



# **Green Trends in Korean Construction Industry**

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# Introduction

〈 Comparison with OECD Countries(2005) 〉

	Korea	Rank	Remarks
Emission	590 million CO <sub>2</sub> eq ton	7 <sup>th</sup>	1 <sup>st</sup> : U.S. (7260), 2 <sup>nd</sup> : Japan (1360)
Increase ('00~'05)	12.1%	4 <sup>th</sup>	1 <sup>st</sup> : Luxemburg (33.3), 2 <sup>nd</sup> : Austria (15.0), 3 <sup>rd</sup> : Spain (14.6)
Emission per GDP	0.62 CO <sub>2</sub> eq ton/1000\$	8 <sup>th</sup>	1 <sup>st</sup> : Australia (0.86), 4 <sup>th</sup> : U.S. (0.66)
Emission per capita	12.24 CO <sub>2</sub> eq ton per capita	13 <sup>th</sup>	1 <sup>st</sup> : Luxemburg (27.9)

\* International Energy Association (IEA) Standards: Korea's GHG Emission Ranks 16<sup>th</sup> out of 137 nations

Source: Kim, Ki-Ho, Green Korea 2009, pp.5

- The global push to “Go-Green”

- In an interconnected world, green lies at the “Heart” of the drivers in shifting global market
- Construction Activities → Majorly Impacts on the environment
  - Buildings and Transportations are the heaviest consumers of natural resources.
- Green Construction → “Next Growth Engine”

- Mechanism of “Green Growth”

- I. Public Policies, Laws & Regulations

- Standards & Codes, Incentives & Penalties System, etc.
    - Long-term Goals → Leading to investments in public & private sector

