Underwriting Survey Report

Comprehensive Machinery Insurance

Apr. 2025

SEgreenenergy Co., Ltd.

Hyundai Insurance

Hyundai Insurance

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Chapter 1 Introduction

Purpose of Visit	This report is risk description and assessment of the SEgreenenergy Co., Ltd. located in Hwaseong City, Korea. The report has been prepared on behalf of the Hyundai Marine & Fire Insurance to give proper information regarding to insurance coverage and estimate the Probable Maximum Loss (PML).
Account	SEgreenenergy Co., Ltd.
Site Address	280-50, Hwagok-ro, Jangan-myeon, Hwaseong-si, Gyeonggi-do, Korea
Class of Risk	Solid Oxide Fuel Cell(SOFC) Power Plant
Survey History	Survey Visit Date - 18 Apr. 2025 Last Survey Date - 17 Apr. 2024
Survey Attendees	Risk Management Research Center, Hyundai HiLife Claims Services Park, Wonhyung - Senior Risk Engineer
Site Contacts	SEgreenenergy Co., Ltd. Park, Sung Ju - President & CEO Choi, Jae Young - Business Operation Team Lee, Seul Bi - Business Operation Team
Disclaimers	This report does not indicate that all possible hazards have been identified, or no other hazards exist. Hyundai HiLife Claims Service Co., Ltd. does not make any warranty concerning the contents of this report or disclaims, whatsoever, for any errors or omissions in the information given or the consequences of reliance thereon. Any advice contained herein is solely for the assisting the insured regarding loss control and safety.

Chapter 2 Summary

SEgreenenergy

Latitude	37.0545 N	Longitude	126.8197 E

Property Values (M KRW)

Building	3,330 -
Structure	210 -
Machinery	134,167 -
Facilities	7,171 -
Fixture	124 -
Property Total	**145,002 -**

* Based on 2025 replacement cost value.

Other Insured Values (M KRW)

Machinery Breakdown	N/A
Operational Business Interruption	10,296 -
General Liability	N/A

Loss Estimates (PML, M KRW)

Property Damage	55,398 -
Machinery Breakdown	N/A
Business Interruption	N/A

Natural Hazard Exposure

Earthquake	Moderate
Tsunami	No Hazard
River Flood	No Hazard
Flash Flood	No Hazard
Windstorm	Moderate
Hailstorm	Very Low
Lightning	Moderate

Allied Perils

External F&E	No Hazard
Vehicle/Vessel Impact	Low
Strikes / Riots	Low
Subsidence / Landslip	Moderate

Main Hazard Features

Site condition / Layout	Average
Building Construction	Average
Operational Hazard	Average
Operational Control	Average
Protection	Below Average
Management	Average

Loss Record (within recent 5 years)

Date	Loss type	Loss (M KRW)
None		

Overall Risk Rating	Average

Chapter 3 Overviews

3.1 Site Operations Summary

SEgreenenergy (hereinafter refers as 'SEG') is a SPC (Special Purpose Company) jointly established by Korea South-East Power Co., Ltd and SK E&C Co, Ltd in 2012. KOEN holds a 84.8% stake, while SK E&C holds a 15.2% stake.

SEG initially intended to carry out the RPF (Refuse Plastic Fuel) power generation business. However, SEG changed its business direction to SOFC (Soild Oxide Fuel Cell) power generation in 2018 due to the conflicts with local residents and change in the government's waste policies.

The SOFC power plant was constructed from July 2019 to June 2020 (12 months). The plant began commercial operations on June 1, 2020.

SEG has total 66 solid oxide fuel cell (SOFC) facilities and its total power generation capacity is 19.8MW (0.3MW x 66 units). All produced electricity are sold to Korea Electric Power Corporation (hereinafter referred to as 'KEPCO') and finally delivered to households and enterprises. SEG signed a 20-year LTSA contract with Bloom Energy Corporation, a fuel cell manufacturer.

The plant operates using NG supplied by Samchully Co., Ltd., and the generated electric power is sold to Korea Electric Power Corporation (KEPCO). The annual sales amount reached approximately 41 billion KRW in 2024. Brief project outline and current generation status are as follows.

Project Outline	
Project	Hwaseong Fuel Cell Power Generation Business
Location	280-50, Hwagok-ro, Jangan-myeon, Hwaseong-si, Gyeonggi-do, Korea
Generation Concept	Solid Oxide Fuel Cells (SOFCs)
Generation Capacity	19.8 MW (300 kW x 66 units)
Fuel cell model	Bloom Energy Server ES5
Construction period	2019.07 ~ 2020.06 (12 months)
Construction cost	About 140 billion Korean Won
Operation period	2020.06 ~ 2040.06 (20 years)
EPC Contractor	SK E&C Co., Ltd.
Fuel Cell Manufacturer (Long Term Service Agreement)	Bloom Energy, a US-based energy firm (20 years)

3.2 Recent Changes

1. SEgreenenergy began replacing power modules in July 2022 to increase power generation efficiency under the LTSA with Bloom Energy. The progress is as follows.

Date	Details
2022.7.20~21	3 additional power modules and 9 replacements
2022.8.17~18	Replacement of 12 power modules
2022.8.29~9.1	Replacement of 40 power modules
2022.12.6~9	Replacement of 41 power modules
2023.2.7~16	Replacement of 66 power modules
2023.4.11	Replacement of 7 power modules
2023.5.15~19	Replacement of 49 power modules
2023.9.7	Replacement of 5 power modules
2023.12.20	Replacement of 10 power modules
2024.1.29~2.1	Replacement of 41 power modules
2024.2.20	Replacement of 9 power modules
2024.3.20~21	Replacement of 6 power modules
2024.5.9~10	Replacement of 30 power modules
2024.5.28~30	Replacement of 30 power modules
2024.7.11~12	Replacement of 29 power modules
2024.10.14	Replacement of 9 power modules
2025.1.15	Replacement of 9 power modules
2025.3.12	Replacement of 4 power modules
2025.3.31	Replacement of 7 power modules

2. In the case of the 480V electric power cable that supplies the power generated from the power module to the substation room, it was determined that the allowable capacity was insufficient, so construction is underway to replace the 180φ power cable to a 240φ power cable. The construction status by target unit is as follows.

