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Economic Cooperation**

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An Overview of Green Building Promotion in Chinese Taipei

Submitted by: Chinese Taipei



**Workshop on Sharing Experiences in the
Design and Implementation of Green
Building Codes
Lima, Peru
5-7 March 2013**

 Sharing Experience on Green Building
in Chinese Taipei, 5-7 March 2013



An Overview of Green Building Promotion in Chinese Taipei




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Ministry of the Interior Date: 03/7/2013**

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Presentation Outline

1. Reveal a Green Building Era in Chinese Taipei
2. Chinese Taipei's Green Building Evaluation System
3. Description of the Green Building Regulations
4. From Green Building to Intelligent Green Buildings

Conclusion



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I. Environmental Change and its Challenges for the Building Sector



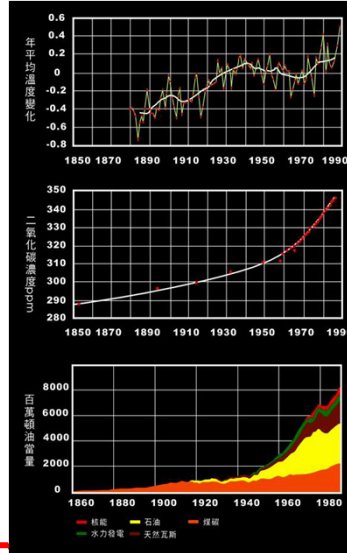
A relationship between the global temperature and anthropogenic CO₂ emission and energy uses over the past century has been identified.



Global temperature

CO₂

Energy



A relationship of the global temperature and energy uses and CO₂ emission can be depicted.

1.2 Environmental Challenges for the Building Sector

- The warming velocity in Chinese Taipei was the double of global average over the past century.
- The CO₂ emission per capita in Chinese Taipei exceeds 11 tons, which is ranked as the 16th highest of the world and three times the world's average.

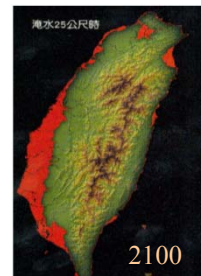


Source: Central Weather Bureau

- High independence on imported energy accounting for 99.3% (the building sector accounting for 28.3% of total energy consumption).

Pursuing a living environment with safety, sustainability, energy saving, health, comfort, and holistic concern has become the major challenge in the building sector of Chinese Taipei as well as around the world.

**Energy Saving and Carbon Reduction
Intelligent Chinese Taipei
Barrier-free Living Environment**



Simulation of sea level rise in 2100
Source: Commonwealth Magazine



Solutions from human-oriented technology

1.3 A Green Building Era in Chinese Taipei



Chinese Taipei, following the global trend of green building movement, has effectively promoted green building nationally and internationally and now been moving towards Intelligent Green buildings.

1.4 Reveal a Green Building Era in Chinese Taipei

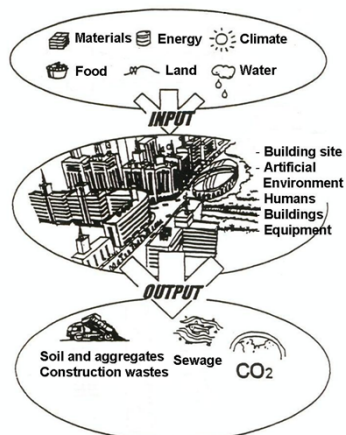
- 1998 Development of the Green Building Evaluation System
- **1999 Launch of the Green Building Labeling System**
- 2004 Establishment of Green Building Material Labeling System
- **2005 Start for the Green Building Chapter in the Building Code**
- 2011 Establishment of “Intelligent Green Building Promotion Program” from 2011 to 2015
- 2012 Modify the Green Building Evaluation System into a Family Systems of Five Categories
- **2012 Modify the Green Building Chapter in the National Building Code**

2. Chinese Taipei's Green Building Evaluation System

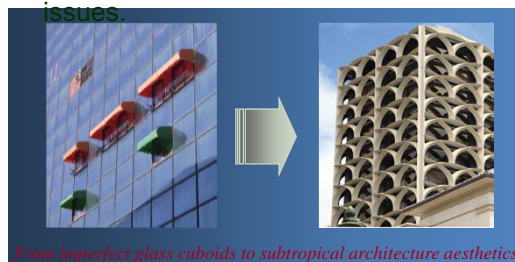


2.1 What type of Green Building capable of matching Chinese Taipei's need ?


□ Definition of the Green Building of Chinese Taipei



- ◆ Sufficiently accommodating with Chinese Taipei's subtropical climatic conditions and local environmental issues.