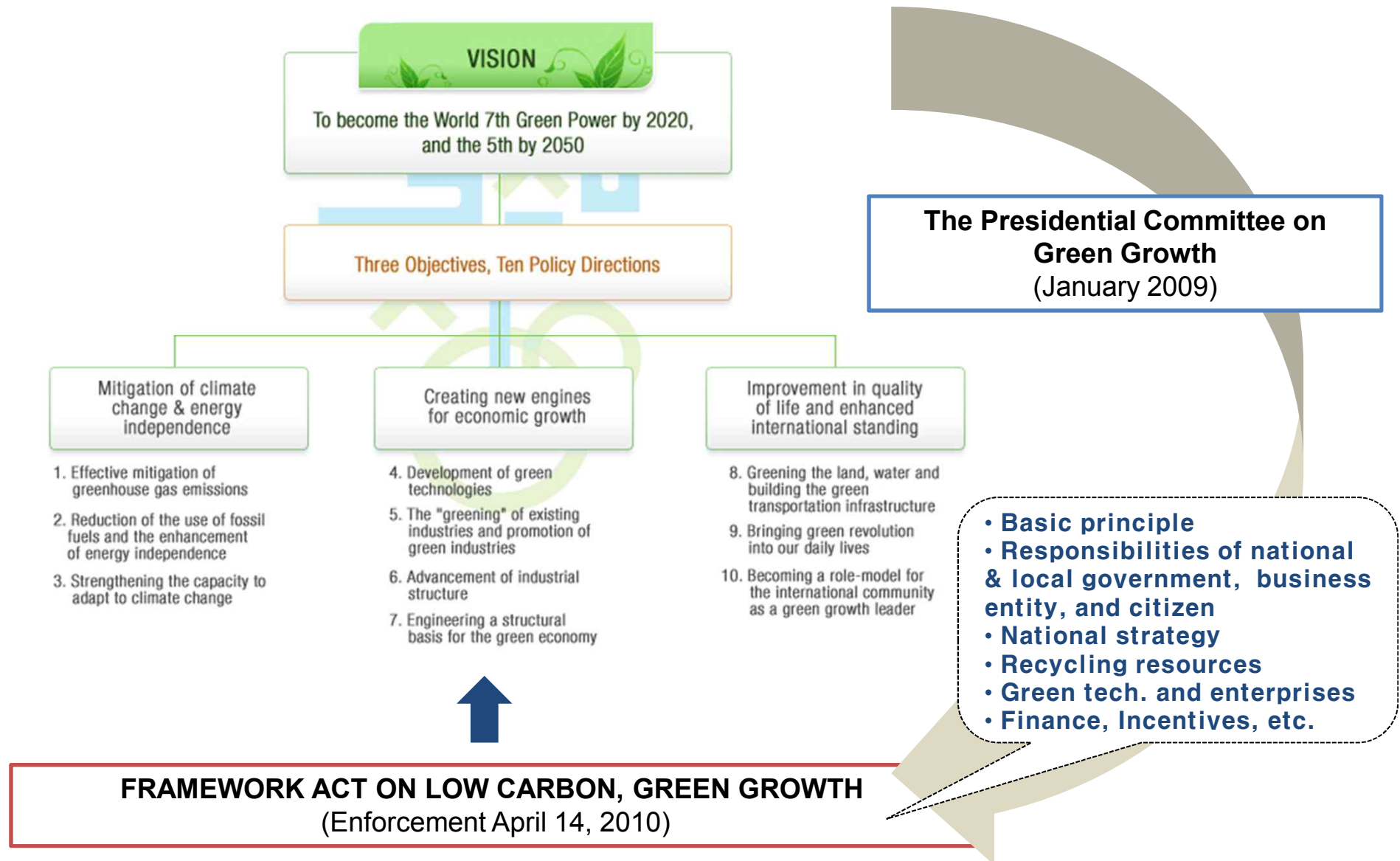
- II. Budget → Green Projects

- Visualization of Green Projects

- III. Green Technologies → Innovation of Construction Engineering & Technologies

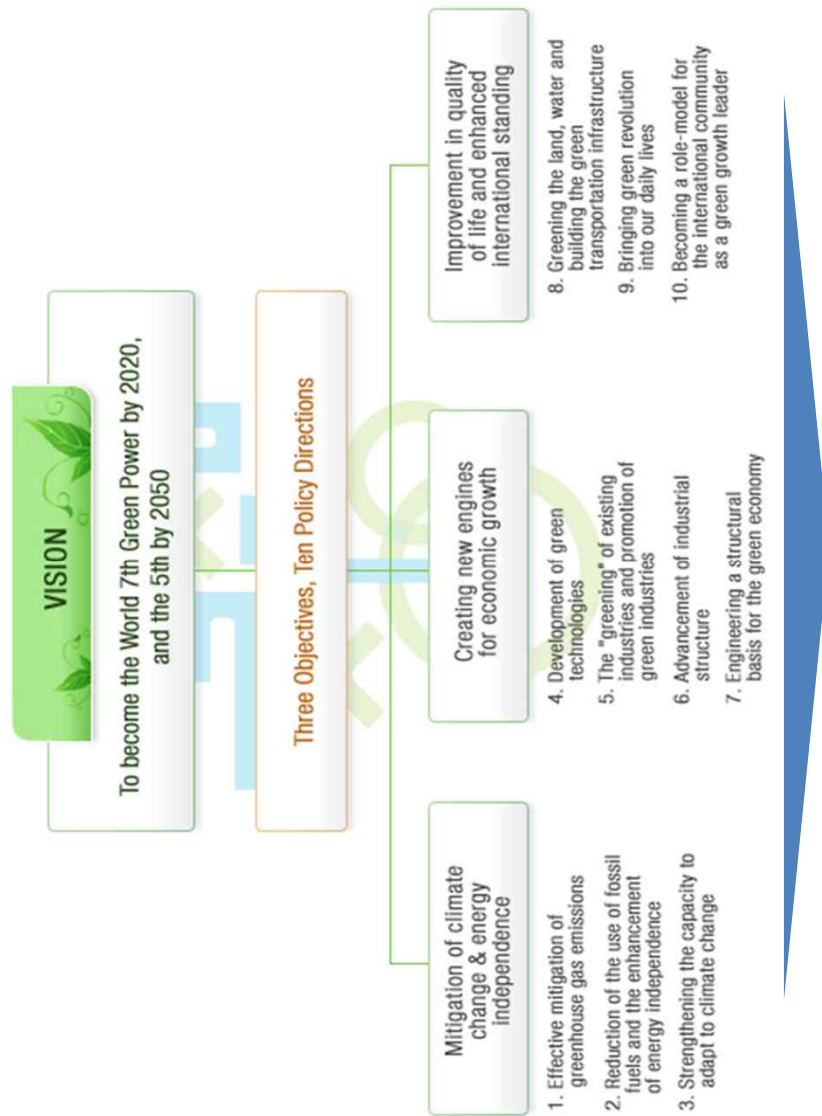
- Existing Tech. + Emerging Tech.(IT, NT, etc.)
    - Who plays a vital role of collaborations in Green Construction? → Green Contractor?