Start date of work	Target unit
2024.5.7	#202, #403, #407, #606
2024.8.20	#602, #605
2024.9.25	#203, #206, #208
2024.11.22	#201, #204, #205, #207, #209, #210
2025.4.10	#701~#709
2025.4.17	#401~#409

3.3 Loss History

No claim loss has been reported in recent five years in SEG.

3.4 Conclusion

SEG generates electricity by operating a SOFC power plant with a total capacity of 19.8 MW. Unlike other fuel-fired power plants, there is no burning of the fuels; instead, it relies on the chemical reaction to generate electricity. Natural gas uses for the raw material. Therefore, the use of flammable gas is the main hazard regarding fire and explosion exposure. This may occur from gas piping or governor stations when large quantity of natural gas is accidentally released into the atmosphere. The governor stations are equipped with pressure safety valves (PSVs) and gas leak detectors, interlocked by automatic shutoff valves.

Additionally, fire can result from an electrical failure in the electric room, which could trigger the explosion in the 1st governor station located near the Substation. When producing electricity through chemical reactions, temperatures reach approximately 900℃. Therefore, fire and explosion can occur due to abnormal temperature or runaway reaction.

SOFC modules are highly resistant (up to 1,000℃) to fire and explosion. Each module is equipped with its own gas leak detector, flame detector, and alarm/trip system (high/low: alarm / high-high/low-low: trip). The fuel cell system is monitored in the Central Control Room (CCR) of the Office and the control room of the Substation. Also, Bloom Energy Corporation monitors the system 24 hours a day. Preventive maintenance is periodically performed by technicians belong to Bloom Energy.

Lightning and static electricity can be an ignition source that may lead to fire. However, all facilities are earth-grounded to prevent the static electricity. The lightning protection system is also installed on the site.

Two buildings were constructed with fire proofing steel structure. Sandwich panels insulated with glass wool are used for both the exterior walls and roofs of the buildings. All building are not fire partitioned.

Main fire protection system for the fuel cell is a portable fire extinguisher. HFC-125 fire extinguishing system is installed in the electric room and control room of the Substation. Regular inspection is implemented by the subcontractor, and the public fire station is about 3.6 kilometers away from the site.

The natural hazard of the site is below the moderate level. However, the Korean peninsula typically experiences two or three typhoons annually during the summer season, which often bring torrential rain and windstorms. Although wind resistant design is applied to the fuel cells and the Substation, strong wind followed by typhoon can result in damage to the sandwich panel walls and roofs.

Based on risk assessments result that comprises a broad categories of exposure to the risk and loss mitigation measures, this site is rated to be an Average level in its risk category.

Remark

Above overall rating in mainly concerned with those perils is relevant to property damage (excluding machinery breakdown) and business interruption. In this report, we provide our opinions as to the quality of the risk on a worldwide industry basis. The following definitions apply;

Excellent	*The very best current day practice in the class of industry*
Good	*Embodies some of the best practices in the class of industry*
Average	*Acceptable standards exhibited*
Fair	*Some areas below the standard of current day practice*
Poor	*Embodies few or none of the standards expected of current day practice*

Chapter 4 Values & Loss Estimation

4.1 Sum Insured Value

(unit : M KRW)

Site	Asset	Insured Value
SEgreenenergy	Building	3,330
	Structure	210
	Machinery	134,167
	Facilities	7,171
	Fixture	124
Total		145,002

※ The above value is based on 2025 replacement cost value.

4.2 Probable Maximum Loss

We understand the probable maximum loss, i.e. the maximum loss that might be expected, at a cautious estimate, to occur as a result of a single loss event, taking into consideration all the circumstances of the risk. Individual property damage rate, fire-fighting facilities/fire protection measures or other management features have to be left unconsidered for a PML assessment. This assumption does not include additional indirect losses like debris removal cost, and we do not take inflation factor into PML consideration.

4.3 Loss Estimates Summary

Coverage	Scenario	Loss Estimates (M KRW)	% TSI
Property Damage	Fire	55,398	38%

4.4 PML Scenario - Fire

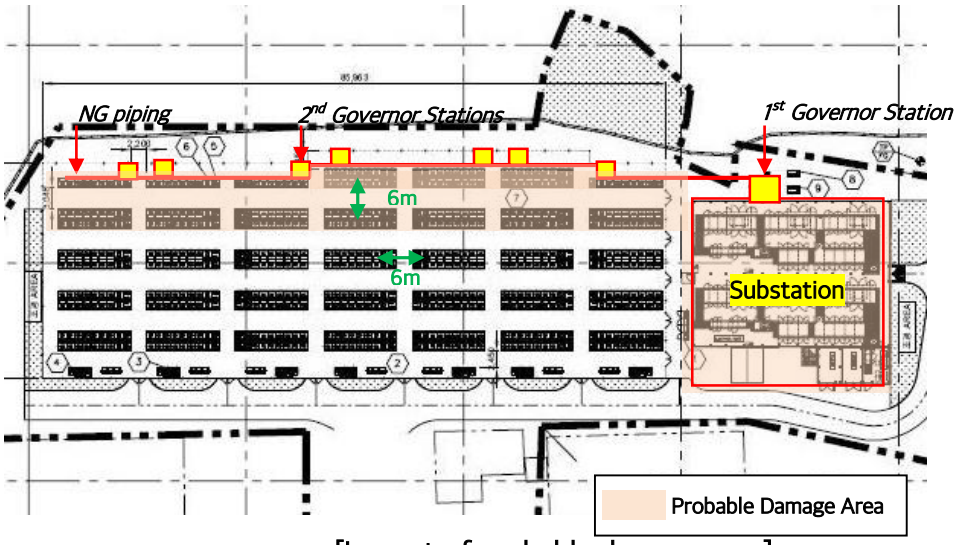
4.4.1 PML for Property Damage

Fire & explosion event is the most severe loss event in respect of Property Damage except the catastrophic disaster such as earthquake. This assumption does not include additional indirect losses like firefighting expense and debris removal cost.

Loss assumption herein is based on present value, and we do not take inflation factor into PML consideration.

PML might occur by gas explosion from piping or a gas governor station. It triggers other explosions which results in more fires, causing total losses of the substation building and ES5 modules, located in front of piping and 2nd gas governor stations. (Considering that ES5 modules are highly resistant to fire and explosion, so other modules may not be damaged)

We consider PML is estimated about 55,398 million KRW for property damage, about 38% of property values (35% of Machinery, 90% of Structure & Facilities, 80% of Building, 30% of Furniture) of the SEG.



