

A child with blonde hair, wearing a blue and white patterned dress, is kneeling on a dark asphalt sidewalk. The child is drawing a colorful path of chalk drawings that starts from a storm drain and leads towards the horizon. The drawings include a battery with a lightning bolt, a lightbulb, a factory with smokestacks, a sun, and various flowers and leaves. The sidewalk is bordered by a low stone curb and a concrete wall on the left. The background shows a bright, open area with green grass.

KOSPO Sustainability Report 2014

Energy for Tomorrow

About This Report

Korea Southern Power Co., Ltd. (KOSPO) has been publishing a biennial Sustainability Report since 2008, and following the last one released in 2012, this is the fourth report, in which stakeholders are shown the results of KOSPO sustainability.

This report contains the sustainability performance of KOSPO for 2013 and 2014. Although it mostly provides data from domestic sites, which take up a large portion of KOSPO's business, it also reports on matters such as overseas business and other related contents that are considered issues of importance.

You can find more information on the business and sustainability of KOSPO by visiting our web site <http://www.kospo.co.kr>.
The information created, acquired and managed by a public institution for operations is disclosed in accordance with the institution's willingness, regulation or demand by citizens who are also its consumers. If further information is needed, please refer to 'Government 3.0 Information Disclosure' on KOSPO's homepage.

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Appendix

Creating Value Beyond Power Generation

Energy for Tomorrow



“

KOSPO is at the turning point of its growth as an integrated energy company. In becoming a progressive organization, KOSPO is converting crises and mistakes into opportunities and capabilities, moving beyond power generation by creating value for the future in order to achieve a vision of 'Energy for Tomorrow.'

Recently, it has become clear that KOSPO is taking active steps toward change. With regards to the management environment, what changes have been made?

KOSPO is at the turning point of its growth as an integrated energy company. Recent changes have originated from this turning point, where KOSPO has a strong will to overcome the difficulties of the power market, leaping forward as a globally recognized power generation company. Since its establishment in 2001, KOSPO has recorded an increase of more than five times in sales, making advancements in the power industry, while playing a role in increasing the rate of combined cycle power generation in support of the government's energy policy to relieve anxieties over power supply. As a result, although KOSPO is producing 53.9% of its electricity through natural gas-fired combined cycle power generation, with power plant utilization rates decreasing, the stabilization of the power market is such that even with the increase of combined cycle power generation, increasing natural gas prices will actually bring a decline in profits. To overcome this domestic market crisis, KOSPO has established the 'KOSPO 2025 Long-term Management Strategy for Strengthening Competitiveness.' Through business restructuring, expanding overseas business, and focusing on strengthening financial soundness, KOSPO hopes to achieve net revenue of 12 trillion won, with an operating profit of 1 trillion won, by 2025.

In order to sustain a business long-term, it is not enough to look at it from a purely economic viewpoint, so in the context of sustainability, what worries are there, and what efforts are being made?

During real decision making processes in this business, many aspects of the sustainability issue are confronted. From an economic perspective, combined cycle power generation carries a profitability problem, but environmentally speaking, also has the advantage of reducing greenhouse gas emissions. In reality, while it may seem like a matter of choosing between one or the other, the more important issue is that it is impossible to ignore both the economic and environmental aspects of combined cycle power generation. Through the reduction of investments in combined cycle power plants, KOSPO seeks to improve the profit structure of domestic business, on the one hand, while delving into new and renewable energy, particularly in wind power, becoming immersed in the development of greenhouse gas emissions reduction technology for the future of sustainable energy, an 'Energy for Tomorrow.' The 10 MW dry carbon capture technology is one of the fruits of such efforts.

Although the fulfillment of social responsibility is judged to be a necessary element for achieving sustainability, it was because KOSPO already possessed such a strong image of integrity that the recent news of its questionable practices was so shocking. What efforts are being made to regain the citizens' trust as a clean organization?

KOSPO has continuously made efforts to improve its constitution with an upright and clean organizational culture, and the result was that in 2014, among 640 public institutions, the company was given an evaluation ranking of 1 for integrity. Even now, KOSPO has the highest

standard of anti-corruption systems and infrastructure compared to other public institutions. But KOSPO would have never guessed that its internal practices, which had been carried out as they always had, would be highlighted as the problem hindering the integrity of the organization. Now, the amount of shame surpasses the pride that came from working in a supposedly clean organization, and this has been a period of reflection. KOSPO is taking issues like this as opportunities for change and reform. Without fail, KOSPO will put the newly announced reform, or '10 Year Plan,' into practice, enhancing ethical management, and eradicating unreasonable practices in order to succeed in the high intensity renovation of personnel.

That is certainly something to look forward to. In closing, tell us briefly about KOSPO's resolutions for the future.

As an organization that is constantly moving forward, KOSPO is going to continue turning crises and mistakes into opportunities and capabilities. Just last year, many of the various difficulties of the power generation industry were overcome, and KOSPO was awarded the Edison Award, also known as the 'Nobel Prize' of the power industry, and was selected as the best organization in the areas of improved regulations and safety and disaster control. KOSPO is the first public institution to introduce a salary peak system, among other things, in preparation for a new future. Domestically to globally, from nuclear power generation to clean energy, KOSPO aims to move beyond power generation and create value, and that value is called sustainability. Running toward the energy for tomorrow, KOSPO requests your encouragement and attention. Thank you.

Chief Executive Officer Kim, Tae Woo

김태우

KOSPO at a Glance

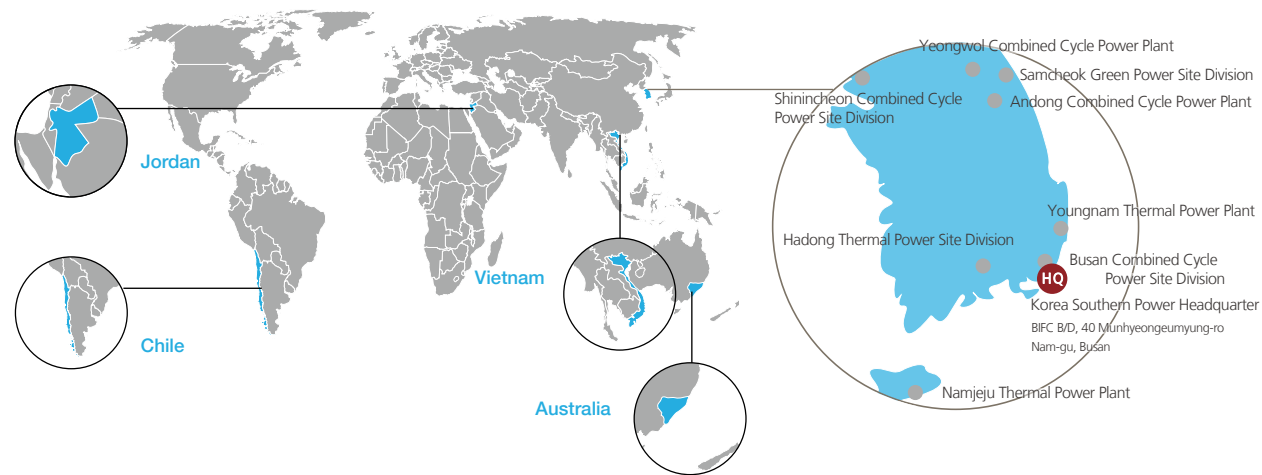
11.2 %
Power Market Share

9,217 MW
Domestic Installed Capacity

based on 2014 standard total domestic power generation
and installed capacity

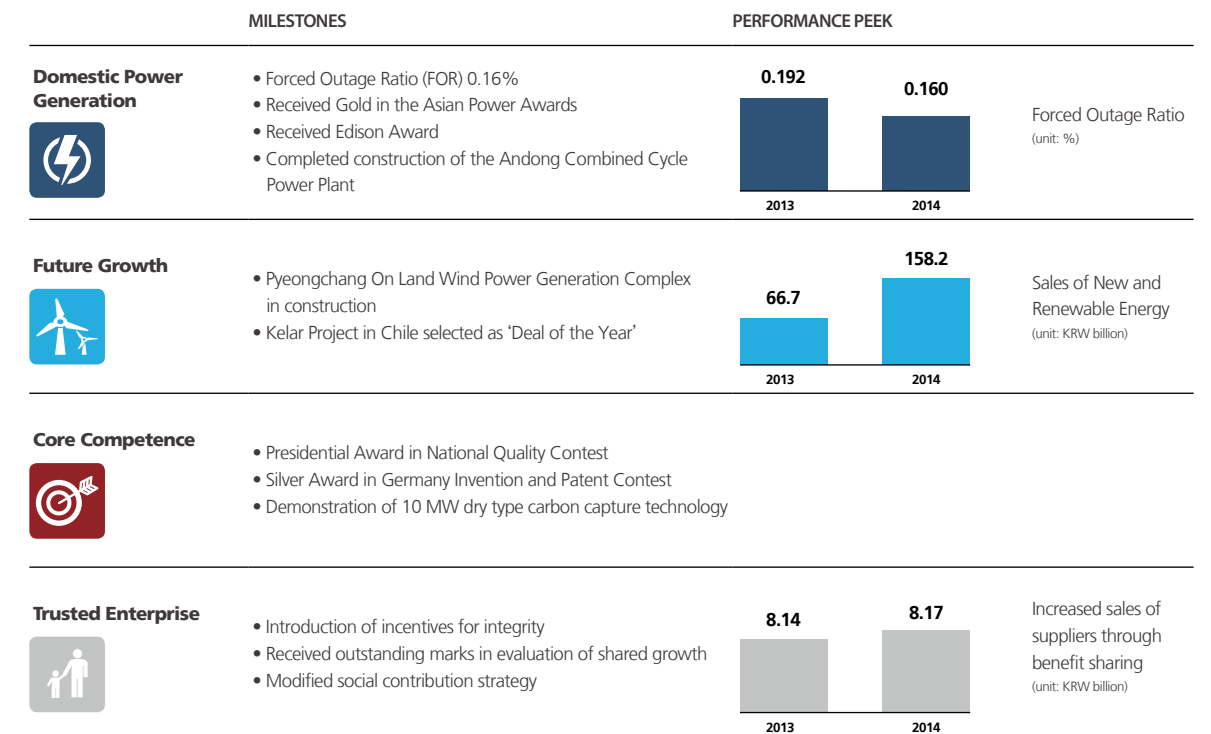
THE KOSPO WAY

KOSPO is a government-owned power generating company with a focus in thermal and combined cycle power plants. Its mission is to contribute to national economic development through the stable supply of power. To accomplish sustainable growth in the future as an integrated energy company, KOSPO has implemented the business in accordance with KOSPO Way 'Best & Leading, Trustful & Harmony, Passionate & Challenging, and Creative & Innovative'.

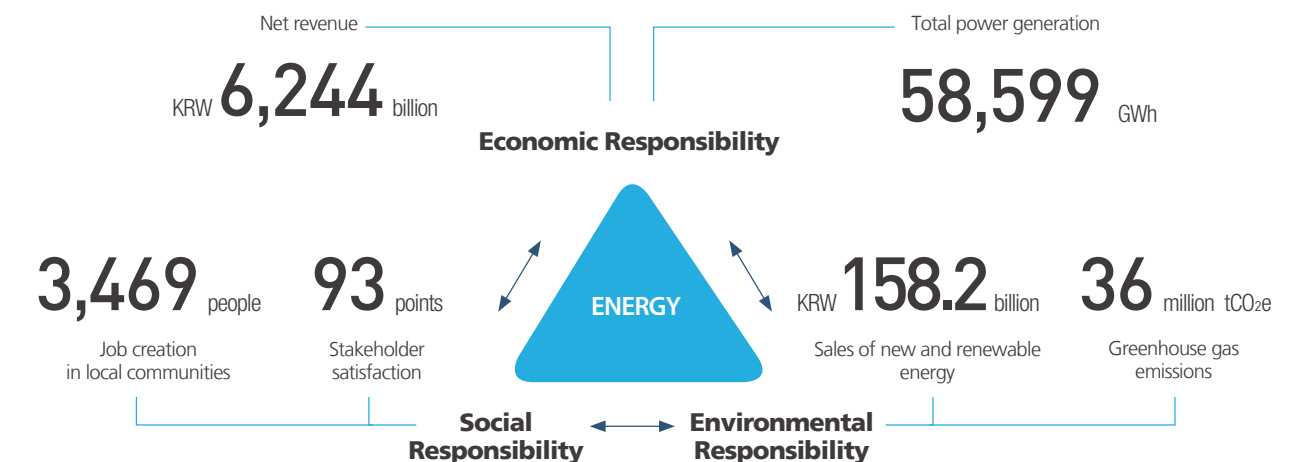


KOSPO owns and operates power generators with a total capacity of 9,217MW at 8 sites in Hadong, Shinincheon, Busan, Yeongweol, Youngnam, Namjeju, Andong and Samcheok. A 2,044 MW power generating facility in Samcheok is also being constructed. In other countries, the company successfully completed test operation projects in India, Saudi Arabia, Qatar, and Israel, and is currently carrying out projects in Australia, Jordan, Chile and Vietnam. KOSPO is also developing new overseas businesses in South America and Asia, including countries such as Panama, Morocco, Sri Lanka, and the Philippines. In compliance with a government policy for balanced national development, KOSPO moved its headquarters from Seoul to Busan in 2014, and also permanently ceased operations at the Youngnam Thermal Power Plant Unit 1, which had been supplying energy to Ulsan Industrial Complex for over 40 years since 1973, as it had reached the end of its lifecycle.

STRATEGIC FOCUS AREAS



SUSTAINABLE GROWTH

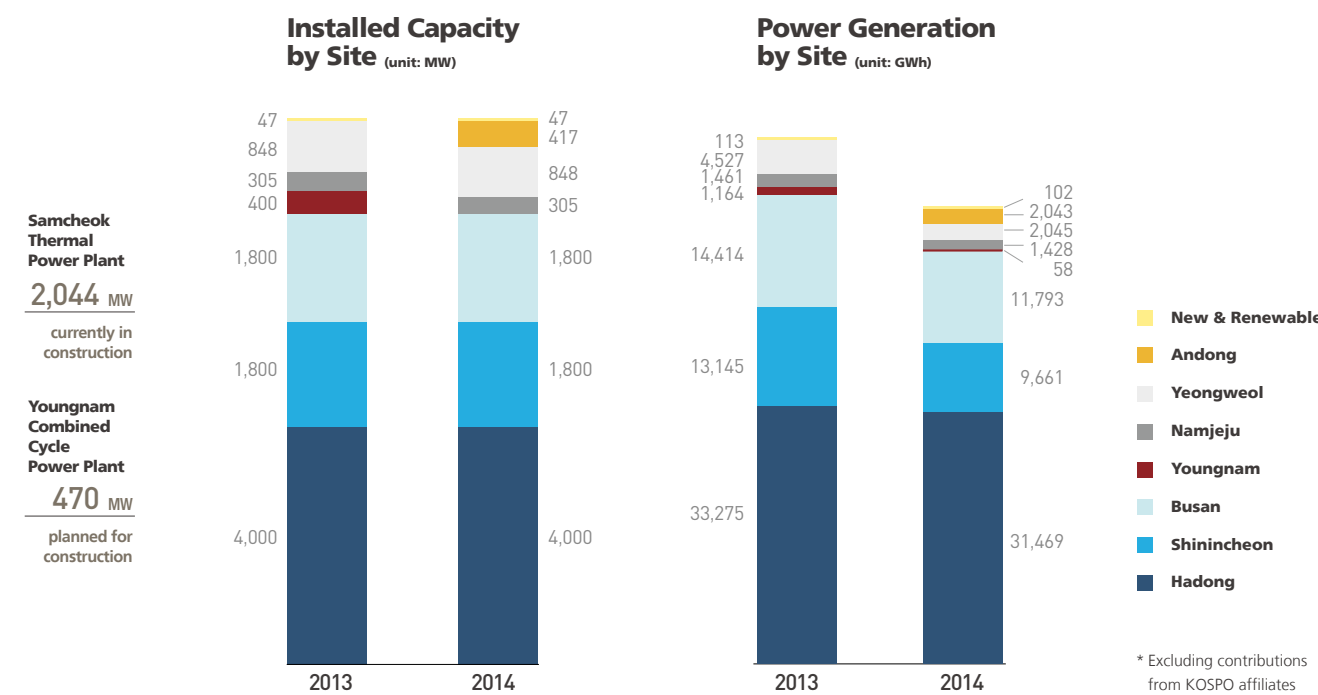


Sustainability Indices

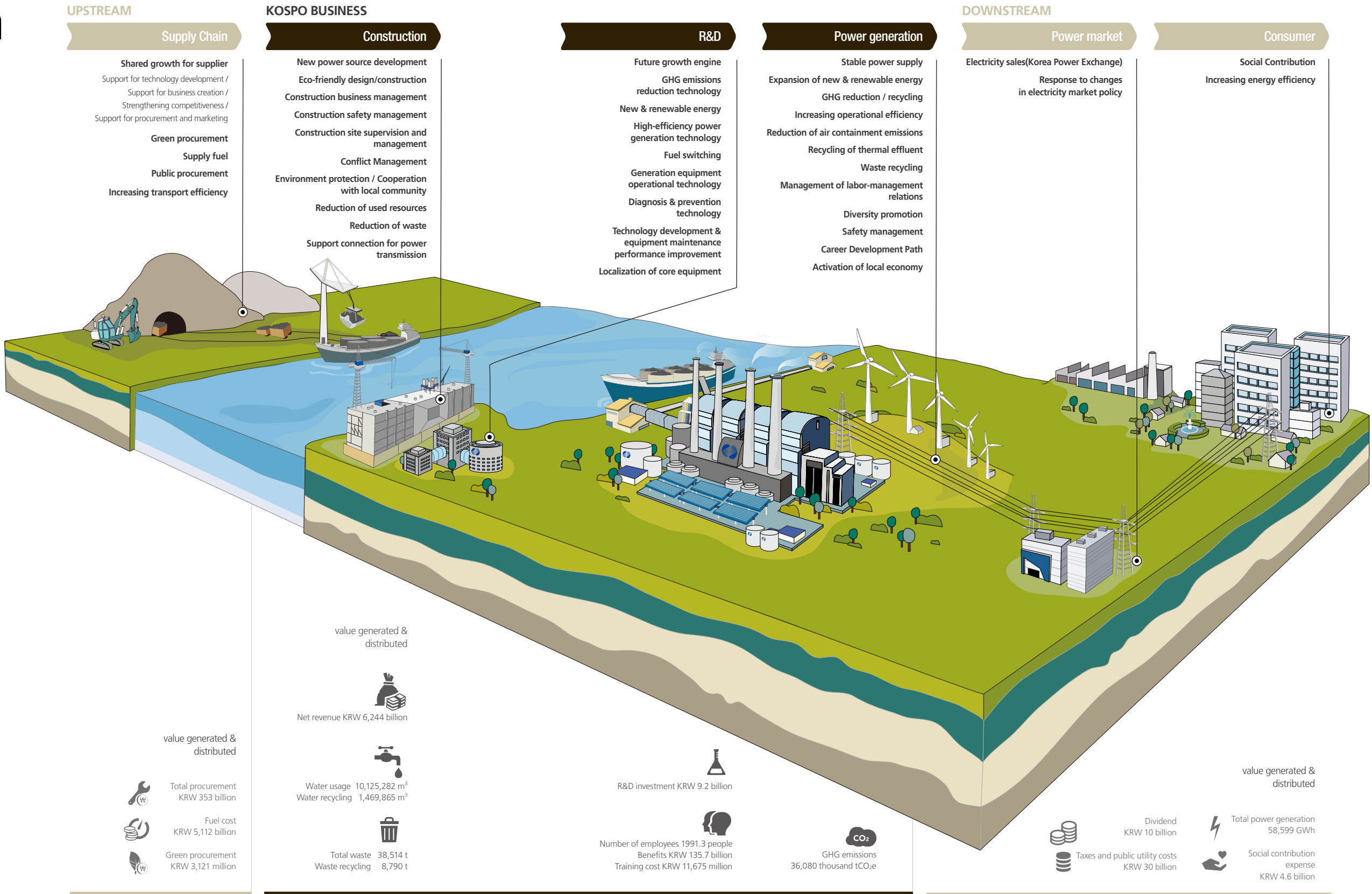
	Unit	2010	2011	2012	2013	2014	2015	Long-term Target (Target Year)
Economic Performance								
Net Revenue	KRW billion	5,126	5,923	6,975	7,133	6,244	4,673	12,006 (2025)
Total Power Generation	GWh	59,626	60,334	63,393	68,099	58,599	46,929	49,711 (2020)
Forced Outage Ratio (FOR) ¹	%	0.135	1.117	0.111	0.192	0.160	0.100	0.100 (2020)
Unplanned Capability Loss Factor (UCLF) ²	%	0.533	1.165	0.484	0.764	0.552	0.250	0.200 (2020)
Environmental Performance								
Greenhouse Gas Emissions	thousand tCO ₂ e	37,489	38,547	39,475	41,197	36,080	Emissions Trading Measures	Post-2020 Measures (2020)
Onsite Power Ratio (OPR) ³	%	3.55	3.54	3.48	3.31	3.46	3.79	3.98 (2025)
Green Procurement Rate	%	56	95	95	96	93	93	100 (2025)
Sales of New and Renewable Energy	KRW billion	14.3	21.2	35	66.6	158.2	160	300 (2025)
Coal Ash Recycling Rate	%	52	80	86.6	143.6	135.2	100	100 (2025)

	Unit	2010	2011	2012	2013	2014	2015	Long-term Target (Target Year)
Social Performance								
CDP-Based Position Assignment Rate ⁴	%	—	—	—	—	65	70	80 (2020)
Labor-Management Relations Satisfaction Level	Point	2.62	2.78	3.36	3.55	3.54	3.72	4.5 (2020)
Safety Culture Index	Point	4.6	5.3	6.3	6.7	7.0	7.3	8.5 (2020)
Assessment of Integrity of Public Institutions ⁵	Point	9.56	8.81	9.28	8.81	8.89	9.00	9.00 (2025)
Assessment of Anti-corruption Competitiveness ⁶	Grade	—	1	1	1	1	1	1 (2025)
Assessment of Shared Growth by Public Institutions ⁷	Grade	-	-	Outstanding	Outstanding	Outstanding	Outstanding	Outstanding (2025)
Job Creation in Local Communities ⁸	Person	609	687	1,226	3,317	3,469	3,570	5,245 (2025)
Public-service Customer Satisfaction Level ⁹	Point	—	—	—	92	93	94	97 (2025)

1. ① The number of hours the unit is on forced outage divided by the total number of hours in a year ② FOR = Forced outage hours / Total number of hours in a year (8,760 hours) 2. ① The rate of power generation lost due to unforeseen causes, such as equipment failure and related issues ② UCLF = Unplanned energy loss / Base power generation (or stabilized power generation, when there is no decrease due to equipment failure or other problems) 3. ① Ratio of power required for power plant operation ② OPR = Power required for power plant operation / Total power generation 4. Ratio of employees assigned to a specialized position in accordance with the Career Development Program 5, 6. Assessment by the Anti-Corruption and Civil Rights Commission 7. Assessment by Korea Commission for Corporate Partnership 8. Creation of new jobs for local residents through either technology development with stakeholders, or signing of social enterprise partnerships in communities where power plants are located 9. PCSI (Public-service Customer Satisfaction Index): An indication of satisfaction public institutions by outside stakeholders, as surveyed by the Ministry of Strategy and Finance



Business Value Chain



2014 Topics

At its turning point for growing into an integrated energy company, KOSPO presented a long-term business strategy in 2014 and is making efforts toward key areas of sustainability, including the reliable supply of power, measures to counter climate change, and establishing the company as an organization based upon active integrity.

The long-term business strategy section deals with KOSPO's efforts and plan to lead the future of the energy industry while maintaining financial soundness. This section likewise provides a glimpse into KOSPO's image as an established presence in the global market, recognized for its outstanding power generation technology.

The reliable power supply section discusses KOSPO's efforts and performance in carrying out its mission of reliably supplying power as a major power generating company.

The section on climate change describes KOSPO's dilemma between profitability and environmental sustainability, and reviews the company's balanced approach as one of the major domestic thermal power generating companies in Korea, which was ranked the 7th largest carbon dioxide emitting country in the world.

The last section on active integrity describes KOSPO's programs to prevent corruption and put integrity into practice, in order to create a clean and more transparent organization.

Aside from the key topics presented above, which are concerned with KOSPO's efforts and commitment to the 'Energy for Tomorrow' vision of creating value beyond power generation, other material issues related to sustainability in 2014 are also listed in the Appendix.

01 Key Topic

P. 12

Business Strategy

KOSPO's strategic direction for sustainability includes issues related to business restructuring, overseas business expansion, and improvement of the company's financial position.

02 Key Topic

P. 18

Reliable Power

KOSPO contributes to national economic development by providing a reliable supply of power. This section reports on issues related to equipment reliability, power supply stability, and the improvement of professional operating capabilities.

03 Key Topic

P. 24

Climate Change

KOSPO, as the thermal power generating company, is particularly sensitive to climate change. This section reports on issues related to green power generation, greenhouse gas reduction technology, as well as new and renewable energy.

04 Key Topic

P. 32

Active Integrity

KOSPO is committed to becoming a company of integrity. This section reports on systems to prevent corruption and the adoption of an anti-corruption culture and policy.

The Other Topics

P. 44

Recycling and Compliance

This section outlines KOSPO's efforts to reduce its environmental impact by decreasing outputs of waste water and industrial waste products, while also recycling industrial byproducts.

Shared Growth

With the competitive strength of its affiliate network, KOSPO strives to create a virtuous cycle within the power generation eco-system, growing together alongside its partners.

Community Engagement

KOSPO is carrying out various programs to bring prosperity to local communities.

Research and Development

This section outlines KOSPO's R&D programs for investing in tomorrow, including the development of domestic technologies and securing global competitiveness.