# Green Policy in Korea: National Strategy



<http://www.greengrowth.go.kr/english>

# Roles of Construction Industry



- **Development of Green Facility Design Criteria, Codes, Standards, etc.**
- **Supply Green Facilities by Sector (City, Building, Road, Plant, Railway, etc. )**
- **R&D of Green Construction Tech.**
- **Fusion between Existing & Emerging Construction Tech.**
- **Green Construction Company**
- **Green Construction Job**
- **Green Education**
- **Entry into Overseas Green Construction Market**

# Green Policy in Korea: Green Certification System(2010.4.14)

**Relevant Regulations**

- Framework Act on Low Carbon, Green Growth Article 32  
Enforcement Decree of the Framework Act Article 19
- Operational Guideline for Green Certification  
(Joint notification by relevant ministries, Apr. 14, '10)

**Objects of Certification**

- Green Technology** → 61 key technologies in 10 areas
- Green Project** → 95 projects in 9\* areas
  - Among 10 areas of green technologies, 'new material' area is excluded.
- Green Tech Enterprise** → Certified green technology companies with 30% or more sales from the previous year

*"Including green construction projects"*

## ◆ Areas need to be improved :

- Not a system for certifying green projects of domestic public sector
- Current green certification system is limited to environment-friendly buildings and energy-efficiency grades

## Tax benefits for Green Financing (Feb. 18, '10)

Category	Green Fund	Green Saving	Green Bond
Tax Benefits	Tax exemption on dividend income	Tax exemption on interest income	Tax exemption on interest income
Limit	KRW 30mil. /person	KRW 20mil. /person	KRW 30mil. /person
Maturity	Over 3 yrs.	Over 3 yrs.	Over 3 yrs.

## Support for 'Companies with Green Technologies'

### Financing

- No limit on policy loan
- Exemption of guarantee fee for technology evaluation (0.2%), preferred treatment for evaluation
- Included in the candidates for investment by New Growth Engine Fund of Korea

### Export-Marketing

- Added points for the application of export incubator, overseas exhibition, support for exporting companies
- Exemption of export insurance fee, guarantee fee(10%~20%), double limit for loan guarantee

### R&D, etc.

- Added points for application of R&D projects by relevant ministries
- Preferential review on patent application, provision of support for employment of foreign engineers, etc.