- ◆ A healthy and comfortable building that is capable of efficiently reducing the consumption of energy and natural resources, and the pollution caused by wastes during the life cycle of the building.



綠建築標章
GREEN BUILDING


2.2 Chinese Taipei EEWB System

Ecology

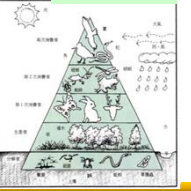
Green vegetation

建築物排放
263kg-CO₂/m²

植物CO₂吸收
600kg-CO₂/m².40yr.)




Biodiversity



Energy saving

Envelope design
Air conditioning
Lighting



Waste reduction

CO₂ emission reduction


187 kg-CO₂/m² (1.4倍)
263 kg-CO₂/m² (1.4倍)

合理的結構系統

SC 20F
RC 20F


Construction Pollution Reduction

空氣污染防制
揚塵化機機
土方平衡




Health

Green Building Material



Water resources

水資源



2.3 Green Building Evaluation System

Green Building is to protect ecosystems, to save energy, to reduce wastes, as well as to promote health and well-being.

Category	Indicator (2003 Revised Version)	Evaluation Items
Ecology	1. Biodiversity	Ecological net, biological habitat, plant diversity (only for sites greater than 1 hectare)
	2. Greenery	CO ₂ absorption (kg-CO ₂ /(m ² .40yr))
	3. Water infiltration and retention	Water content of the site, including infiltration, retention, runoff management.
Energy Saving	4. Daily Energy Conservation (prerequisite)	Building envelope design ENVLOAD (20% higher than building regulation), and other techniques (including HVAC system, lighting, management system)
Waste Reduction	5. CO ₂ Emission Reduction	CO ₂ emission of building materials (kg CO ₂ /m ²)
	6. Construction Waste Reduction	Waste of soil, construction, destruction, utilization of recycled materials
Health	7. Indoor Environment	Acoustics, illumination, and ventilation, interior finishing building materials
	8. Water Conservation (prerequisite)	Water usage (L/person), hygienic instrument with water saving
	9. Sewage and waste disposal facility improvement	Sewer plumbing, sanitary condition for garbage gathering

2.4 Green Buildings adopting EEWH technologies and techniques

- Ecology



Permeable pavement for parking area

Energy Saving



Building Energy Management System



BIPV and renewable energy

2.5 Green Building System in Practice

Eligibility

- Green Building Candidate Certificate for building projects.
- Green Building Label for completed buildings

Validity

- The validity for a Green Building Label is three years.



Rating

- A five ranges rating system was established in 2007 to encourage builders or owners to pursuing better practices.

Certified: 12*~26 Bronze: 26~34 Silver: 34~42 Gold: 42~53 Diamond: 53 and above

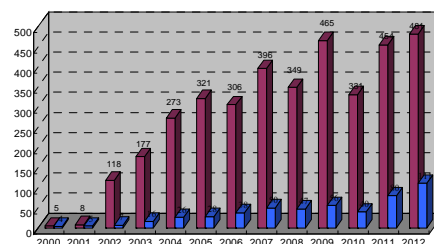
2.6 The Achievements of the Green Buildings

- All new public buildings should pass green building certification prior to get building license.
- Green building cases grow rapidly:
By the end of December 2012, 3,684 buildings or building projects were certified as green buildings.