[Layout of probable damage area]

4.4.2 PML for Business Interruption

There are some outside factors which can leads to BI event like cut off fuel (NG) or water supplying. However, it is assumed that the influence about BI is considered as slight because fuel or water supplying could be restored within a week.

SOFC facility is supplied from domestic company, but staff says that its lead time is nearly 6 months. Also, main step-up transformers are expected to be restored within 6 months.

Therefore, we estimate the maximum recovery time in the event of the loss of SOFC facilities, and the expected recovery period is 6 months.

Chapter 5 Site Description

5.1 Natural Hazard Exposures

5.1.1 Metrological Data

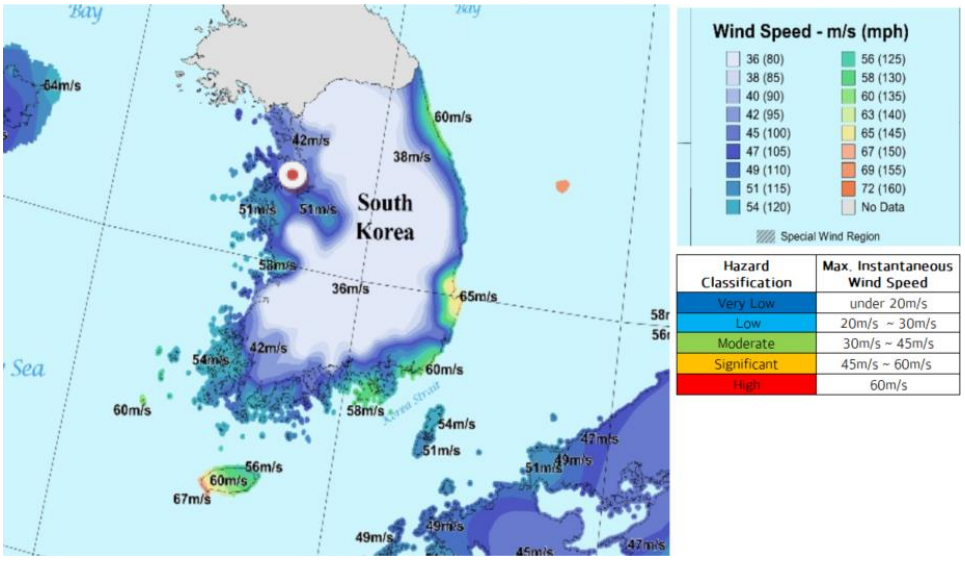
Temperature Max.	39.3 ℃	Temperature Min	-18.6 ℃
Precipitation (24 hours) Max	333.2 mm	Precipitation (1 hour) Max	92.5 mm
Snow Fall Max.	32.3 cm	Great Gust	30.5 m/s
Annual Precipitation (total)	1,320.3 mm		

Above meteorological data is based on Statistical Data of Korea Meteorological Administration - Focused on Suwon City between 1995 and 2024. There can be geological differences between actual location of the site and meteorology observation post.

5.1.2 Windstorm / Flood

Korea is located in an area prone to tropical cyclones and is subject to typhoons. On average, typhoons hit Korea three times a year, mostly between July and September. Typhoons usually bring torrential rain and strong winds. According to the Korea Meteorological Administration, the peak wind gust at the site since the first observation is 30.5m/s and it is classified as a moderate (30-45m/s) windstorm risk zone.

Wind resistant design is applied to the fuel cells and the substation. However, strong wind followed by typhoon can result in damage to the sandwich panel walls and roofs. The plant conducts periodic inspections of its buildings and outdoor facilities.

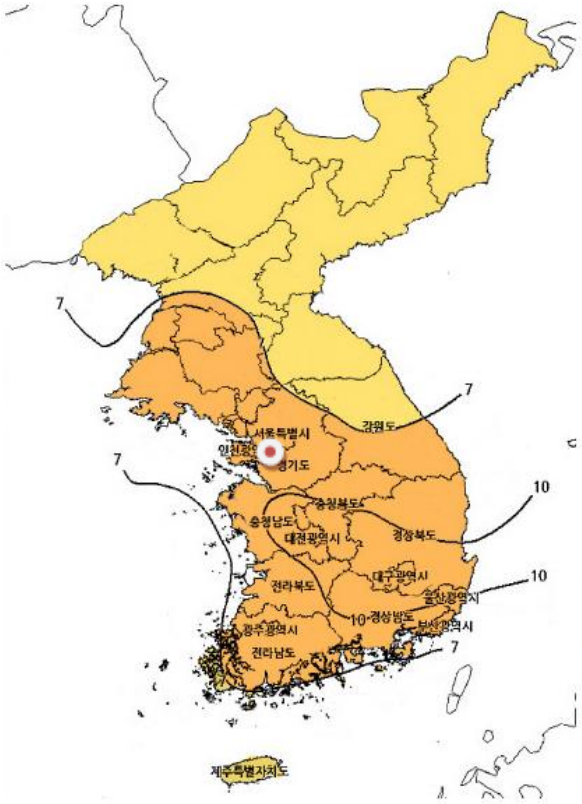


[Basic Wind Speed, a 100-year mean recurrence interval (Refer to FM Global Data Sheets)]

5.1.3 Earthquake

The Korea National Emergency Management Agency (NEMA) issued the seismic hazard map considering the seismic zone factor based on the 500-year return period. According to this map, Effective Peak ground Acceleration (EPA) of this area is 0.07~0.10g for the return period 500 years. And it is classified as Moderate earthquake risk zone.

The buildings are applied an earthquake-resistant design with seismic capacity rating of Ⅶ-0.229g on the MMI scale. The fuel cells are also earthquake-resistant. Since its operation, there haven't been any significant seismic or tsunami events at the site.