**Incentives and supports will be determined by the end of May, 2010 by relevant ministries**

# Expansions of Green Construction Projects Certification

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**As Is**

- Green Building Certification System
- Energy Efficiency Rating System

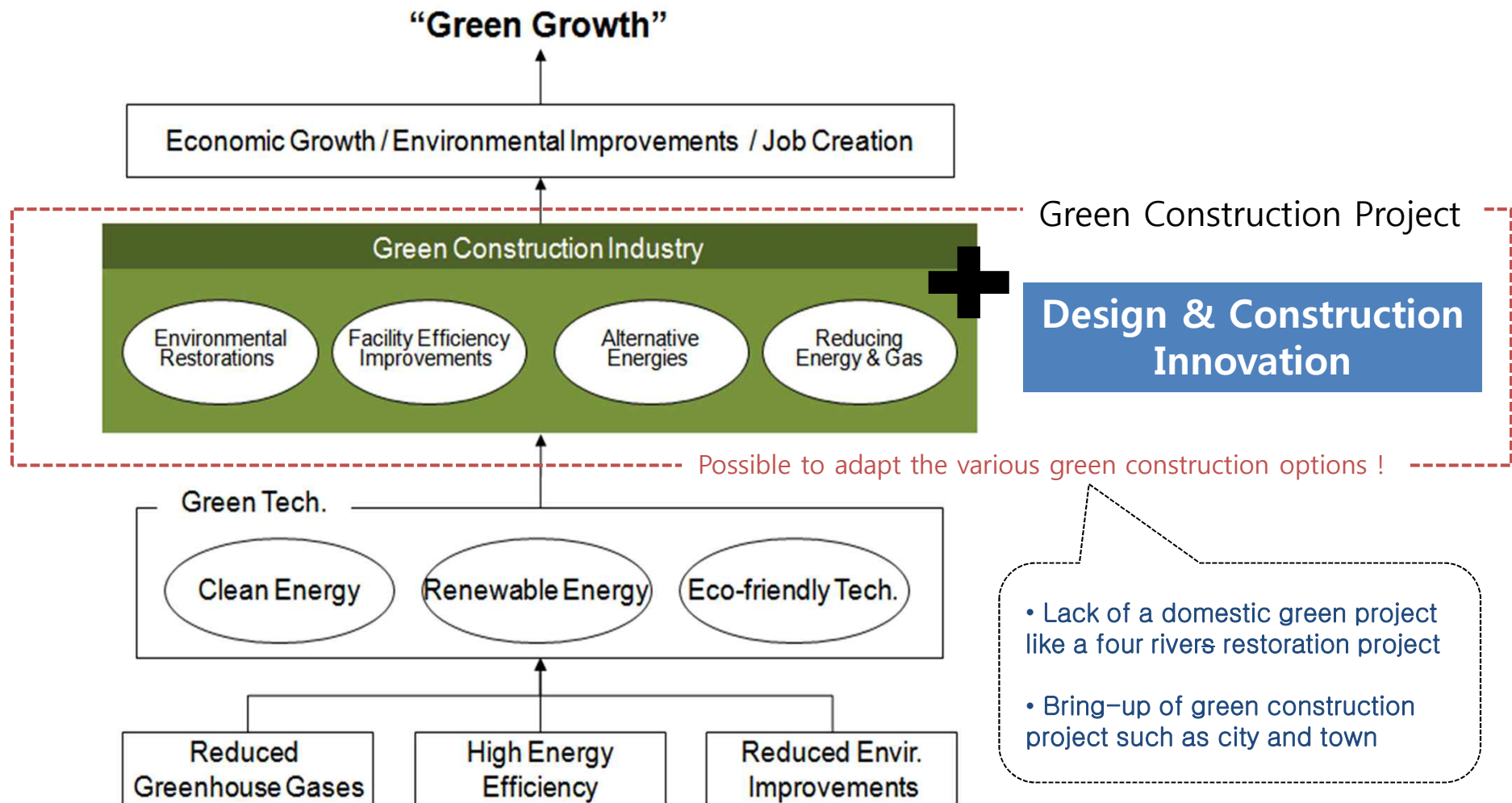
**Identification-System of Green Construction Projects**

**To Be**

- Green Building Certification System
- Energy Efficiency Rating System
- **Green Transportation Certification System**
  - ✓ Road, Railway, Port, Airport
- **Green Plant Certification System, etc**



# What is Green Construction ?



‘Green Effects’

- The green construction  
= environmental protection + economic growth ← green technology



## Green Construction Areas

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- **Green construction market consist of 4 major areas.**
  - **Green Building:** government office, commercial office, education, airport etc.
  - **Green Energy:** wind, hydro, solar, biofuels, etc.
  - **Green Infrastructure:** road, railways, etc.
  - **Green city :** Smart city, Zero-carbon emission, Zero-energy consumption city, etc.
- **Green Construction Market are limited to energy and Building areas in Korea.**
  - ❖ **Infrastructure is not a major market in green construction industry.**
  - ❖ **4 rivers restoration project was completed in 2012.**
  - ❖ **High Speed Railway projects have been underway for 15 years.**
- **It is needed to identify the “green projects” in the construction market !!**
- **CERIK identified the green construction ratings by construction type.**
  - ❖ **Six expert groups of practitioners with more than 10 – 15 years of experience in the construction industry were invited to participate in the Delphi survey.**

