

Underwriting Survey Report

Insured Name : Gyeonggi Green Energy
Business : Fuel Cell Power Plant
Survey Date : 2025-05-27 ~ 2025-05-27
Surveyor : Uhm Hae Yong

[Contents]

Summary

1. Construction	page 3
2. Occupancy	page 4
3. Protection	page 6
4. Exposure	page 7
5. Management	page 7

[Attachment]

6. Insured Value	page 8
7. Loss history	page 9
8. On-site photo	page 10
9. Total building list	page 12

Underwriting Survey Report

SUMMARY

► Survey Information

Insured Name	Gyeonggi Green Energy	Business	Fuel Cell Power Plant
Address	77,Barangongdan-ro 3-gil, Hyangnam-eup, Hwaseong-si, Gyeonggi-do, Korea	KFPA No.	
Surveyor	Uhm Hae Yong	KFPA Business	
Survey Date	20250527 ~ 20250527	Note.	

► Loss History

※ For detailed loss history, please refer to [7. Loss History]

No.of losses	0 (Covered : 0 / Non covered : 0)	Maximum Loss		0
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► Insured Value

※ For detailed insured value, please refer to [6. Insured Value]

Category	Currency	PAR	BI	MB	MLOP
Replacement cost	KRW	419,058,544,000	22,266,500,000	374,522,050,000	22,266,500,000
Note.	Others are softwares. BI value is 22,266,500,000 on the policy, 2024, and IP is based on six months.				

► EML

EML Target		1 out of 2 buidings	Building No.	1		
EML Ratio	Combined	43.03 %	PAR	40 %	BI	100 %
EML Amount	Combined	189,889,000,000 WON	PAR	167,623,000,000 WON	BI	22,266,000,000 WON
EML Scenario		Fcell units, electrical building and facilities are damaged by explosion at the fuel cell unit due to leakage of LNG. BI is based on the 2024 policy, and IP is six months. Therefore BI EML is expected as double				

► Risk Grading & Rating

※ This risk rating was evaluated focused on PAR. Check MB&BI rating at [2.Occupancy – MB/BI].

Category	Grading	Rating	Business Avg.	Risk analysis																					
Overall	Average	49.4	56.1	<table><tr><th>Category</th><th>Rating</th><th>Business Avg.</th></tr><tr><td>Overall</td><td>49.4</td><td>56.1</td></tr><tr><td>Construction</td><td>43.9</td><td>57.0</td></tr><tr><td>Occupancy</td><td>53.5</td><td>53.5</td></tr><tr><td>Protection</td><td>50.2</td><td>55.2</td></tr><tr><td>Exposure</td><td>52.5</td><td>61.3</td></tr><tr><td>Management</td><td>47.5</td><td>59.0</td></tr></table>	Category	Rating	Business Avg.	Overall	49.4	56.1	Construction	43.9	57.0	Occupancy	53.5	53.5	Protection	50.2	55.2	Exposure	52.5	61.3	Management	47.5	59.0
Category	Rating	Business Avg.																							
Overall	49.4	56.1																							
Construction	43.9	57.0																							
Occupancy	53.5	53.5																							
Protection	50.2	55.2																							
Exposure	52.5	61.3																							
Management	47.5	59.0																							
Construction	Average	43.9	57.0																						
Occupancy	Average	53.5	53.5																						
Protection	Average	50.2	55.2																						
Exposure	Average	52.5	61.3																						
Management	Average	47.5	59.0																						
※ Risk Grading(Poor : 0~20, Below avg. : 20~40, Abg. : 40~60, Above avg. : 60~80, Excellent : 80~100)																									

Overall	<div>* There are 21 units of fuel cells as MCFC type. 15 units are operated now, and 6 units are under replacement. It is planned in 2026.</div> <div>* Total output capacity is 58.8MW (2.58MW per one unit). Previous LTSA contract was expired on 21, May. It is signed new LTSA contract with FCE to 2033 year. The operation status is monitored and controlled by FCE.</div> <div>* There are two buildings and twenty one units of fuel cell. The office and UT building is constructed of steel and sandwich panel walls(combustible). Electrical building is constructed of concrete structure.</div> <div>* The site is covered by hydrants and portable extinguishers. The electrical building is protected by gaseous flooding system, and main TR is covered by deluge system.</div> <div>* The buidings are detected by smoke and heat detector. Fuel cell units are monitored by gas and flame detectors. TR is monitored by line detectors.</div> <div>* It is surrounded by manufacturing factory and vacant lot. The nearest factory is ubder 5m away from the site. In case of a fire, the fire spreading risk is considered as high.</div> <div>* Natural hazards is classified as LV2, however, typhoon is LV 3.</div> <div>* All inspections related to main utility and process are regularly conducted by ONM company and relevant staffs.</div>
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1. CONSTRUCTION