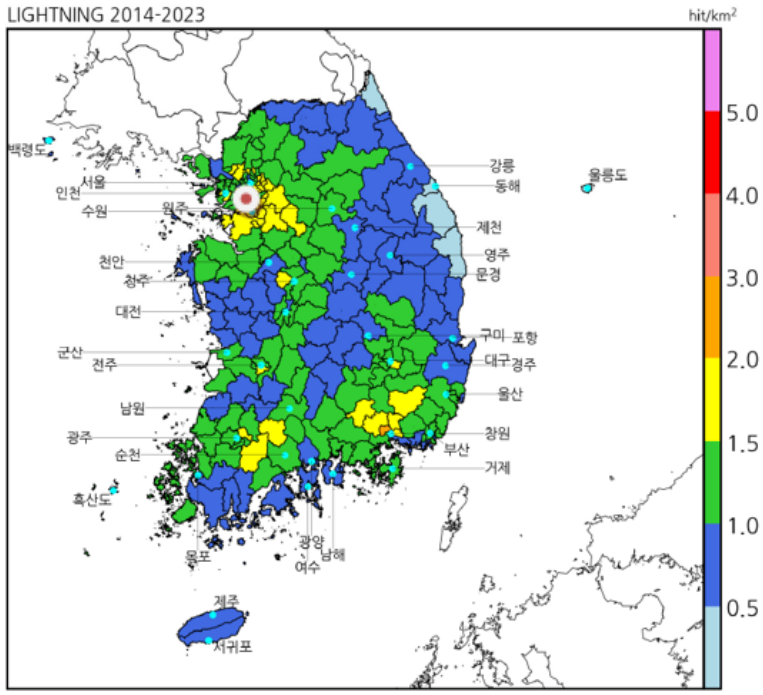
Hazard Classification	Effeective Peak Ground Acceleration
Very low	~ 0.03g
Low	0.03g ~ 0.07g
Moderate	0.07g ~ 0.16g
Significant	0.16g ~ 0.20g
High	0.20g ~

[Seismic hazard map based on 500-year return period (%g)]

5.1.4 Lightning

Korea Meteorological Administration analyzes the average annual lightning strikes per unit area (grid), with each grid size based on 5 km x 5 km. According to this data for recent 10 years (2014 to 2023), the annual flash rate/km^2 in this site is about 1.5~2 flashes, classifying it as a low lightning risk zone.

The site has a properly prepared lightning protection system, with lightning rods installed on the top of the buildings and surge protections for the electric power system. No lightning accident has been reported since its completion.



Hazard Classification	Annual flash rate per km²
Very low	~ 1
Low	1 ~ 3
Moderate	4 ~ 6
Significant	7 ~ 15
High	16 ~

[The map of lightning hazard based on the annual average of lightning strikes during 10 years (2014 ~2023)]

5.2 Geographic Conditions / Layout

SEG is located at the rural area in Hwaseong City, which is approximately 80 kilometers southwest of Seoul City. Global location of SEG is latitude 37.0545˚N & longitude 126.8197˚E. The site has an average elevation of approximately 10 meters above the sea level and the Yellow sea is located about 4 kilometers west of the site.

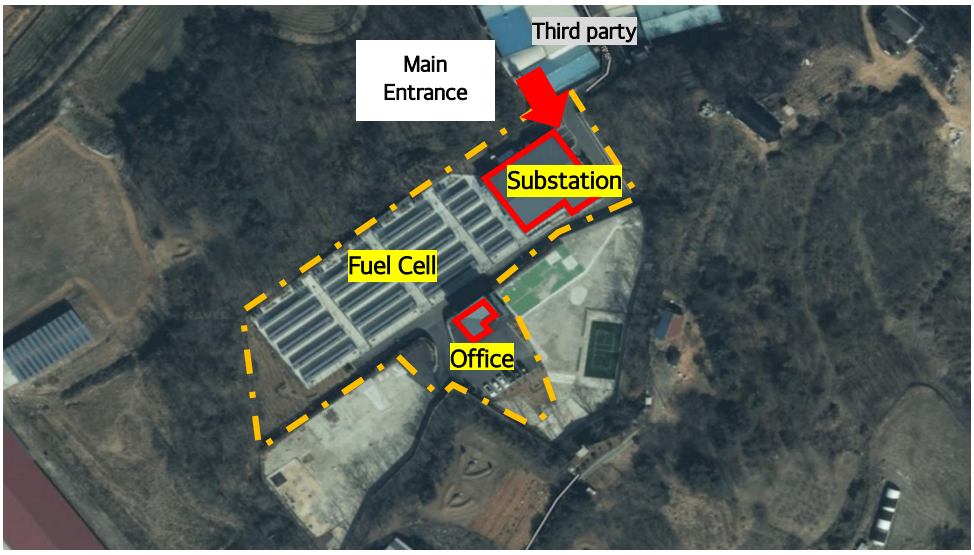
The site occupies a lot area of 6,966 square meters and is situated on flat ground. The surface is paved with a well maintained asphalt compound and cement paste. Moreover, there have been no significant signs of subsidence or collapse in the buildings, and no recorded losses related to them. The ground condition is considered stable and rigid.

The fuel cells and Substation are located on the north side of the site, while the Office is located on the south side. There is a slight ground level difference between the north and south of the site, with the south being 5 meters higher than the north.

[Ground level difference]

SEG has only one entrance gate near the Substation, which can be directly accessed via a 6-meter road. Thus, the general accessibility to the site is considered to be good.

Three sides of the site, excluding the north, are surrounded by hillocks. The nearest third-party, an incineration plant, is located about 10 meters north of the Substation. Therefore, there is a risk of fire spreading to each other.



[The layout of SEgreenergy]

5.3 Buildings & Constructions

There are two buildings, Substation and Office, in the site and total floor area is 859.02 square meters. Two buildings were constructed with fire proofing steel structure. Sandwich panels insulated with glass wool are used for both the exterior walls and roofs of the buildings. All building are not fire partitioned.

The substation is a single-story building divided into five sections; the electric room, control room, fire extinguishing agent room, storage, and toilet. The electric room occupies the majority of the substation's space.

The Office is a two-story building, with both floors used as office space. The Central Control Room (CCR) is located on the first floor.

Office building is above 10 meters off from the fuel cell facilities, but the substation is within 6 meters of the fuel cell facilities. So there is a possibility that the fire will spread between the substation and the SOFC facilities.

Summary of buildings in the site is as follow;

No	Name of Building	Structure			Floor	Fl. Area (㎡)
		Column	Ext. Wall	Roof		
1	Substation	STL	SP	SPOST	1F	624.15
2	Office	STL	SP	SPOST	2F	234.87

* Abbreviation

STL : Steel SP : Sandwich Panel

SPOST: Sandwich Panel On Steel Truss

[Substation]

[Office]

5.4 Manufacturing Processes & Facilities

5.4.1 SOFCs Power Generation Introduction

SEG is 19.8 MW SOFC power plant, and the generated electric power is sold to KEPCO. The SOFC modules, called 'Energy Server 5 (ES5)', are installed at the plant in compliance with various safety standards. Bloom Energy, the manufacturer of the SOFC modules, manages all aspects of the operation and maintenance of the fuel cell system.