# Rating of Green Construction Products

## [Green Construction Ratings by Construction Type]

Construction Products			'Construction Greening' (As-Is)				Construction Greening Rate
			Reducing Energy & Gas	Alternative Energies	Facility Efficiency Improvements	Envir. Re-storations	
			L M H	L M H	L M H	L M H	
Residential	Residential Housing, Housing Complex						Low
Non-residential	Building	Office Building					Low
		Commercial Building					Low
		Institutional & Public Building					Low
		Hospital & Hotel					Low
		Gymnastics					Low
	Industrial Structure	Industrial Factory					Low
		Steel Industrial Facilities					Low
		Cement, Paper-mill, Mining Facilities					Low
		Chemical, Petroleum Plants					Low
		Oil & Gas Plants					Fair
Infrastructure	Transportation	Railway, Rapid Transit					Fair
		Road, Bridge					Low
		Airport					Low
		Port, shipbuilding					Low
	Public Health	Water supply and Drainage					Fair
		Sewer and Waste Water Treatment					Fair
		River Improvement Facilities					Fair
		Garbage, Sewage Sludge Treatment					High
	Energy	Soil-purification					Fair
		Thermal Power Plant					Low
		Combined Cycle Power Plant					Low
		Combined heat and Power Plant					Fair
		District Heating & Cooling Facilities					Fair
		Wind Power Plant					High
		Transmission & Distribution Facilities					Low
		Sunlight & Solar Heat Power Plant					High
		Tidal Power Plant					High
		Nuclear Power Plant					High
		Hydropower Plant					Fair
		Wave Power Plant					High
		Biomass Power Facilities					High
		Mechanical Biological Treatment					High

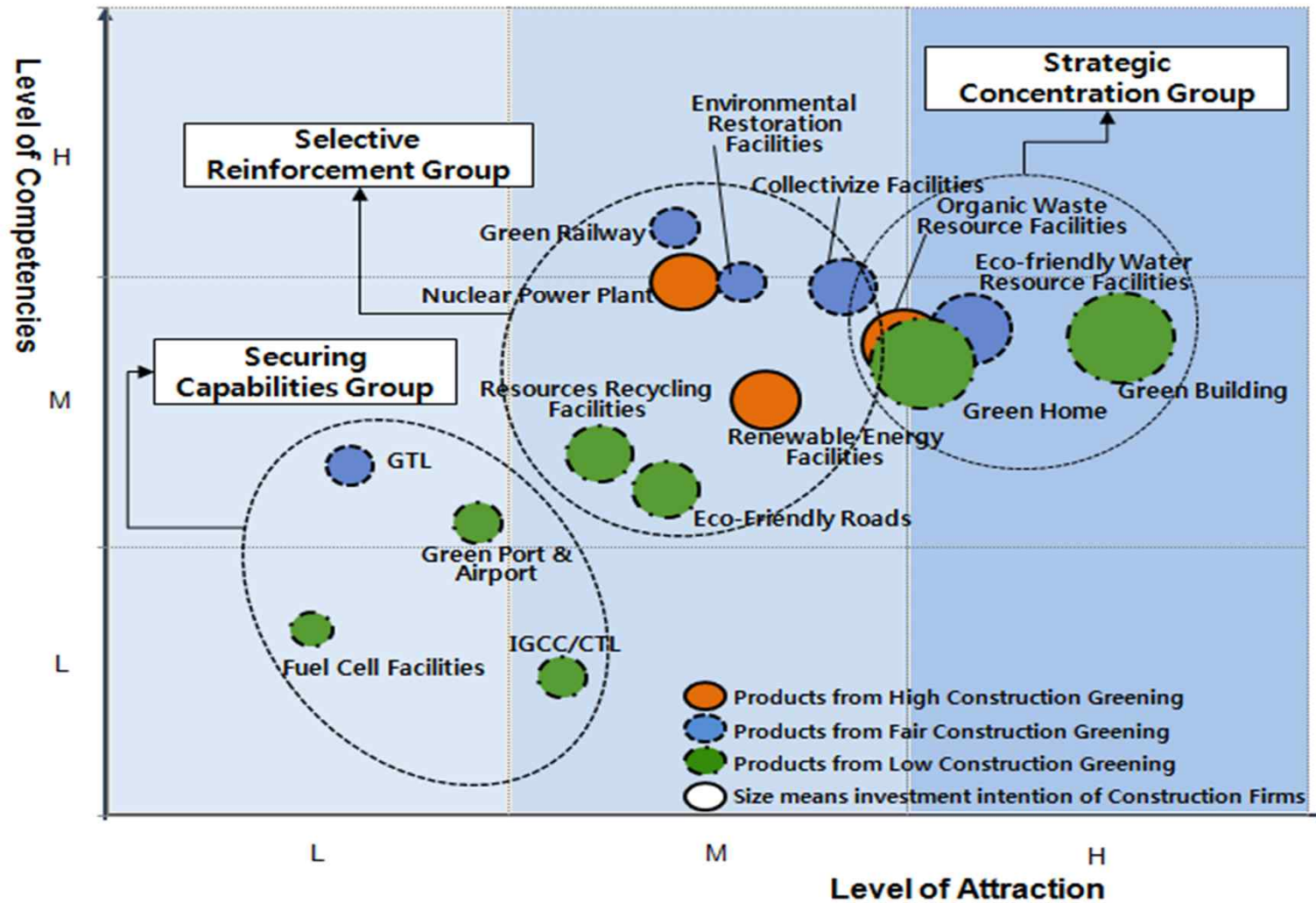
**Frontier Green Construction Products**

