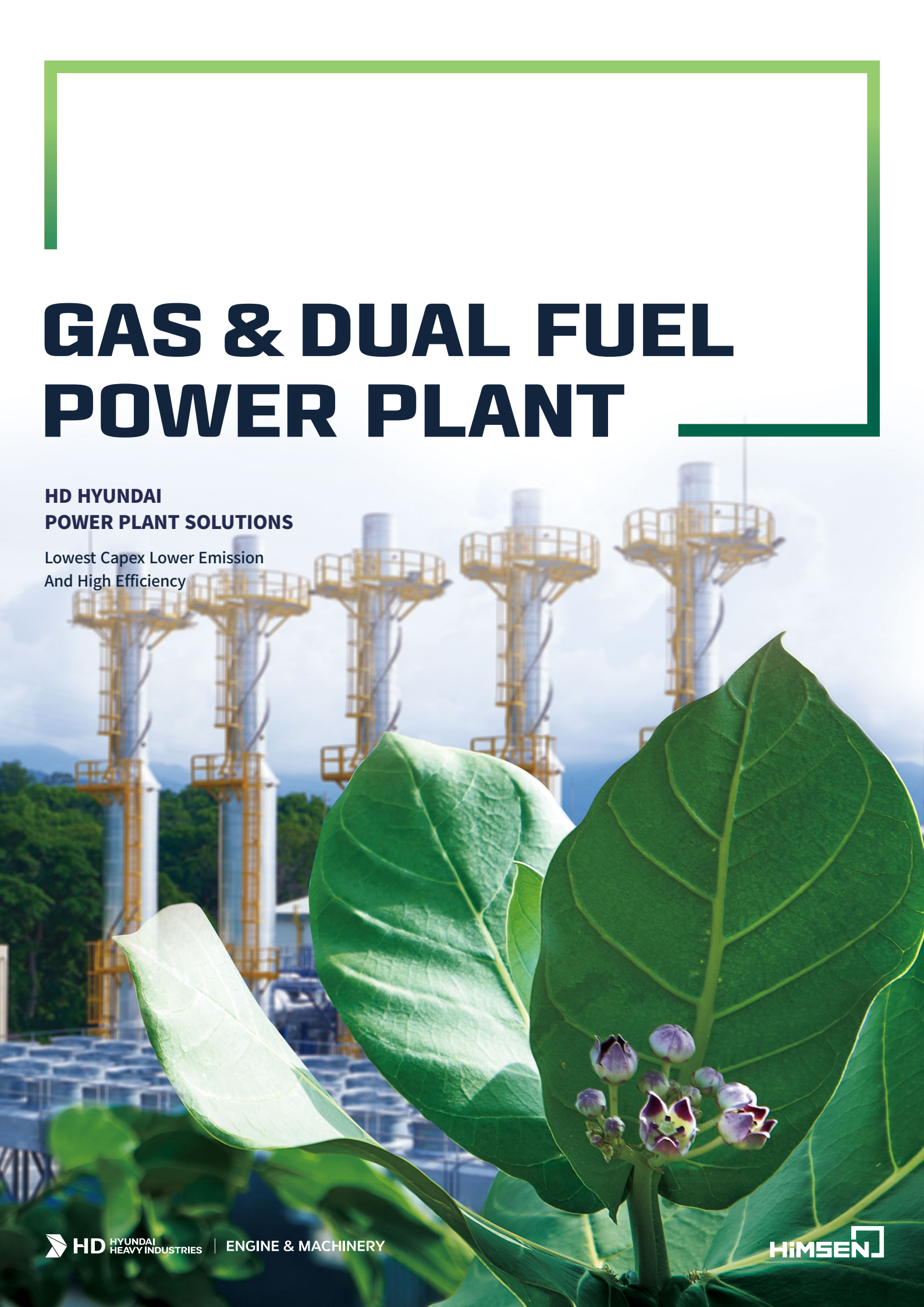
GAS & DUAL FUEL POWER PLANT

HD HYUNDAI POWER PLANT SOLUTIONS

Lowest Capex Lower Emission
And High Efficiency



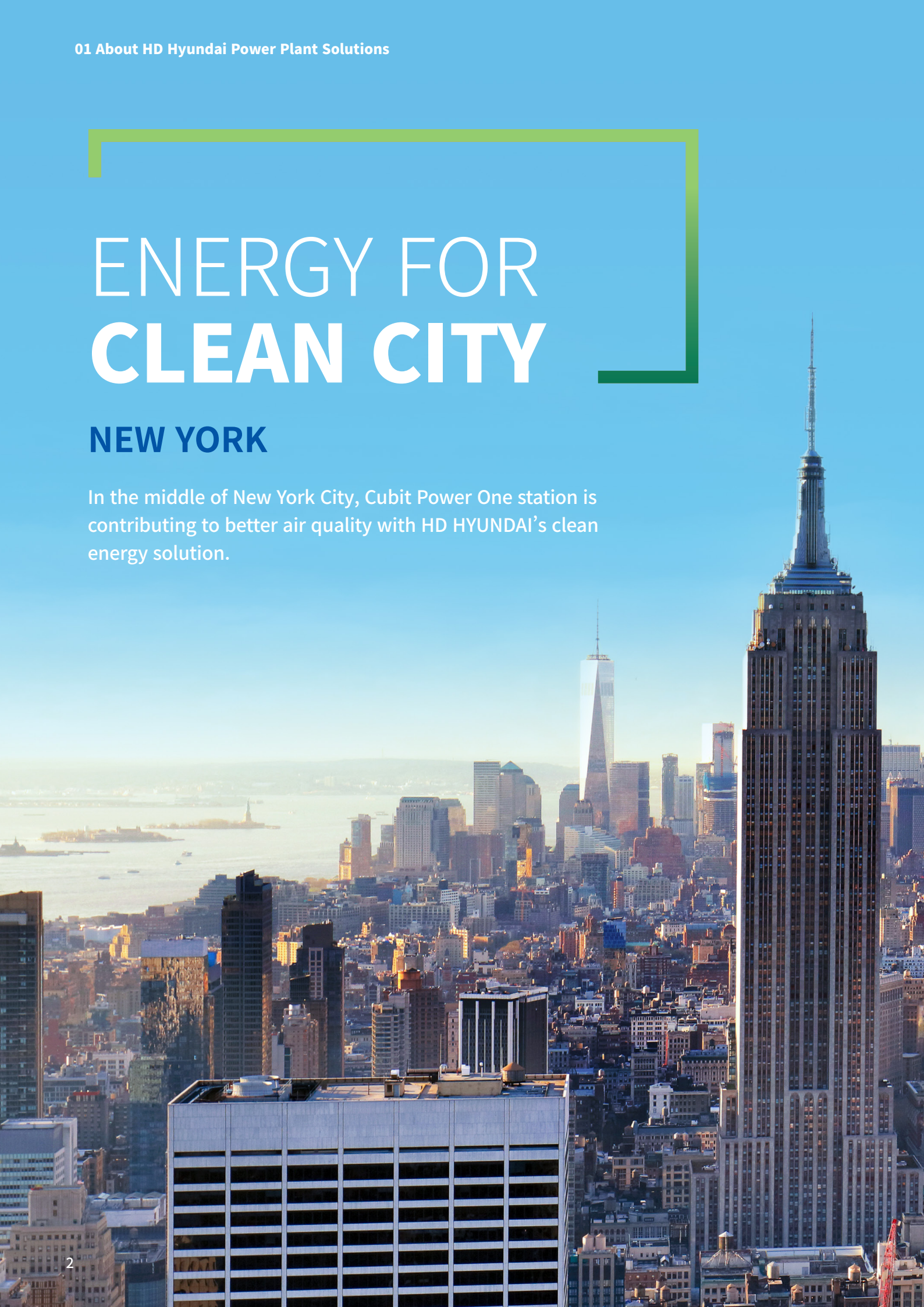
HD HYUNDAI HEAVY INDUSTRIES | ENGINE & MACHINERY

HiMSEN

ENERGY FOR **CLEAN CITY**

NEW YORK

In the middle of New York City, Cubit Power One station is contributing to better air quality with HD HYUNDAI's clean energy solution.