KEY TOPIC

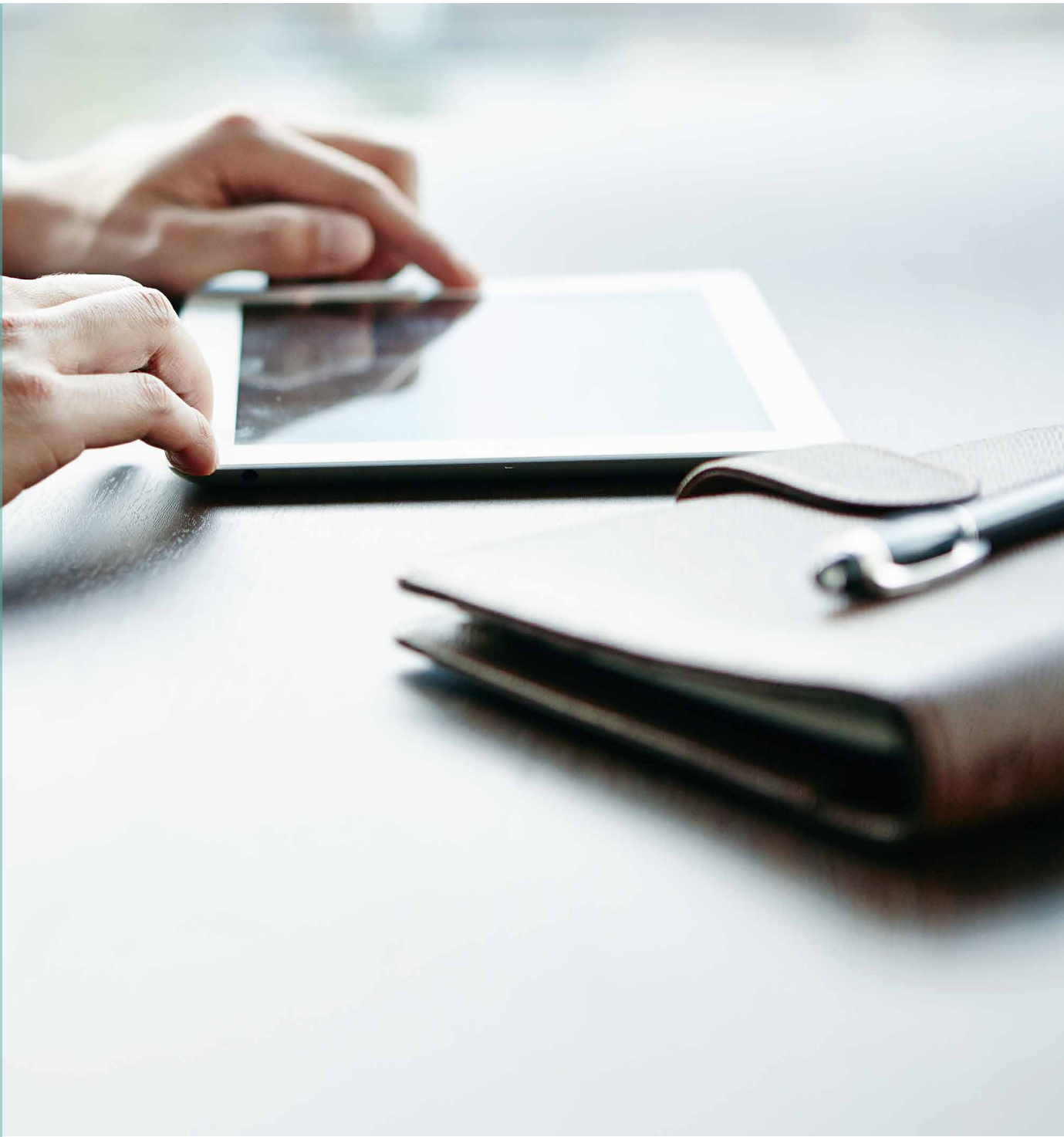
Business Strategy

Profitability of Combined Cycle Gas Turbine (CCGT) Power Plants and Debt Reduction

Anxieties over Korea’s power supply began when the Government’s forecast regarding electricity demands had missed the mark. In the end, rolling blackouts were implemented in order to prevent a large scale power failure in 2011. To overcome this problem, the Government constructed many CCGT power plants all at once, which could be built quickly and immediately supply power whenever necessary.

Although the operation of CCGT power plants gradually stabilized the balance between supply and demand within the power market, they also imposed profitability enhancement issues upon KOSPO. While KOSPO generates 53.9% of electricity from these CCGT power plants, as the price of natural gas used for fuel increases, KOSPO has been forced into a vicious cycle where plants are kept running and power generation has increased, but profitability has unexpectedly declined. Inevitably, this led to the deterioration of KOSPO’s financial indices and an increase in debt ratio which had been stably maintained below 100% since the company was founded but the stability of the debt-to-equity ratio exceeded 150%. Despite such inherent difficulties, the Government is strongly pushing all public institutions to lower their debt ratios as part of a drive to reform the public sector, a key part of the agenda for the Government’s 3-Year Plan for Economic Reform. As such, the effort to reduce debt has become an important factor in the assessment of the management and performance of public enterprises, and KOSPO, like any other public enterprise, needs to actively carry out programs to comply with this.

The profitability of CCGT power plants and the soundness of its financial structure are two key issues for KOSPO to be concerned with from now on, in the continuation of its business operations and in coping with Government policies and assessments.



KOSPO and its internal/external stakeholders jointly evaluated ‘Financial Performance and Long-term Business Strategy’ as the second most material topic for the 2014 report.

	Strategic Materiality	Evaluation by Stakeholders	Priority
Financial Performance and Long-term Business Strategy	95.2	76.6	2

The KOSPO Approach

KOSPO announced the ‘KOSPO 2025 – Long-term Management Plan for Strengthening Competitiveness’ and has been restructuring its business structure to deal with profitability problems. The long-term business restructuring must include both economic and environmental factors, accounting for sustainability issues. Although CCGT power generation suffers from profitability problems when viewed from an economic standpoint, it also creates less greenhouse gases and thus can reduce adverse environmental effects. To improve profitability, KOSPO decided that while reducing investments on CCGT power generation, they would expand their business to include new and renewable energy sources, particularly wind energy, so as to secure long-term sustainability as an energy company. All the while, KOSPO would also be developing new opportunities through business diversification and overseas enterprise, carving out the direction of the company’s future. As such, the company is strategically focusing on the three areas of business restructuring, overseas business expansion, and improvement of financial soundness, in order to achieve its goal of reaching KRW 12 trillion in sales and an operating profit of KRW 1 trillion by 2025.

Strategic Focus

Business Restructuring	Overseas Business Expansion	Improvement of Financial Soundness
2.2 % Operating Profit Ratio	KRW 43.2 billion Overseas Sales	151.1 % Debt Ratio
2015 Target 2.8 %	2017 Target KRW 94.4 billion	2015 Target 165.5 %*

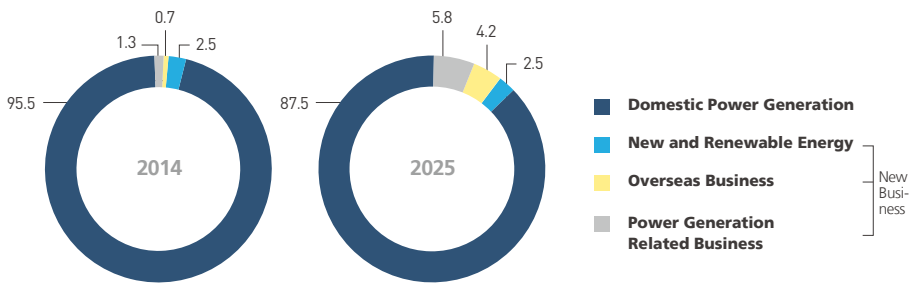
* The debt ratio is expected to increase in the short term due to the investments made for the construction of new power plants.

Business Restructuring

Rate Reduction of Combined Cycle Gas Turbine Power

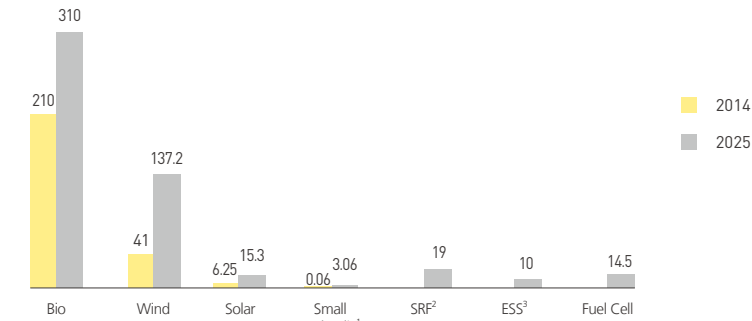
KOSPO plans to decrease its rate of domestic power generation to 87.5% increasing the proportion of overseas business to 4.2% and power generation related business to 5.8% by 2025. KOSPO has also adjusted the expected rate of new and renewable energy business to 2.5% by 2025, up from 2% by 2020. Currently, the ratio of bituminous thermal power generation and CCGT power generation at KOSPO is 55:45, yet KOSPO considers 7:3 to be the optimal ratio under the present market conditions. As such, KOSPO will disperse its investments on Goseong and Samcheok Units 3 and 4 following the completed construction of the bituminous thermal power plant Samcheok Units 1 and 2, but has no plans to further invest in new CCGT power generation, with the exception of the 470 MW Youngnam Combined Cycle Power Plant to be completed in 2017.

Change of Business Structure (unit: %)



New and Renewable Energy Power Generation Capacity (unit: MW)

Based on domestic power generation, the power generation capacity of bio fuel is calculated with the mixed fuel burning ratio, while the power generation capacity of an invested company is calculated on the basis of equity share.



Improving the Efficiency of Combined Cycle Equipment

KRW 5 Billion

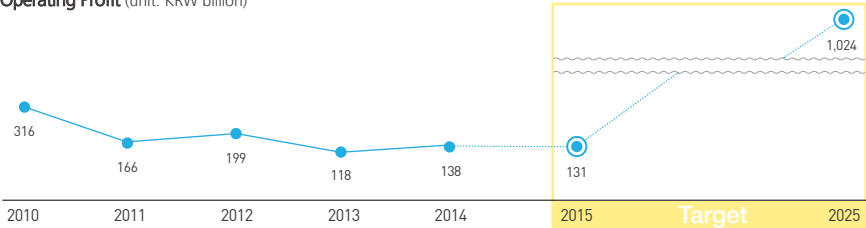
KOSPO is carrying out a scheme that, on the one hand, will increase the efficiency of combined cycle power generators in the short term by reinforcing areas vulnerable to failure and improving performance and that, on the other hand, will increase utilization in the long-term by progressing with power generation-related business that incorporates combined cycle technologies. In 2014, KOSPO improved the vacuum mechanism and efficiency of the heat recovery boilers by upgrading poorly performing parts at the Shinincheon, Busan and Andong power plants, as well as by changing the operation of the combined cycle steam turbine and high temperature components, making enhancements to the equipment. These changes resulted in a cost reduction amounting to about KRW 5 billion.

The CCGT power plants in Busan and Shinincheon were built as an intended solution to the regional problems of local municipalities through the use of power generation technologies. As a solution to water shortages in Busan, the Busan Combined Cycle Power Plant will use sea water as a coolant for power generation, taking the warm water that is discharged and desalinating it before making it available to the community. When the desalination project commences in 2018, the power plant will generate fresh water and will help keep the utilization rate of the Busan Combined Cycle Power Plant at around 85%. The Shinincheon Combined Cycle Power Plant reviews a project to supply electricity to the capital region, where the demand is increasing sharply, and to provide a source of heat by reusing the heat waste discharged by power generation.

KOSPO increased the efficiency of their CCGT power plants, and spent KRW 147.32 on fuel in the production of 1kWh of electricity in 2014, which is the lowest figure among domestic power plants that operate combined cycle power generators. Additionally, the utilization rate of the combined cycle power generators was maintained at around 61.2%, the highest out of all competitors.

KOSPO intends to achieve KRW 12 trillion in sales, with an operating profit of KRW 1 trillion by 2025 via a reorganization of its business structure, reducing combined cycle power generation and expanding into new business ventures.

Operating Profit (unit: KRW billion)



Strengthening Wind Power Generation

Efforts to Expand on Inland and Onshore Wind Farm After negotiating with the Ministry of Industry, Trade and Energy, and the Ministry of Environment, KOSPO received a permit for the construction of inland wind farms in Pyeongchang, Jeongam, Taebaek District 2, and Gangreung Anin. The company was able to obtain the consent of local residents by proposing the cultivation of high income crops using wind-powered farm grounds in Pyeongchang, as well as the creation of a wild flower garden to attract tourists to Jeongam. As a result, KOSPO is constructing a 30 MW inland wind power generator in Pyeongchang and plans to construct a 40 MW inland wind power generator in Jeongam in 2015. Given the construction of 100 units of inland wind power generators, the annual profit will amount to KRW 8.3 billion, and exports from the wind power industrial sector are expected to bring in an additional profit of KRW 120 billion.

The Daejeong onshore wind farm will consist of twelve 7 MW wind power generators, and its construction will begin in 2016. When the Daejeon wind farm starts generating electricity, the annual revenue is expected to be KRW 56 billion.

Improvements in Wind Power Utilization In 2013, KOSPO developed a system to remotely monitor wind power generators in Taebaek and Changjuk from the Wind Power Generation Control Center and to protect them from lightning. Intensive maintenance from May to August, when the wind is particularly strong, reduced the overall repairs required and increased the utilization rate of wind power generators by 1.1%, from 95.0% to 96.1%. As a result, the profits from electricity generated by wind power increased by KRW 5.7 billion.

Creation of New Revenue Sources

High Value-Added Business Using Coal Ash KOSPO has the technology to produce sand substituting construction materials by combining coal ash, the fine powder left over after electricity is generated by burning coal, with CO₂. If a factory inside Samcheok Green Power is built in 2015 and produces 400,000 tons of this eco-friendly material each year, then the KRW 4~6 billion handling fees for burying coal ash underground can be saved, and an additional yearly profit of KRW 7 billion is also expected.

Participation in Cogeneration Projects Utilizing its experience with operating CCGT power plants, KOSPO participated in cogeneration power generation projects in Daegu Innovation City and Yangju New Town, creating additional sales of KRW 21 billion and KRW 44.4 billion, respectively, in 2014. The Osan Cogeneration Power Plant supplying heat and electricity to Osan New Town has been led by KOSPO all the way from construction to operation, and is expected to create sales of KRW 10 billion after 2016.

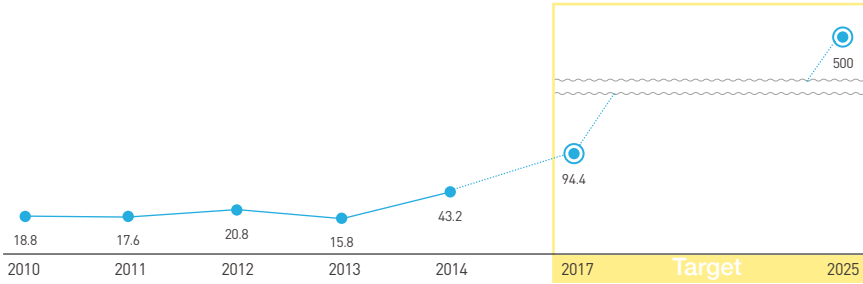
1. Small hydropower: Hydraulic power plant capable of generating over 10,000 kW of power 2. Solid Refuse Fuel: Composed of disposed plastic, rubber, wood, etc. that has been recycled for use as fuel 3. Energy Storage System: A system allowing for excess energy to be saved, ready for use whenever more energy is needed

Expansion of Overseas Business

KOSPO in the World

KOSPO is pushing forward with new low-investment and low-risk overseas business developments for sustainable growth in the future. With the success of the Kelar Power Plant in Chile, the company is actively developing new businesses in Chile and Panama, identifying new opportunities in Asia, such as in Sri Lanka and the Philippines, as well as in Africa, such as in Morocco, to solidify its presence in the global power generation markets.

Sales from Overseas Business (unit: KRW billion)



Kelar’s Light

KOSPO is participating in the Kelar Combined Cycle Power Plant BOOM (Build, Own, Operating and Maintenance) Project to supply 517 MW of electricity to the Antofagasta region of Chile. The company was able to appeal to the project owner with its outstanding management capabilities, proven by having the world's lowest forced outage rate and a high operation rate, allowing them to secure the project over other renowned competitors. It is notable that 80% of the total project cost was raised through PF¹. The project was recognized by two of the world's most respected financial magazines, since both PFI (Project Finance International) and IJ Global (Infrastructure Journal and Project Finance Magazine)² selected Chile IPP³ as the Deal of the Year in Power Generation in Central and South America Construction of the Kelar Combined Cycle Power Plant will be completed in 2016, supplying 3,400 GWh of power to a nearby copper mine each year. When the power plant begins producing electricity, KOSPO expects an annual sales profit of KRW 67 billion.

Wind in Tafilah

KOSPO plans to build a wind farm consisting of fifteen 3.3 MW wind power generators in Tafilah, Jordan, with a total power generation capacity of 49.5 MW. As the Jordanian authority that governs power will purchase all the electricity produced, a stable income is guaranteed. The construction of these power generators will start in 2016, and KOSPO expects an annual profit of KRW 10 billion when the wind turbines begin rotating in Tafilah.

Test Operation Service in Vietnam

The Mong Duong Power Plant in Vietnam uses fluidized bed boilers⁴, similar to Samcheok Units 1 and 2. KOSPO provided test operation services for the Mong Duong Power Plant using its prior experience with having performed test operations of Samcheok Units 1 and 2, resulting in a profit of KRW 120 million in 2013 and KRW 7.6 billion in 2014. KOSPO expects an additional profit of KRW 10.4 billion in 2015.

“The demand for energy is continuously growing in Chile due to the increasing population size and growing urbanization. This is a good opportunity for the investors who are excited about testing the new technologies in the generation of electricity and carving out new fields of business. We have no doubt that KOSPO will complete the construction of the power plant in time, and will operate it in an outstanding way, w i t h the most skillful manpower. As you can see, Kelar is contributing, and will continue to contribute, to the energy industry in Chile.”



Fernando Segovia Astorga
Kelar S. A.

1. Project Financing: A financial transaction in which the financial institution finances a project based only on its profitability and expected future cash flows. 2. PFI and IJ Global: Two of the world's most renowned financial magazines, which annually select outstanding financial transactions worthy of being deemed 'Deal of the Year'. 3. Independent Power Plant: A project in which a private capital corporation constructs a power plant and operates it for a period of time to recoup its investment. 4. Fluidized Bed Combustion: The process of simultaneously injecting coal, limestone, and air, circulating them for combustion. It is an eco-friendly power generation process, discharging less atmospheric pollutants, such as sulfur dioxides and nitrogen oxides. Since the fuel can be burned stably even at low temperatures, even the low grade coal or debris can be used, and resources can thus be utilized with less environmental impact.

Strengthening Financial Soundness

Improvement of Management Practices

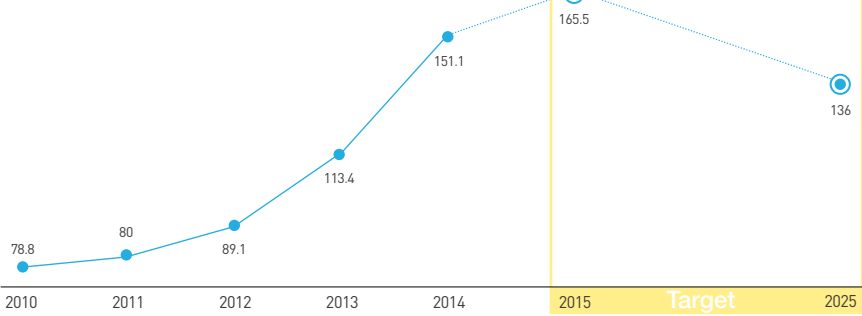
Segment Accounting and Debt Management Systems⁵ KOSPO has clarified the causes and liabilities of its debt by expanding its segment accounting practices to include the minimum units of the company that are generating a cash flow. Unit debt levels, as well as net increases/decreases are disclosed on the first page of the company portal and shared in real-time with all employees. Debt reduction performance is also evaluated for each business unit.

Formation of Team Dedicated to Debt Reduction In 2014, KOSPO formed the Emergency Response Committee and Normalization Task Force to respond to the demand for a normalization of the management of public institutions. The Normalization Task Force is an official group dedicated to reducing debt and includes professional accounting personnel. The Emergency Response Committee meets every Monday to discuss debt-related issues and solutions.

Encouraging the Participation of All Employees To ensure that all employees remain attentive and competitively immersed in the task of debt reduction, KOSPO awards pay bonuses according to evaluations of employee performance rates and efforts toward reducing debt. It also operates various programs to encourage debt reduction, such as holding idea contests for strengthening financial soundness and monetary incentive systems.

Through these efforts to improve the structure of management, KOSPO has been able to reduce debt levels by KRW 88.1 billion, surpassing the original amount planned for back in 2014.

Debt Ratio⁶(unit: %)



Risk Management System Improvement

In 2014, KOSPO upgraded its financial risk management system to be able to predict and manage the financial risk more accurately. KOSPO segmented risk into the four levels of “Safe,” “Cautious,” “Alert” and “Critical” (an expansion from the three levels previously used), measuring risks in real-time and linking the risk management system with mid-/long-term financial forecast scenarios. The Financial Risk Early Warning System displays warning messages specific to the assumed level of risk.

Business Feasibility Assessment

KOSPO has developed a business feasibility analysis tool that comprehensively evaluates public interest toward projects, profitability (IRR⁷), and risk. The preliminary feasibility of a project is sequentially verified by the Project Selection Committee, Investment Assessment Committee and Risk Management Committee before an actual investment is made The investment risk of ongoing projects is also managed so that they can be completed without further losses, such as when a project must be terminated due to a change of circumstances. Two year post-construction power plants and ongoing projects are both reevaluated for profitability and business risk to determine whether to maintain them, make improvements, or withdraw investments altogether.



The Financial Risk Early Warning System

5. ① Segment Accounting: Reviewing financial information by dividing the whole business into separate units. ② For example, the account data of a power company may be divided into the separate units of thermal power generation, CCGT power generation, and new and renewable energy. The divided data will show which business unit the profitability issues are originating from. 6. The debt ratio increased in the short-term, in accordance with the construction and investment of new power plants. 7. Internal Rate of Return: IRR is the rate of return at which point the present value of the cash investment is the same as the present value of future cash flows from the investment. Calculating the IRR using the investment amount and expected future income, and comparing it to the IRR of other investments, reveals which investments will bring in a higher profit.

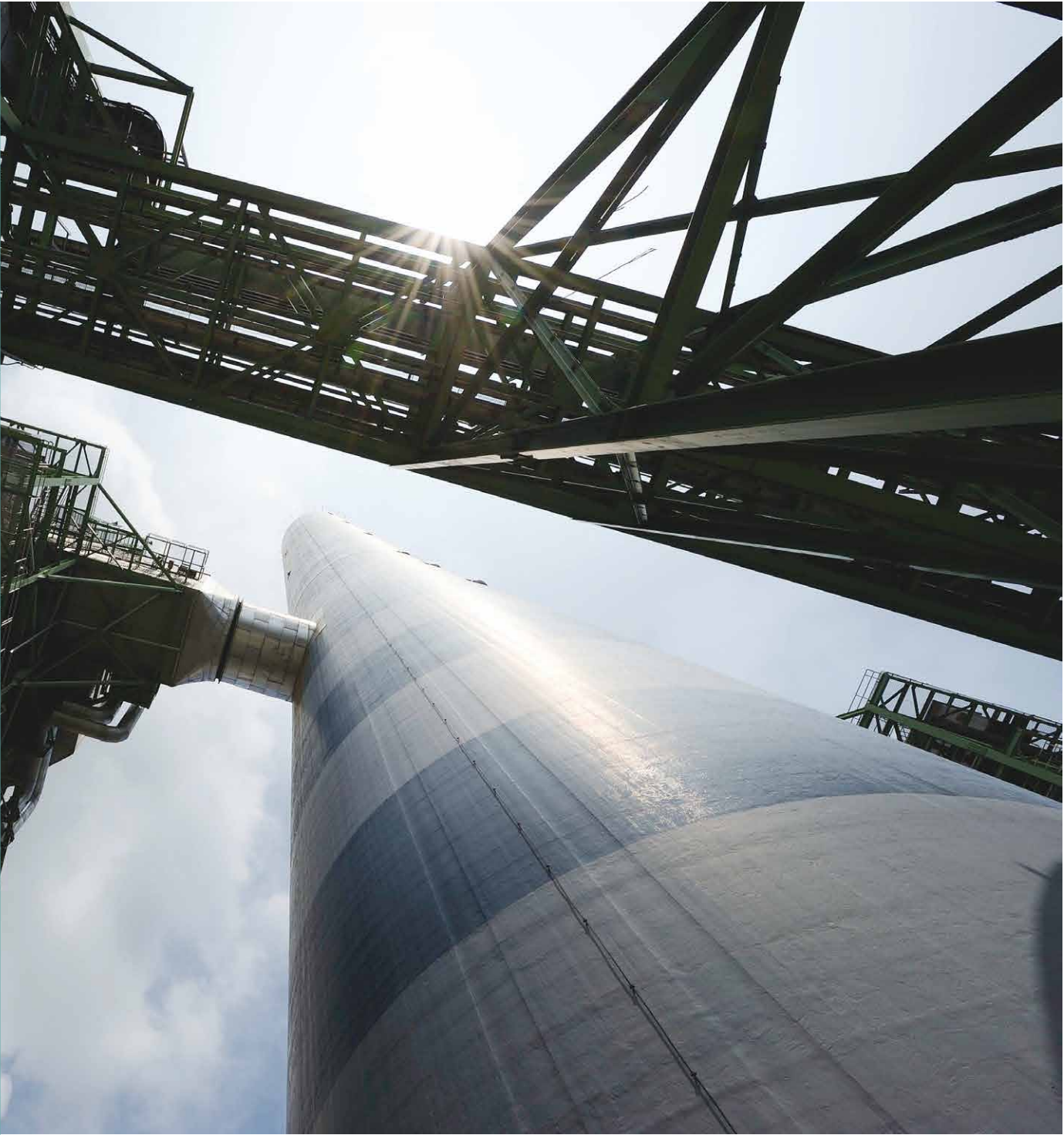
Enhancement of
Equipment Reliability
Stable Power Supply
Development of Specialized
Operating Capabilities

KEY TOPIC

Reliable Power

No Tolerance for Even One Failure Although the government forecasts the demand for power, establishing a Master Plan for Power Supply and Demand every two years, power crises have repeatedly recurred due to an increasing demand that surpasses forecasted levels, in addition to the unprecedented heat waves and cold waves of the past several years. Despite that the supply and demand instability in the power market is gradually subsiding with the construction of CCGT power plants and modification of supply and demand plans, the failure and shutdown of a power plant can pose a significant risk to stable power supply regardless of the circumstances, as seen with the citizens who were greatly inconvenienced following a recent failure of a nuclear power plant.