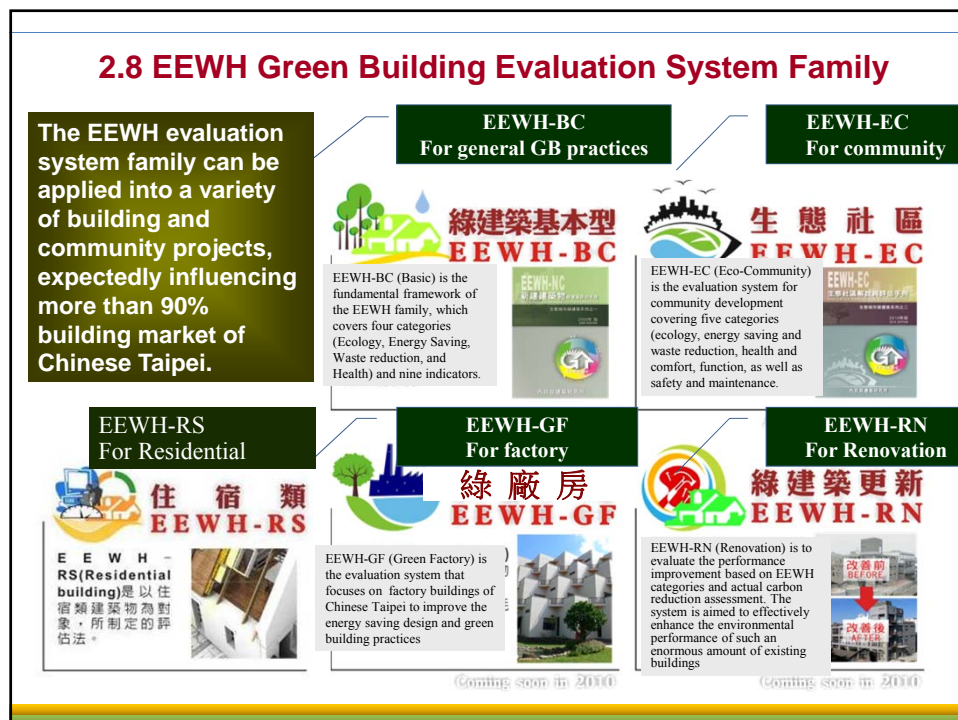
Year	No. of Certification
2000	5
2001	8
2002	118
2003	177
2004	273
2005	321
2006	306
2007	396
2008	349
2009	465
2010	331
2011	454
2012	481
Total	3,684

The benefits are :

- Total building floor areas: about 42.85 million m²
- Electricity saving: 1078 million kWh
- Water saving: 47.99 million tons



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2.9 Establish Green Building Material Labeling System

- In order to minimize the harm to human health from the materials used inside buildings, Chinese Taipei launched the Green Building Material Labeling System in 2004 that had been put into effect in conjunction with revisions to the Green Building Chapter of Chinese Taipei's Building Code.
- Regulation of green building material utilization in the Building Code:

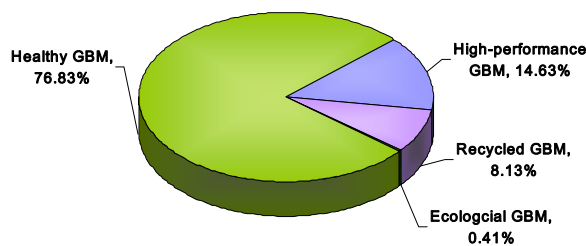


(Article 321) From July 2009, green materials must be used for interior finishing and flooring, and must constitute at least **45%** of all decorating materials.



2.10 GBM Achievements

By the end of December 2012, 761 green building material labels were conferred, which covered more than 5,850 products in total. Today the green building material label has gradually become an identifier for customers to purchase good-quality building materials.



The statistics show that **healthy GBM** has grasped the focus of the market interests



3 Progress of Green Building Regulations in Chinese Taipei

- In 1995, Ministry of the Interior, central authority governing building, took the initiative in formulating the "energy saving" regulations in the Building Code to stipulate energy consumption of building envelope.
- In response to our sustainable development policy and subtropical climate, the Assessment and Labelling System for Green Building and its assessment indicators was established in 1998.
- Public-owned new buildings over NT\$ 50 million in value were required to obtain a green building label starting 2002 in order to promote the concept of green building in private sector.
- In 2004, parts of the indicators were legalized and enacted in Building Code for the regulations of green building. The regulations gradually took effect starting 2005.



