Green building materials

Catogory	Partially certificated enterprises	Catogory	Partially certificated enterprises
Thermal insulation	Owens Corning and Saint-Gobain	Ceramic tiles	Xin Zhong Yuan and Champion
Doors and windows	Orient Sundar and Assa Abloy	Sanitary wares	Jomoo and Supor
Glass	AGC and Yaohua Pilkington	Integration ceiling	Youpon and Aupu
Artificial plate	Tubao and Moganshan	Sealing glue	GB Silicones and Geliahao
Coating	CRC and SKSHU	Sunshade	Hunter Douglas and Graff
Waterpro ofing	Oriental Yuhong and Panjin Yuwang	Diatomite	Lanshe and Lantiden
Pipe materials	Ginde and Rifeng	Sea shell powder	Rihe and Wanyuan

Thank you!