Although thermal power plants in Korea are stably operated with a forced outage factor of 0.2% or less, around 20% of all thermal power plant facilities have been running for more than 30 years, and government plans to construct four coal fired thermal power plants were canceled, because they did not meet the greenhouse gas reduction demands. Power plants that are being constructed are already facing difficulties due to resistance from local residents. Power plant operation cannot afford to be relaxed, since even one failure can shut down a power generator for an extended period of time, the scenario repeating itself in unforeseen power shortages. As a public institution supplying around 10% of domestic power, KOSPO has a responsibility to provide a stable supply of power by lowering the forced outage rate and increasing facility reliability.



KOSPO and its internal/external stakeholders jointly evaluated ‘Power Generation Reliability and Stable Power Supply’ as the most material topic for the 2014 report.

	Strategic Materiality	Evaluation by Stakeholders	Priority
Stable Power Supply	95.2	81.6	1

The KOSPO Approach

KOSPO is fully aware of the importance of this subject, as it is directly related to the company’s foundational objective, and presents three strategic directions and achievement indices for stable power supply. The three strategic directions for stable power supply include lowering the unplanned capability loss factor and forced outage factor to strengthen the reliability of power generating facilities, preparing for power peaks and emergency situations to ensure the long-term stability of power supply, and improving workforce expertise in operations for power plants to be constructed in a timely manner and operated.

Strategic Focus

Enhancement of Equipment Reliability	Stable Power Supply	Development of Specialized Operating Capabilities
0.160 %	88 %	38 people
Forced Outage Factor	Samcheock Construction Progress Rate	Cultivation of specialized technical professionals
2015 Target 0.100 %	2015 Target 97.8 %	Expansion of cultivation of technical manpower for 2015*

* Cultivation of a specialized labor force that incorporates a power market scheme change, including the four technical areas of ETS/power exchange, control systems, combustion tuning, and fluidized bed operation testing.

Enhancement of Equipment Reliability
Stable Power Supply
Development of Specialized Operating Capabilities

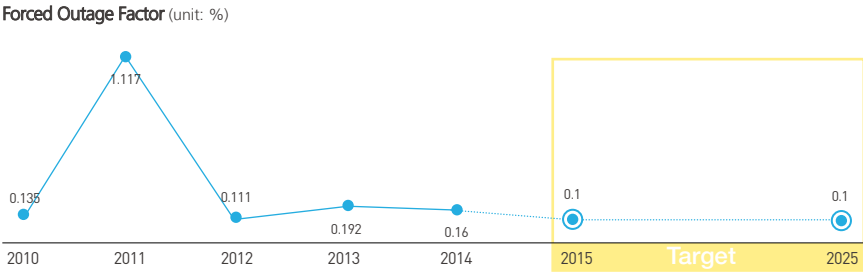
Enhancement of Equipment Reliability

The shutdown of a power plant due to an unforeseen failure will interrupt the power supply flow. KOSPO strives to eliminate the root cause of such failures by minimizing the forced outage rate and reinforcing potentially vulnerable facilities.

At the Asian Power Awards 2013, KOSPO's Hadong Unit 5 received the Gold Award in Power Generator Operation, for having operated without any failures for 3,000 days. In 2014, KOSPO received the Edison Award, which is known as the 'Nobel Prize' of the power industry.

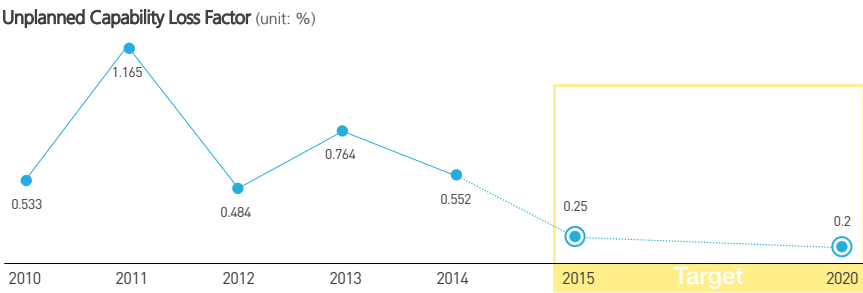
Towards a 0.0% Forced Outage Factor

KOSPO's forced outage factor was 0.192% in 2013, the best level in the world. The forced outage factor indicates the rate at which a power plant is shut down due to failures in single year. KOSPO was the first Korean power generation company to achieve a forced outage factor of less than 0.2% for three years in a row. However, KOSPO was not content with the result, and intended to further widen the gap between it and the rest of the world by achieving even lower forced outage factors. Using NERC¹ FOR Comparison Index² as an indicator, KOSPO challenged itself to reach the ultimate limit of 0% by continuously improving vulnerable facilities, and was able to achieve a forced outage factor of 0.16%, 0.032%p lower than the previous year.



Achievement of lowest national rate of unplanned loss

KOSPO recorded an unplanned capability loss factor (UCLF) of 0.764% in 2013. This was the lowest level among power plants in Korea³. The UCLF is the amount of power lost by failure, coastdown⁴, etc. of facilities, and is used as a reference, along with FOR, to evaluate the reliability of power generation facilities. In 2014, KOSPO achieved the historically low UCLF of 0.552%, which was 0.212%p lower than the previous year, by improving power generator performance, operation methods, and power trade bidding management systems.



Hadong Unit 5 Power Generator: Achieved 10 Continuous Years with No Failure

Enhancement of Vulnerable Aging Facilities

Identifying vulnerable facilities in advance is an important factor in preventing failures and outages. To be able to increase recognition of parts vulnerable to failure, due to both fatigue from continuous power generator operation, and deterioration⁵ from frequent operation interruptions⁶, KOSPO has established a reinforcement plan reflecting operation patterns. Failure patterns were analyzed according to changes in operating characteristics and fuel, and 32 of a total of 43 power generators were selected as targets for concentrated reinforcement. Then, the discontinued parts were replaced with the latest equipment, and the vulnerable materials were reinforced. Precision diagnosis and planned preventive maintenance of Hadong Units 1 through 6 and Busan CCGTs were performed. In May 2014, the Hadong Unit 5 power generator achieved 10 continuous years with no failure and the lowest forced outage factor among combined cycle generators. The equipment life of the Shinincheon combined cycle power generator steam turbine, which often failed, was diagnosed to check how much longer it could be operated, and then underwent reinforcement.

As 15 units of 35 combined cycle power generators contained aged equipment, with more than 15 years in operation, the reinforcement of aged equipment is important to ensure that the equipment is managed in a reliable and stable fashion. For that purpose, financial resources and manpower must be allocated on an ongoing basis. KOSPO invested KRW 198.8 billion in 2013 and KRW 223.5 billion in 2014 to diagnose and reinforce vulnerable equipment, and increased the number of power generators planned for maintenance from 23 to 25 units.

Improvement of Power Generator Operation Technology Competitiveness

KOSPO is strengthening its operation technology by improving predictive diagnosis and using a performance monitoring system combined with the state-of-the-art ICT⁷ to manage power generators more precisely and scientifically. In 2014, the company selected equipment with a high frequency of failure, developing 12 cases for the improvement of equipment reliability, including pipe vibration absorption, and also obtained patents for making such improvements. KOSPO also developed Korean models of key power generator parts in order to become more technologically self-sufficient, such as a gas measuring device with digital bidirectional communication abilities and a high temperature/high pressure condensed water discharge valve.

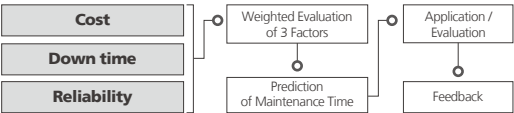
Strengthening of Safety Management

To objectively and expertly manage the safety problems that can occur during operation and construction, KOSPO has set up a Safety Management Committee chaired by the Chief Risk Officer (CRO). KOSPO introduced the Behavior Based Safety (BBS) program, which improves individual behavior for accident prevention, and also allows field workers and supervisors to actively cope with dangers, especially since it is reported that 88% of disasters were caused by unsafe behaviors. This program is eliminating safety risks, one by one, by studying the dangerous behaviors of field workers and tying them to performance measures. In 2014, the program was expanded company-wide.

All work in the power plants must receive approval from safety professionals (SAP). A SAP assesses the risk of work in advance, and supervises a work approval system to prevent accidents caused by the potential for danger and personal error. Moreover, being alert to information leakage from hacking by other power companies, KOSPO is also strengthening its information security. KOSPO was certified under the international information security management standard, or the ISO 27001 standard, in 2013, and put in place a smart security system to increase field security levels in the power plants.

1. North American Electric Reliability Corporation (NERC): A non-profit international regulatory organization that seeks to guarantee the reliability of bulk power systems (BPS) in North America. BPS refers to the entire electricity supply system, including the power plants, substations, and power transmission lines. 2. ① NERC Comparison Index = FOR of power plant/Average FOR of power plants in North America as announced by NERC ② A lower value indicates a power plant with an FOR that surpasses that of the world average. 3. Since NERC does not announce unplanned capability loss factor, it is difficult to compare this figure with the world average. 4. The condition of being unable to generate the rated power output due to problems with a power generator (or, abnormal circumstances that lead the system to failing to generate the rated output, but that do not stop power generation altogether, such as in the event of an equipment shutdown). 5. Deterioration: Where performance and quality are undermined due to heat, light, ultra-violet light, radiation, acid, water, ozone, and/or other substances. 6. Generally, after a generator commences operation, it can be difficult to cease and recommence operation. However, combined power generation facilities can commence and cease operation relatively quickly, and their capacity is therefore often utilized in emergencies. 7. Information and Communications Technology 8. Power generation equipment can be divided into the main equipment, such as the turbine directly related to electricity generation, and the mechanical and electrical parts of the main equipment. Operating maintenance means the maintenance of the equipment other than the main equipment. 9. Unlike competitive contracting, which allows multiple parties to participate in negotiations to evaluate relative competitiveness, a private contracting arbitrarily selects an exclusive party for contracting.

Maintenance System Innovation Based on ‘KOSPO 4-way’



KOSPO is developing a next generation maintenance system based on 'KOSPO 4-way,' the name for KOSPO's unique maintenance system. The system is an economically efficient maintenance model that schedules maintenance times in accordance with priority, by using a weighted evaluation of equipment based on the 3 factors of investment cost, down time due to failure, and equipment reliability. The development of

this new power generation equipment optimal maintenance system will be completed in 2015, and the system will be applied beginning in 2016. To increase its competitiveness in operation maintenance⁸, private contracting⁹ will be decreased, while competitive contracting will be increased. Moreover, the spare parts for maintenance are to be jointly managed with other power plants and suppliers to increase maintenance efficiency.

Enhancement of
Equipment Reliability
Stable Power Supply
Development of Specialized
Operating Capabilities

Stable Power Supply

To supply electricity stably, it is crucial to establish a management system to cope with possible supply and demand instability, and to construct new power plants according to schedule, so that electricity can be supplied at the planned time.

Management System for Stability of Power Supply

In the summer and winter, when power usage sharply increases due to cooling and heating requirements, even small failures can cause serious inconveniences for the lives of citizens. Around 37% of failures at power plants are similar to past failures. Under the slogan of “A failure not remembered is sure to be repeated,” KOSPO is strengthening its failure management system by sharing forced outage cases and implementing a tracking system for similar failures. As a result of improving the failure management process to prevent such similar failures, the duration of failures during peak periods¹ was reduced by 83% in 2014.

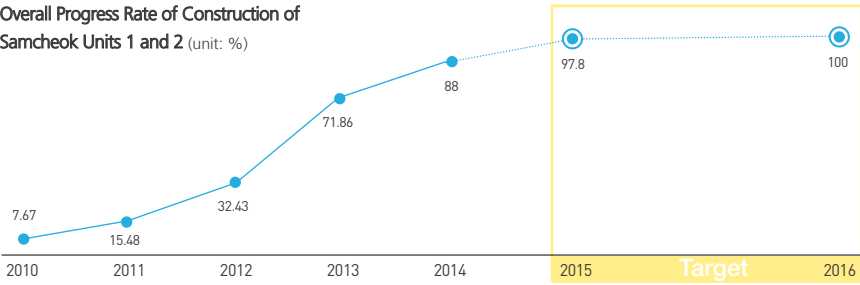
Improvement of Failure Management Processes to Prevent Repetition of Similar Failures

Type	Current Condition	Improvements
Maintenance Target	Limited to "Unforeseen outage"	Expansion to 4 types of forced outages + Coastdowns + Increased maintenance of failure due to planned outages
Sharing Method	Information about situation provided after official document creation	Real-time information given via SMS; development of similar management systems for tracking failure
Analysis System	Analysis of failure on-site	Investigation of failure and joint establishment of counter measures by site + specialized manpower + manufacturer
Follow-up Evaluation	Same responsibility/evaluation scheme for all failures	Strengthening of internal evaluation scheme (weighted factor applied to similar failures and failures during peak periods)

Timely Construction of New Power Plants

KOSPO is committed to completing the construction of new power plants as scheduled, in order to fulfill the National Power Supply and Demand Master Plan's original objective of stably supplying power. The Andong Combined Cycle Power Plant constructed in June 2014 is a CCGT power plant with a 417 MW power generation capacity and contributes to stabilizing the power supply in the region during the winter season. Power plants are normally considered an unwanted public facility, but the architectural design and cultural space reflecting the traditional culture of Andong transformed the environment of Andong Combined Cycle Power Plant into something more akin to a college campus. KOSPO is accepted as a role model for cultural power plants, communicating with local residents and contributing to regional economic development. Moreover, the Samcheok Green Power Plant Units 1 and 2, which are fluidized bed power generators with the world's largest commercial capacity, are being constructed on schedule, with the goal of beginning commercial operation in 2016, while the construction to convert the aged Youngnam Thermal Power Plant into a more efficient combined cyle power plant will begin in 2015.

Overall Progress Rate of Construction of Samcheok Units 1 and 2 (unit: %)



“A joint effort by all of us is needed to accomplish the government goal of a 22% reserve ratio in 2029. KOSPO is one of the domestic power generating companies responsible for supplying power. I ask the company to do its best in stable facility operation, so as not to disrupt the power supply because of equipment failure or unforeseen outages. Moreover, the timely construction of power plants is needed to ensure that the power generation capacity shortage is supplemented, and it is also important not to create conflict with local residents, which is one of the main reasons for delaying power plant construction.”

Yeong-je Cho,
Deputy Director,
Power Industry Dept.,
Ministry of Trade, Industry and Energy

Development of Specialized Operating Capabilities

Development of Specialized Technical Manpower

As state-of-the-art control systems are procured, cultivation of specialized technical manpower to operate the new systems has become even more important. The improvement of specialized skills is important to strengthening not only the skills of the internal labor force, but also for the capability of suppliers cooperating in new businesses. KOSPO is supporting OJT² to strengthen the core maintenance competency of maintenance suppliers. 74 employees of suppliers, such as Iljin Power, accumulated experience in the maintenance of single shaft gas turbines and cooling towers in Korea, while 54 employees of suppliers like HPS participated in fluidized bed boiler and gas turbine maintenance education.

Nonstop Emergency Technical Support

Technical support from the manufacturer is needed at the time of a major failure. KOSPO established a system to immediately attain a precision diagnosis and the technical support of manufacturers in case of emergency, and from an analysis of the cause of the failure, can also implement a joint nonstop emergency repair and material procurement. When a gas turbine seal³ at the Yeongweol Combined Cycle Power Plant was damaged in April 2014, KOSPO jointly analyzed the cause and quickly repaired the damaged part with the manufacturer, MHI. Excessive turbine vibrations of the Hadong Thermal Power Plant in November 2014 were stabilized by adjusting the bearing⁴ temperature after a precision diagnosis by both Doosan Heavy Industry & Construction, and the Korea Energy and Power Research Institute (KEPRI).

Emergency Recovery System

KOSPO became the first Korean power generating company to adopt Business Continuity Management (BCM) in 2014. BCM is the crisis management capability of being able to continue operations via the timely restoration of the core service and production activity at the time of a crisis, such as in the event of a natural disaster or terror attack. BCM adoption has implemented a system to minimize the interruption of power generation by enabling a quick recovery from serious disaster or crisis, and its capability was verified through ISO 22301⁵ certification.

Conflict Management during Construction and Operation

If the construction or operation of a power plant causes conflict with local communities or affiliates, it will interrupt power generator operation and eventually create problems with the power supply flow. KOSPO recognizes conflict management as an important issue for the stability of the power supply. In 2013, it created a manual to aid in the training of internal conflict management professionals, and applied different solutions in accordance with the type of conflict. As such, it rationally coordinated compensation problems for many stakeholders, including local fishermen, during the construction of Samcheok Green Power, and also attained the consent of local residents who opposed the construction of a power transmission line in Andong through a combination of communication and persuasion. KOSPO will pay a total of KRW 2,133 million won to 45 local households who had to relocate after the construction of Samcheok Green Power.⁶



Consultations among stakeholders for the construction of the Andong Power Plant

1. This indicates a period of rapid increase in electricity demand. In Korea, the summer used to be a period of peak demand, but of late, the demand for heating in the winter has meant that winter and summer electricity demands are now comparable.

2. On the Job Training 3. A device to prevent the leakage of vapor and gas from a gas turbine 4. A mechanical element that supports the movement of a rotating or rectilinear moving shaft 5. International standard for business continuity management systems 6. The amount is based on the compensation payment to Samcheok City, as the compensation is still being paid. The compensation to local fishermen for damage to the fishing business will be separately paid.

Expansion of
Green Power Generation
Development of Greenhouse
Gas Reduction Technologies
Leadership in New and
Renewable Energy

KEY TOPIC

Climate Change

The Dilemma of Thermal Power Generation The Korean Government submitted the 7th Power Supply and Demand Master Plan, which includes a plan to cancel the construction of four coal-fired thermal power plants and to construct two new nuclear power plants. The government’s long-term energy policy for decreasing the share of thermal power generation while increasing that of nuclear and new and renewable energy reflects measures to implement the post-2020 greenhouse gas reduction target, and will be submitted to the United Nations Framework Convention on Climate Change (UNFCCC) by September of this year. The plan to reduce the share of thermal power generation and to construct additional nuclear power plants is a subject of controversy. This stems from the dilemma concerning whether to be more focused on economic factors and the efficiency of the power generation source as an issue of climate change. KOSPO also faces the same dilemma. Although combined cycle power generation is helpful in reducing greenhouse gas emissions in the short term, there is a long-term problem with profitability deterioration due to higher fuel costs, and thus combined cycle power generation is no longer considered an alternative to cope with climate change. As shown by Germany’s plan to gradually close coal-fired thermal power plants by 2020, complying with UNFCCC is an issue that an enterprise cannot afford to circumvent when ensuring its long-term survival, since UNFCCC expectations are agreed upon worldwide. It is not realistic for KOSPO to delay relinquishing bituminous coal-fired thermal power generation until new and renewable energy business grows to a certain level, and that is why coping with climate change is an material issue.



KOSPO and its internal/external stakeholders jointly evaluated ‘Greenhouse Gas Reduction’ as the third most material topic and ‘New and Renewable Energy’ as the fifth most material topic in the report for 2014.

	Strategic Materiality	Evaluation by Stakeholders	Priority
Greenhouse Gas Reduction	88.1	78.9	3
New and Renewable Energy	83.3	78.7	5

The KOSPO Approach

KOSPO recorded the lowest level of operating and net profits, although it showed the highest rate of sales among 5 domestic thermal power generating companies in 2014. The reason for this is because KOSPO has a higher share of CCGT power plants which use natural gas in comparison to other domestic thermal power generating companies. For example, the share of combined cycle power generation of domestic power generating company A is less than 5%, while it is 53.9% at KOSPO. KOSPO recognizes coping with climate change not as an issue related to social responsibility, but as an important issue directly related to its sales and future survival, prompting KOSPO to approach climate change from three viewpoints of sustainability. In other words, KOSPO responds to the issues of climate change by implementing programs in strategic directions, including green power generation to reduce greenhouse gas emissions while also increasing power generation efficiency, development of greenhouse gas reduction technologies, and taking a leadership new and renewable energy markets, in which an early foothold is important, despite the problem with profitability. Therefore, KOSPO plans to decrease greenhouse gas emissions by 5.6 million tons by 2020.*

Strategic Focus

Expansion of Green Power Generation	Development of Greenhouse Gas Reduction Technologies	Leadership in New and Renewable Energy
3.46 %	10 _{MW}	100 %
On-site Power Ratio	Dry CO ₂ capture technology	RPS Implementation Rate
2015 Target 3.79 %**	2017 Target 300 MW	2015 Target 100 %

* Target of emitting 5.6 million tons less greenhouse gas than BAU (Business As Usual), which is the amount of greenhouse gas that would be emitted if there were no reduction efforts, by 2020
** An increase in on-site power generation due to both increased power reserve rates and decreased equipment utilization rates

Expansion of
Green Power Generation
Development of Greenhouse
Gas Reduction Technologies
Leadership in New and
Renewable Energy

Expansion of Green Power Generation

To reduce the greenhouse gas emitted during power generation, a fuel that generates less greenhouse gases should be used, or the power generation efficiency should be increased to produce more electricity with the same amount of fuel. KOSPO strives to increase power generation efficiency, using alternative fuels and designing power plants with due regard for greenhouse gas emissions and eco-friendliness.

Use of Alternative Fuel

KOSPO switched the fuel used at Namjeju Thermal Power Plant from heavy oil to bio heavy oil. Bio heavy oil is similar to heavy oil, a fossil fuel, but is created from coconut or animal/vegetable oil. Compared to heavy oil, it can reduce the discharge of atmospheric pollutants, such as sulfur oxides, nitrogen oxides, and other particulate matters, by 70%, 16%, and 33%, respectively, thereby lowering the emission of greenhouse gas. The 100 MW Namjeju Thermal Power Plant Unit 1 uses 8.9 kℓ bio heavy oil and is expected to reduce 344,000 tons of CO₂ emissions each year.

Improvement of Efficiency of Combined Cycle Power Generation

As the reserve margin increases, supply and demand is expected to be more balanced, and the utilization of combined cycle power generation is expected to decrease. With increasing fuel prices and deteriorating profitability, the CCGT power plant is no longer considered as to be the main means of lowering greenhouse gas emissions. However, when an aged heavy oil-fired power generator is replaced with a 900 MW combined cycle power generator, a total of KRW 75 billion can be saved, including KRW 20 billion for land and construction costs, and KRW 55 billion for construction of power transmission lines; additionally, savings of KRW 8.3 billion can be expected from the reduction of greenhouse gas emissions. KOSPO is converting the Youngnam Thermal Power Plant, currently using heavy oil, into a CCGT power plant that uses natural gas, and is trying to increase the efficiency of CCGT power plants currently in operation.

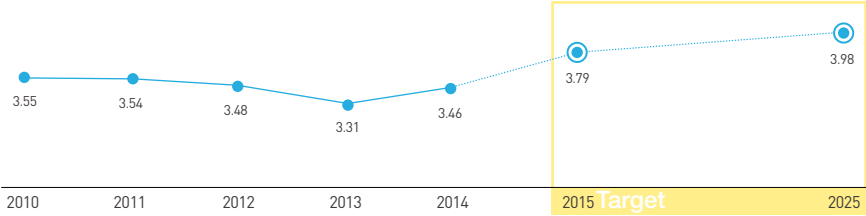
Minimization of Wind Power Generator Failure

The prolonged use of wind power generators has led to foundation subsidence¹ and frequent transformer failure. KOSPO introduced state-of-the-art displacement monitoring systems to provide advanced warning of the possibility of sinking, and to prevent failure, while also applying non-destructive reinforcement technologies² to subsided concrete. As a result, there was no foundation subsidence in 2014, compared to three subsidence events in 2013. Transformer failure was found to be mostly caused by dielectric breakdown³ due to saline (in the form of seawater). The transformers were replaced with high performance models with structures not affected by salt, and state-of-the-art transformer cooling systems that prevented salt damage were also introduced. As a result, cases of transformer failure decreased from 7 in 2013 to 1 in 2014. The lower number of failures enabled wind power generators to produce a total of 197 GWh electricity⁴ in 2014, 4 GWh more than the previous year, which is equivalent to around 124,000 tons in CO₂ emission reductions if the same amount of electricity were to be generated using fossil fuels.

On-site Power⁵ Saving

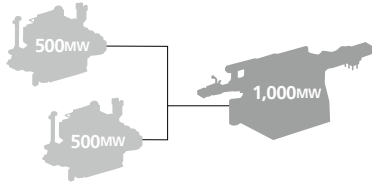
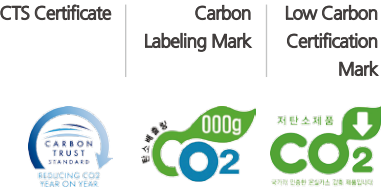
To reduce on-site power, power consumed by the auxiliary devices of power generation, KOSPO monitors energy usage at its Performance Monitoring & Diagnostic Center (PMDC) and encourages company-wide energy saving in accordance with the Energy Target Management scheme. KOSPO is upgrading low efficiency equipment to high efficiency models to conform to the government’s energy service company (ESCO) policy for saving energy.