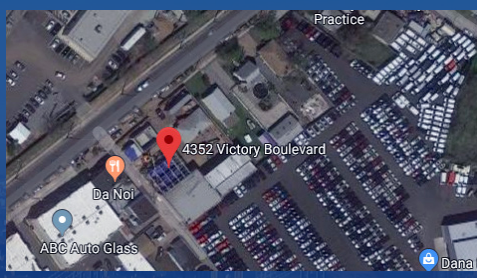
Gas Engine Power Plant

CHP System

Reduce Emission

High Efficiency

The Cubit Power One adopted HD HYUNDAI's 11MW gas engines(12H35/40GV x 2sets) help reducing air pollution with SCR(Selective Catalytic Reduction) and improving high efficiency with CHP(Combined Heat & Power) system. The Cubit Power One station has shown remarkable performances in stable electric power supply regardless of hot and humid summer and heavily snowing winter in Staten Island.



The power plant is 1 hour away from JFK

KEY FIGURES

Total Output	11MW
Customer	Cubit Power One
Operating Mode	Base Load
Gensets	12H35/40GV x 2sets
Fuel	Natural Gas
Scope	Genset
Delivered	2018.05

Scope Of Supply

1. Power house
2. HAM & EGM unit
3. Engine
4. Exhaust gas boiler
5. Exhaust gas silencer & Stack
6. Cooling radiator
7. Fuel tank farm
8. Water tanks
9. Fire fighting house
10. Purifier & Pump house
11. Substation
12. Workshop/Warehouse
13. Administration building
14. Electrical & Control building
15. Step-up transformer
16. Guard house

* HAM : HiMSEN Aux. Module
EGM : Exhaust Gas Module


11
8
9
15
7
10
2
3
EPC
Engineering
Procurement
Construction
Engineering
(Basic + Detail)
Bulk
Materials
Equipment
Supply

HD HYUNDAI'S GAS & DUAL FUEL POWER PLANT

"HD HYUNDAI's gas and dual fuel power plant ensures not only safety of the power plant but also eco-friendly environment. HD HYUNDAI's dual fuel power plant creates added value through offering true flexibility in fuel selection and in our ability to respond to various operational demands."

Safe System

When using gas as the power source, safety is a crucial issue. The control/safety systems and sensors created by HD HYUNDAI, are installed and prepared for safe gas operation.

