Eco-Friendly Construction

The eco-friendly construction has become a must with the series of rising trends and events including an increase in demand for corporate responsibility on the environment, the agreement of the international community on the New Climate System after 2020, and the increase in potential for companies to create values through the environment-friendly business model. Highly regarding environmental protection and respect for life as the overriding values of corporate management, Daewoo E&C strives to become a global eco-friendly construction leader by continuously expanding its eco-friendly business as well as making effort to prevent global warming.

Goals

- **Environmental management**
  - Accomplish zero violation of environmental laws and occurrence of environmental accidents
  - Reassign roles and responsibilities of environment managers
  - Raise the level of environmental management in operation sites through the implementation of HSE One Stop Service
  - Achieve the target to reduce costs of waste disposal compared to sales: 0.25%

- **Response to climate change**
  - Assess estimated amount of GHG emission and set objective and strategy for reduction
  - Increase disclosure of environmental information, won CDP (Carbon Disclosure Project) Sector Winners, participate in the environmental information disclosure initiative by the Ministry of Environment

- **Eco-friendly businesses**
  - Develop optimal technology and construction process to build high-rise zero energy houses
  - Develop DECO2 (Daewoo Elimination of CO2) integrated process optimal technology and seek methods to commercialize carbon capture bioprocess

Activities and Achievements

- **Environmental management**
  - Accomplished zero penalty and sanction for violation of environmental laws
  - Reestablished the roles and responsibilities of environment managers
  - Implemented HSE One Stop Service
  - Achieved the target to reduce costs of waste disposal compared to sales: 0.18% (calculated with estimated sales at the end of November 2015)

- **Response to climate change**
  - Expanded public disclosure of environmental information: Won CDP (Carbon Disclosure Project) Sector Winners Award

- **Eco-friendly businesses**
  - Secured core technologies to accomplish Green Premium roadmap and established zero energy house (ZENERHEIM)
  - Became the first in Korea to develop DECO2 integrated process optimal technology and design a direct synthesis for CO2 integrated process plant

Plans for 2016

- **Environmental management**
  - Accomplish zero violation of environmental laws and occurrence of environmental accidents
  - Enhance job competency of environment manager
  - Prepare to convert to ISO 14001:2015
  - Achieve the target to reduce costs of waste disposal compared to sales: 0.19%

- **Response to climate change**
  - Assign reduction target for the company, division, on-site team and execute real time monitoring
  - Conduct consistent training and promotion on GHG reduction
  - Actively respond to public disclosure on environmental information

- **Eco-friendly businesses**
  - Develop optimal technology and construction process to actualize zero energy houses in projects and reduce 80% of energy consumption
  - Design and install the first year lay out design for a direct synthesis pilot plant for CO2 integrated process
  - Enter new market for domestic/overseas new renewable energy business and secure performance
Environmental Management

Strategic Direction

Environmental management is essential in promoting sustainable construction business. To live up to our top priorities, which lie in the values of human being and the environment, we promote continuous improvements on our environmental management. We have established guidelines on complying with regulations and operating environmental management systems, have made universal announcement on our established environmental objectives, such as accomplishing zero violation of environmental laws and occurrence of environmental accidents, and have managed the implementation results. In addition, we have retained the environmental management system certification, ISO 14001, since 1997 through post-certification inspections.

Environmental Management Organization

Daewoo E&C’s environmental management organization is composed of Corporate HSE Team, which supervises a company-wide environmental management, and Global HSE Team, which takes care of overseas on-site environment management. The Corporate HSE Team is keeping up with the status of the environmental management system implementation, while the Global HSE Team is constantly strengthening environmental management in overseas operation sites.

Environmental Management Organizations Throughout the Company and by Division

Reestabishment of Role and Responsibilities of Environment Managers

In October 2015, the Corporate HSE Team reestablished the appointment standards and the roles of environment managers to increase work efficiency and minimize environmental risk. Persons were selected for management, project control and construction.

Activities and Achievements

Daewoo E&C, a trustworthy and eco-friendly construction company, has improved the quality of on-site environment management through the implementation of HSE One Stop Service, to comply with environmental regulations and to settle its environment management system. We have also achieved zero penalty and sanction on violation of environmental laws by conducting a thorough HSE management system audits. As for the target ratio of waste disposal costs to sales, we recorded 0.18%, far surpassing the 0.20% which we set out earlier through the implementation of the environment management system.