Onsite Power Ratio⁶ (unit: %)



Low Carbon Management Certification

A reliable standard is needed to measure how much CO₂ gas is generated, and from where, as well as to systematically manage gas levels. KOSPO adopted the international standard, ISO 14064, company-wide, and is certified under the Carbon Trust Standard (CTS) in recognition of its outstanding efforts to reduce greenhouse gas. The carbon labeling system is a scheme for labeling the greenhouse gas emitted by all production processes. Although all enterprises do not have the obligation to include carbon labeling on their products, companies voluntarily displaying the carbon labeling are showcasing how the government has certified that “This product is an outcome of efforts to prevent climate change.” For a product that uses technology to cope with climate change, a Carbon Emission Certificate is issued to show that “This product is certified to emit only the amount of CO₂ labeled on the product,” while a product that reduces greenhouse gas emissions by using technology to lower carbon output in its production processes is issued a Low Carbon Product certificate. Six KOSPO sites received the Carbon Emission Certificate, while the Shinincheon, Busan and Yeongweol Power Plants received the Low Carbon Product certificate. This represents recognition that KOSPO is generating clean electricity.



2:1 Supercritical Pressure CFBC Boilers and Steam Turbine

Supercritical Pressure CFBC Boiler

Samcheok Green Power plans to generate electricity from its 2,000 MW power generator, which combines two 500 MW supercritical pressure CFBC (Circulating Fluidized Bed Combustion) boilers and a 1,000 MW turbine. The meeting point at which the start and end of the evaporation of water are the same is referred to as a threshold (225.56 kg/cm², 374.15°C), and depending on whether the steam inside the power plant generators is pressurized at a temperature lower or higher than this level, the terminology used is subcritical and supercritical pressure, respectively. Since it uses high temperatures and high steam pressure, it offers a higher power generation and reduce greenhouse gas emission compared to thermal power plants⁷.

The technology that circulates the solid particles released from the burning of coal, in which oxygen and limestone are mixed together to initiate combustion, is called Circulating Fluidized Bed Combustion Technology, and is utilized by CFBC boilers where internal heat distribution is uniform and the combustion temperature is low, at 900°C. Therefore, the discharge of environmental pollutants, such as nitrogen oxides, can also be reduced⁸.

1. Circumstances in which foundations that support equipment or structures subside or otherwise become deformed. 2. Construction methods involving the expansion and reinforcement of existing foundations without excavation 3. Circumstances in which a sudden excess flow of current results from too much voltage being applied to an insulator that does not conduct the electricity or heat 4. Wind power generator utilization rate of 96.04% 5. Ratio of power required for power plant operation 6. ① OPR = Power required for power plant operation / Total power generation ② OPR increased due to increase of electric power reserve rate and decrease of capacity factor 7. ① According to IEA (International Energy Agency), the worldwide capacity of thermal power generation is 1,000 GW, and 2/3 of them are aged 20 years or longer. Thus the energy efficiency is only 29%. ② These thermal power plants emit total of 3.9 billion tCO₂. Assuming that the life of a thermal power plant is 40 years and that the thermal power plants are all converted into the supercritical pressure power plants, which typically have the energy efficiency of 45%, after the life is expired, 1.4 billion tCO₂ equivalent to 36% of total can be reduced each year. 8. The nitrogen oxides are generated when the fuel is burnt at a very high temperature.

Greenhouse gas emissions reducing low-carbon electricity

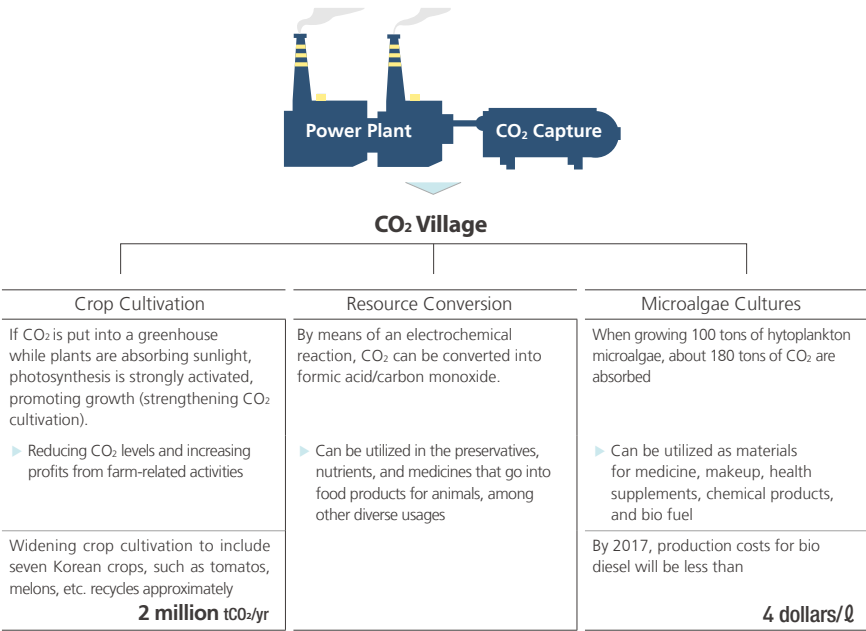
4.46%

The combined cycle power generator at Shinincheon Power Plant Unit 4 had shown deteriorating performance, as it had been more than 15 years since it was installed, and the aged gas turbine needed to be upgraded. A higher performing gas turbine can generate more electricity, because the gas produced is hotter. However, the existing heat recovery steam generator (HRSG) could use only a portion of the heat generated by the turbine. According to a KOSPO analysis, power generation could be increased if these two parts were enhanced and made to work in synergy. In other words, the gas turbine could be enhanced to generate more primary electricity, and then the HRSG could be enhanced to recover all the heat produced, generating more secondary electricity. As a result, in 2013, the upgraded Shinincheon Unit 4 Power Generator could generate 9 MW more electricity in one time than before. The amount of CO₂ discharged while producing 1 kWh of electricity decreased by 0.022 CO₂/kWh, and there was a total reduction of 280,000 of CO₂ in 2013. As such, the electricity generated by the Shinincheon Power Plant was certified as Low Carbon, reducing greenhouse gas emissions by 4.46%.

Development of Greenhouse Gas Reduction Technologies

KOSPO is transforming the issue of CO₂ generated during power generation that uses fossil fuels into an opportunity for new growth.

Carbon-dioxide Capture & Reuse



CO₂ capture technology allows for the capture of CO₂ generated during power generation before it is emitted into the air. Captured CO₂ can be used for other meaningful purposes. In other words, CO₂ can be transformed from a problem into a new resource. Such technology, in which CO₂ is captured for reuse, is called CCR (Carbon Capture & Reuse).

KOSPO has jointly developed 10 MW dry CO₂ capture technology¹ with the Ministry of Industry, Trade and Energy, KEPRI of KEPCO, and the Korea Institute of Energy Research. A pilot plant was installed in Unit 8 of the Hadong Thermal Power Plant in 2014, and has been tested through continuous operation. This facility can handle 35,000 Nm³/h or 2% of the exhaust gas from Hadong Unit 8, capturing 200 tons of CO₂ per day and around 70,000 tons per year. After a year of testing the pilot plan, it was deemed a success, and KOSPO plans to begin designing a 300 MW facility.

CO₂ Village

Using CCR technology, KOSPO captures CO₂ and uses it in various value added businesses that are linked to the livelihood of local residents, such as the cultivation of microalgae, enhanced cultivation of agricultural products using CO₂, and production of formic acid. The program, called 'CO₂ Village', is a project about doing more than just reducing greenhouse gas emissions by responding to the expectations of local communities that want economic development.

Turning CO₂ into Resources

When coal is burnt at a high temperature in a thermal power plant, it leaves a fine powder called coal ash. In 2013, the Samcheok Green Power Division combined coal ash with CO₂ to develop a new eco-friendly material that can replace the sand and gravel used for constructing buildings. By recycling coal ash, the company expects an annual reduction of 60,000 tons of CO₂ emissions.

“Compared to other power plants, KOSPO is better at coping with climate change. It also has the frontier spirit for technology development. Investment for the future may accompany the pain of deteriorated short-term profitability. I hope that KOSPO will grow out of being just a generator of power by entering the potentially huge CCS² market, with the vision of becoming an integrated energy company and playing a key role in securing a new engine for national growth.”

Chang-geun Lee, PhD
Korea Institute of
Energy Research (KIER)



1. ① The CO₂ capture technology, which separates CO₂ from the exhaust gas generated by burning fuel and captures it, is divided into the dry method and wet method, according to which type of absorbent is used. ② Dry capture technology does not capture as much CO₂ at once as the wet type, but it is considered an innovative CO₂ recycling technology, because it does not produce secondary pollutants and is less costly. 2. ① Carbon Capture & Storage ② KOSPO pursues CCR, which does more than just storing the captured CO₂ by reusing it.

Expansion of
Green Power Generation
Development of Greenhouse
Gas Reduction Technologies
Leadership in New and
Renewable Energy

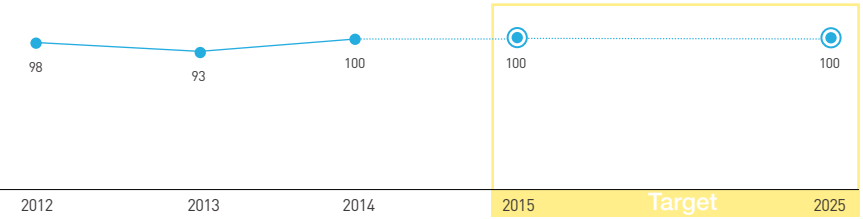
Leadership in New and Renewable Energy

KOSPO promotes the production of new and renewable energy, such as bio energy, wind power, solar energy, hydrothermal energy, waste energy, energy storage systems, and small hydropower systems. In particular, KOSPO is making considerable investments in wind power generation.

Leadership in RPS

Under the Renewable Energy Portfolio Standard (RPS), a power generating company owning 500,000 kW or more of power generation capacity is obligated to supply 2% or more of that total with new and renewable energy. In 2013, KOSPO had difficulties reaching this quota in areas other than solar energy due to environmental regulations of wind power generation, delayed approvals, and resistance from local residents. However, the company overcame such difficulties and expanded new and renewable energy power generating facilities to supply 100% of its 2,162 GWh quota in 2014.

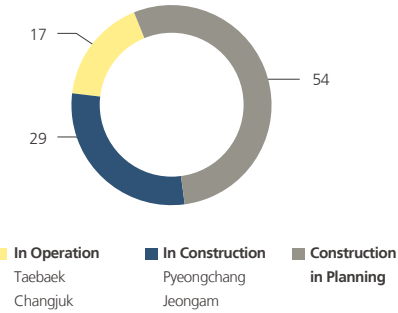
RPS Implementation Rate (unit: %)



Construction of 100 Domestically Manufactured Inland Wind Power Generators

KOSPO is currently executing a project for the construction of 100 wind power generators manufactured in Korea. As most wind farms in Korea operate using imported equipment, KOSPO is trying to jointly develop Korean models of wind power generators with domestic manufacturers. KOSPO is currently operating 18 MW and 16 MW wind farms in Taebaek and Changjuk, respectively. The Changjuk Wind Farm can produce 37,800 MWh of electricity each year. The figure is sufficient to supply electricity to 10,500 households, replacing 8,130 TOE imported oil, and reducing greenhouse gas emissions by 17,800 tCO₂ each year. The company is additionally constructing 30 MW and 40 MW wind farms in Pyeongchang and Jeongam, respectively, and has received a permit for Taebaek District 2, Mt. Yugbaek, Mt. Podo, and Anin, with plans to construct the wind farms sequentially. If wind farms are constructed on schedule, 12 more wind power generators manufactured in Korea will be installed, for a total of 112 units. The construction of 100 domestically manufactured wind power generators will allow KOSPO to attain the technical know-how and operating experience needed for entering the global wind power generation markets.

Progress for Construction of 100 Domestically Manufactured Wind Power Generators (unit: unit)



Energy Storage System (ESS)³ Linked with Wind Power Generation

KOSPO is developing ESS, a system specific to wind power generation, and plans to implement a trial run of 2MW ESS at the Seongsan Wind Farm in 2015.

Export-Linked Domestically Manufactured Offshore Wind Power Generators

The global wind power market is showing more than a 20% rate of growth each year, and the offshore wind power market is expected to surpass the inland wind power market after 2026. KOSPO plans to establish a 84 MW wind farm off the shore of Daejeong-eup in Jeju Island beginning in 2015, constructing a total of 723 MW worth of wind farms off the shores of Jeju Island and the southwestern coast of Korea. Using accumulated wind power know-how, the company also seeks to enter overseas wind power markets, such as in Jordan.

Cogeneration Using SRF (Solid Refuse Fuel)⁴

In 2015, KOSPO will complete the construction of a 66 MW cogeneration power plant that utilizes waste as fuel in Naepo New Town, Chungnam. The Naepo Cogeneration Power Plant is designed not to discharge dioxins, a hormone disrupter. In 2014, KOSPO also released a plan to construct 20 MW SRF power plants using the idle sites at Samcheok Green Power and Youngnam Thermal Power Plant.

3. ① A device that stores surplus energy so that it can be used later when there is a shortage of electricity. ② Since new and renewable energy using natural resources, like wind power or solar energy, is affected by the weather, it is difficult to always produce a specific amount of electricity. Using ESS helps utilize new and renewable energy more efficiently. 4. Solid fuel recycling of waste resources such as plastic, rubber, and wood.

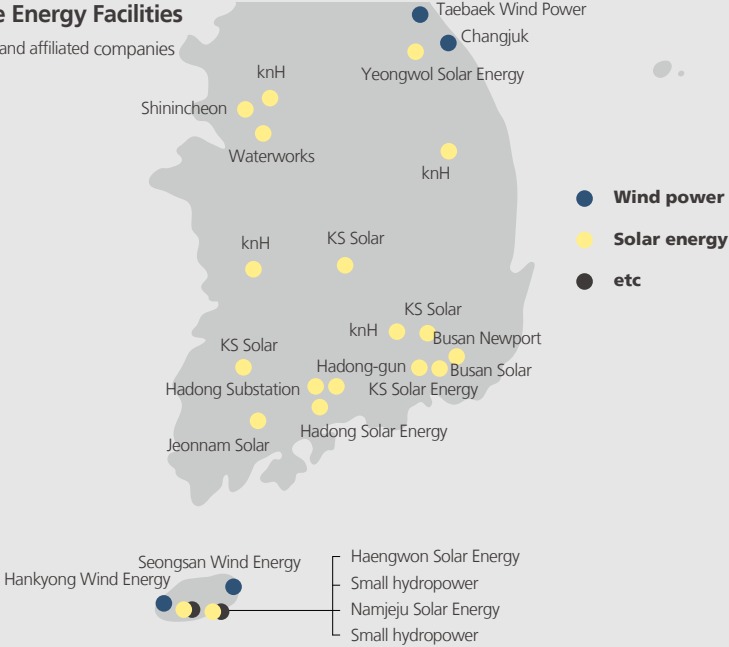
Facts

96.04 %
Wind power generator utilization rate

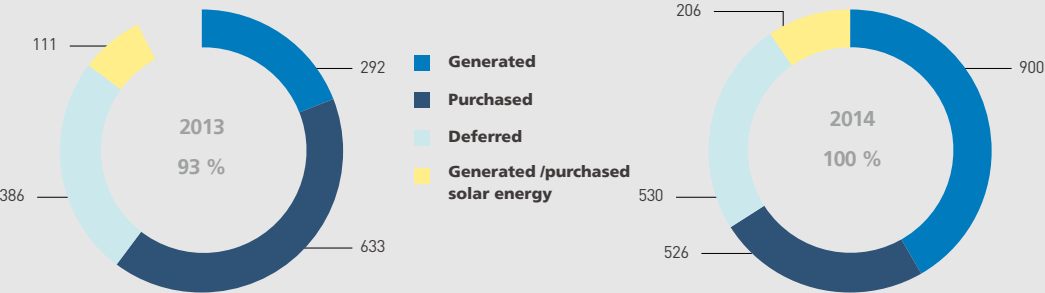
2,162 GWh
Supply of new and renewable energy in 2014

3,800 thousand tCO₂e
Greenhouse gas reduction

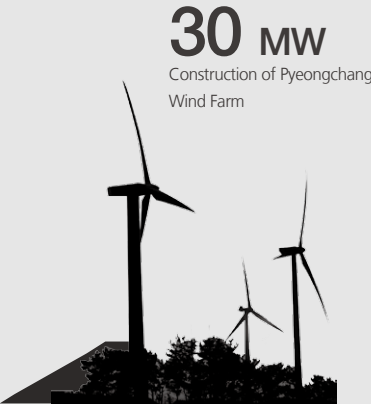
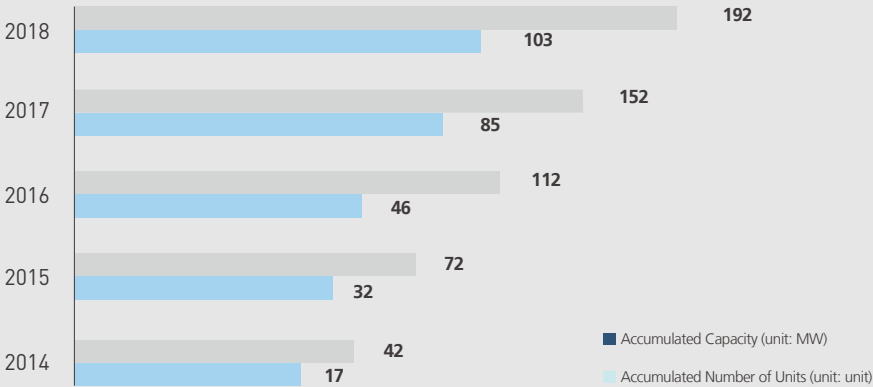
New and Renewable Energy Facilities
including domestic operation and affiliated companies



RPS Implementation (unit: GWh)



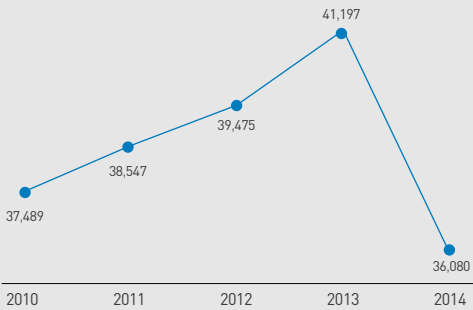
Construction of 100 Domestically Manufactured Inland Wind Power Generators



30 MW

Construction of Pyeongchang Wind Farm

Greenhouse Gas Emissions* (unit: thousand tCO₂e)



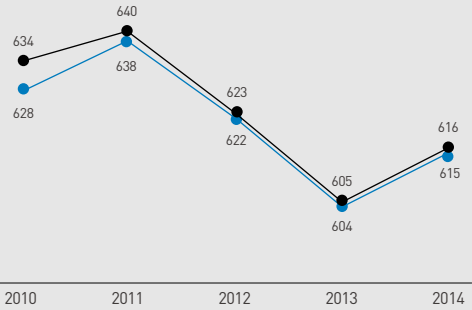
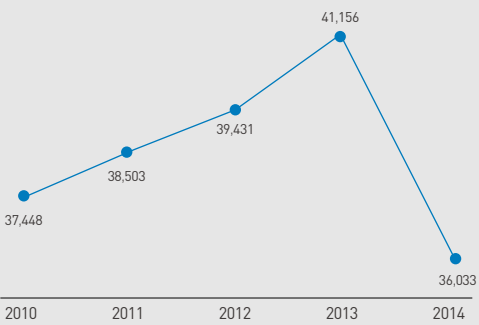
* The amount of greenhouse gas emissions may be somewhat different from previous reports. This is because greenhouse gas emissions are calculated with the emission coefficient announced by the government each year, and past emissions are recalculated using the current emission coefficient.

10 MW

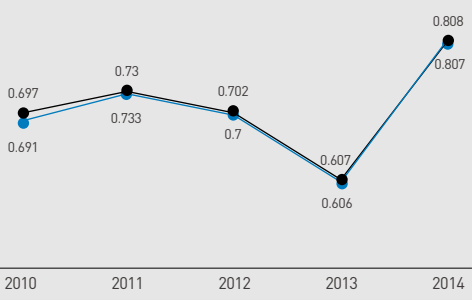
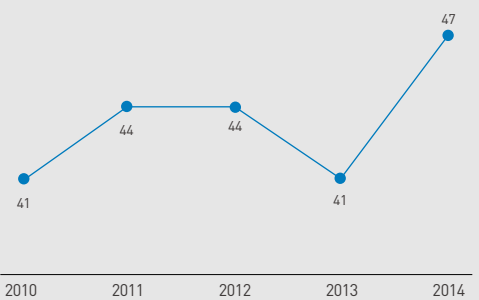
Hadong Thermal Power Plant
CO₂ Capturing Plant



Direct Greenhouse Gas Emissions (unit: thousand tCO₂e)



Indirect Greenhouse Gas Emissions (unit: thousand tCO₂e)



Emissions Trading Scheme

The emissions trading scheme will begin in Korea in 2015. Enterprises can emit greenhouse gases at the levels specified by the government, and must purchase emissions permits in the market if they generate greenhouse gases that exceed the prescribed level. If reductions in emissions mean that they emit less than the prescribed amount, remaining emissions permits may be sold to other enterprises. In other words, enterprises can make profits by selling emissions permits, as long as they can reduce greenhouse gas emissions. In 2013, the Korea Energy Management Corporation (KEMCO) and 5 domestic power generating companies, including KOSPO, agreed to cooperate with each other in preparation not only for the rollout of the emissions trading scheme in Korea, but also for the global emissions trading scheme scheduled for implementation in 2020. It is expected that the cooperating parties can save on expenses associated with learning and duplicating practices in the reduction of greenhouse gas emissions, increasing their implementation capability, especially when compared to taking on the task individually.

KEY TOPIC

Active Integrity

Power Supply and Demand are Directly Related to Safety As a power generating company that deals with many suppliers in fuel supply and construction because of the characteristics of its supply chain, difficulties can arise in the handling of corruption. The blackout following the shutdown of nuclear power plants due to irregularities with suppliers in 2013 came as a shock to many, and there were reports of 16 thermal power plants operated by domestic power generating companies using defective parts from suppliers who had falsified test reports for 7 years, leading all the way up to 2014. This information was astonishing because corruption at power plants directly led not only to instability in the supply and demand balance, but also to serious safety issues. Even companies with clean images and good reputations for sound internal management systems may be shaken by a corruption case if even one employee lacks a sense of ethics. Moreover, KOSPO is a public institution that influences many stakeholders and thus has the social responsibility to improve its internal integrity, but also to spread a wider culture of integrity to the private sector.



Improvement of Corruption
Risk Analysis and Systems
Proliferation of
Anti-corruption Culture
Strengthening
the Anti-corruption System

KOSPO and its internal/external stakeholder jointly evaluated ‘Anti-corruption’ as the fourth most material topic and ‘Compliance with Social Law and Regulation’ as the ninth most material topic in the report for 2014.

	Strategic Materiality	Evaluation by Stakeholders	Priority
Anti-corruption	83.3	80.8	4
Compliance with Social Law and Regulation	76.2	78.3	9

The KOSPO Approach

KOSPO implements ‘active integrity’ in order to lead the reform of public institutions in Korea and to practice higher ethical management. Active integrity differs from ‘passive integrity,’ the concept of faithfully conforming to rules and laws, as well as prescribed ethical practices, in that it is a concept for increasing the productivity and efficiency of an enterprise based on compliance with fairness and integrity in personal and business life. Active integrity improves upon KOSPO practices in a way that combines both the pursuit of company profit and an anti-corruption culture. KOSPO’s anti-corruption strategy to practice active integrity focuses on the improvement of corruption risk analysis and systems, proliferation of a culture of integrity, and strengthening of an anti-corruption system.

Strategic Focus

Improvement of Corruption Risk Analysis and Systems	Proliferation of Culture of Integrity	Strengthening of Anti- corruption System
6 cases*	56,673 hours	253 people
Catching violations against code of conduct	Employees educated on anti-corruption	Employees receiving integrity incentives
2015 Target 0 violations	2015 Target 57,239 hours	2015 Target Expansion of integrity incentives

*The violations mostly resulted from inadequate security management and job handling, and the offending employees were reprimanded, cautioned, or given a warning.

Improvement of Corruption Risk Analysis and Systems

Selection and Management of Jobs Vulnerable to Corruption

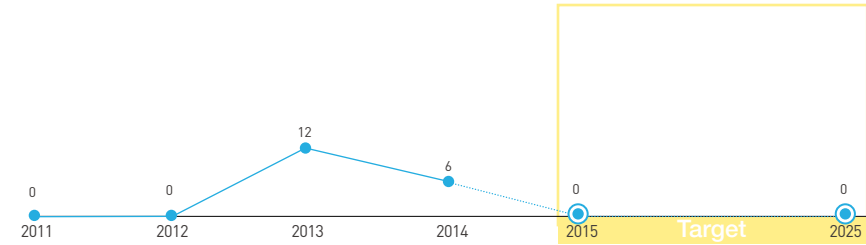
KOSPO investigated corruption risk throughout its entire business process and determined that fuel purchase, material procurement, power plant construction, and expenditure are the four areas (Red Zones) vulnerable to corruption. These red zones are strictly managed with fuel e-bidding systems, departments dedicated to purchasing, supervision of the legal violations of contractors, and accounting support document management ERP systems.

Red Zone	Corruption Risk Management
Fuel Purchase	Operation of 'Ubicoal', the first international e-bidding system for a power generating company
Material Procurement	Real-time tracking of materials and prevention of unauthorized checkout at the source
Construction	Constructor supervision system to strengthen supervision of payment to constructors and worker wages
Expenditure	Strengthening of internal control through constant monitoring of department accounts linked with financial institutions

Punishment for Violations of Anti-corruption Policy

KOSPO is catching corruption and violations of the code of conduct through audit programs. There were no violations reported by the external monitoring organization in 2013 or 2014. However, an internal audit found 12 and 6 employees violating the code of conduct in 2013 and 2014, respectively. The violation cases included inadequate security management, failure to report on the outside lecture and inadequate job handling. The violating employees were reprimanded, cautioned, or given a warning.