A list of milestones of progress in the green building development

Time	Progress of Development
1995	MOI adds the "energy saving" regulations in Building Code by placing high energy-consuming buildings under control such as department stores and hotels, as well as by stipulating an energy-consuming benchmark for building envelope.
1997	MOI amends the "energy saving" regulations by enlarging its application scope to include hospitals as well as accommodation-type buildings.
1998	Based on the features of our subtropical climate, MOI establishes the Assessment and Labelling System for Green Building and formulates seven assessment indicators.
1999	On September 1, MOI begins to receive applications for the green-building label.
2001	MOI draws up the "Green Building Action Scheme" stipulating that public buildings worth over \$50 million adopt the initiative first.
2002	MOI amends the "energy saving" regulations by taking into account different features in climate of the northern, central and southern Chinese Taipei.
2003	MOI amends the green building assessment system by adding up to nine assessment indicators.
2004	MOI stipulates the green building regulations in the Building Code and related specifications.
2005	Parts of the green building regulations: greenery of site, soil water content, energy saving; are brought into practice.
2006	The regulations of green building material take effect. This material must be used at least 5% for interior finish, such as ceiling, flooring and wall material.
2009	The regulations of recycling of building's rainwater and daily wastewater take effect. MOI amends the energy saving regulations to enlarge its application scope, and increases the rate of green building material from 5% to 30%.
2012	To fully promote the Green Building, MOI enlarges the application scope of greenery of site, soil water content, recycling of building's rainwater and daily wastewater, and increases the rate of green building material from 30% to 45%. In addition, it's stipulated that green building material must be used at least 10% for outside pavement.

3.1 Description of the Green Building Regulations

- The Green Building Regulations includes
 - greenery of site
 - soil water content
 - energy saving of building
 - recycling of building’s rainwater and daily wastewater
 - green building material
- Through legislation it requires that public and private buildings above a certain size carry out green building planning and design.
- Besides, taking into account the fact that the green building initiative is unfamiliar to the public in 2004, its practice adopts a proper sequence and review on an annual basis in a bid to make its execution feasible. Green building has been incorporated into the Building Code, so the architect shall sign the document for responsibility to implement the certification system.



Ecology



Energy Saving



Waste Reduction



Health

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The Five Indicators -1

Indicator	Definition	Assessment standard	Effective date
Greenery of site	To mitigate impact of CO ₂ emissions on environment, planting and afforestation for absorbing CO ₂ is most cost-effective and is designed to facilitate planting and greening quality.	With regard to greening for site., the total CO ₂ value (TCO ₂) designed for greening shall be higher than the product (TCO ₂) of 1/2 of statutory vacant area of the building base multiplied by the required fixed CO ₂ standard.	2005
Soil water content	To make sure that the site after being developed still retains the ability of conserving or storing permeating rainwater, develops the function of land's natural adjustment to climate, and reduces heat island effects, this indicator is designed to facilitate the site to conserve and store permeating rainwater.	The soil water content index, λ , derived from the developed soil water content amount divided by the site's original soil water content amount, shall be over the required soil water content standard value, λ_c .	2005
Energy saving of building	To tie in with implementation of overall energy saving policy and to take into account subtropical climate features, this indicator is aimed to achieve energy saving through the building envelope.	<ul style="list-style-type: none"> Based on energy consumption of the building envelope (ENVLOAD) ,equivalent window opening rate of the envelope, as well as average roof heat transfer rate. To enhance thermal performance of outside wall and window ,the average thermal transmittance (U) of outside wall and fenestration , shading factor and openable window ratio were added in 2013. 	2005

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The Five Indicators -2

Indicator name	Definition	Assessment standard	Effective date
Recycling of building's rainwater & Recycling of building's daily wastewater	To facilitate effective use of water resource, under the conditions of not interfering with safety, health and comfort, this recycling of rainwater index stipulates designs for collecting, filtering and reusing rainwater. In addition, the recycling of daily wastewater index stipulates a design for collecting, filtering and reusing daily wastewater.	The rainwater storage utility rate (Rc) for buildings' rainwater storage and use facilities shall be higher than the required standard rainwater utility rate, Rcc; meantime, the design volume (Vs) for the rainwater storage tank must be higher than the required rainwater storage tank volume (Vsm). The daily wastewater recycling rate (Rr) for building daily wastewater recycling facilities shall be higher than the required daily wastewater recycling standard (Rrc).	2009
Green building material	To reduce energy and resources consumption and to maintain health of indoor environments and sustainable development of ecological environments, this index stipulates that materials recognized by the MOI as ecological, recyclable, environment-friendly, healthy, and high-performance, be adopted.	<ul style="list-style-type: none"> The inside green materials rate (Rgi) must be higher than the standard (Rgci =45%) . The outside green materials rate (Rgo) must be higher than the standard (Rgco =10%) . 	2006

3.2 Perfecting Green Building Regulations

- The Building Code was amended, special regulations for green building included, and five design and technique directions formulated for all the indicators.
- To establish equipments such as rainwater and daily wastewater recycling systems or solar photoelectric generation, it could loose restrictions on their capacity of floor areas.
- To tie in with spot check regulations on the certification items of construction licenses and miscellaneous licenses, the MOI stipulates that green building be listed as a necessary spot check item and that inspections be strengthened.