► Risk Rating of Construction

Category	Grading	Rating	Description
Construction	Average	43.9	* There are two buildings and twenty one units of fuel cell. * The office and UT building is constructed of steel and sandwich panel walls(combustible). * Electrical building is constructed of concrete structure. * The separation distance is insufficient under 10m between fuel cell units and/or building.
Main structure	Below average	32.5	
Building aging	Average	50.0	
Layout	Above average	75.0	
Fire compartment	Average	50.0	
Fire door/shutter	Below average	25.0	

► Location

Topography	Flat	Site area	20,362 m ²	Total floor area	3,128 m ²	Legend
Layout						↔ Distance ○ Utility — Site boundary ① Building No. ② Temporary building ■ EML Target ■ Building connections

► Main Buildings

※ For detailed total buildings, please refer to [9. Total building list]

No.	Risk Zone	Name (Floors)	Year built Building age	Floor area(m ²) Occupancy	Column Fire proof	Outer wall Insulation(OW)	Roof Insulation(R)	Clean room EML Target
1	A	Office & UT	2014	1,820	Steel frame	Combustibles	Sandwich panel	X
		2	11	Utility facilities	No fireproofing	Combustibles	Combustibles	X
2	B	Electrical Building	2014	587	Reinforced Concrete	Reinforced Concrete	Concrete slab	X
		1	11	Utility facilities				O

► Management

Fire compartment	Partially inadequate
Fire door/shutter	Some are inoperable
Clearance	No combustible materials outside of storage areas

2. OCCUPANCY

► Risk Rating of Occupancy

Category	Grading	Rating	Description
Occupancy	Average	53.5	* There are 21 units of fuel cells as MCFC type. 15 units are operated now, and 6 units are under replacement. * Total output capacity is 58.8MW (2.58MW per one unit). * Previous LTSA contract was expired on 21, May. It is signed new LTSA contract with FCE to 2033 year. * The operation status is monitored and controlled by FCE.
Fire load	Below average	30.0	
Equipment	Average	40.1	
Storage	Excellent	100.0	
Operation	Above average	62.5	
MB	Below average	25.0	* Fuel Cell unit could be damaged by long term operation, and it should be imported from USA. * Regarding the utility supply machinery items, Power transforming facilities (i.e. transformers and circuit breakers), and some other utility machinery items are exposed to the machinery breakdown risk. * The imported period is assumed over one year.
BI	Poor	0.0	

► Operation Status

Business status	Operation	Operation rate	44 %	Employees	Total	10	Day	9	Night	1
Established year	2011	Years in business	14	Work Shift	Group	2	Shift	1	Operation hr.	24
Operation year	2014	Years in operation	11	Outsourced	O(Production)				No. of staff	4
Sales	60,800,000,000 KRW			Prod. capa.						

► Products and Raw Materials

Products	Electricity / Heat / REC
Raw material	LNG

► Storage

Main storage	No storage on premises
Yard/Under.	No inventory stored at yard or underground
Amount	One-level storage (Less than 50% of floor area)

► Fire Load

Occupancy class	Extra Hazard 1	Major item	Combustible liquids, flammable vapors/liquids
Process area	No combustibles in process area (except raw material and product)		

► Production Process

Process flow	
Process description	*A type of fuel cell is a MCFCs (Molten carbonate fuel cells) which is operated temperatures around 600°C and use a molten metal carbonate suspended in a porous ceramic matrix for the electrolyte. At the cathode, oxygen and carbon dioxide are converted to carbonate ions, which then move through the electrolyte to the anode and react with hydrogen to produce carbon dioxide and water (steam).
Major hazards	* Explosion at the fuel cell due to leakage of LNG
Safety control	* Operation, Control and monitoring by FCE(Fuel Cell Maker) * Interlock with flame and gas detector

▶ Main Equipment

Equipment		Location	Quantity & Capa.	Classification	Years in use
Fuel Cell Units		Field	21 Units, 58.8MW(2.8MW * 21)	High temperature/high pressure, fire hazard work(welding, cutting, etc.)	Acquired 10 to 15 years ago
Expansion plan	X				
Suspension	O	6 Unit repairment and Replacement			

▶ Utilities

Utility	Location	Quantity & Capa.	Classification	Years in use
Transformer	Electrical Building	50MVA(65MVA) * 2ea	Oil type	Acquired 10 to 15 years ago