Violations of Code of Conduct (unit: cases)

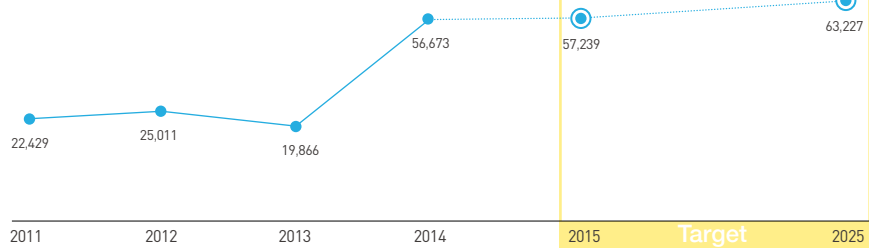


Proliferation of Anti-corruption Culture

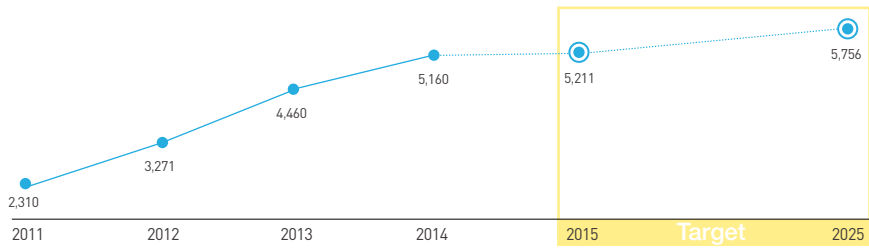
Expansion of Integrity Education

KOSPO is conducting education on integrity to instill pride in its employees regarding the virtuousness of integrity. In 2014, 2,637 employees completed an integrity education course, and the figure represents a 47% increase over the previous year. 1,713 employees, or 297%p more than in 2013, participated in cyber integrity education. In 2014, 13 integrity lecturers conducted 43 classes, while the CEO and standing auditor conducted 35 special lectures at all company sites. 73 employees with responsibilities related to contracting, inspection, etc. (which are vulnerable to corruption) participated in a 2-day KOSPO Integrity Healing program, which was initiated to be an experiential learning of integrity culture, emphasizing participation in in-depth discussions and visitations to historic sites related to integrity.

Duration of Employee Education Related to Anti-corruption (unit: hours)



Employees Completing Education Related to Anti-corruption (unit: persons)



Integrity ①DOL Group

KOSPO created the Integrity ①DOL Group in 2013 to inspire integrity awareness in employees right from the time they are hired. The ①DOL Group, composed of 24 employees with fewer than 3 years at KOSPO, is entrusted with the role of propagating outstanding integrity case studies company-wide and presenting integrity-related ideas. In recognition of its performance in 2014, KOSPO expanded the group to 28 people, and the scope of its activities now extends to the management of Integrity Club events and group level integrity activities. The ①DOL Group was accepted as an outstanding model by the Anti-corruption and Civil Rights Commission and contributed to the improvement of integrity at KOSPO.

Every Day Integrity Practices

KOSPO encourages employees to practice integrity in accordance with cultural integrity contents. At the beginning of each year, the Integrity Pledge is posted on the company portal, and employees pledge to act with integrity by attaching the Integrity Pledge to their desk as a constant reminder. The CEO also sends a Letter of Integrity to newly appointed managers to encourage them to take the initiative. The manager is also obligated to respond to the 365 Integrity Pledge message at the end of each business day, taking a moment to look back and reflect upon the day. At 8pm, a brief weekly integrity message is sent to remind the manager of integrity even in personal life outside of the workplace.

Improvement of Corruption Risk Analysis and Systems
Proliferation of Anti-corruption Culture
Strengthening the Anti-corruption System

Integrity Rating of 1

Integrity Survey of Public Institutions

	2012	2013	2014
Overall Integrity	9.28	8.81	8.89
External Integrity	9.40	8.88	9.01
Internal Integrity	9.21	9.18	9.16
Customer Evaluation of Policy	—	8.04	8.24

KOSPO has been consistently given a rating of 1 in the Integrity Surveys of Public Institutions since 2012. The Integrity Survey is conducted by the Anti-corruption and Civil Rights Commission to evaluate the integrity level and corruption-causing factors of public institutions under the provisions of the Act on the Prevention of Corruption and the Establishment and Management of the Anti-corruption and Civil Rights Commission. KOSPO received 8.89 points in overall integrity and was ranked no. 1 among the 640 public institutions surveyed in 2014. Strengthening the implementation of the code of conduct raised the overall integrity score,

but the areas ofoutsourcing contacts, supervision, and related job handling were found in need of revision, so KOSPO is in the process of making the necessary improvements.

Strengthening the Anti—corruption System

Corruption is not a problem of specific employees, as everyone can be exposed to it without exception. As such, it is very important to establish a system to eliminate the root cause of corruption.

Beginning of Active Integrity

The government demands that public institutions put in place measures to encourage management efficiency and facilitate anti-corruption management. Realizing that the company was ready to push further, after repeatedly receiving an integrity rating of 1, KOSPO initiated an ‘Active Integrity’ program. Active integrity is a part of management innovation, going beyond both the passive integrity of ‘not giving and not receiving’ and the mechanical integrity limited to laws and regulations, to change the business structure and culture as a whole.

To practice active integrity, KOSPO restructured the organization around the audit office and integrated the inspection function of some sites with the head office. KOSPO also held a practical ideas contest open to all employees and operates an Active Integrity TFT¹.

In accordance with the 2020 Long-term Audit Strategy, the direction of auditing also changed from not just internal control and compliance with the law and regulations, but to preventive consulting audits for achieving the corporate vision and creating values. Its intention is to go beyond the conventional method of centralized audits and to incorporate field visitations for direct communication. Moreover, employees of auditing offices will pursue problem solving via audits by autonomously researching, establishing, and implementing the subjects of audits.

Fairness	Integrity	Efficiency
<div>▮ Applying the same standard (impartiality)</div> <div>▮ Strict separation of public and personal interests</div> <div>▮ Company interest come first</div> <div>▮ Breaking away from the culture of doing favors and looking the other way</div>	<div>▮ Matching words (policy) with action (practice)</div> <div>▮ Handling of company matters as if they were personal matters</div> <div>▮ Thoughts and conducts that will not embarrass the ‘self’, ‘company’ or ‘customer’</div> <div>▮ Prevention of moral hazard</div>	<div>▮ Creation of business outcomes by changing corporate practice</div> <div>▮ Saving of resources and prevention of waste → Increased profits</div> <div>▮ Seeking alternatives → Innovation</div> <div>▮ Leading a culture of integrity in Korea</div>

Strengthening the Internal Check System

KOSPO has appointed outside experts in 31 specialized areas of auditing, such as safety, information security, and accounting. Their purpose is to increase audit expertise by strengthening the independence and specialization of internal check systems. Realizing that it is difficult to guarantee independence when the auditing organization of each site belongs to that specific power plant, the affiliation of the head of the audit team at each site has been transferred to the head office. As such, the audit independence index² increased from 98 points in 2013 to 98.5 points in 2014.

“ The difficulties of the power market can be an opportunity, the change needed to turn the crisis into the momentum needed for taking an even bigger leap forward. Views on integrity and anti-corruption must also change in the same context. Now is the time to go beyond the mechanical integrity of simply complying with procedures and laws, or the passive integrity of ‘not giving and not receiving,’ instead focusing on the active integrity of changing corporate practice and culture. KOSPO’s active integrity begins where business performance meets anti-corruption strategy.”

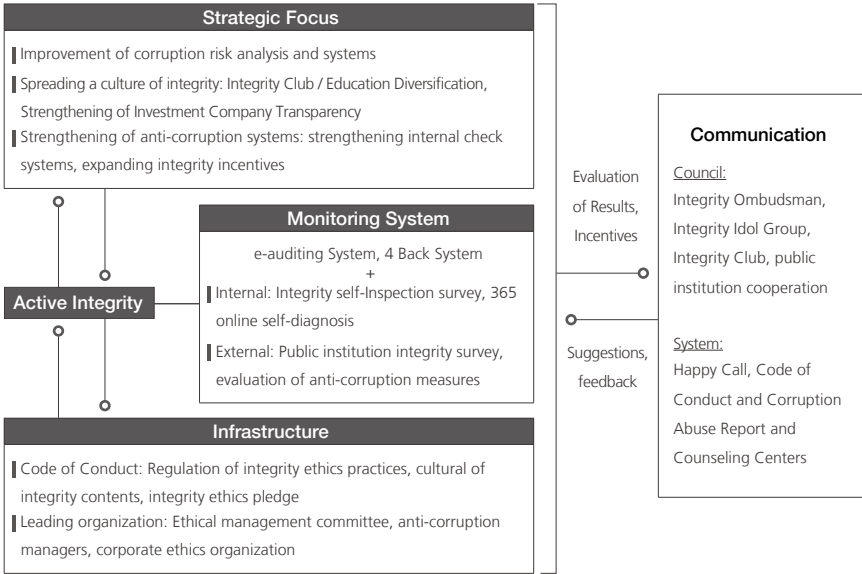
Jeong-deok Lim,
Standing Auditor Office of Audit,
KOSPO



K-1 Bank to Turn Integrity Idea into Asset

Improvement of Ethical Management Implementation Systems

Encouraged by exemplary outcomes in integrity and anti-corruption competitiveness in the public sector, KOSPO strives to spread the concept of integrity as a culture of its own. Integrity as a culture breaks away from top-down methods led by the ethics department and seeks voluntary participation. As part of its integrity as a culture strategy, KOSPO added an integrity idea bank called K-1 Bank to its ethical management system. The system recognizes integrity ideas as an asset and allows all employees to deposit an idea at any time. In 2014, ideas proposed to K-1 Bank and related to the integrated management of materials vendors of domestic power generating companies were adopted by the government as part of a collaborative agenda.



Integrity Incentive

KOSPO has adopted the integrity incentive scheme and assigns mileage to the individual integrity performance of each employee. Beginning with granting weighted points for 2-level promotion evaluation to employees with outstanding performance in 2013, 12 employees received the Presidential Award and 154 employees received Integrity Merit Awards. Starting in 2014, as a means to spread the integrity culture among mid-level managers, the company then introduced extra points for integrity to mid-level managers subject to promotion, who had received a specific level of integrity mileage.

Strengthening of Management Transparency of Affiliates

The integrity of its affiliates is directly related to the integrity of KOSPO. In 2014, KOSPO identified areas of improvement for increasing integrity at each business stage, from business development to operation of affiliates, and made efforts to improve the business transparency of affiliates to match the level of the company, including an integrity pledge at the time of establishment and areflection of integrity in HR rules. As such, KOSPO is carrying out intermediate feasibility evaluations at the business development stage, and has modified the HR rules of four affiliates, including Korea Offshore Wind Power.

This case was adopted by the Anti-corruption and Civil Rights Commission and shared by all public institutions.

Improvement of Corruption
Risk Analysis and Systems
Proliferation of
Anti—corruption Culture
Strengthening
the Anti—corruption System

1. Task Force Team: A temporary group organized to accomplish a specific goal. 2. Survey of audit independence conducted by an outside surveying agency after auditing each year

Facts

KOSPO Responds to Public Concern Regarding Use of Defective Parts at Domestic Thermal Power Generation Companies

In May 2013, the irregularities of supply parts at power plants became a social issue after it was reported that defective parts falling below the quality standard had been used for years on end at the nuclear power plants. In order to repair and replace the defective parts, it was necessary to suspend the operation of said nuclear power plants, while work on power plants that were still in construction also had to be temporarily suspended, causing a power crisis. Some factories were shut down, and citizens had to endure the hot summer as cooling systems could not be used at home or in the office.

Following the incident, five domestic thermal power generating companies conducted external and voluntary internal audits to investigate if any power plant was using defective parts with falsified test reports. At the same time, KOSPO conducted a voluntary audit. The government decided that a more thorough investigation was needed to eradicate the supply irregularities of power plants as they are directly related to stable power supply and citizen safety. In 2014, the Intergovernmental Group Eradicate Corruption conducted a full investigation of the utilization of parts at all domestic power plants. The group checked all parts used at 32 thermal power plants nationwide since 2008 and discovered that 12 part manufacturers had supplied defective parts to three domestic power generation companies by falsifying test reports. A case of the falsification of a materials test report for a pulverizing mill motor was also found at KOSPO, and the investigation discovered that the part manufacturer was deceiving KOSPO with illegal information, such that KOSPO was not involved in the illegal activity. KOSPO sanctioned the part manufacturer and reported them to the authorities.

In October 2014, KOSPO developed a verification system to check the authenticity of test reports in real-time, so that the quality of power generation and the transparency of contracting are not damaged; KOSPO is now taking the test reports, which used to be submitted by the suppliers, directly from authorized testing agencies. To ensure the fairness of the verification, KOSPO contracts a specializing third party to inspect plants, and also has them survey the supply parts that had problems in their test reports, to find ways to prevent falsification of test reports. The survey results indicated that purchase specifications demanded too many items to be included in the submitted test report, and that it was a burden on suppliers. To solve the problem, purchase specifications were disclosed in advance to adjust for the tested items, and the test expense was separately calculated in the manufacturing cost.

KOSPO pays particular attention to the reliability of power supply, so as to ensure that it does not deteriorate at any time due to the use of improper part.

Appendix

40 Stakeholder Engagement

KOSPO's stakeholder groups and their participation, and the main cases of participation

42 Determination of Report Content

Process and result of determining what will be reported in the 2014 Sustainability Report, and how

44 The Other Topics

- Recycling of industrial byproducts and compliance with environmental regulations
- Shared growth
- Social contributions and relations with local communities
- R&D

58 Governance

Governance and sustainability system of KOSPO

60 Human Resources

Human Resources composition by gender and site

61 Change in Power Market

Understanding the power market and introduction of Approved VC Scheme

62 GRI G4 Indices

63 Third Party's Assurance Statement

Stakeholder Engagement

Stakeholder engagement is the basis for establishing the business direction of KOSPO. The company rejects one-time only and mono-directional communication and seeks the participation of stakeholders in business strategy and actual management activities.

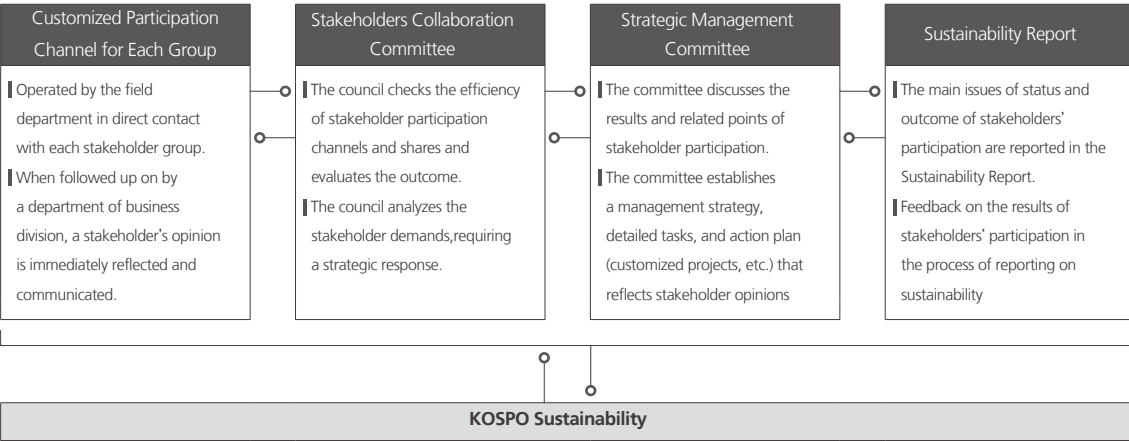
Re-categorization of Stakeholder Groups

KOSPO re-categorized stakeholder groups in accordance with the attributes of the interests of each stakeholder, KOSPO’s response to it, and the degree and similarity of their mutual influence upon each other. Each stakeholder is categorized into one of eight groups: public sector, shareholders and customers, employees, suppliers, industrial partners, local community, media and NGO.

Integrated Management of Stakeholder Participation

In 2014, KOSPO organized the Stakeholders Collaboration Committee to manage stakeholders in an integrated way, and also redesigned the process of stakeholder participation. The Stakeholders Collaboration Committee, which is made up of managers of relevant departments and outside advisors, performs monthly reviews on the status and efficiency of stakeholder engagement through the contact point of field departments, integrating the outcome. The main issues discussed at the Stakeholders Collaboration Committee are reflected in the establishment of business plans specific to each stakeholder.

KOSPO’s stakeholder participation process is as follows:



Management of Stakeholder Satisfaction

KOSPO created the Public-service Customer Satisfaction Index (PCSI) in 2013 as an add-on to measuring the overall satisfaction of labor relations. When the satisfaction level is surveyed, the expectations and opinions of KOSPO are also collected. It is part of the process of carrying out the stakeholder’s specific projects. In 2014, the targets for the satisfaction survey and opinion collection were expanded to local municipalities and industrial partners.

Demands of Stakeholders and Responses

KOSPO has established and is operating a participating channel for each stakeholder group to increase the communication efficiency. The main issues identified by stakeholders’ participation during this report period, as well as KOSPO’s responses, are as follows:

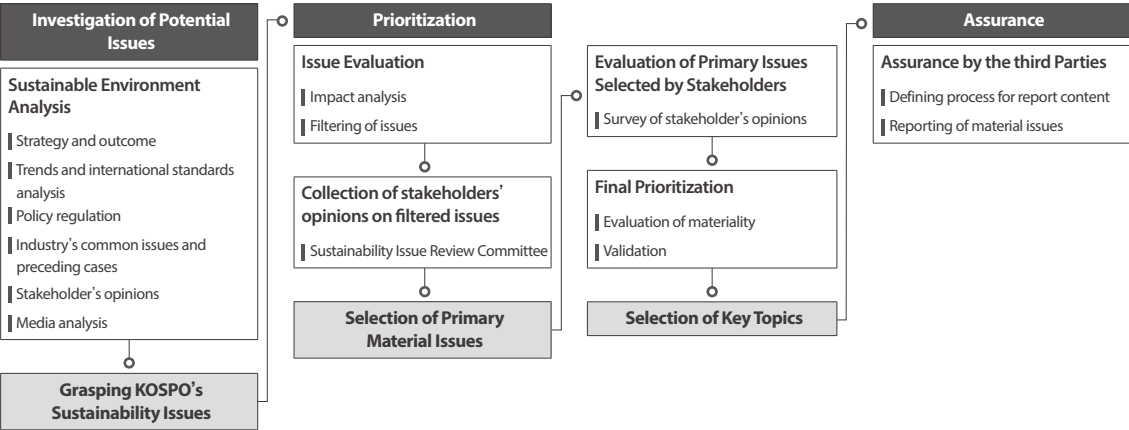
Stakeholder Group	Customized Participating Channel	Main Issue	Response
Public Sector	<ul style="list-style-type: none">Policy cooperating consultative groupsPublic polic y forum3.0 implementation advisory groupManagement performance evaluationGovernment administration inspection	<ul style="list-style-type: none">Gov't 3.0 emphasizing openness and communicationDetailed ethical management action planExternal proliferation of integrity cultureIntegrated stakeholders management systemReflection of social contribution satisfaction survey on social contribution programsPrecise business strategy in accordance with type of scenario	<ul style="list-style-type: none">Expansion of information disclosure¹ and development of open information systemImplementation of ethical management strategic programsSharing of integrity incentive as success casesOrganizing Stakeholders' Collaboration CommitteeSurvey of social contribution satisfaction and demand to identify new projectsManagement strategy in accordance with environmental change scenarios
Shareholders and Customers	<ul style="list-style-type: none">Shareholders' meetingBODMeeting of company presidentsCommitteesPolicy seminar	<ul style="list-style-type: none">Efficient BOD operation systemResults-oriented BOD operation	<ul style="list-style-type: none">Expansion of expertise of part-time directors and reorganization of open specialized committees participated in by outside expertsDirect management of 4 key management issues by part-time directors
Consumers	<ul style="list-style-type: none">Online: SNS and homepage	<ul style="list-style-type: none">Information disclosure	<ul style="list-style-type: none">Disclosure of requested information: Actual power generation, forced outages, fuel usage, purchase of bituminous coal, power trading, market shares, and HQ transfer status
Employees	<ul style="list-style-type: none">Online: Portal, Integrity K-①Bank and My KPILabor-mgmt. conferenceGrievance settlement systemGWP ForumJunior BoardIntegrity ①DOL ClubLabor relation satisfaction survey	<ul style="list-style-type: none">Improvement of business, systems, practices, etc.Improvement of communication capability according to one's positionExplanation and discussion of management issuesPrevention of accidents and stable operation of equipmentImprovement of productivity and organizational efficiency	<ul style="list-style-type: none">Implementation of 21 projects, such as improvement of practicesLeadership education by levelManagement status briefing: twice a year at each siteJoint inspection by labor and managementSelection of outstanding work site innovative company and outstanding labor-management partnership company (Ministry of Employment and Labor)
Suppliers	<ul style="list-style-type: none">365 Communication RelayShared Growth CouncilPCSI surveyOnline: KOCO A Talk², material supplier integration system, 2nd tier and 3rd tier vendor payment mgmt. system, and SNS	<ul style="list-style-type: none">Customized shared growthInconveniences of qualification assessment and registration	<ul style="list-style-type: none">Completion of 11 programs to jointly develop SMP-30 projectEstablishment of power plant material supply qualifier integration system³
Industrial Partners	<ul style="list-style-type: none">Council for each collaboration programPCSI survey	<ul style="list-style-type: none">Sharing of outstanding casesJoint responseImproved competitiveness through collaboration	<ul style="list-style-type: none">Proliferation of outstanding cases: Improvement of performance of composite systems and development of power exchange bidding systems utilizing weather informationSuggestion of new and renewable energy policy modificationsJoint operation of high priced spare parts
Local Community	<ul style="list-style-type: none">Online: SNS and homepagePower plant ombudsmanHappy CallSocial Contribution CommitteeMeeting with residentsVarious councils: Environment, migration measure, power transmission line, local shared growth, etc.Regional Support Project Deliberation CommitteePCSI survey	<ul style="list-style-type: none">Resolution of conflict with local residents related to power plant constructionCreation of jobs and contribution to increased income of local communitiesPromotion of local economy in new HQ area	<ul style="list-style-type: none">Consultation in progress with Samcheok residents and about Andong power transmission lineOperation of social enterprise 'Happy Weondeok' to provide jobs and increase income of local residentsPrograms to hire local residents in Busan, cultivate vendors, and social contribution services
NGO	<ul style="list-style-type: none">Environmental ForumSocial Contribution CommitteeSocial contribution demand survey	<ul style="list-style-type: none">Specialized social contribution that is systematic and continuous, highlighting project characteristics	<ul style="list-style-type: none">Reestablishment of social contribution strategy linked with the characteristics of energy business
Media	<ul style="list-style-type: none">PressMedia Research	<ul style="list-style-type: none">The decision making process for what contents to include in the biennial sustainability report reflects sustainability issues derived through media analysis.	

1. Expansion of disclosed information in accordance with the stakeholder’s opinions: Additional disclosure of information regarding topics such as year-by-year public purchase, overseas business, new and renewable energy business and information on main contracts requested by vendors; atmospheric pollutant emissions and year-by-year discharge of coal ash requested by local residents; actual power generation, forced outage, fuel usage, purchase of bituminous coal, power trading, market shares, and HQ migration status requested by consumers 2. KOCO A Talk: An app service providing mobile information on SMB support 3. For government-owned power generating companies including KOSPO are normally set to assess qualification for suppliers to be procured. Instead of implementing qualification assessment by each power plant company, it is integrated managed by if a supplier is qualified by one power plant company, then also collectively qualified by other companies. (expected to reduce assessment costs of KRW 2.5 billion and also evaluation events up to 80%)

Defining the Report Content

KOSPO is operating 8 sites in Hadong, Shinincheon, Busan, Youngram, Namjeju, Yeongweol, Samcheok and Andong in Korea. In other countries, its Australian unit is participating in resource development projects, whilevarious businesses such as IPP¹, operation & maintenance (O&M) and test operations are being carried out in South America and Asia by Jordanian and Chilean units. Although the data in this report mostly focus on domestic sites that take up most of KOSPO's business, the main issues related to overseas business are also included. The Youngram Thermal Power Plant was closed due to aged equipment in 2014, but this report contains its status and data. The Andong Combined Cycle Power Plant constructed in 2014 is also included in this report.

Report Content Determination Process



Investigation of Potential Issues

KOSPO investigated all potential issues by analyzing the internal and external environment in the context of sustainability. The issues were investigated by dividing the sustainability environment into six areas. The energy and utilities industrial value added index by GRI G4 was included for the analysis of international trends and standards, while issues of policy and regulation were centered aroundthe expectations of the Ministry of Strategy and Finance, the Ministry of Trade, Industry, and Energy, the Ministry of Environment, the Korea Commission for Corporate Partnership, and the policy, assessments, and findings of the Anti-corruption and Civil Rights Commission. To identify issues, the expectations of stakeholders identified during the establishment process for mid-long term management strategy were also considered.

Prioritization

Filtering of Issues

KOSPO and an outside expert group first evaluated the impact of potential report issues and excluded less important issues. For the impact analysis, an evaluation matrix including both the impact on sustainability and risk occurrence probability for each issue was analyzed, and then the issues deemed to have less impact were excluded.

Review of Filtered Issues by Stakeholders

After filtering, the remaining issues were grouped by subject, and reviewed by in-house experts and outside stakeholders to confirm that the filtering process was transparent, appropriate, and not arbitrary, as well as to correct any possible errors that might have occurred. The reviewers checked whether the issue filtering process was appropriate, whether the selected issues were actually important to KOSPO, and whether any important issues were omitted. The review by the outside stakeholders was performed by the

Issue Review Committee, which is composed of the representatives of each stakeholder group. The results of the review reflect the common opinions agreed upon by many stakeholder groups.