- Renewable Energy Facilities
- Nuclear Power Plant
- Organic Waste Resource Facilities
- GTL
- Green Railway
- Collectivize Facilities
- Environmental Restoration Facilities
- Eco-friendly Water Resource Facilities
- Green Home
- Green Building
- Resources Recycling Facilities
- Eco-friendly Roads
- Green Port & Airport
- IGCC/CTL
- Fuel Cell Facilities

**For increasing 'Construction Greening'**

# Green Construction Areas

## [Matrix of Attraction-Competence for Green Construction Products]



# Green Construction Activities and Projects in Korea

## Green City

- 10 Innocity Projects(provincial city in Korea)
  - ❖ 2007~2030
  - ❖ preserve natural environment and secure diversity & circulation of ecosystem
  - ❖ establish sustainable urban spatial structure and transportation system that conserves energy and resources
- Gangneung green city
  - ❖ 18.3km<sup>2</sup>, 23,400 residents
  - ❖ Sustainable land use, Green transportation, Green Energy, Recycling, etc.



## Green Transportation

- Maximize low carbon transportation
  - ❖ Road → Railway
  - ❖ new projects → renewal projects
- Establish hi-speed railways network within 90 minutes in the whole country
- Enlargement of cycle lanes
- CNG bus, electrical automobile, light rail, etc.

## Green Buildings

- Korean Green Building Certification System(KGBC)
  - ❖ 2,132 projects were certified by KGBC (2011. 2)
- Green Home plan by public sector
  - ❖ Green projects for 2Million households to 2018
  - ❖ \$30.8 Billion will be invested by public sector
- Adapt ICT systems to control green building efficiently
- Open Green Architectural Center
  - ❖ Dissemination of green building information
  - ❖ Certification of KGBC and Energy Efficiency Rating System
  - ❖ Perform related research, etc.