5.4.2 Raw Material / Product

Methane, the principal component of natural gas (NG), is converted into hydrogen through internal reforming within the module of ES5. NG is supplied by the Samchully through pipelines. There is no bypass line other than a main and spare line.

NG is distributed to the modules through a two-stage governor system. The 1st governor station regulates NG from 8 bar to 2 bar and 2nd governor stations regulate NG from 2 bar to 0.75 bar.

The modules are arranged in seven rows, with seven 2nd governor stations installed in each row. The 1st governor station is located north of the substation.

The generated electricity is transmitted to KEPCO's Joam Substation about 4.7 kilometers away by both underground and overhead lines.

[1st governor station]

[2nd governor station]

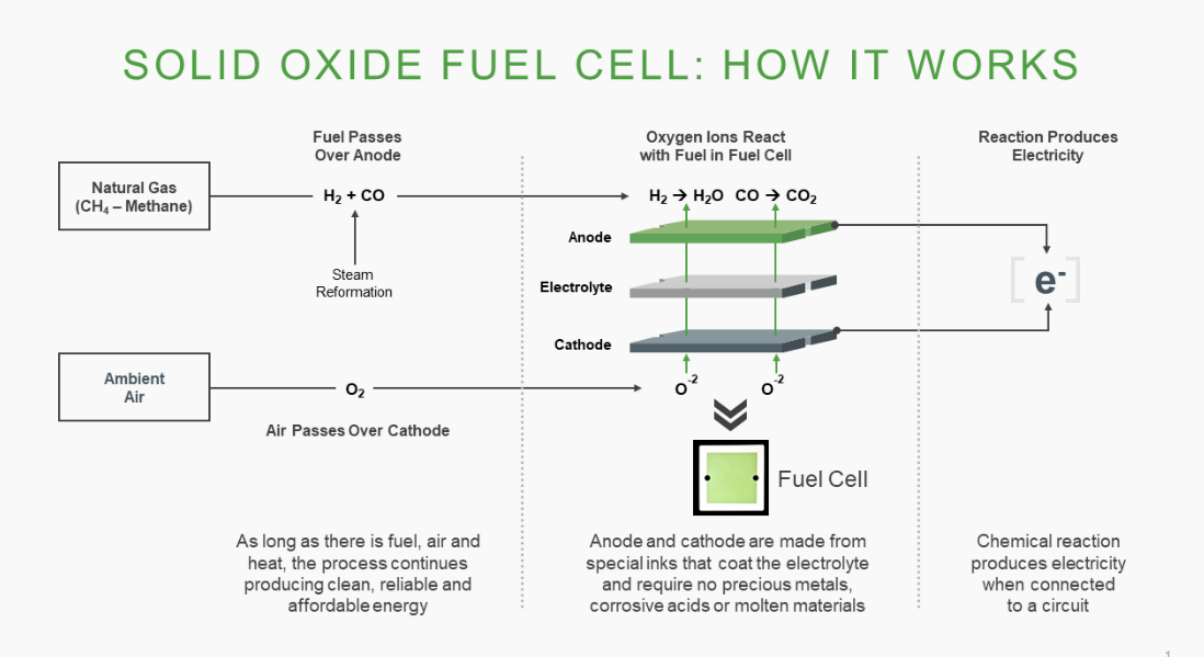
5.4.3 Process Description

The electrolyte in SOFCs is solid ceramic material. The anode and cathode electrodes in Bloom Energy's fuel cells are special inks that coat the electrolyte. Unlike other types of fuel cells, Bloom Energy's SOFCs do not require precious metals, corrosive acids, or molten materials. Operating at high temperatures (about 900 degree Celsius) inside the ES5, ambient air enters the cathode side of the fuel cell.

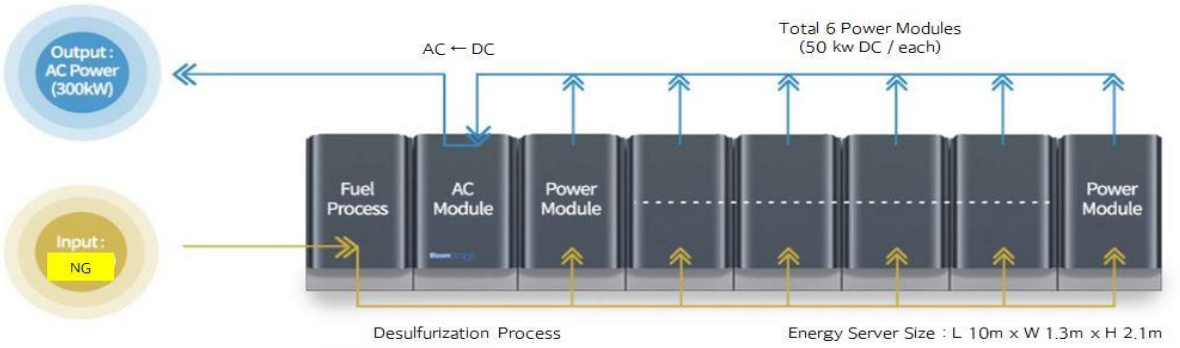
Meanwhile, steam mixes with fuel (NG) entering through the anode side to produce reformed fuel. As the reformed fuel (hydrogen), crosses the anode, it attracts oxygen ions from the cathode. The oxygen ions then combine with the reformed fuel to generate electricity, steam, and carbon dioxide.

[Fuel cell]

[Distance between the fuel cells]



[Process flow of SOFC]



[Components of ES5]

The steam produced during the reaction is recycled to reform the fuel. Due to this recycling process, Bloom Energy's fuel cells do not require water during normal operation. The electrochemical process also generates heat, maintaining the fuel cell's temperature and driving the reforming reaction process. As long as fuel and air are supplied, the fuel cells continue converting chemical energy into electrical energy, providing an electric current directly at the fuel cell site. SOFCs are the first (and smallest) component manufactured for the ES5. The SOFCs are then combined into a fuel cell stack, and multiple stacks create the ES5. One 300kW ES5 unit in the site consists of six modules. The distance between the units is about 3.5 meters.