Evaluation of Select Material Topics by Stakeholders

Stakeholder Evaluation

The selected issues were evaluated by stakeholders. For eight days between June 10, 2015 and June 17, 2003 of KOSPO employees and 835 outside stakeholders who were in direct contact with KOSPO participated in an evaluation to exchange opinions. During the same period, local residents and general consumers were also surveyed online through SNS. 707 KOSPO employees and outside stakeholders responded for a 24.9% response rate², and 1,456 local residents and general consumers responded through SNS.

Final Prioritization

KOSPO prioritized the selected material topics by reflecting upon their strategic materiality as evaluated internally and via assessments by stakeholders. As a result, power generation reliability and stable power supply, financial performance and long-term business strategy, and greenhouse gas reduction and anti-corruption were selected as issues of key priority. In addition, new and renewable energy, compliance with environmental regulations, shared growth, social contributions and local community relationship management, compliance with social sector regulations, recycling of industrial byproducts, and R&D were also assessed to be important, in that order.

Validity Verification

The selected topics include negative issues to ensure that the sustainability of KOSPO is analyzed with balance. The data collection plan was established by reviewing the impact on sustainability of each issue, and in which area of the inside or outside of the organization that impact would have an effect, in addition to whether any incidents occurred during the report period and an evaluation of the long-term impact of the individual subjects.

Layout of material topics

The four material topics are described in the first half of the report, while the other topics are described mostly in the form of results in the second half. Some topics were grouped together when they were found to be more meaningful placed side-side.

Key Topics of the 2014 Sustainability Report

Report Scope						Topics of Sustainability for KOSPO				Layout of Material Topics		
Internal		External				Strategic Material-ity	Evaluation by Stake-holders	Priority				
Dome-stic	Over-seas	Supp-lier	Public Sector	Share-holder/ Customer	Con-sumer				Local Community			
●			●	●	●	●	Power generation reliability and stable power supply	95.2	81.6	1	P. 12	Business Strategy
●	●		●	●		●	Financial performance and long-term business strategy	95.2	76.6	2	P. 18	Reliable Power
●			●				Greenhouse gas reduction	88.1	78.9	3	P. 24	Climate Change
●			●				Anti-corruption	83.3	80.8	4	P. 32	Active Integrity
●	●	●					New and renewable energy	83.3	78.7	5	P. 44	Recycling and Compliance
●			●			●	Compliance with environmental regulations	81.0	79.9	6	P. 48	Shared Growth
●		●	●				Shared growth	78.6	76.3	7	P. 52	Community Engagement
●	●		●		●	●	Local community relationship management	78.6	76.3	8	P. 55	Research and Development
●		●	●				Compliance with social regulations	76.2	78.3	9		
●			●		●	●	Recycling of industrial byproducts	73.8	78.9	10		
●		●	●				Research and Development	76.2	73.3	11		

Assurance by the Third Parties

An independent verification agency having no direct interest in KOSPO reviewed the report to check if the process fully reflected the report issuing procedures and criteria of AA1000AS and GRI G4, as well as to see whether the selected subjects were well disclosed in the report. The reader can check the verification opinions of the third party on p.63.

1. Independent Power Plant: A project in which private capital constructs a power plant and operates it for a period of time to recoup its investment

2. 574 out of 2,003 KOSPO employees were surveyed, and 139 out of 835 outside stakeholders that were surveyed responded, while 1,456 people participated in the SNS survey.

Recycling and Compliance

If the industrial byproducts, wastewater, and various wastes that come from power plants are to be disposed of into the natural environment, there are economic and environmental costs related to establishing an area to store and process the waste before disposal. Wastes and industrial by-products, although an annoyance to some individuals, can actually increase social benefits if properly utilized where needed. To KOSPO, recycling waste and wastewater is an opportunity for reducing its environmental impact while finding new sources of profit and increasing the income of local communities. Moreover, as KOSPO is in the business of large scale power generation, which affects the natural environment, including the atmosphere, as well as soil and water quality, compliance with environmental regulations must be continuously managed.

The KOSPO Approach

KOSPO’s green management consists of the four domains of an environmental management system, resources and energy, climate change, and social responsibility. The resources and energy domain includes measures for reducing on-site power usage during power plant operation, creating more energy with less fuel by increasing the performance and efficiency of equipment, in addition to reducing the burden on the environment and finding business synergy by recycling industrial byproducts. Complying with environmental laws and regulations is the minimum criteria that must be fulfilled in all areas. As for recycling, the strategic focus is on desulfurized gypsum and coal ash, as well as compliance with environmental regulations.

Strategic Focus

Recycling of Industrial Byproducts	Wastes and Wastewater Discharge	Compliance with Environmental Regulations
98 %	135.2 %	0 cases
Desulfurized gypsum recycling rate	Coal ash recycling rate	Violation of important environmental regulations
2015 target: 100 %	2015 target: 100 %	2015 target: 0 cases

Recycling of Industrial Byproducts

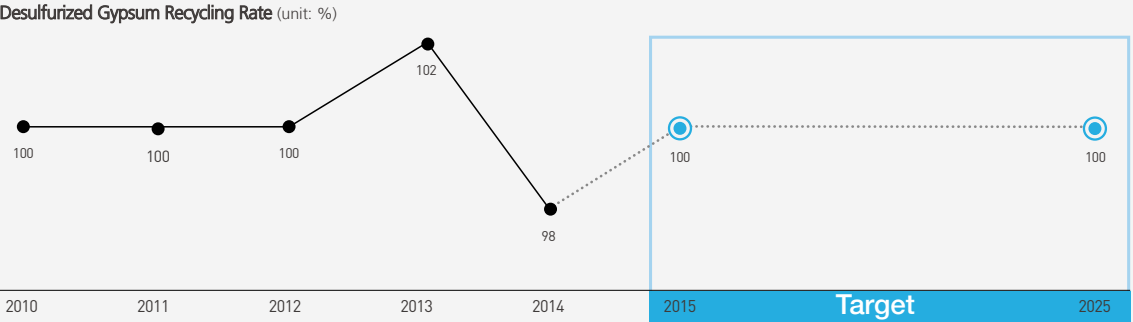
Recycling of Condenser Effluent

A large amount of cooling water is needed to cool the steam generated by turbine operation, and the temperature of this water increases by 5~7°C after cooling. It is important to consider the impact of discharging this heated water, called condenser effluent, into sea water. KOSPO chooses to use condenser effluent to increase the income of local residents by providing it for use in the breeding of agricultural products and fish adapted to a warmer environment. Using the recycled condenser effluent, local residents saved 80% on heating costs, or KRW 1.5 billion, and gained KRW 530 million in additional income through better products. The government selected this as an outstanding case of resource recycling¹, and KOSPO is considering applying such methods to other power plants, including Hadong, to spread condenser effluent recycling nationwide.

Recycling of Desulfurized Gypsum

Limestone slurry is injected into power plant desulfurizing facilities in order to remove sulfur dioxide from exhaust gas. This lime slurry reacts with a sulfur dioxide component to become gypsum, which is then used widely in gypsum board and cement making. KOSPO

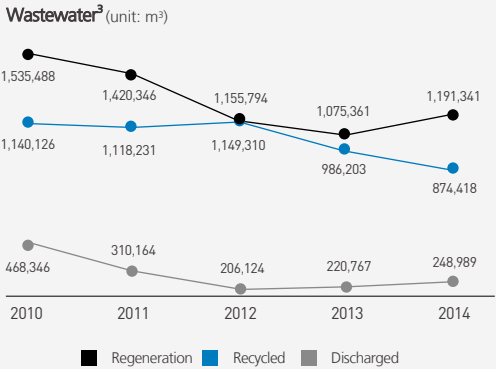
recycles all 400,000 tons of desulfurized gypsum generated annually by the Hadong Thermal Power Plant and Namjeju Thermal Power Plant which results in income of around KRW 5.0 billion.



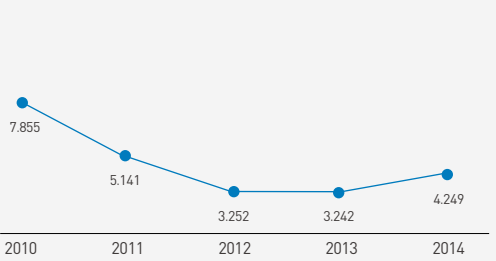
Discharge of Wastes and Wastewater

Recycling of Wastewater

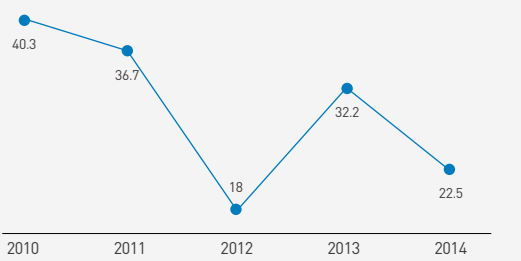
Waste water is generated by power plants during the processes of boiler water quality management, demineralized water² production, and sulfur dioxide removal from exhaust gas arising from burnt fuel. KOSPO operates wastewater treatment facilities that manage wastewater, by applying treatment that transforms it into clean water. This water is reused to transport coal ash generated by combustion of coal.



Wastewater discharge per Power Generation⁴



Wastewater Recycling Rate⁵



1. After it was selected as an outstanding management improvement case by the Ministry of Strategy and Finance in 2013, KOSPO signed an Agreement for Recycling of Industrial Byproducts with the Ministry of Trade, Industry and Energy in 2014.

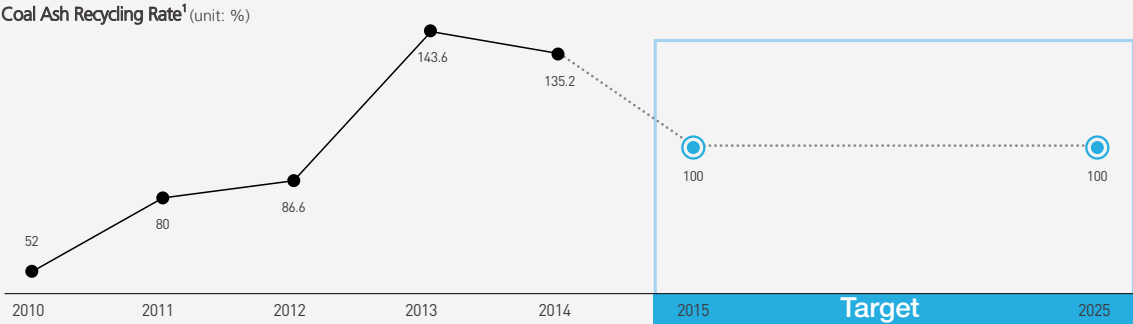
2. Demineralized water: Water removed of impurities such as metal ions. The water used for generating power is converted into steam by high temperature and pressure inside the power plant. If metal ions are present in the water, pipelines can quickly become corroded. Spent water is changed to demineralized water in an effort to prevent this.

3, 4. The 2012 Sustainability Report incorrectly stated the amount of discharged wastewater. The correct amount is represented here.

5. The wastewater recycling rate decreased in 2014 due to the construction of the new Andong Combined Cycled Thermal Power Plant.

Recycling of Waste

Power plants generate more than 30 types of waste including coal ash, a fine powder generated by the incineration of coal, waste oil generated by facility maintenance, waste heat insulators and waste synthetic resin. KOSPO contracts specialized companies qualified to handle 18 types of waste, including waste sludge and waste heat insulators, and recycles the other 12 types of waste, including coal ash, into needed resources. It strategically focuses on the recycling of coal ash, which is essential for the continuation of thermal power plant operation.

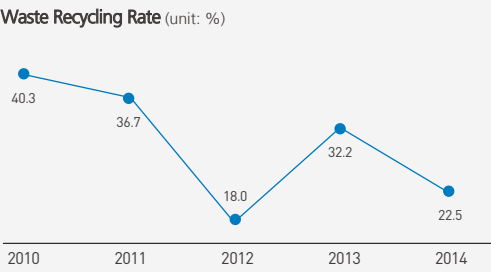
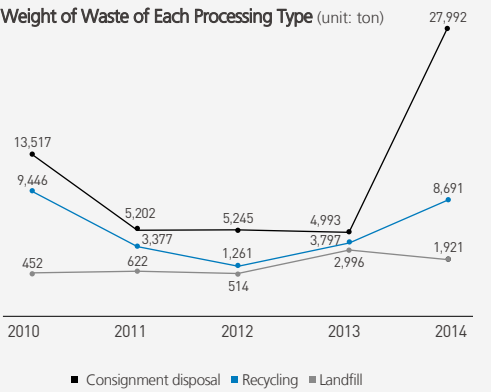
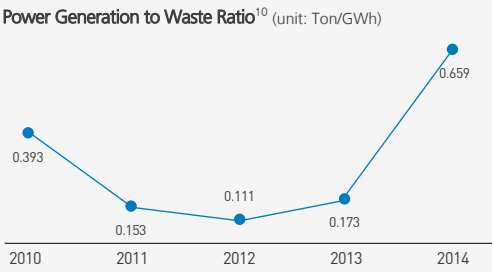
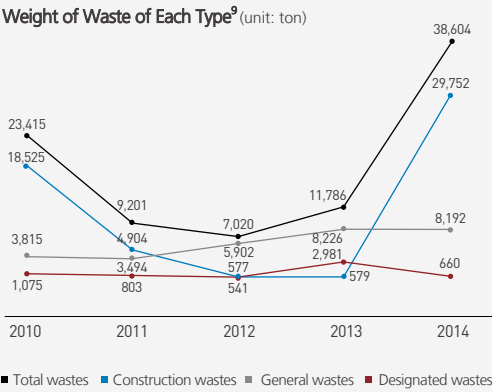


Filling for Mine Restoration

Coal ash is recycled into the materials to be used as fill material², cement raw material and the mixing material of ready-mixed concrete. However, the demand for such materials is low when the construction industry is sluggish. The coal ash generated by power generation is stored in a temporary storage area to be recycled later. It is costly both to procure the space for these areas, called ash ponds, and to store the coal ash in them. Limestone mining companies have other problems. Mined space must be filled with other materials to prevent collapse, and only legally approved materials can be used for that purpose. KOSPO cooperated with Mine Reclamation Corp. to test³ the mines in Gangwon Province in accordance with the precautionary principle⁴. To be objective, the related policies in Korea and other countries were reviewed, and experts’ opinions were collected and submitted to the Ministry of Environment. The Ministry of Environment then inspected the test site with KOSPO. As it was proven that it was possible to restore the mine using coal ash⁵ it is expected that the government will be able to secure more resources as 35% more limestone can be mined, the mining company will be able to gain more income, and KOSPO will be able to reduce the cost of ash ponds by KRW 90.0 billion.⁶

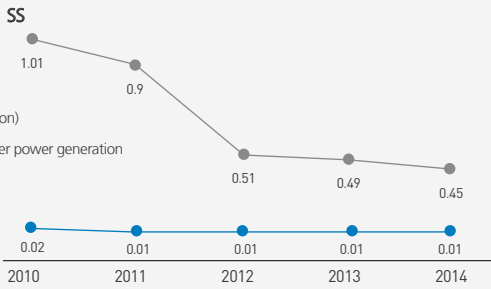
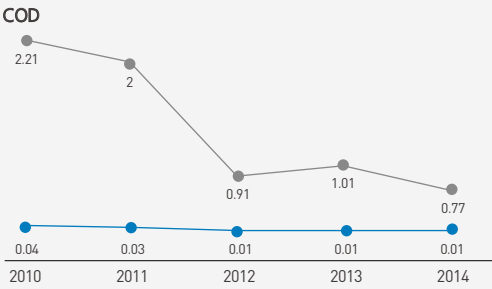
Eco-friendly Construction Material

KOSPO has eco-friendly construction material production technology to mix coal ash with CO₂ in order to replace construction materials such as sand and gravel. The artificial light-weight aggregate⁷, which is coal ash processed at 1,200°C to replace basalt, is costly and has limited demand. Considering the economic and environmental factors, KOSPO developed the technology to convert coal ash into eco-friendly construction materials by combining it with CO₂ at room temperature. A patent is pending on this technology developed as part of a joint project among members of industry, academia, and research. For commercialization of the technology, a pilot test, basic facility design, and feasibility study were conducted between April 2013 and April 2014, and KOSPO established Samcheok Eco Construction Material Co., Ltd. with outside funding. The eco-friendly construction material factory being constructed in Samcheok has the capacity to produce 200,000 tons of fine aggregates⁸ and 200,000 tons of cement admixture. Recycling 400,000 tons of coal ash will lead to an additional income of KRW 7.0 billion, as well as coal ash processing cost savings of KRW 6.0 billion and annual greenhouse gas reductions of 80,000 tons.



Compliance with Environmental Regulation

KOSPO strives to minimize its impact on the environment. Statutory environmental regulation provides the minimum standard for KOSPO’s environmentally related practices. To manage its impact on the environment, the company complies with the Clean Air Conservation Act, the Special Act on the Improvement of Air Quality in Seoul Metropolitan Area and Guidelines on Greenhouse Gas/ Energy Target Management Scheme in the atmospheric preservation area; the Water Quality and Aquatic Ecosystem Conservation Act in the water preservation area; and the Wastes Controls Act, the Act on the Promotion of Saving and Recycling of Resources, and the Construction Waste Recycling Promotion Act for waste. In addition, it also complies with the Toxic Chemicals Control Act, the Persistent Organic Pollutants Control Act, and the Soil Environment Conservation Act. In 2013 and 2014, KOSPO did not face any fines or non-monetary punishment due to violation of environmental laws or regulation.



1. In 2013 and 2014, existing companies even recycled coal ash, pushing the rate of recycling beyond 100%. 2. Fill material: Filling a low area in the ground with soil. (The soil used for filling up is called fill material.) 3. Collaborative research for filling ash for recovering mine business (2010–2014) with KOSPO, MIRECO, MOE and Korea Limestone Cooperative and MOTIE 4. The principle that when there is a possibility that an action or policy can be harmful to the public or environment, the responsibility to prove its harmlessness is assumed by the individual or group taking the action when there is no scientific agreement regarding the level of harm. 5. Amendment of the Enforcement Rule of the Waste Control Act: ‘Mining restoration material’ was added to the purpose of ‘Guideline on Recycling of Cinder Discharge material’. 6. It is expected that 10 million m² of empty space will be created in the limestone mines along the shores of the East Sea each year, and the coal ash generated by a 8,300 MW power plant for 30 years can be recycled to fill the empty space with coal ash. 7. Artificial material used to reduce the weight of concrete. 8. Fine sands or aggregates used as the raw material for concrete

9, 10. The amount of construction waste and the waste to power generation ratio increased in 2014 because of the Andong Combined Cycle Power Plant construction.

The Other Topics

Shared Growth

Current economic features include the breakdown of industrial boundaries and the intertwining of industry and technology resulting from development. To be more competitive, the stakeholders involved in a value chain must form a cooperative network. KOSPO must also find ways to have mutual competitiveness with suppliers in a supply chain and to cooperate with others in building the foundations for long-term development. The domestic power market is limited, so it is important to cultivate and support the joint entry of small domestic companies into global markets so that they have the technical capability necessary to be accepted in foreign markets and expand overseas business. The competitiveness of such networks is essential as KOSPO seeks to expand its business internationally.

The KOSPO Approach

KOSPO's suppliers can be divided principally into fuel suppliers and construction vendors. KOSPO is implementing a shared growth model under which it creates synergy with a network of suppliers and strengthens the competitiveness of society at large. In other words, it is pursuing more than just achievements for large and small companies; rather it is seeking to provide both national and societal attainment in addition to that reached by firms. KOSPO's shared growth strategy focuses on three areas – strengthening the industrial eco-system, supporting SMEs and fair competition, and establishing 6 approaches for strengthening the trusted management value system, strengthening benefit sharing, developing world markets, strengthening general competitiveness, and increasing the fair trade implementation system.

Strategic Focus

Strengthening of Industrial Eco-system	Support of SMEs	Fair Competition
40 cases	KRW 34.4 billion	22.8 %
Agreement to benefit sharing	Purchases from FDS enterprises	Rate of private contracts
2015 target: 50 cases	KRW 100.0 billion in joint purchases for 5 years from 2013 to 2017	2015 target: 20 %

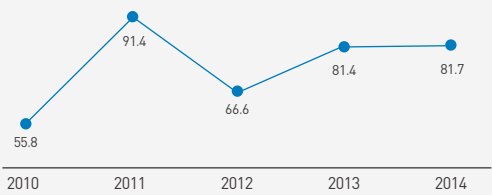
Strengthening of Industrial Eco-system

Benefit Sharing

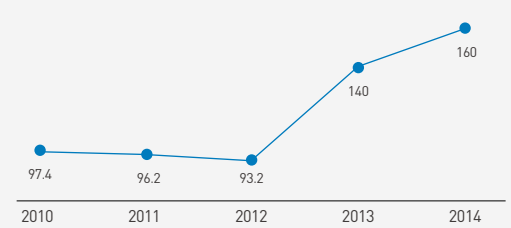
Benefit sharing occurs when a large company helps a supplier lower costs as well as develop technology and then shares the ensuing results. If a supplier realizes increased profit as a result of the large company aiding in the technological development of the supplier, the two parties share the increased profit as agreed in advance. As benefit sharing is a way to improve the competitiveness of both parties, it is one of the key shared growth programs of KOSPO. The benefit sharing scheme was adopted to help small and medium suppliers increase sales and has established the largest benefit sharing fund among government-owned power generating companies.

Increased Sales at Suppliers

as the Result of Benefit Sharing (unit: KRW 100 million)



Benefit Sharing Fund (unit: KRW million)



SMP 30 Project to Develop Hidden Champions

KOSPO realized that providing technological development support to unspecified suppliers would result in an inefficient scattering of capabilities. What was needed was selection and concentration. As such, the company is carrying out the SMP 30 (Small & Medium Co. Partnership 30) project to develop world-class companies which are small but strong (hidden champions). It plans to select 30 companies with great potential and invest KRW 10.0 billion by 2020 in addition to providing specific support dependent upon a firm's stage of growth. The SMP 30 project has provided grants to 21 suppliers totaling KRW 5.4 billion.

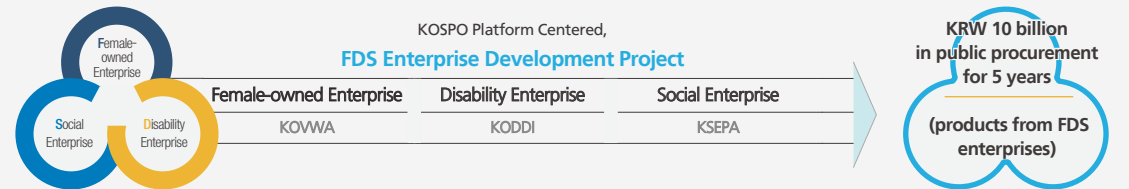
Status of SMP 30 Project

Type	Goal (R&D Investment)	Outcome						Total (Companies/ Investment)
		Companies Selected (Number of company)			Investment (KRW billion)			
		2012	2013	2014	2012	2013	2014	
Small Giant	10 companies (KRW 3.0 billion)	2	4	1	0.6	1.1	0.4	7 companies (KRW 2.1 billion)
KOSPO Star	10 companies (KRW 2.0 billion)	7	3	-	1.2	0.6	0.2	10 companies (KRW 2.0 billion)
K-10	10 companies (KRW 5.0 billion)	4	0	-	1.3	-	-	4 companies (KRW 1.3 billion)
계	30 companies (KRW 10.0 billion)	13	7	1	3.1	1.7	0.6	21 companies (KRW 5.4 billion)

Support of Small & Medium Suppliers

FDS Enterprise Development Project

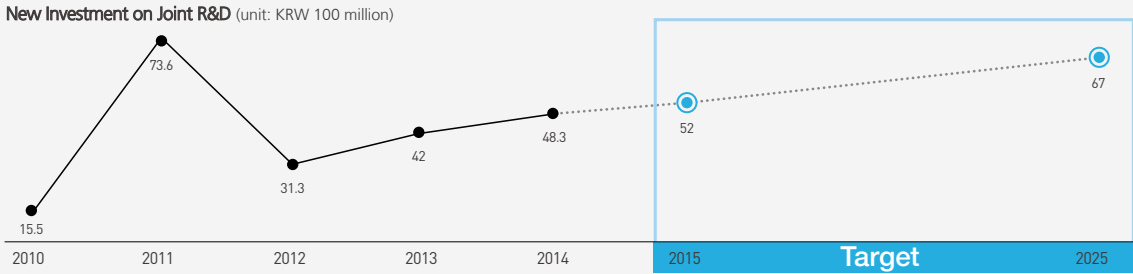
KOSPO is carrying out the FDS Development project to support the long-term growth of socially disadvantaged enterprises in power generation, specifically enterprise owned by female or the disabled and Social enterprises (FDS enterprises). Recognizing that purchasing of mostly consumables would lead only to limited shared growth, KOSPO decided to provide support for long-term growth through technology transfer, improvement of competitiveness and development of sales channels. KOSPO plans to spend around KRW 100.0 billion to purchase products from FDS enterprises for 5 years from 2013 to 2017 in cooperation with relevant agencies. It has thus far spent KRW 36.9 billion in 2013 and KRW 34.4 billion in 2014, a total of KRW 71.3 billion, to purchase products from FDS enterprises.



As a result of the FDS Enterprise Development project, the consumables centered purchase pattern is changing to a technology based material purchase pattern. In addition, 10 companies that KOSPO supported for commercial R&D acquired 2 patents. As such, the Ministry of Health and Welfare selected KOSPO as the most outstanding company in preferred purchasing of products from disability enterprises in 2014.