Development of One Touch HSE-Q Mobile Application

Daewoo E&C has first developed the One Touch HSE-Q application in the construction industry in order to enhance transparency and convenience in waste disposal. Using this mobile HSE-Q application, our employees can manage the ‘ALLBARO’ system at operation sites. Since One Touch HSE-Q is well connected with the ‘ALLBARO’ system of Korea Environment Corporation and the company’s waste disposal system (E-WPMS), anyone can create, delete and manage electronic hand-over document anytime anywhere. Through the mobile application, which enable employees to register hand-over document with photos attached, the number of errors occurred by not posting the document or miswriting has significantly decreased. In recognition of our efforts, Mobile HSE-Q won the Chairman Award for the ‘Best Practice for Construction Environment Management’ in November 2015.

HSE One Stop Service

To encourage domestic and overseas operation sites to comply with environmental regulations and establish the environment management system, Daewoo E&C implemented the HSE One Stop Service. It serves as the total support service on HSE to HSE managers, on-site employees, and on-site suppliers’ employees. The service consists of HSE Starter, Helper, Letter, Tester and supports employees for the early adoption of HSE system, providing training, evaluation and various information. It made a great contribution to our environment management competency enhancement by providing its services 40 times in 2015.
HSE Management System Audits

Daewoo E&C has been conducting annual HSE management system audits to supervise the operation status of the environment management and compliance of environmental regulations of operation sites. In 2015, Daewoo E&C has executed 66 HSE management system audits on our operation sites and notified operation sites of the results, by announcing exemplary and poor cases. In addition, by enhancing the compliance inspection on environmental regulations, Daewoo E&C achieved zero penalty and sanction on the violation of environmental regulations.

<table>
<thead>
<tr>
<th>Category</th>
<th>Civil Project</th>
<th>Building Works</th>
<th>Housing</th>
<th>Plant/Power</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSE management system audits (regular)</td>
<td>17</td>
<td>6</td>
<td>10</td>
<td>-</td>
<td>33</td>
</tr>
<tr>
<td>HSE management system audits (special)</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>HSE management system audits (fugitive dust)</td>
<td>15</td>
<td>4</td>
<td>12</td>
<td>2</td>
<td>31</td>
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<tr>
<td>Total</td>
<td>32</td>
<td>10</td>
<td>27</td>
<td>2</td>
<td>66</td>
</tr>
</tbody>
</table>

Environmental Management Training

Daewoo E&C provides environmental training for environment managers, on-site managers, on-site workers, and on-site executives of excellent and major suppliers in order to prevent environmental accidents and cultivate functional knowledge on environmental management. On-site trainings are conducted autonomously once a month, based on the environmental training materials prepared by the Corporate HSE Team.

Visions and Objectives

Daewoo E&C will continue to strengthen the expertise of our environment managers and environmental management system. For the settlement of environment managers’ roles and responsibilities, the company will conduct environmental management training by appointing environment managers for each business division. Preparation to convert to ISO 14001:2015 will also take place as well as supporting site environment management via the HSE One Stop Service. Through the consistent improvements on environment management activities, we will once again, pursue zero violation on environmental laws and occurrence of environmental accidents and 0.19% ratio of waste disposal costs to total sales.

- Enhancement of job competency of environment manager
  - Support and confirm on-site application of HSE One Stop Service
  - Revise working-level guideline for on-site environment management
- Appoint environment managers for business divisions and conduct trainings
- Support environment managers in acquiring management license on toxic chemical substances
- Preparation to convert to ISO 14001:2015
  - Complete training course on system conversion (once a year, 16 hours)
  - Analyze revised version of ISO 14001:2015
  - Prepare for conversion screening inspection
- Waste management
  - Achieve the target to reduce costs of waste disposal compared to sales (0.19%) for 2016
  - Identify and register exemplary waste treatment companies by region
  - Establish methods to recycle the waste (construction sludge, waste soil, etc.) generated in operation sites within three years
Key Environmental Performance