[Components of ES5]

Following table is a specification of ES5(ES5-YA8AAN) installed in the Hwaseong plant of SEG.

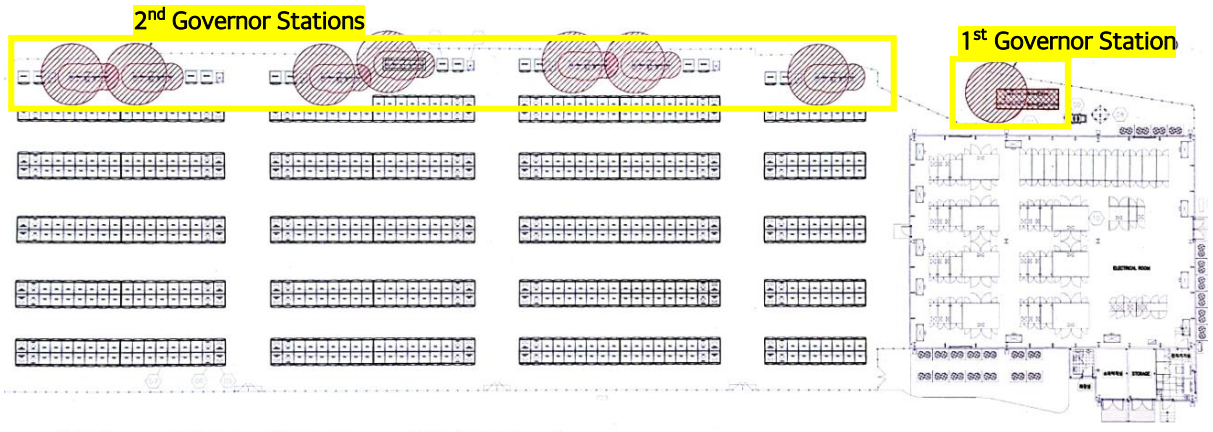
Energy Server 5	Technical Highlights (ES5-YA8AAN)
Outputs	
Nameplate power output (net AC)	300 kW
Load output (net AC)	300 kW
Electrical connection	480V, 3-phase, 60 Hz
Inputs	
Fuels	Natural gas, directed biogas
Input fuel pressure	10-18 psig (15 psig nominal)
Water	None during normal operation
Efficiency	
Cumulative electrical efficiency (LHV net AC)[1]	65-53%
Heat rate (HHV)	5,811-7,127 Btu/kWh
Emissions[2]	
NOx	0.0017 lbs/MWh
SOx	Negligible
CO	0.034 lbs/MWh
VOCs	0.0159 lbs/MWh
CO_2 @ stated efficiency	679-833 lbs/MWh on natural gas; carbon neutral on directed biogas
Physical Attributes and Environment	
Weight	15.8 tons
Dimensions (variable layouts)	18'94" x 8'8" x 7'0" or 32'11" x 4'5" x 7'5"
Temperature range	-20° to 45° C
Humidity	0% - 100%
Seismic vibration	IBC site class D
Location	Outdoor
Noise	< 70 dBA @ 6 feet
Codes and Standards	
Complies with Rule 21 interconnection and IEEE1547 standards	
Exempt from CA Air District permitting; meets stringent CARB 2007 emissions standards	
An Energy Server is a Stationary Fuel Cell Power System. It is Listed by Underwriters Laboratories, Inc. (UL) as a 'Stationary Fuel Cell Power System' to ANSI/CSA FC1-2014 under UL Category IRGZ and UL File Number MH45102.	
Additional Notes	
Access to a secure website to monitor system performance & environmental benefits	
Remotely managed and monitored by Bloom Energy	
Capable of emergency stop based on input from the site	

[1] 65% LHV efficiency verified by ASME PTC 50 Fuel Cell Power Systems Performance Test
[2] NOx and CO measured per CARB Method 100, VOCs measured as hexane by SCAQMD Method 25.3

5.4.4 Process Safety Management

All facilities are earth-grounded to prevent static electricity. The lightning protection system is also installed on the site.

Inside the enclosure of the 1st governor station is classified as a Zone 1 hazardous area. The 2nd governor stations and the pressure safety valve (PSV) vent of the 1st governor station are classified as a Zone 2 hazardous area. All electric apparatus on the stations are designed to be explosion-proof. Additionally, the 1st and 2nd governor stations are equipped with PSVs and gas leak detectors, which are interlocked to automatic shut-off valves.



[Explosion hazardous area classification]

[Ground wire]

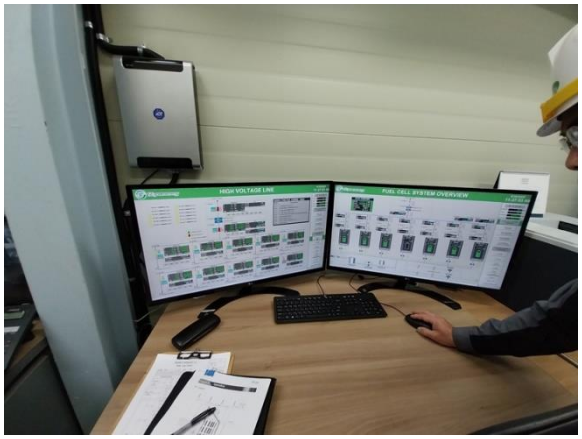
[PRV(Pressure Relief Valve)]

[Gas leak detector]

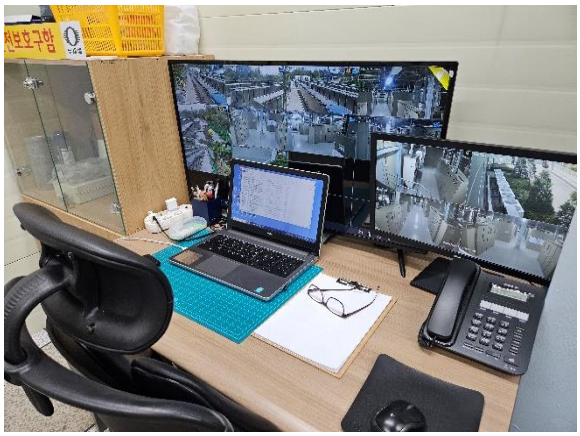
The modules are highly resistant to fire and explosion. Each module is equipped with its own gas leak detector, flame detector, and alarm/trip system. Its operation parameters such as temperature, cell voltage, gas flow, and gas pressure are monitored and displayed on the programmable logic controller (PLC).