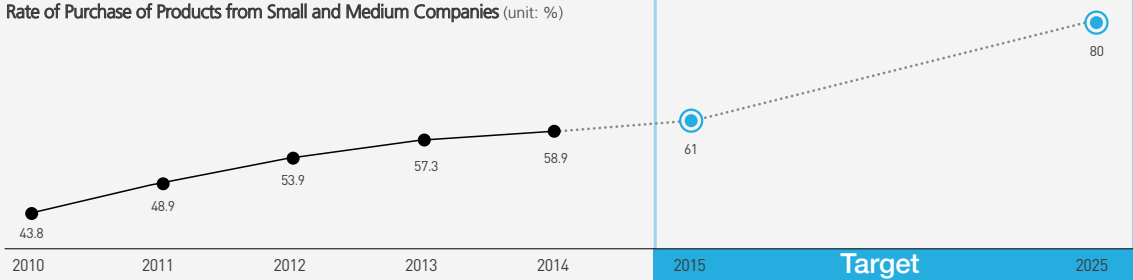
Joint Technology Development

In a 2013 shared growth business preferences survey of small and medium companies, the support most preferred by suppliers was joint technology development. KOSPO divides R&D with suppliers into three steps: joint R&D, technical problem resolution, and outcome commercialization, and provides support specific to each step.



Purchase of Products from SMEs

Recognizing that the individual purchasing of government-owned power generating companies causes inefficiency through schedule duplication and increased cost, KOSPO led efforts for an integrated system of product purchasing from SMEs. As a result, the number of suppliers participating in purchase counseling increased from 40 to 80 and the counseling period drastically decreased from around 3 months to one day.



Glocal Power 10 Project

'Glocal', a term produced by combining the words global and local, means 'globalization with local context'. KOSPO has been supporting customized growth of emerging small and medium companies in the Busan region since it moved its headquarters to Busan in compliance with the government's policy of moving government-owned companies outside of the capital region. The Glocal Power 10 is a venture in which 10 small energy part material companies in the Busan region are selected to receive support for the development and commercialization of specialized technologies. KOSPO plans to invest KRW 5 billion for 3 years and is providing 75% of the total development cost for up to KRW 0.5 billion for each project. In the first phase of the project, 5 companies, including Power Tech, were selected and provided grants totaling KRW 1.9 billion for joint R&D. There are plans to select 5 more companies in the second phase. In 2014, the purchase rate for supplier companies in the Busan area amounted to about 4% of the KOSPO total, and from 2015, KOSPO plans for local partners to participate in bids by making regionally-restricted bids mandatory, thus strengthening local purchases.

Fair Competition

Improvement of Systems Reflecting the Opinions of Suppliers

KOSPO formed the Regulation Improvement Committee, in which experts and supplier representatives participated, and initiated 52

projects to improve systems in 5 areas, including bidding and contracting, after collecting the opinions of 640 suppliers. Currently, 28 projects have been completed through the modification of regulation, etc., and the satisfaction level of suppliers as surveyed by an outside survey agency increased by 15% from 7.8 points to 9.0 points. As a result, KOSPO was selected in 2014 by the Ministry of Trade, Industry and Energy as the most outstanding company in improving regulation.

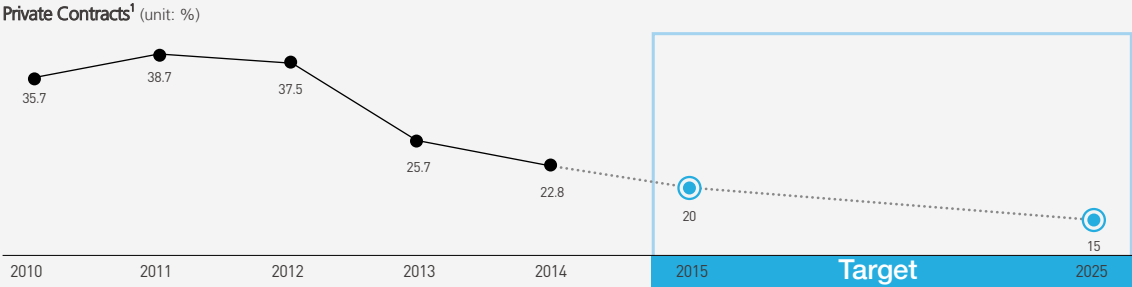


EASY-U System

a company registered as a vendor with a participating government-owned power generating company is authorized as a vendor for all companies. It is expected that by utilizing EASY-U, vendors will save KRW 1.85 billion while government-owned power generating companies will save KRW 650 million, thus resulting in total savings of KRW 2.5 billion. Vendors additionally benefit from the simplified registration process as around 80% of procedures for qualification application and inspection/evaluation have been eliminated. This system was selected as an outstanding case of management of public institutions in 2013.

Improvement of Transparency and Fairness of Contracting

KOSPO discloses private contract information, kept confidential in the past, in the bidding system in advance and allows bidders to raise objections. It also operates the Contract Review Committee, in which the majority of members are outside contracting experts, to increase the transparency of the contracting process. The integrity supervision system compares past bid winning rates of vendors.



Protection of Subcontractors and Payment of Fair Prices

KOSPO amended the criteria related to contracting and payment in order to protect subcontractors and ensure that they are paid a fair price. The subjects of payment supervision were expanded from only 1st tier vendors to include 2nd and 3rd tier vendors, and the internal evaluation guidelines for the rate of direction payment were changed from full credit for 20% direct payment to full credit for 30% direct payment. Whereas in the past a vendor was only asked to correct a situation if a subcontractor was subjected to fair trade practice violations, the contract now stipulates a stricter termination clause. To firmly establish fair trade practices, the payment supervision system is operated to prevent late or nonpayment to 2nd or 3rd tier suppliers.

In recognition of these efforts, KOSPO maintained the highest outstanding grade in assessment of public institutions on shared growth given by the Ministry of Trade, Industry and Energy in 2012.

1. The target rate for private contracts is managed with the aim of balancing the two purposes of providing fair competition by having as many participating vendors as possible and providing preferential treatment to small companies in order to protect the disadvantaged.

Community Engagement

Power plant construction and operation can affect the health and life of local residents as well as the natural surroundings. It may seriously affect the local environment or even force residents to relocate. Local residents may oppose not only the power plant but also auxiliary facilities such as transmission towers which send generated electricity to consumers. They are also uncomfortable with the wastewater and discharge gas produced by power generation. Although electricity generation may result in the emission of unwelcome elements, it is a process that is essential not only to local residents but to all members of society. Therefore, it is important to consider ways in which both power plants and local communities can prosper while continuing to produce electricity, the resource which power national economic development.

The KOSPO Approach

KOSPO has reformed its social contribution strategy to broaden its perspective on volunteering and donations and to approach social contributions in a more strategic way. Its intention is to participate in solving social issues while utilizing the core capacity of its business and business strategy. KOSPO's social contribution strategy can be divided into three parts: the creation of values linked with business, the development of local manpower and creation of jobs, and assistance for the socially disadvantaged. KOSPO particularly focuses on the creation of values linked with business and development of local manpower and promotion of economy. The outcome of KOSPO's social contribution and local community relationship management is assessed by PCSI.

Strategic Focus

Creation of Values Linked with Business	Promotion of Local Economy
KRW 80 million	3,469 persons
CO ₂ Paparo (meaning 'less and less') Residential Environment Improvement Project	Creation of jobs in local community
2015 target: KRW 100 million	2015 target: 3,570 persons

Creation of Values Linked with Business

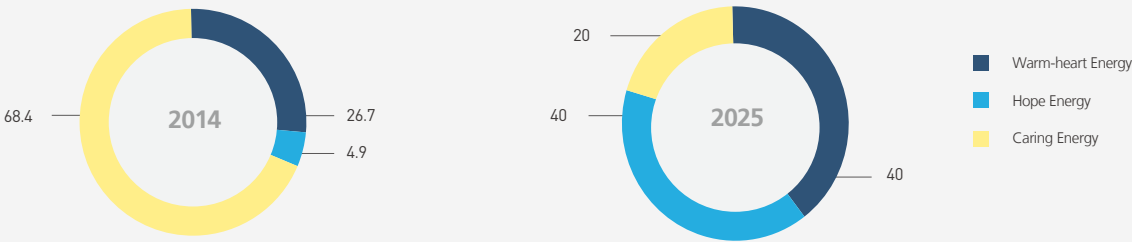
Energy ON

KOSPO's social contribution program consists of Warm-heart Energy, Hope Energy and Caring Energy.

Warm- heart Energy	Hope Energy	Caring Energy
Creation of values and energy welfare ¹	Development of local manpower and promotion of the economy	Assistance for the socially disadvantaged
<div>Energy assistance to low income families: CO₂paparo residential environment improvement and heating support</div> <div>Safety diagnosis and infrastructure improvement of facilities vulnerable to heat</div> <div>Energy specialized projects around power plants: 1-power plant-1 specialized project</div> <div>CO₂ Village</div> <div>Heemang (meaning 'Hope') Light – Overseas voluntary service</div>	<div>Education on energy: Green Energy Science Class</div> <div>Discovery of local talents in educationally neglected groups: Support for afterschool cultural and art classes</div> <div>Development of regional industrial-academic cooperation: Practical energy lectures and college student supporters for voluntary work</div> <div>Increased income in local community: Social enterprise – Happy Wondeok</div>	<div>Voluntary service in new HQ area: 365 Everyday Food Delivery, assistance for people neglected by welfare, food services to low income senior citizens, school uniform support to students, and assistance in cultural life</div> <div>Joint social contribution with public institutions: Free food for low income groups, sharing of rice, and sharing of briquettes</div> <div>Energy Sharing Concert</div> <div>KOSPO Angel Crayon Choir</div> <div>Health, Energy and Love Sharing</div> <div>Fence of Love</div>

Among the programs listed above, KOSPO plans to increase investment in Warm-heart Energy as it most represents the core business values of KOSPO.

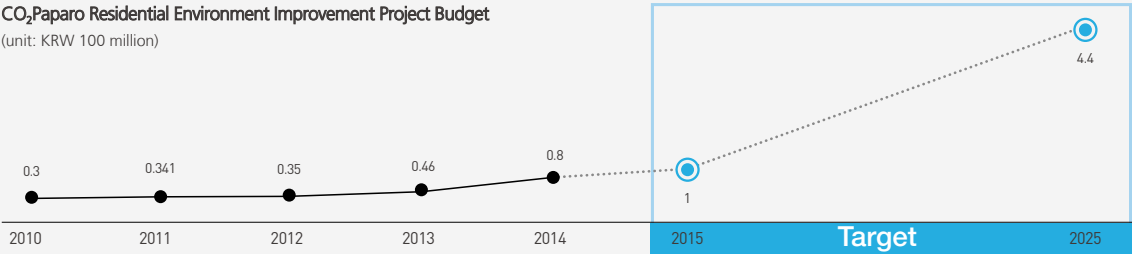
Change of Social Contribution Portfolio (unit: %)



Energy Welfare

KOSPO has been carrying out 'CO₂Paparo Residential Environment Improvement' since 2009. It is a project that involves saving office energy and using the savings to establish a fund for improving the energy environment of local residents each year. In 2014, a fund of KRW 80 million was established with office electricity cost savings for the year 2013 and was used to build the 'Energy Love House #1' in Agyang-myeon, Hadong-gun. It was built with the purpose of providing a new residential dwelling for lower income families who may not benefit much from electric equipment replacement.

CO₂Paparo Residential Environment Improvement Project Budget (unit: KRW 100 million)



Local Social Contribution in Overseas Bases

To solidify its foundation for overseas business, KOSPO is also paying attention to local social contributions. It created the Power Generation Technology Short-term College in Cambodia and provided education on power generation technology to college students in Chile and power industry professionals in both Chile and Jordan in order to improve the company's global profile and develop power generation manpower in areas of potential overseas expansion.

In Cambodia, KOSPO provided solar cell system, LED lighting and educational materials to 3 areas, improved educational facilities and provided medical services in a farming village near Phnom Penh. In Vietnam, it carried out the 'Heemang Light Sharing' project providing youth education, eyesight recovery surgery and assistance in increasing energy efficiency. In 2015, it plans to donate solar photovoltaic power generation systems and provide technical lectures to Tafilah Technical University located near the Tafilah Wind Farm site in Jordan. All these efforts are the outcome of plans to practice socially responsible management linked with overseas business development.

Development of Local Manpower and Promotion of Local Economy Growing Together with Busan

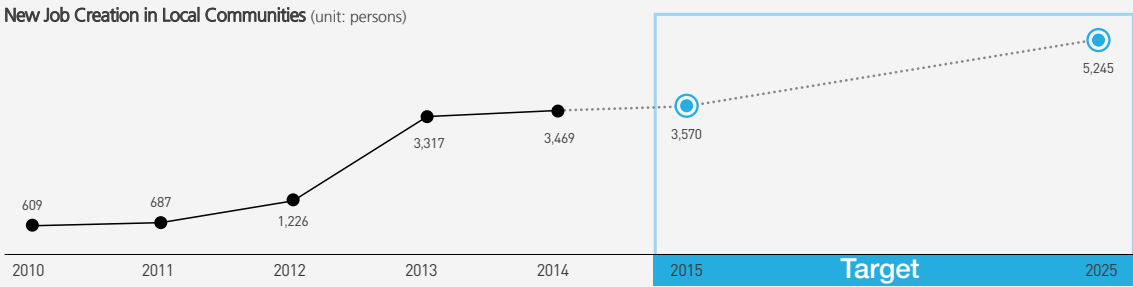
Since it moved its HQ office to Busan in 2014, KOSPO has been reviewing measures to contribute to the local economy through cooperation with local suppliers, social contributions and the employment of local residents. The economy of Busan is struggling with declining employment, an aging population and a deficient welfare infrastructure. KOSPO was able to fill 16.4% of new employee

1. Helping residents experiencing difficulties to efficiently use energy

positions with local residents by giving extra credit to applicants from the Busan region. It has established educational cooperation systems with local colleges to educate local personnel and strives to promote the local economy through social service and shared growth.

Creation of New Jobs

Happy Wondeok, located in Wondeok-eup, Samcheok City, is a social enterprise¹ founded by KOSPO in 2013 to provide jobs to local residents. In 2014, Happy Wondeok provided 27 new jobs and recorded sales of KRW 1.0 billion. In addition to operating this social enterprise, KOSPO strives to provide decent new jobs to local communities through outsourcing of operations and maintenance work, preferred hiring of local residents at construction sites, and development of new projects through partnership with the private sector.

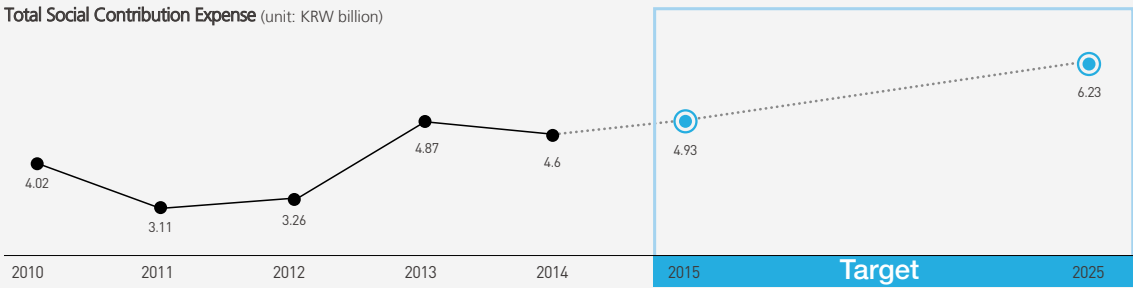


Energy Tourism

To improve the negative image of power generation and contribute to the promotion of the local economy using the resources of power plants, KOSPO developed a tourism product based on energy themes. The green energy industry tourism program created in cooperation with local communities is linked with local history, culture and the nature of the mines, solar photovoltaic power generators and wind farms near the Yeongweol Power Plant. The program, which was selected as a grant project by the Ministry of Culture, Sports and Tourism, brought 500 more tourists to the region, resulting in economic benefits of KRW 130 million in 2014.

Support of Neglected Groups

Although KOSPO intends to expand Warm-heart Energy and Hope Energy to strategically implement its social contribution programs, it does not intend to ignore Caring Energy and its support for neglected groups. The social responsibility of a state-owned energy company is broader than that of commercial companies (the primary objective of which is to pursue profits) and is partly to play the role of window for government policy designed to assist neglected groups. To meet its social responsibilities, KOSPO is carrying out various social contribution programs such as Energy Sharing Concerts and Fence of Love. It intends to maintain a certain portion of Caring Energy in the future.



The Other Topics

Research and Development

Life without electricity is unimaginable. From the alarm that wakes us up, to the transportation that carries us to school or work, and the heating devices that keep our homes warm while we sleep energy is a vital part of daily life. Energy powers the medical equipment in emergency rooms, the manufacturing processes of factories and street lights in neighborhood alleys. KOSPO produces the energy that has become an essential element to life on this planet. To KOSPO, R&D is the study of how to supply needed energy, how to produce better energy more stably and how to prepare the energy needed for the future. R&D can be a burden to the financial performance of a company in the short term as it requires the investment of human and financial resources. However, the importance of R&D is clear when considering the fact that conveniences based on technologies that hadn't even been thought of only a few years ago are now part of everyday life. R&D is an investment for the future.

The KOSPO Approach

The purpose of R&D at KOSPO is to realize the core values of change and innovation to help create sustainable growth. For that, KOSPO strives to develop technologies for the future and secure global competitiveness with Korean technology. The core of R&D consists of developing next generation key technologies ahead of others, securing the world's best power plant operation know-how and employing a future growth engine. The main programs for taking early leadership in next generation key technologies include development of technologies to cope with climate change such as greenhouse gas emission reduction, new and renewable energy, development of technologies to increase the efficiency of power generation and technologies that use alternative fuel to increase economic efficiency and environmental factors. The main programs for power plant operation know-how include development of technologies for preventive diagnosis, equipment maintenance and performance improvement and development of Korean models of key equipment. Since the value of such technologies will only be clear after they have been commercialized, KOSPO plans to encourage commercialization of these technologies by using the Practical Index of each technology as a performance measure.

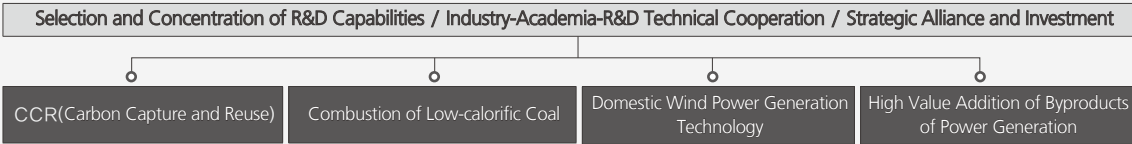
Strategic Focus

Preoccupying with Next Generation Key Technology	Development of Power Plant Operation Know-how	Performance Management Focusing on Commercialization Outcome
10 MW CO ₂ dry capture technology 2017 target: 300 MW	Localization of condenser drain valve for high-temperature and high-pressure Localization of component 2015 target: Expand on technology for gas turbine component for high temperature	Introduction of RnDeX R&D commercialization index 2015 target: Development of RnDeX

Preoccupying with Next Generation Key Technologies

KOSPO G4

KOSPO is carrying out the KOSPO G4 project to develop the four next generation key technologies through selection and concentration of R&D capabilities, cooperation among industry, academia, and research, strategic alliances and investment. The 4 next generation key technologies include CCR (carbon capture and reuse), combustion of low-calorific coal, domestic offshore wind power generation and value added technologies utilizing power generation byproducts. The commercialization plan and research for this project are carried out by a total of 36 experts, 6 for each technology, from industry, academia, and research.



1. An organization established with the purpose of providing jobs and social services to the socially disadvantaged with income gains through social value activities

Industrial Property Rights

KOSPO currently owns 262 patents and 57 utility models and plans to ensure sustainable growth by focusing on the development of technologies to lead the future. It received the Presidential Award in the National Quality Contest of 2013 and was awarded both a Silver Medal in the German Invention and Patent Contest and a SME Technology Cooperation Award in 2014.

Industrial Property Rights Ownership

Type		Description	Cases	Status
Domestic	Patent	Slurry transport pipe for thermal power plants, etc.	262	Registered
	Utility Model	Conveyor pulley, etc.	57	Registered
	Trademark	ATP-100, etc.	16	Registered
	Design	Water treatment pipeline for power plants	1	Registered
International	Patent	CO ₂ absorbent for strong dry recycling	9	Registered

CO₂ Capture and Reuse

KOSPO proved possible a 10 MW CO₂ dry capture technology in a 2014 field test.¹ Through more than 1,800 hours of operation, it tested which capture equipment was the most efficient and under what kinds of conditions as grounds for new business using CO₂. This technology reduces CO₂ emissions at a low cost, produces construction materials and chemicals, and enables high efficiency agricultural industry.

High Capacity Fluidized Bed Power Generation Technology

The Samcheok Thermal Power Plant currently being constructed applies the world’s largest 500 MW ultra-supercritical pressure circulating fluidized bed combustion (CFBC) boiler. Until now, the CFBC boiler² at the Lagisza Power Plant in Poland had the largest capacity with 460 MW, but KOSPO has developed CFBC technology with a larger 500 MW capacity. A CFBC boiler is an eco-friendly power generation system that greatly reduces discharge of pollutants such as sulfur oxides without using a separate desulfurization system. It does so through a desulfurization process inside the boiler during which coal, limestone and air are simultaneously injected and then cyclically combusted. Moreover, the combustion temperature inside the boiler is kept at around 900℃, lower than a conventional combustion furnace, so that relatively fewer nitrogen oxides, which are generated at high temperatures, are emitted. As a CFBC boiler can use a wide range of fuels, it can completely combust low grade coals that generally cannot be used in power plants. For that reason, the CFBC technology is more favorably accepted in areas where coal is in short supply, and its demand is continuously increasing. Particularly, the CFBC boiler operated in Samcheok can create combustion even when bio fuel, such as the barks of trees, is mixed in. Furthermore, it can produce electricity with only low-calorific coals³ which are cheaper and can thus significantly reduce fuel cost.

2:1 Boiler-to-Turbine Combination Technology

Four 500 MW capacity supercritical pressure CFBC boilers and two 1,000 MW capacity steam turbine power generators are being constructed at Samcheok Green Power. They are organized in a 2:1 boiler-to-turbine ratio, meaning the steam generated by two boilers powers a single turbine generator. This is the first facility in the world to make use of a 2:1 combination with supercritical pressure CFBC boilers and is expected to yield higher efficiency than power plant facilities that use a 2:1 combination of subcritical pressure boilers. While power plants with a 2:1 combination of subcritical pressure boilers are operated in constant pressure mode⁴ under which a constant boiler pressure is maintained, Samcheok Green Power applied the concept of sliding pressure operation to adjust boiler pressure while all steam control valves are opened. It reduces throttling loss⁵ by steam control valve and thus increases

efficiency. The benefits of sliding pressure operation also include the reduction of boiler tube and turbine thermal stress as boiler temperature can be constantly maintained even during lower load power generation. The Samcheok 2:1 Power Plant is designed for flexible operation during an emergency as it can be operated at 1:1 when a boiler is shut down. Conceptual Drawing of 2:1 Combination at the Samcheok Green Power 2:1 Combination

Development of Equipment Operation Technologies

Improvement of Equipment Reliability and Early Stabilization of New Equipment

In 2014, KOSPO identified facilities vulnerable to frequent repairs and developed 12 technologies including a pipe vibration absorption technology to improve equipment reliability⁶ that led to a forced outage ratio⁷ of 0.16%. In addition, the company developed 33 operation technologies and applied them for process management. KOSPO further introduced a turbine bearing⁸ inspection technology that reduced test operations at Samcheok Thermal Power Plant by 55 days.

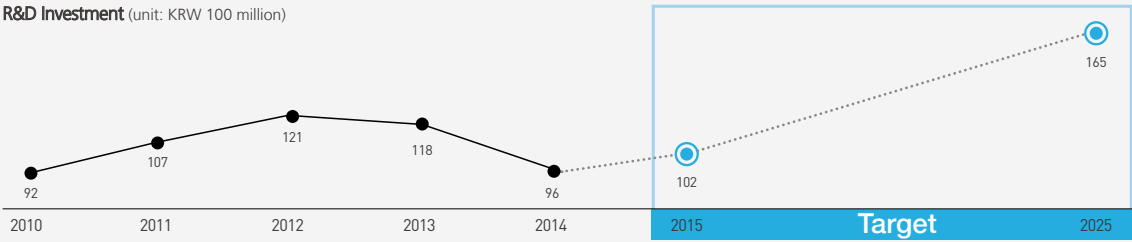
Parts Localization

KOSPO is developing Korean models of key power generation parts to increase long term technology self-sufficiency and economic system efficiency. These efforts led to 69 patents and 30 technology transfers in 2014. Development of Korean models of digital bidirectional communicating gas measurement devices and condensed water discharge valves for high temperature and pressure resulted in cost savings of KRW 3 billion and KRW 8.5 billion won, respectively.

Practicality Oriented Performance Management

Practicality Index of R&D

KOSPO is developing RnDeX, an indicator of increased productivity resulting from R&D investment, to manage the level of practical R&D. The RnDeX was named by combining the terms R&D and Index, which is used to measure the outcome of R&D. Existing R&D performance management has only focused on the steps prior to commercialization of developed technology and measured attained patents and transferred technologies. The new strategy, however, intends to focus on practical success and measure products sold and saved costs. When RnDeX development is complete, KOSPO expects to quantitatively and objectively measure and manage the effectiveness of its R&D investment plan.



R&D details regarding CO₂ recycling technology and new and renewable energy for coping with climate change can be found on p. 29, cases of high value additions to power generation byproducts on p.44~46, and efforts to increase equipment reliability on p. 18~23.

1. The field test included pilot operations to check if the new technology could actually be applied in the field. 2. A critical point (225.56kg/cm², 374.15℃) is the point where the beginning and ending points of water vaporization are the same. In power generation, it is called subcritical pressure if the main steam pressure of a power plant is lower than the critical point and supercritical pressure if it is higher than the critical point. Power plants generally raise steam pressure to increase power generation efficiency. 3. As high-calorific coal generates more heat than low-calorific coal when the same amount is combusted, it is preferred by most power plants worldwide which has pushed up the price. As a result, it is actually more economical to use more low-calorific coals than fewer high-calorific coals. However, using low-calorific coals requires a system that can produce electricity with low-calorific coals. 4. This is the control of output by regulating the steam flow rate with the steam control valve while maintaining pressure of main steam out of the boiler. It differs from sliding pressure operation under which the boiler is operated with controlled steam pressure in order to prevent deterioration of thermal efficiency at low load.