Waste

<table>
<thead>
<tr>
<th>Category</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Volume*</td>
<td>475,189</td>
<td>628,471</td>
<td>412,881</td>
</tr>
<tr>
<td>Treatment Cost*</td>
<td>89</td>
<td>156</td>
<td>108</td>
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</tbody>
</table>

Energy

<table>
<thead>
<tr>
<th>Category</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Waste Volume</td>
<td>226.13</td>
<td>1,188.05</td>
<td>1,410</td>
</tr>
<tr>
<td>Total Treatment Cost</td>
<td>0.22</td>
<td>0.36</td>
<td>0</td>
</tr>
<tr>
<td>Total GHG Emissions</td>
<td>1,071.56</td>
<td>1,247</td>
<td>1,312</td>
</tr>
<tr>
<td>Total Energy Performance</td>
<td>183.90</td>
<td>1,132.05</td>
<td>1,312</td>
</tr>
</tbody>
</table>

GHG Emissions

<table>
<thead>
<tr>
<th>Category</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total GHG Emissions</td>
<td>1,186.52</td>
<td>1,771.72</td>
<td>1,994.99</td>
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</tbody>
</table>

Climate Change

Strategic Direction

In December 2015, as the result of COP21 held in Paris, an agreement which imposed activities on mandatory emission reduction and a response to climate change, was reached among 195 countries including developing countries. As the government's target for 2030 national GHG emission reduction was set at 37% compared to Business As Usual (BAU), it became urgent for the industry to reduce more of GHG emission. Following the current domestic and international trends, Daewoo E&C is promoting a sustainable management based on two major strategic directions: 1) Understanding climate change risks and opportunities and 2) Preparing a climate change response system. The HSE-Q Division leads the arrangement of climate change response system as the head of HSE-Q Division is the chief officer in climate change. In addition, as we discharge a large amount of GHG due to the nature of the industry from constructing buildings to using and disposing construction materials, Daewoo E&C constantly monitors and manages the impact on climate change.

- Establishment of climate change response system
- Head of HSE-Q Division: manages the overall climate change response activities
- Evaluate executives' environmental Management: Conduct evaluations annually, examine climate change response activities and performances
- Climate change risks and opportunities: Analyse risks and opportunities according to changes in regulations due to climate change, physical changes, and changes in customer behavior

Analysis of Risks and Opportunities in Climate Change

<table>
<thead>
<tr>
<th>Category</th>
<th>Risks</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory Factors</td>
<td>Target Management System for GHG/energy</td>
<td>Cost saving by reducing GHG, less fines levied when targets are accomplished</td>
</tr>
<tr>
<td></td>
<td>Emissions Trading</td>
<td>Evaluate executive's environmental management: Establish climate change response system and conduct evaluations annually, examine climate change response activities and performances</td>
</tr>
<tr>
<td>Other Factors</td>
<td>Target Management System for GHG/energy</td>
<td>Competitive advantage with accumulated eco-friendly/energy/saving technologies</td>
</tr>
<tr>
<td>Physical Factors</td>
<td>Increase in Average Precipitation</td>
<td>Proactive management of climate change response activities and participation in related projects</td>
</tr>
<tr>
<td></td>
<td>Rise in Temperature</td>
<td>Green Buildings Construction Support Act</td>
</tr>
<tr>
<td></td>
<td>Changes in Natural Resources</td>
<td>Renewable Portfolio Standard (RPS)</td>
</tr>
<tr>
<td>Other Factors</td>
<td>Reputation</td>
<td>Green Buildings Construction Support Act</td>
</tr>
<tr>
<td></td>
<td>- Increased demand in repair works and loss minimization facilities due to increased number of disaster occurrences</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Increased dust scattering, negative impacts on product quality due to changes in construction materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Unstable supply of materials, increased project expenses and delayed construction period</td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td></td>
<td>- Unstable supply of materials, increased project expenses and delayed construction period</td>
<td></td>
</tr>
</tbody>
</table>
Activities and Achievements

Public Disclosure of Environment Information
We have actively and transparently been responding to the public disclosure of environmental information requested by external parties. As a result, we were elected as the 2015 Carbon Management Sector Winner hosted by Korea CDP and improved our score on disclosure section from 94 in 2014 to 97 in 2015. We have also accomplished A band on environment section from the ESG evaluation by Korea Corporate Governance Service, as well as participating on statistical survey on chemical substances. Based on the excellent performance on responding to the request for information disclosure, Daewoo E&C strives to build up trust among stakeholders including investors.