Monitoring system is installed at the Central Control Room (CCR) in the office and control room in the substation. Employees from SEG are stationed in the CCR, and a site engineer from YOUNGJIN (subcontractor) is stationed in the control room. There are no employees from Bloom Energy in the site, but the fuel cell system is remotely operated and monitored 24 hours a day by Bloom Energy.

[CCR in the Office]


[Control room in the Substation]

[Gas leak alarm system]


[CCTV monitoring]

Under the LTSA contract with Bloom Energy Corporation, the power plant completed the replacement of the power module sequentially from July 2022 to the end of March 2025 to ensure power generation efficiency. In addition, in the case of 480V power cables that supply generated power to the substation, 180 φ cables are being replaced with 240 φ power cables to prevent overload.

5.5 Storage

There are no flammable materials in use or storage other than LNG at the site. LNG is used for fuel of SOFCs facilities. LNG is supplied through the pipeline from an external gas company. Also, nitrogen injection system was installed to purge the fuel cell facility when starting it after stopping. N2 Gas capacity is 2 bottles of 50kg.

[N2 supply system]


[N2 bottles]

5.6 Utilities

5.6.1 Electric Power

SEG is supplied with 22.9kV electric power from KEPCO's Joam Substation through a single feeder and stepped down to 380V/220V by the station service transformer. Mold-type transformers are installed in the substation. The contract demand is 800kW, but peak demand has not been provided. The current electric power is stable without any unnoticed interruptions.

The generated DC power from the fuel cell is converted to AC by the inverter and stepped up to 480V through transformers of each SOFCs. Subsequently, the 480V electric power is stepped up to 22.9kV by seven main transformers. It is then transmitted to the 22.9 kV grid of Joam Substaion about 4.7 kilometers away by both underground (3.6km) and overhead lines (1.1km). Seven main transformers are tied to each other.

Location	Equipment	Capacity	Type	Unit	Voltage
Substation	Step-up Transformer	4.5MVA 4.0MVA	Mold	3 4	480V → 22.9kV
	Station service Transformer	400kVA		2	22.9kV → 380V/220V

All electric facilities are inspected by a subcontractor according to the maintenance schedules. A detailed inspection is conducted by the Korea Electrical Safety Corporation (KESCO) every two years.

Furthermore, electric room is protected by total flooding type HFC-125 gaseous fire extinguish system.

5.6.2 UPS

While there is no emergency generator, an uninterruptable power supply (UPS) for the electric control supply is installed in the substation. The UPS on the site can provide backup power for up to 8 hours.

[Substation]

[UPS battery]

Chapter 6 Fire Protections

Design criteria and installation of fire protection system was based on Korean standards. Firefighting equipment undergoes monthly check by the subcontractor. The performance test for firefighting equipement is conducted annually.

6.1 Fire Extinguishers

Portable fire extinguishers (total 110units) are easily available throughout the entire site.

[Fire extinguishers]

6.2 Gas Fire Extinguishing System

A total flooding type HFC-125 fire extinguish system is installed in the electric room and control room of the substation. Total 31 bottles are installed in the fire extinguishing agent room of the substation. This system is activated by fire detectors. Emergency manual activation panels are also installed on outside of the protected rooms.

Actuating device units are installed for each extinguishing zone and are managed solenoid valves with the safety pins removed for immediate reaction. The management team measures the amount of agent once a year.

[Agent room]

[Actuating box]

[Emergency manual activation panel]

[Discharge nozzle in the substation]

6.3 Fire detections / Alarms

Heat and smoke detectors, along with manual fire alarm push buttons are provided in the substation. However, there are only manual fire alarm push buttons in the office.

Previously, there was only one P-type fire alarm control panel installed in the fire extinguish agent room of the substation where no one is working. Currently, SEG has installed a new sub P-type fire alarm control panel in the control room of the substation, where the site engineer is stationed. Two fire alarm control panels are interlocked with each other.

[Fire alarm control panel in the agent room]

[Fire alarm control panel in the control room]

6.4 Fire-Fighting Organization

Volunteer fire brigade with employees is organized, and a fire drill is held annually. The fire drill is based on the emergency evacuation scenarios such as fire and gas leak.

The closest public fire brigade to SEG is Jangan 119 Safety Center, located approximately 3.6 kilometers away from the site. They can dispatch fire engines within 11 minutes in case of the fire.

Chapter 7 Management Systems

7.1 Organization & Maintenance

7.1.1 Organization

SEG has four employees; three in the Engineer team and one in the HR team. Additionally, one site engineer from YOUNGJIN, a subcontractor, works on-site. They are working for day-duty. The Engineer Team is related to monitoring for the fuel cell system and operating only auxiliary utilities such as transformers.

7.1.2 Maintenance

Bloom Energy manages all aspects of the operation and maintenance of the fuel cell system. SEG keeps stable workforces of the Bloom Energy who have a number of experiences in overseas plants. Preventive on-site maintenance is periodically performed by them. The regular maintenance is conducted on 10 units at a time, and the total period for 66 units takes about a month to complete.

The governor stations are managed in accordance with the process safety management (PSM) system regulations developed by the Korea Occupational Safety and Health Agency (KOSHA). Spare parts are kept in the storage of the substation and used for the repair or replacement of failed units, such as the fuel cells.

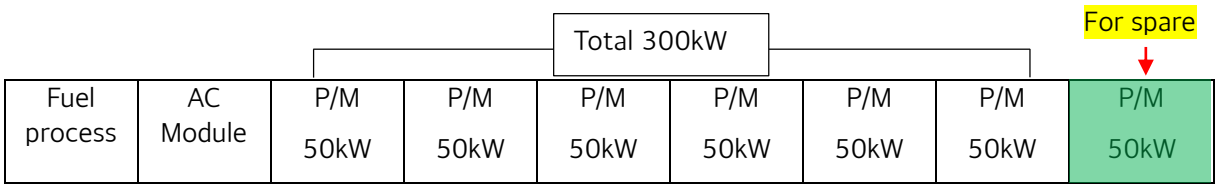
7.1.3 Long Term Service Agreement (LTSA)

There is a Long-Term Service Agreement (LTSA) for the fuel cell with Bloom Energy. The LTSA encompasses remote monitoring and operation system as well as planned maintenance service. Bloom Energy receives the operational signal in real time, and feeds technical support. The duration of the LTSA contract is 20 years.