## Export of Green Experiences & Track Records



# Expectation of Green Building Market in Global Regions

## [Market Trend and Outlook for Green Building by Region in the World]

Divisions	Overview (Business Weights)	Facilities	Others
Europe	<ul style="list-style-type: none"> <li>- 2008: 0 ~ 5% weight</li> <li>- 2013: at least 16% or more / 60% or more (65% of respondents)</li> </ul>	<ul style="list-style-type: none"> <li>- Residential&gt;office&gt;governmental office &gt;factories, etc.</li> <li>- Expected growth of 20% or more for the next five years</li> <li>- Growth momentum during recession</li> </ul>	<ul style="list-style-type: none"> <li>- Increased sales and profits</li> <li>- Reason for green business: market demand</li> <li>- Barrier: excessive cost</li> </ul>
North America	<ul style="list-style-type: none"> <li>- 2008: 6 ~ 10% weight</li> <li>- 2013: at least 16% or more / 60% or more (52% of respondents)</li> </ul>	<ul style="list-style-type: none"> <li>- Residential&gt;governmental office&gt;education&gt;office&gt;&gt;hospital, etc.</li> <li>- Growth momentum during recession</li> </ul>	<ul style="list-style-type: none"> <li>- Increased sales and profits</li> <li>- Reason for green business: right direction</li> <li>- Barrier: excessive cost</li> </ul>
South America	<ul style="list-style-type: none"> <li>- 2008: 0 ~ 5% weight</li> <li>- 2013: at least 16% or more</li> </ul>	<ul style="list-style-type: none"> <li>- Residential&gt;office&gt;hospital, etc.</li> <li>- Expected 101 billion dollar market in the future</li> </ul>	<ul style="list-style-type: none"> <li>- Increased sales and profits</li> <li>- Reason for green business: market change</li> <li>- Barrier: lacking political supports and excessive cost</li> </ul>
Australia /New Zealand	<ul style="list-style-type: none"> <li>- 2008: 0 ~ 5% weight</li> <li>- 2013: at least 16% or more / 60% or more (48% of respondents)</li> </ul>	<ul style="list-style-type: none"> <li>- Governmental office&gt;office&gt;residential</li> <li>- Future market is expected to be the focal field</li> </ul>	<ul style="list-style-type: none"> <li>- Increased sales and profits</li> <li>- Reason for green business: market demand</li> <li>- Barrier: excessive cost</li> </ul>
Asia	<ul style="list-style-type: none"> <li>- 2008: 0 ~ 5% weight</li> <li>- 2013: 60% or more (73% of respondents)</li> </ul>	<ul style="list-style-type: none"> <li>- Office&gt;governmental office&gt;factory&gt;residential</li> <li>- Expected growth in a very rapid speed</li> </ul>	<ul style="list-style-type: none"> <li>- Increased sales and profits</li> <li>- Reason for green business: internal corporate decisions</li> <li>- Barrier: excessive cost</li> </ul>
Middle East /North Africa	<ul style="list-style-type: none"> <li>- 2008: 0 ~ 5% weight</li> <li>- 2013: at least 16% or more / 60% or more (59% of respondents)</li> </ul>	<ul style="list-style-type: none"> <li>- Residential&gt;office&gt;governmental office</li> <li>- Possibly highlighted as a rapid growth and attractive market</li> </ul>	<ul style="list-style-type: none"> <li>- Increased sales and profits</li> <li>- Reason for green business: right direction</li> <li>- Barrier: short of related professionals</li> </ul>

Questionnaire: More than 700 construction leaders in 45 countries

Source: Global Green Building Trends, 2008, pp.8~14

# Green Construction Market Outlook in Korea

## [Green Construction Market Outlook]

\$ Mil.	2007	2012	2020	2030
<u>Overall Construction Output</u>	<b>86,864</b>	<b>102,669</b>	<b>134,154</b>	<b>187,417</b>
Housing	47,975	56,704	74,094	103,511
Ground Shaping	3,997	4,724	6,173	8,624
Road & Bridge	7,245	8,563	11,189	15,631
Water & Sewer	1,190	1,407	1,838	2,568
<u>Green Construction</u>	<b>2,710</b>	<b>38,431</b>	<b>50,216</b>	<b>70,154</b>
Housing	<b>2,399</b>	<b>34,022</b>	<b>44,456</b>	<b>62,107</b>
Ground Shaping	100	1,417	1,852	2,587
Road & Bridge	181	2,569	3,357	4,689
Water & Sewer	30	422	551	770

Source: Green Technology Roadmap, MLTM, 2009  
 The above green market is not include whole construction product such as energy plant, city, and commercial buildings, etc.

- **Public Sector → Private Sector**
- **New Projects → Renewal Projects**
- **Aggressive R&D Investment**
- **More Green Polices and Regulations**
- **Strategies for Green Market**

# Conclusion

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## **Focusing on laws, policies, and regulations of advanced countries**

- Needs mainly considerable investments on construction sector as well as renewable energy → Initiatives for green construction vitalization
- Beforehand, actions with law/regulation
- Focusing on concrete and quantitative objectives → Accelerating to establish a mechanism for Green-standards and effectiveness-measurements

## **Possible impacts on construction industry and market**

- Construction industry → Highly possible to be changed into "Green Construction"
- Green construction industry leadingly functions to acquire "Gas Emission Trading Scheme"
- Potential for "Market" to be globalized by advanced countries → Requiring concerns and efforts of domestic construction industry

## **Improvement of "Korean Green Construction Growth" regulations**

- Accorded with a functional role for a reduction of energy consumption and carbon-emission
- Green construction projects → Green design standards + Budget
- Needs the advent of the strong "Incentive" policy for accelerating the green-rising of facilities, buildings, and cities
- Developing the standards and certifications for green-infrastructure(i.e. transportation) facilities