▶ Hazardous Material

Materials	Phase	Hazard class	Storage location	Use	Ex.-proof

▶ Management

Hazardous material	Access	N/A
	Management	No hazardous materials
	Explosion proof	Explosion proof equipment is installed adequately
Equipment	Maintenance	Preventive maintenance(TBM or CBM)
	Inspector	Dedicated staffs and external company
	Idle facility	Management in the same way as oprating facilities
	PSM	PSM assessment M grade or not meet requirements of OSHA PSM(D/E grade)
	Response scenario	Established scenario for various hazards including fire/explosion

▶ MB/BI

MB	Inspection	MB risk of main process facility + Preventive maintenance
	Restoration	Overseas repair only
BI	Replacement Period	More than 12 months
	Product inventory	No product inventory (Not included in EML)
	Alternative production	No alternative production

3. PROTECTION

► Risk Rating of Protection

Category	Grading	Rating	Description
Protection	Average	50.2	* The site is covered by hydrants and portable extinguishers. * The electrical building is protected by gaseous flooding system, and main TR is covered by deluge system. * The buildings are detected by smoke and heat detector. Fuel cell units are monitored by gas and flame detectors. TR is monitored by line detectors. * The fire alarm is monitored at the office and ONM staff's offices(Korea and USA).
Auto-extinguishing system	Poor	17.5	
Fire detection	Excellent	100.0	
Fire Water	Above average	66.3	
Management	Average	50.1	
Emergency Response	Average	50.0	

► Fire-fighting Facilities by Major Buildings

※ For detailed Firefighting facilities by building, please refer to [9. Total building list]

No.	Risk Zone	Name	AFD system	Sprinkler	Gas-based	Auto extinguishing	Indoor hydrant	Outdoor hydrant	Additional Information
1	A	Office & UT	O	X	X	X	O	O	
2	B	Electrical Building	O	X	O	X	X	O	Deluge System for TR

► Fire Detection System

Auto fire detection	Installed	Conventional detectors for all buildings and additional flame detectors			
Fire alarm panel	P Type		Special Detector	Installed	Flame detector
Monitoring	24/7 monitoring by professional personnel in FCC			line for TR, Flame and Gas for Fuel Cell,	
Status	Normal operation		Auto. fire notice sys.	Not installed	

► Fire Water Supply System

Fire water		O	Tank	Time	Legally Quantity (Max. 20 min.)	Location	Office & UT Building	Level	Good
Fire pump	Main	O	Motor	Capa.	60HP / 2,000lpm / 70M	Location	Office & UT Building	E.Power	X
	Standby	O	Engine	Capa.	82HP / 2,000lpm / 70M	Location	Office & UT Building	E.Power	O
	Jockey	O	Motor	Capa.	5HP / 60lpm / 70M	Location	Office & UT Building	E.Power	X
Fire water main		Loop type							
Valve condition		Good condition (applying tamper switch)							

► Inspection and Emergency Response

Inspection	Legal & self inspection by external professional	Inspector	Dedicated staffs and external company	
Impairment	Impairment procedure has not been established	Facility condition	In normal operation	
Emergency organization	Self-defense fire brigade	Mutual aid Agreement	N/A	
Training	Annually	Joint training	N/A	

► Public Fire Brigade

Fire brigade	Hwasung Fire Bdirge	ETA	5min. ~ 10min.	
Access road	Good(2 lane road)	Distance	within 10km	

4. EXPOSURE

► Risk Rating of Exposure

Category	Grading	Rating	Description
Exposure	Average	52.5	* It is surrounded by manufacturing factory and vacant lot. The nearest factory is under 5m away from the site. In case of a fire, the fire spreading risk is considered as high. * Natural hazards is classified as LV2, however, typhoon is LV 3.
Natural Hazard	Above average	70.0	
Surrounding	Below average	35.0	

► Surrounding

Category	Surrounding		Exterior wall	Distance
East	General factory or warehouse	BNM	Sandwich panel	Within 5m
West	General factory or warehouse	Daejun F&C	Sandwich panel	Within 5m
South	Vacant lot			15m ~ 20m
North	General factory or warehouse			15m ~ 20m