Strategic Direction
Increase in demand for environmental responsibilities can also mean a new business opportunity for a company. Daewoo E&C is diversifying eco-friendly business into various areas such as the development of eco-friendly technologies and construction materials, eco-friendly architecture business, and new renewable energy business that aids the reduction of environmental impacts. Targeting zero energy on housing construction by 2023, Daewoo E&C is on its way to create a cleaner and safer world to live in through the development of eco-friendly technologies and building materials within all sectors and areas such as civil, building works, housing and plant business. In addition, as there has been growing demand to diversify energy distribution due to the response on the Climate Change Convention and fluctuations in oil prices, we are in the midst of developing and promoting domestic and overseas new renewable energy businesses.

Visions and Objectives
Efforts to mitigate and adapt to climate change must be continuously enhanced. Therefore, starting 2016, from which GHG target management system is implemented, Daewoo E&C aims to promote company-wide reduction activities according to GHG management guideline and directives. As the reduction target has been set, we seek to analyze the amount of GHG emissions and execute reduction activities around the areas with high volume, while continuing to identify items for reduction. Furthermore, we will strive to expand our promotion activities to raise company-wide interests in GHG reduction and strengthen our transparency and trust among stakeholders by proactively responding to the request for carbon disclosures.
Eco-Friendly Construction
Managing Sustainability Issues at Daewoo E&C

Activities and Achievements
Development of Eco-Friendly Technologies
In September 2009, Daewoo E&C established construction objectives to build ‘Zero Energy House’, in which energy is produced and used within the apartment complex by 2023, and has developed and applied the ‘Green Premium’ technology consisted of eco-friendly and energy saving residential products.

In 2015, with the objective to come up with a new alternative that can overcome the storage limit of CO₂, we started developing a technology (DECO₂), utilizing building materials and carbon capture for the first time in Korea. This research project is to develop a continuous carbon capture process that can hold up to 40 tons of CO₂ per day through the direct reaction of CO₂ in the exhaust gas and use the capture as materials for civil work and building construction, where mass usage is possible. We aim to complete the commercialization of the process development by 2019, starting June 2015. As of 2015, we have completed the basic and implementation design of the direct reaction plant that can capture 40 tons of CO₂ a day.

First time entering the Chinese market for an air pollution elimination technology
In November 2015, Daewoo E&C has set the stage for the expansion of its eco-friendly technologies to the Chinese market, by signing a MOA with Shandong Guohuan Industry Investment Co., Ltd, a representative company for the environment sector in China, and Laosheng Nemination plant, to apply a technology that eliminates air pollution. We agreed to provide 1) designing of Dual Bag Filter (DBF), which we developed and own, 2) an operation technology, and 3) a portion of necessary tools and materials, while Shandong Guohuan Industry Investment Co., Ltd taking charge in on-site construction, licensing, and operation.

What is Dual Bag Filter? It is an eco-friendly technology that eliminates substances such as particulate matter and dioxin that create air pollution in the process of incineration. Registered as New Environment Technology and Green Technology in Korea, it not only grasps the aspect of eco-friendliness, but also secures economic efficiency as the consumption of activated carbon is reduced to less than 1/5 through the recycle of the activated carbon. The technology is in the commercialization phase and it is expected to enter commercialization stage by 2019. It can be applied to various industries such as foundries, incineration plants, and steel factories with issues concerning particulate matter and dioxin concentration.