In addition, SEG has a warranty contract with Bloom Energy regarding the utilization rate and efficiency rate of the fuel cells. The utilization rate and efficiency rate are 95% (with a warranty of 90%) and 56% (with a warranty of 54%), respectively. If these rates do meet the contracted levels, expense compensation for production decreases is provided by Bloom Energy.

7.2 Spare Parts

Spare parts are maintained based on design demands of manufacturer. SGE has total 66 solid oxide fuel cell (SOFC) facilities and its total power generation capacity is 19.8MW (0.3MW x 66 units). One SOFC set consists of six power modules with a capacity of 50kW, and one power module per set is spare. So, SEG has a total of 11 power modules (50kW x 11units) in reserve for spare. Additionally, consumables and critical spare parts for major equipment are procured according to the LTSA schedule.



[Components of SOFC unit]

7.3 Safety

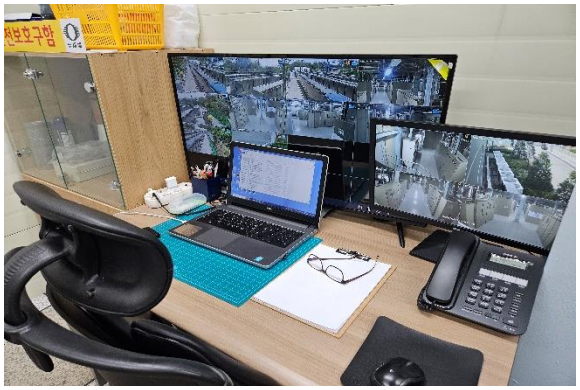
Planned daily maintenance is conducted, and safety education is provided to employees. Also, SEG has emergency evacuation scenarios such as fire and gas leak. They conduct the fire drill based on the scenarios annually.

A formalized work permit system is not applied. In case of hot work such as welding and grinding work, portable fire extinguishers are placed on the worksite. Also, safety education is provided prior to starting any of hot work.

Smoking is permitted only at designated outdoor smoking area in the site. The smoking area is equipped with steel ashtrays. However, there is no fire extinguisher in this area.

7.4 Site Security

There is no security guard in the site. However, an unmanned security system and CCTV cameras are installed throughout the site area. Additionally, steel fences surround the site.

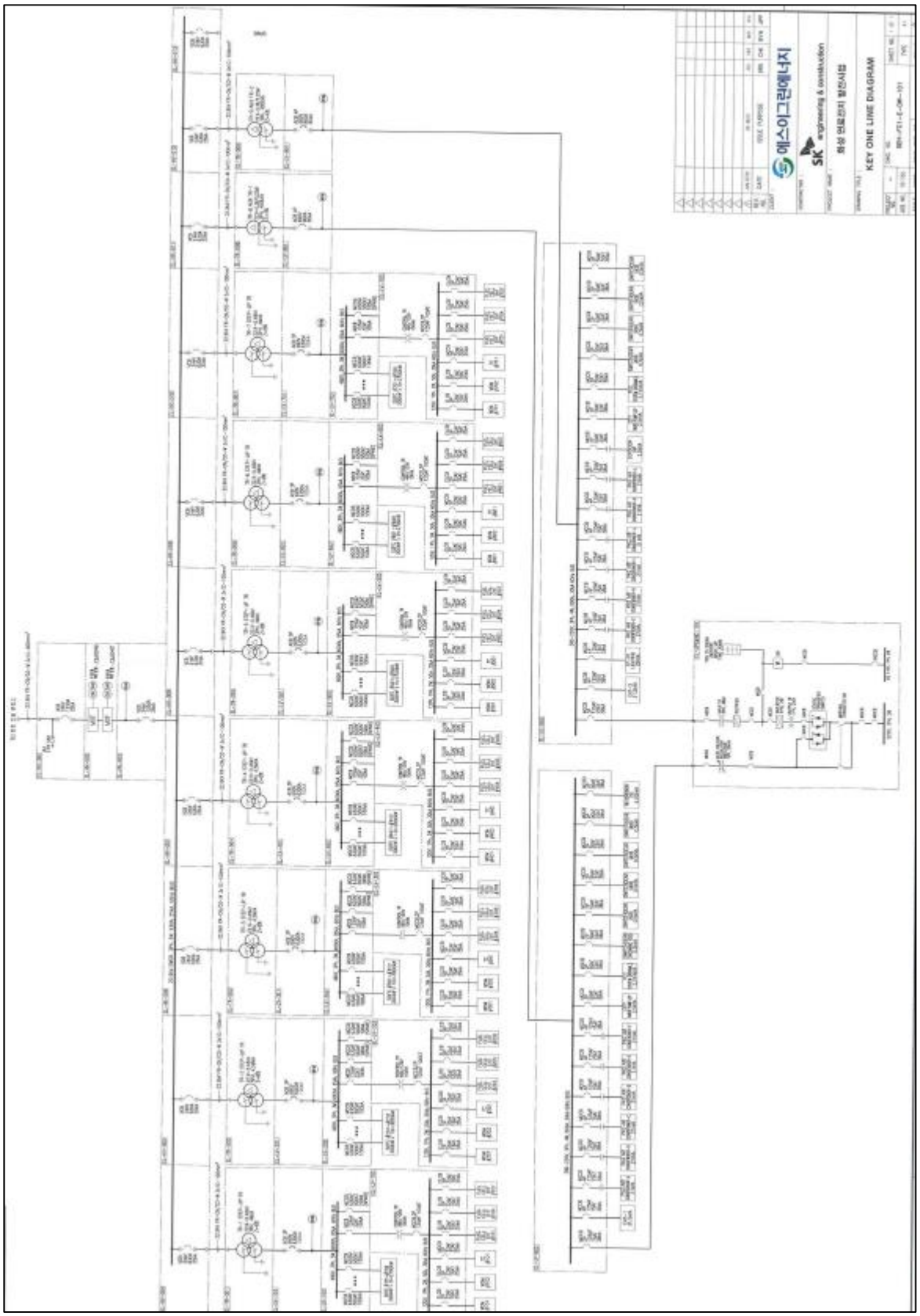


[CCTV monitoring]

Chapter 8 Appendices

8.1 Layout

8.2 Key Single Line Diagram



8.3 Power Transmission Line