► Levels of Natural Hazards and Surrounding

	Windstorm and flood Combined	Windstorm and flood by each			Forest fire	Earthquake
		Typhoon	Flood	Tsunami		
LV.	LV.2(Low)	LV. 3	LV. 1	LV. 1	LV.2(200m~800m from forest)	LV.2(EPA 0.08g~0.09g)
Criteria	LV1 (Very low) LV2 (Low) LV3 (Moderate) LV4 (High) LV5 (Very high)	LV1 (MWS 30m/s or less) LV2 (MWS 31~35m/s) LV3 (MWS 36~40m/s) LV4 (MWS 41~50m/s) LV5 (MWS 51m/s or more)	LV1 (No flooded area) LV2 (Depth 0.5m or less) LV3 (Depth 0.6~1.0m) LV4 (Depth 1.0~2.0m) LV5 (Depth 2.1m or more)	LV1 (No flooded area) LV2 (Depth 0.5m or less) LV3 (Depth 0.6~1.0m) LV4 (Depth 1.0~2.0m) LV5 (Depth 2.1m or more)	LV1 (Forest 800m or more) LV2 (Forest 200~799m) LV3 (Forest 30~199m) LV4 (Forest 1~29m) LV5 (Within the forest)	LV1 (EPA 0.07g or less) LV2 (EPA 0.08g~0.09g) LV3 (EPA 0.10g~0.14g) LV4 (EPA 0.15g~0.21g) LV5 (EPA 0.22g or more)

► Vulnerability to Natural Hazard and Response

Vulnerability	* Sandwich panel walls and roof is vulnerable against typhoon.
Response	Equipped with related equipment(Only)

5. MANAGEMENT

► Risk Rating of Management

Category	Grading	Rating	Description
Management	Average	47.5	* All inspections related to main utility and process are regularly conducted by ONM company and relevant staffs. * Smoking is allowed in a designated area. * The site is monitored by CCTV for 24hr and it can be monitored by mobile as well unmanned security system is provided to the site. * Work permit is established on daily base, * The replacement of fuel cell units is conducted during the survey, and it is planned in 2026.
Smoking	Below average	25.0	
Work permit	Average	50.0	
Security	Average	50.0	

► General Management

Smoking		Allowed in designated area within or around the building		
Work permit	Type of work	Various hazardous works including hot work		
	Permit to work	Issued daily		
	Hot work management	Pre-training, fire watch during hot work		
Security	Access	Access control during day or night time only	Patrol	N/A
	Unmanned security	Installed throughout the site	Fence	Higher than 2m perimeter fence with CCTV
	Security guard	Unmanned security system or 24/7 security guard	CCTV	Installed and mobile monitoring
Safety	Activities	Regular activity		
	Budget	Established and executed annually		
	Organization	Dedicated safety management organization		
	Education	For regular employees only		

6. INSURED VALUE

Section	Type	Currency	Replacement cost	Actual cash value	Insurable value
PAR	Building	KRW	4,933,371,000	0	0
	Structure	KRW	39,290,370,000	0	0
	Machinery	KRW	374,522,050,000	0	0
	Tools	KRW	0	0	0
	Vehicles	KRW	0	0	0
	Fix. & Fur.	KRW	255,466,000	0	0
	Inventory	KRW	0	0	0
	Attachment	KRW	0	0	0
	Construction in progress	KRW	0	0	0
	Others	KRW	57,287,000	0	0
Total			419,058,544,000	0	0
MB	Machinery Breakdown	KRW	374,522,050,000	0	0
BI	Business Interruption	KRW	22,266,500,000	0	22,266,500,000
MLOP	Machinery Loss Of Profit	KRW	22,266,500,000	0	22,266,500,000
Note.	Others are softwares. BI value is 22,266,500,000 on the policy, 2024, and IP is based on six months.				

7. LOSS HISTORY

No.	Description						
1	Date		Loss amount		KRW	Insurance	
	Type of loss		Cause of loss				
	Details						
	Countermeasure						

8. ON-SITE PHOTO



01 Office & UT Building



02 Electrical Building



03 Fuel Cell Units



04 Flame Detector for FCU



05 Gas Detector for FCU



06 LNG Governor



07 Main TR



08 Deluge Controller for TR



09 Fire Detection and Protection for Main TR



10 Electrical Panels



11 UPS



12 Gaseous Flooding System Bottles



13 Gaseous Flooding System for Electrical Room



14 Fire Pumps



15 Monitoring Room on 2F



16 LOTO Station

9. TOTAL BUILDING LIST

No.	CONSTRUCTION								PROTECTION				
	risk zone	Name	Year built	Floor area(mi)	Column	Outer wall	Roof	Clean room	AFD system		Gas-based	In.hydrant	Additional Information
		(Floor)	Building age	Occupancy	Fireproof	Insulation(OW)	Insulation(R)	EML Target	Sprinkler		Auto-extinguishing	Out.hydrant	
1	A	Office & UT	2014	1,820	Steel frame	Combustibles	Sandwich panel	X	O		X	O	
		2	11	Utility facilities	No fireproofing	Combustibles	Combustibles	X	X	%	X	O	
2	B	Electrical Building	2014	587	Reinforced Concrete	Reinforced Concrete	Concrete slab	X	O		O	X	Deluge System for TR
		1	11	Utility facilities				O	X	%	X	O	

► Construction Note.

Note.	Main facilities are 21 units of fuel cells.
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