5. Throttling loss is the loss of heat and pressure by pressure, velocity and temperature decrease due to friction and turbulence created when vapor suddenly passes through a narrow path such as the valve hole. 6. This is an indication of how stably electricity can be supplied without equipment failure or power loss and can be represented by the forced outage rate, unplanned capacity loss rate, heat efficiency or onsite power rate. 7. The rate of power generation lost due to unforeseen causes such as equipment failure or problems. 8. A device which fixes the turbine shaft position and supports the weight to ensure seamless turbine rotation.

Governance

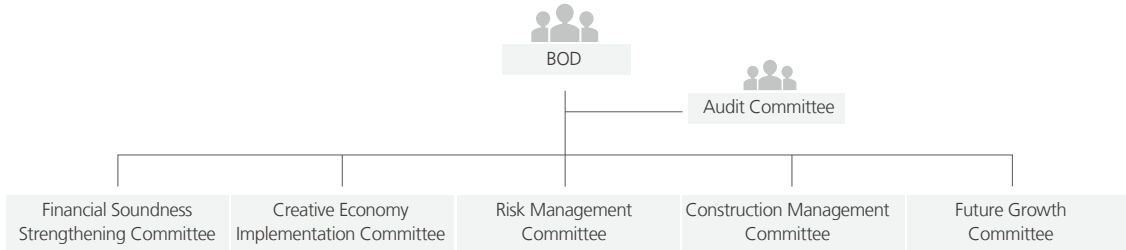
KOSPO is a market based public corporation¹ generating electricity mostly from thermal power plants and is fully owned by KEPCO.

Board of Directors

KOSPO organizes its Board of Directors (BOD) to decide main management issues in accordance with the Commercial Act, the Act on the Management of Public Institutions and the Articles of Association. The BOD is the highest level decision making body on management issues and is composed of four Executive directors including the CEO and 5 Non-executive directors. It operates 5 specialized committees including the Financial Soundness Strengthening Committee, Creative Economy Implementation Committee, Risk Management Committee, Construction Management Committee and Future Growth Committee. It also operates the Audit Committee to audit the company's business and accounting. The Audit Committee is composed of the Executive Auditor and two Non-executive directors. The chairman is selected from the Non-executive directors. The BOD also operates an advisory group composed of lawyers and accountants to support decision making, as well as an administrative office responsible for general BOD administration.

Non-standing director candidates are recommended by the Executive Recommendation Committee through open recruitment. The non-standing director is then appointed by the Ministry of Strategy and Finance after deliberation and decisions made by the public institution operation committee and a meeting of the shareholders.

Committees under BOD



BOD Organization

Executive Director		Non-executive Director	
Kim, Tae Woo	CEO	An, Wang Seon	Senior Non-executive Director (Chairman of BOD) Current Representative Lawyer of Law Firm, Dong Seo Nam Buk Former Auditor of KEPCO
Lim, Jung Duk	Executive Auditor Former Professor, Busan University Former President, Busan Development Institute	Ryu, In Goo	Audit Committee Member Former Member of the Legislation Budget Committee of Jeonnam Former Director Evaluation, Jeonnam Local Officials Training Institute
Lee, Jong Sik	Head of Planning and Management Division Former Director of Business Strategy Former Director of Management Support	Hwang, Ki Cheol	Audit Committee Member Former CEO of GNK International Co., Ltd. Former Director of Business, KEPID
Lee, Geun Tag	Head of Technology Division Former Head of Hadong Thermal Power Site Division Former Director of Power Generation	Koo, Bon Woo	Former SVP Electric Power System of KEPCO Former SVP Marketing of KEPCO
		Kim, Tae Nyun	Former Head of Busan Traffic Broadcasting Network Former Head of Ulsan Traffic Broadcasting Network

BOD Operation and Sustainability System

The BOD of KOSPO deliberates and decides upon the company's main policies and major issues including management goals, budgets and settlements, as well as long-term financial management plans. It reports on the findings of parliamentary inspection of administration, accounting audits and audits by the Board of Audit, in addition to inspections and follow-up measures. The general administrative office of the BOD implements the system and educational programs to strengthen the roles of the BOD and non-standing directors.

KOSPO is also strengthening the deliberative functions of the BOD. It operates a 3-tier deliberation system under which an agenda item goes through preliminary deliberation by a specialized committee, review of the agenda item, and joint deliberation by Non-standing directors in order to thoroughly review the agenda item in question before it is officially submitted to the BOD. For a project that requires heavy investment, field review is mandatory so as to thoroughly review feasibility.

KOSPO has also put in place an 'intermediate monitoring system' to encourage feedback on BOD decisions. Its purpose is to report and inspect the progress of the approved projects, to speed up sluggish projects and to continuously assess commercial value. The BOD of KOSPO is particularly focused on 4 issues: stable power supply, anti-corruption and integrity, disasters and accident prevention, and future growth creation in the public interest. In addition, it also reviews many issues related to sustainability².

Sustainability Systems



Assessment and Compensation of BOD

KOSPO assesses the BOD activities using the KOSPO BODI (Board Of Directors' Index). The BODI quantitatively evaluates BOD meeting attendance rates, management suggestions, and contributions made at BOD meetings, and the level of BOD operational satisfaction is surveyed to continuously improve BOD operations.

BOD Operation Status

	Unit	2012	2013	2014
BOD meetings	times	13	13	14
Resolution	cases	40	37	54
Preliminary deliberation rate	%	100	100	100
Reported agendas	cases	23	19	11
BOD meeting attendance rate	%	98	99.1	99.2
Non-executive director attendance rate	%	100	100	100

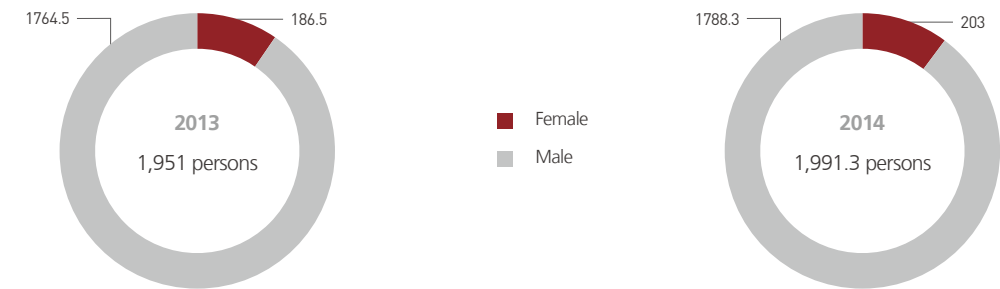
1. A public corporation whose asset size reaches or exceeds KRW 2 trillion and whose self-generating revenue in relation to total revenue reaches or exceeds 85% under the provisions of Paragraph 3 of Article 5 of the Act on the Management of Public Institutions

2. In addition to 4 key management areas, other sustainability issues such as labor relations, environmental problems, and shared growth are comprehensively deliberated.

Human Resources*

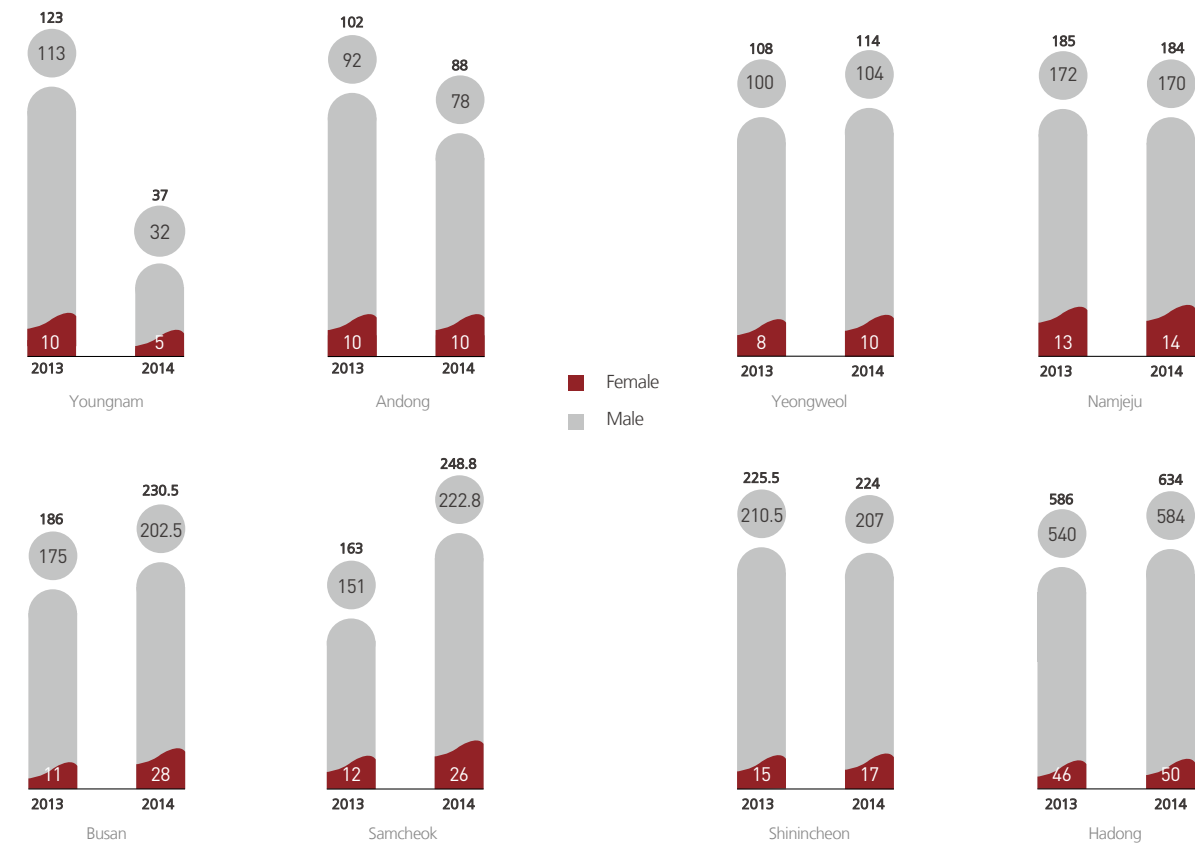
* ① Domestic employees. ② The number of employees is based on the Public Institutions Business Information Disclosure System Alio (<http://www.alio.go.kr>). If there is a part-time employee who works 4 hours a day, he or she is counted as 0.5 persons. Thus, the total number of employees may not be an integer.

Regular Full-time Employees by Gender (unit: persons)



The proportion of regular full-time employees subject to collective agreement was 99.8% in 2013 and 99.7% in 2014. These figures represent all regular employees except for 4 executives. Temporary employees are not subject to collective agreement. There were 6 contract employees (5 males and 1 female) in 2013, but all personnel were regular full-time employees in 2014.

Employees at Each Business Site by Gender (unit: persons)



Changes in the Power Market

Understanding the Power Market

Power plants sell electricity, while consumers purchase it. Enterprises, individuals, and the nation itself all purchase and use electricity. Between power plants and consumers, there are intermediate sellers who predict how much electricity will be needed, make orders for it, and distribute the purchased electricity to consumers. Korean Electricity Power Corporation (KEPCO) plays the role of such an intermediate seller. An intermediate seller predicts how much electricity will be needed for every hour of the next day and places an order accordingly. After reviewing the order, the power plant submits a plan indicating how much electricity, in relation to the amount requested, it can actually generate and sell on the specified day. Then the intermediate seller makes an order for power plant A to generate a certain amount of electricity and for power plant B to generate another amount of electricity, and so on, so as to ensure that collectively, the power plants are collectively generating electricity at the lowest possible cost. Upon receiving an order, power plants supply the desired amount of electricity the next day, review the orders for the upcoming day, and submit a plan again. The ordering and selling of electricity are executed at Korea Power Exchange.

Power plants generate electricity, while the intermediate sellers buy the electricity and resell it to consumers. A substation changes the features of the electricity so that it is not lost in the process of being delivered to consumers. Producing electricity is called power generation, the sending of electricity to a substation is called power transmission, and the sending of electricity processed by the substation to consumers is called power distribution. Hence, the power plant generates the power, and KEPCO, as an intermediate seller, transmits and distributes the electricity.

Determination of Electricity Price

An intermediate seller determines the price of electricity based on the power plant with the largest variable cost related to generating power when supplying electricity at a particular hour. The price is generally determined in accordance with combined cycle power generation, which uses natural gas, because most of the variable cost is influenced by the fuel prices. Since other power plants supplying electricity at the same hour sell it at the same price, coal thermal power plants using less costly fuel will achieve relatively higher profits, while the intermediate seller paying the same high price for all electricity will sustain a loss. To rectify this problem, an adjustment factor is applied. This allows the intermediate seller to compare the rate of return on their investment with that of each power plant, so that they can buy electricity at a discount from the power plant with higher profitability. The use of the adjustment factor will be gradually be phased out and terminated following the Government Approved Vesting Contract (VC) Scheme to be implemented in 2016.

The Vesting Contract Scheme

The Government Approved VC Scheme is a framework in which a power generating company and an intermediate seller agree to buy and sell electricity at a predefined price for a specific period, and if a party acquires a gain or loss due to a gap between the agreed price and market price, the profiting party compensates for the loss incurred by the other party. Trading in electricity with a long-term contract under the Government Approved VC Scheme will eliminate the process of having to applying the adjustment factor and calculate the price for each transaction, and is expected to stabilize the price of electricity. It is also expected to help increase the competitiveness of power plants as a higher efficiency of power generation will lead to increased profits. However, it is still not yet clear what the actual impact of the new scheme for power generating companies will be.

Preparation for Changes in the Power Market

KOSPO has included electricity price variations resulting from the Government Approved VC Scheme as components of its long-term business strategy outlook. It has made preparations for the uncertainty of the scheme. The power trade function of the Power Generation Planning Team was used to create a separate Power Trade Team for the development of trade specialists, while a committee of internal and external experts was formed to establish appropriate contract volumes and pricing, so as to ensure stable facility operation and financial soundness. To actively cope with power market changes, company-wide seminars are held to share information, discuss the general status of the Government Approved VC Scheme with all employees, and collect ideas. The company is also carrying out research projects to minimize risks associated with changes in the market environment.

GRI G4 Indices(Core)

GENERAL STANDARD DISCLOSURES

General Standard Disclosures		Page Number (or Link)	External Assurance
STRATEGY AND ANALYSIS			
G4-1	Statement from the most senior decision-maker	2~3	●
ORGANIZATIONAL PROFILE			
G4-3	Name of the organization	4	●
G4-4	Primary brands, products, and services	4	●
G4-5	Headquarter location	4	●
G4-6	Countries in operation	4	●
G4-7	Nature of ownership	58	●
G4-8	Markets Served	4	●
G4-9	Scale of the organization	4, 5, 60	●
G4-10	Total workforce by region and gender	60	●
G4-11	Percentage of total employees covered by collective bargaining agreements	60	●
G4-12	Supply chain	48	●
G4-13	Significant changes regarding size, structure, or ownership	4, 22	●
G4-14	Precautionary approach	46	●
G4-15	Initiatives to which the organization subscribes	65	●
G4-16	Memberships of associations	65	●
EU1	Installed capacity	7, 14	●
EU2	Net energy output broken down by primary energy source and by region	6~7	●
EU3	Number of customer accounts	Transmission and distribution are not applicable to KOSPO(refer to p.61)	●
EU4	Length of transmission and distribution lines	Not applicable	●
EU5	Allocation of CO ₂ emissions permits	For emission trading scheme is in early stage, not all companies allocated yet.(refer to p.31)	●

General Standard Disclosures		Page Number (or Link)	External Assurance
IDENTIFIED MATERIAL ASPECTS AND BOUNDARIES			
G4-17	All entities included in the organization's consolidated financial statements	42	●
G4-18	Process for defining report content	42~43	●
G4-19	Material aspects	43	●
G4-20	Aspect boundary within the organization	43	●
G4-21	Aspect boundary outside the organization	43	●
G4-22	Restatements of information provided in previous reports	31, 45	●
G4-23	Significant changes in the scope, boundary	42	●
STAKEHOLDER ENGAGEMENT			
G4-24	Stakeholder groups	40~41	●
G4-25	Basis for identification and selection of stakeholders	40	●
G4-26	Approach to stakeholder engagement	40~41	●
G4-27	Key topics and concerns that have been raised through stakeholder engagement	41	●
REPORT PROFILE			
G4-28	Reporting period	About This Report	●
G4-29	Date of most recent previous report	About This Report	●
G4-30	Reporting cycle	About This Report	●
G4-31	Contact point for questions	64	●
G4-32	GRI Content Index	62	●
G4-33	External assurance	43, 63	●
GOVERNANCE			
G4-34	Governance structure	58~59	●
ETHICS AND INTEGRITY			
G4-56	Codes of conduct	https://www.kospo.co.kr/?mn=sub&mcodes=06070100	●

SPECIFIC STANDARD DISCLOSURES

DMA and Indicators		Page Number (or Link)	External Assurance
CATEGORY: ECONOMIC			
MATERIAL ASPECT: ECONOMIC PERFORMANCE			
G4-DMA	Generic disclosures on management approach	12~13	●
G4-EC1	Direct economic value generated and distributed	8~9	●
G4-EC2	Financial implications and other risks and opportunities for the organization's activities due to climate change	13, 24~26, 28~29	●
MATERIAL ASPECT: PROCUREMENT PRACTICES			
G4-DMA	Generic disclosures on management approach	48	●
G4-EC9	Proportion of spending on local suppliers at significant locations of operation	50	●
MATERIAL ASPECT: Availability and Reliability			
G4-DMA	Specific disclosures on management approach	18~19	●
EU10	Planned Capacity	6, 14	●
MATERIAL ASPECT: Research and Development			
G4-DMA	Specific disclosures on management approach	55	●
CATEGORY: ENVIRONMENTAL			
MATERIAL ASPECT: EMISSIONS			
G4-DMA	Generic disclosures on management approach	24~25	●
G4-EN15	Direct GHG emissions	31	●
G4-EN16	Energy indirect GHG emissions	31	●
G4-EN19	Reduction GHG emissions	30	●
MATERIAL ASPECT: EFFLUENTS AND WASTE			
G4-DMA	Generic disclosures on management approach	44	●
G4-EN22	Total water discharge	45	●

DMA and Indicators		Page Number (or Link)	External Assurance
G4-EN23	Total weight of waste	46~47	●
MATERIAL ASPECT: COMPLIANCE			
G4-DMA	Generic disclosures on management approach	44	●
G4-EN29	Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations	47	●
CATEGORY: SOCIAL			
MATERIAL ASPECT: LOCAL COMMUNITIES			
G4-DMA	Generic disclosures on management approach	52	●
G4-SO1	Percentage of operations with implemented local community engagement, impact assessments, and development programs	52	●
G4-SO2	Operations with significant actual and potential negative impacts on local communities	23, 53~54	●
EU22	Number of people displaced and compensation	23	●
MATERIAL ASPECT: ANTI-CORRUPTION			
G4-DMA	Generic disclosures on management approach	32~33	●
G4-SO3	Total number and percentage of operations assessed for risks related to corruption and the significant risks identified	34	●
G4-SO4	Communication and training on anti-corruption policies and procedures	35	●
G4-SO5	Confirmed incidents of corruption and actions taken	34, 38	●
MATERIAL ASPECT: COMPLIANCE			
G4-DMA	Generic disclosures on management approach	32~33	●
G4-SO8	Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with laws and regulations	34	●

Third Party's Assurance Statement

To the Readers of KOSPO Sustainability Report 2014:

Responsibility and Independence

Korea Management Association Registration Inc. (hereinafter “the assurer”) has been requested by of Korea Southern Power CO., Ltd. (hereinafter “KOSPO”) to verify the contents of its Sustainability Report 2014 (hereinafter “the Report”). The assurer is responsible for the assurance of the Report, and KOSPO is responsible for the information presented in the Report. As an independent assurance agency, the assurer is not in any conflict of interest that may undermine its independence.

Verification Methodology

The verification has been conducted in accordance with Type 2, Moderate level using AA1000AS (2008) as an assurance standard. The assurer’s assurance team (hereinafter “the assurance team”) evaluated the adherence to Principles of inclusivity, materiality, responsiveness and the reliability of specified sustainability performance information. In addition, the assurance team checked whether the Report satisfied the ‘Core Option’ requirements of GRI G4 Guidelines. The data and information of outside of the organization among report boundaries such as suppliers, contractors is excluded from the verification scope. The assurance team has verified data management system and reporting process, and verified internal documents and data, and interviewed people in charge of preparing the Report.

Findings and Conclusion

The assurance team could not find any inappropriate contents in the Report to the compliance with the principles stipulated below, nor could find any evidence the Report did not comply with ‘Core Option’ requirements of GRI G4.

- Inclusion: Inclusion is the participation of stakeholders in developing and achieving an accountable and strategic response to sustainability. KOSPO is developing and maintaining stakeholder communication channels in various forms and levels in order to make a commitment to be responsible for the stakeholders. The assurance team could not find any critical stakeholder group left out during this procedure.
- Materiality: Materiality is determining the relevance and significance of an issue to an organization and its stakeholders. A material issue is an issue that will influence the decisions, actions and performance of an organization or its stakeholders. KOSPO is determining the materiality of issues found out through stakeholder communication channels through its own materiality evaluation process, and the assurance team could not find any critical issues left out in this process.
- Responsiveness: Responsiveness is an organization’s response to stakeholder issues that affect its sustainability performance and is realized through decisions, actions, and performance, as well as communication with stakeholders. The assurance team could not find any evidence that KOSPO’s counter measures to critical stakeholder issues were inappropriately recorded in the Report.

Recommendation for improvement

The assurer hopes the Report will actively be used as a communication tool with stakeholders and recommends the following for improvements.

- KOSPO needs to utilize power production, its main business activities, through more strategic way from the point of sustainability management, whether the activities have high public concern by themselves. In this respect, the assurer suggests that KOSPO continually harmonize its business activities with the mission and strategies of sustainability management activities.



August, 27th, 2015
K. H. Park
CEO Ki Ho Park

Energy for Tomorrow

Communication is the first step
of sustainability for KOSPO.

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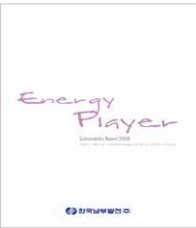
Participation in Principle

2007. 3 Enrolled in UN Global Compact Agreement and signed the agreement to comply with 10 principles.

Membership in Associations

- Korea Institute of Internal Auditors
 - Business Ethics and Sustainability management for Top performance
 - Korea Technology Innovation Society
 - Korea Management Association
 - Korea Employers Federation
 - Korea International Trade Association
 - Korea Resource Economics Association
 - Korea Committee of World Petroleum Congress
 - The Korea Gas Union
- Korea Power Exchange
 - Korea Society of Geothermal Energy Engineers
 - Small Business Innovation Forum
 - Edison Electric Institute
 - Korea Plant Industry Association
 - The Korean Society of Mechanical Engineers
 - The Korean Institute of Electrical Engineers
 - Korea Energy Foundation
- Korea Electrical Engineering & Science Research Institute
 - Korea Electric Power Industry Code (KEPIC)
 - The Korean Society for New and Renewable Energy
 - Korea New & Renewable Energy Association
 - Offshore Wind Power Forum
 - World Wind Energy Association
 - Korea Wind Energy Association
 - Korean Standards Association

Our Footprints for Sustainability



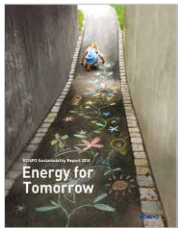
2008



2010



2012



2014

2013. 2

2013 Korea's Most Respected Companies in Power Industry (Ranked No. 1)
KMA Consulting
2013. 7

2013 Korea Global CEO Award
JungAng Daily and Forbes Korea
2013 Green Management Award (Specialized Award)
Ministry of Knowledge Economy and Ministry of Environment
2013 Korea Green Economy CEO Award
Korea Chamber of Commerce and Industry and DongAllbo
2013. 8

2013 Korea Sustainability Award (Overall Award)
Association of Korean Journalists
- 2013.10

2013 Executive Award
Korean Academy of Organization and Management
2013 Asian Power Awards (CEO Award, Gold Award in Power Generator Technical Management and Silver Award in Power Generation Improvement)
Charlton Media Group
- 2013.11

39th National Quality Management Contest (Presidential Award)
Ministry of Trade, Industry and Energy
2013 100 Best Companies to Work for
GWP Korea
- 2013.12

2013 Global Energy Award (Power Industry Leader Company Award)
Platts
2014. 1

2014 Korea's Most Respected Companies in Power Industry (Ranked No. 1)
KMA Consulting
2014. 6

2014 Edison Award
US EEI (Edison Electric Institute)
2014. 7

Social Enterprise Development Merit (Presidential Award)
Ministry of Employment and Labor
2014. 9

2014 Asian Power Awards (Gold Award in Operation of Power Generator Using Clean Energy)
Charlton Media Group
- 2014.11

2014 German International Invention Exhibit (Silver Award and Special Award)
AFAG Messen und Ausstellungen GmbH
- 2014.12

2014 Korea Intellectual Property Right Contest and Korea Invention and Patent Contest (Bronze Award)
Korea Industrial Property Office and Korea Invention Promotion Association
Korea Invention and Patent Contest and Seoul International Invention Exhibit (Semi Grand Award)
Korea Industrial Property Office and Korea Invention Promotion Association
22nd Safety Management Award in Electrical/Gas/Water Service Industry (Energy Industry) Sector
Ministry of Employment and Labor and Maeil Business Newspaper
Presidential Merit for Family-Friendly Management
Ministry of Gender Equality & Family
2015. 2

2014 National Infrastructure System Disaster Management Assessment (Presidential Award)
Ministry of Public Safety and Security

KOSPO SUSTAINABILITY REPORT 2014

Energy for Tomorrow

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To minimize environmental impact throughout the entire lifecycle of this eco-design report, KOSPO has used soybean oil and shunned the use of spot color printing or coating.

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