3.4 Incentive Measures for Green Building

Reward Private Sector for Improvement of Existing Buildings toward Green Building

- From 2004 to 2011 the MOI has been allocating a budget for rewarding existing buildings on conducting green building design and improvement.
- Since 2012, the “ Green Building Renovation Diagnosis and Reconstruction Evaluation Program ”has set up.
- Rewarded category include environmental protection, energy saving, waste reduction and health of indoor.



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3.5 Green Building Renovation and Diagnosis Projects

- By the end of 2012, a total of 527 green building renovation and diagnosis projects for central government buildings is completed with a total investment of 1 billion NTD.
- Existing buildings accounts for more than 97% of total buildings. Despite higher renovation costs, its overall economic benefits covering energy saving, water conservation, carbon reduction, waste reduction and environmental protection should be simultaneously considered. These demonstrative projects also progressively expanded the effects to promote the green remodeling for existing buildings.

Green Remodeling Project – NCKU ecological wetland



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3.6 Green Building Renovation Projects

Renovation and Restoration of an Old Winery (Taichung)

BEFORE Lack of natural light Poor natural ventilation and IEQ



AFTER

Introduce Daylighting

Ventilation Tower

Sun-shading and Reuse of Tile Wastes

Indoor Environment Improvement






Subsidize the Local Governments to Promote the Green Building

1. Improvement of the green building for public buildings

Source:Kaohsiung government

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Subsidize the Local Governments to Promote the Green Building

- 2. Strengthened inspection for construction licenses on conducting green building design.
- 3. Green Building lectures, training, and awareness campaign.



Source: I-lan county government



Source: Southern Chinese Taipei Science Park Administration

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4 Intelligent Green Building

- **Intelligent Green Building:** A building serves as a carrier synthesizing the introduction of green building design and the application of advanced high-tech products and materials so that the objectives of safe, health, convenience, comfort, energy efficiency, carbon reduction, environmental protection can be attained.
- A dual-track implementation with both green building and intelligent building certifications.

Intelligent Green Building =



+



4.1 Scopes of the Smart Green City

Intelligent Green housing→



1. Scenario simulation of future life
2. indoor environment control
3. safety & security
4. Information acquisition and delivery
5. House work assistance function
6. Household intelligent control platform
7. Home information appliance development

Intelligent Green building→



1. information telecom system
2. Disaster prevention system
3. healthcare and comfort system
4. Energy saving system
5. unified wiring
6. system integration
7. facility management

Smart Green community →



1. concierge security
2. resident and visitor identification system
3. Certified mail reception system
4. waste automatic classification system
5. surveillance system of community public spaces



Smart Green city



1. urban information network infrastructure
2. urban function management center
3. intelligent traffic system
4. Intelligent crime prevention system
5. e-administration & e-government
6. urban intelligent control platform

4.2 Conclusions

1. The implementation of the green building regulation has great affection on the new construction buildings, and has been gradually forming a viable scheme of sustainable development and circulation to buildings and its indoor quality.
2. The enforcement of the mandated green building standards in the Building Technical Regulations has effectively extended the green building design for all newly-constructed buildings in Chinese Taipei.
3. The introduction of the green building rating system has successfully encouraged the builders/owners to pursue a better and higher-rated green building design. The effect of energy saving has now reached 25% and water conservation more than 30%.



4.3 Conclusions (Cnt'd)

4. The evaluation of green building material and its testing mechanism have adequately prevented inferior materials from dumping to ensure citizen's health and to further facilitate the domestic green building material market.
5. As the completion of the existed buildings promotion program by the end of 2011, the significant carbon reduction of 270 million kg is estimated.
6. The Executive Yuan has ratified and implemented the "Intelligent Green Building Promotion Program (2010-2015)" to be the guideline of the future development of green building and intelligent living space of Chinese Taipei.



Sharing Experience on Green Building
in Chinese Taipei, 5-7 March 2013



THANKS FOR YOUR ATTENTION