Eco-Friendly Technology, ‘Green Premium’
‘Green Premium’ is an eco-friendly technology developed by Daewoo E&C that can save energy costs such as electricity and gas to ultimately accomplish the Zero Energy House. This can be achieved by applying the passive and active technologies that are optimized into a building. A passive technology minimizes the energy consumption within the building, whereas an active technology produces energy. For apartments Green Premium technology has been applied, various functions are provided, including a real-time energy monitoring system, a smart batch control switch enabling gas shut-offs, lights controls, securities settings, and elevator calls all at once, heating energy consumption saving system, and standby power shutoff devices. A collection and analysis of information on consumption of five services, which are electricity, gas, water, hot-water, and heating, are provided through a telemetering monitoring system. Moreover, we foster an eco-friendly residential culture by installing energy saving equipment such as air volume control multi-drop chambers, sensor type air water saving machines, and highly water-efficient toilets. Daewoo E&C has established the ‘Green Premium’ roadmap to accomplish Zero Energy House by 2023 and succeeded in securing the core technologies to achieve the roadmap in 2015. Through the firmly established method for analyzing energy saving rate, we put together the optimal plan to achieve 80% of energy saving. Furthermore, with the application of an energy saving technology, we developed a formula for estimating the energy saving rate that enables us to figure out the effect of the saved energy in the early stage of a project.
Development of Eco-Friendly Construction Materials
Daewoo E&C has made efforts to reduce resource use and minimize GHG emissions by developing eco-friendly construction materials. Instead of cement with high CO2 emissions, the Eco-Friendly Mass Concrete was developed through the combination of fly ash, blast furnace slag powder, and high contents of other industrial byproducts. By using industrial waste and byproducts, we were able to reduce cement contents by 40% compared to the regular concrete, resulting in a decrease of 79kg of CO2 per m³. It is currently being used in various sites as the level of its eco-friendliness.

Eco-Friendly Architecture Business
An eco-friendly architecture is designed to minimize the environmental harm throughout its entire lifecycle of engineering, construction, operation and maintenance, with the objective of providing a pleasant residential environment while saving energy and resources, recycling, and preserving natural environment. In 2014, Daewoo E&C constructed various eco-friendly buildings. Certifications such as eco-friendly architecture, Green Buildings and Energy Efficiency Ratings were also obtained.

Eco-Friendly/Quality Product Certification Status

<table>
<thead>
<tr>
<th>Project</th>
<th>Eco-Friendly and Quality Product Certificates</th>
<th>Project</th>
<th>Eco-Friendly and Quality Product Certificates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geongsang Central Prugio City</td>
<td>- Green Building main certification: ‘Green 3’ grade</td>
<td>Upolreung Compo Prugio Complex</td>
<td>- Green Building main certification: ‘Green 2’ grade</td>
</tr>
<tr>
<td>Sangeun Mokdongsing Station Prugio F7/F8</td>
<td>- Green Building preliminary certification: ‘Green 1’ grade</td>
<td>Spin Gwagong Apartment Package</td>
<td>- Green Building preliminary certification: ‘Green 4’ grade</td>
</tr>
<tr>
<td>Gungpo Pungmu 3 Block Apartments</td>
<td>- Green Building preliminary certification: ‘Green 2’ grade</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

New Renewable Energy Business
Daewoo E&C actively examines and fosters the expansion of new renewable energy business through the application of eco-friendly technologies, such as organic waste-to-energy technology (a technology that produces new renewable energy using organic waste such as sewage sludge, livestock manure, and food waste), CCU (Carbon Capture and Utilization) and CCE (Carbon Capture and Storage) in obtaining contracts. Having secured a foothold in the business with the on-going project on developing offshore wind power structure designing regulations and concrete structures by the Ministry of Oceans and Fisheries, we were able to acquire business license for wind power plants in Jeju Island. Relevant teams at Daewoo E&C are constantly collaborating in order to expand business within the new renewable energy sector.

Visions and Objectives
To become a sustainable eco-friendly construction company that raises the value of the earth and quality of life, Daewoo E&C will continue to actively promote the development of eco-friendly technologies and businesses such as eco-friendly housing, construction, and energy.

- Development of eco-friendly technologies
  - Design and install first ever key cut design for a direct synthesis pilot plant for CO2 integrated process
  - Establish CO2 integrated direct synthesis pilot plant for emitted gas within three years

- Achieve zero-energy house as a business in high-rise housing buildings
- Development of eco-friendly construction materials
- Continuously develop and apply eco-friendly cement materials
- Eco-friendly green growth business and new renewable energy business
- Focus on winning contracts for domestic projects based on project performance capabilities and cutting edge technologies on water treatment and biogas plant
- Develop and promote domestic and foreign new renewable energy business such as wind power, solar power and tidal power