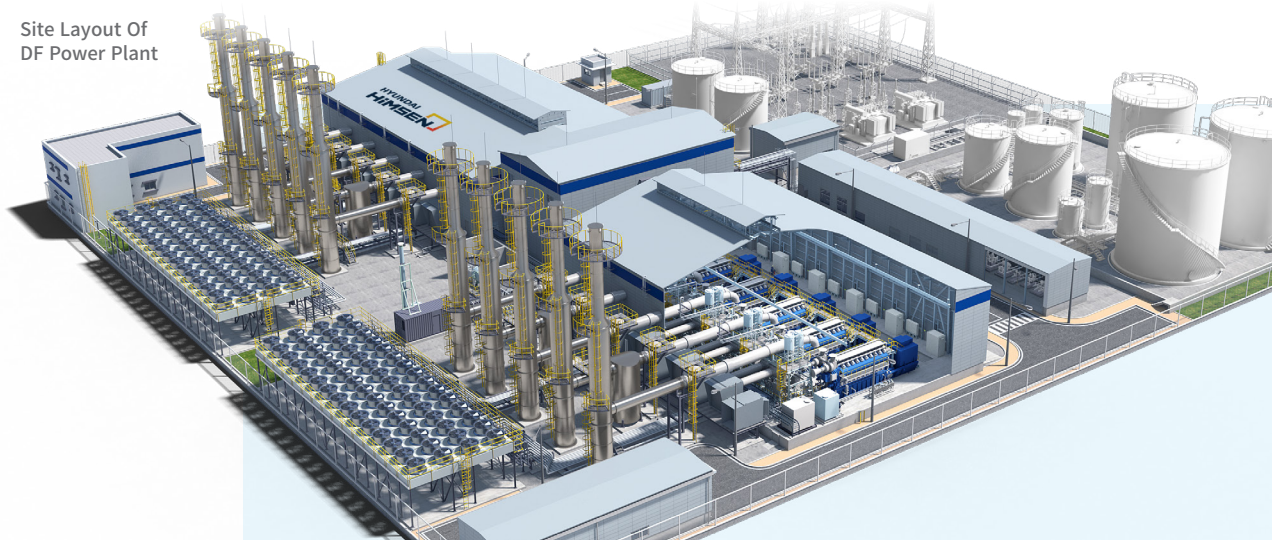
Eco-friendly

The gas/dual fuel power plant has the advantage of reducing the emission rate.
HD HYUNDAI's gas engines are credible for its low NOx emission rate, smoke-less operation range, low vibration, and less noise.

Flexible Fuel Support For Dual Fuel

The dual fuel power plant offers total fuel flexibility.
When gas operation is interrupted or gas shortage occurs, the system switches to diesel fuel operation seamlessly and swiftly.

Site Layout Of
DF Power Plant



Who Is It For?

- For those who are looking for efficient and economical power plant.
- For those who want to follow environmental regulations.
- Duel fuel is often used for places where there is unstable gas supply and diesel can be used for backup.

Why Are They Good?

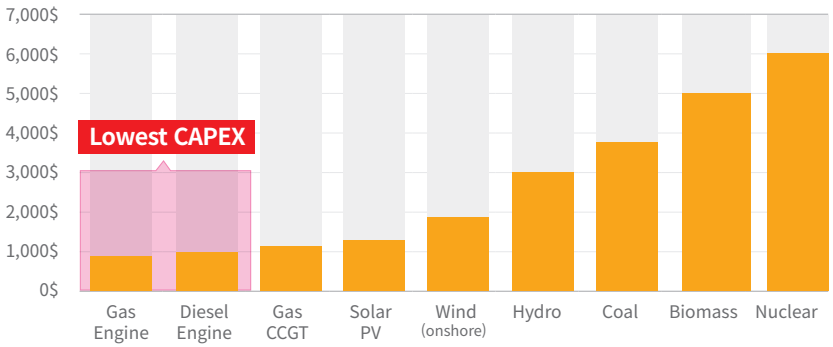
1. LOWER EMISSION

Gas engines have lower emission rates and high efficiency in energy production.
As emission regulations become stricter, gas operation has advantages such as low NOx / CO2, and no SOx / Particle emissions.

2. ECONOMICAL

Gas engines are one of the most economical options in the various power sources.
The operation and maintenance costs are especially lower than other power plant running on different fuels.

CAPEX For Various Power Sources



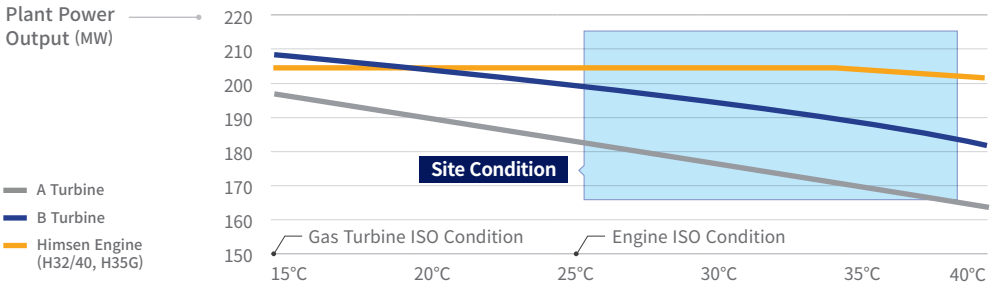
3. QUICK START TIME

Gas engines have a shorter start time compared with gas turbines. It takes 15 to 40 minutes for turbines to start, whereas gas engine only takes 2 to 7 minutes.

4. STABLE POWER OUTPUT

Gas engines are able to operate more stable than gas turbine under different ambient temperatures. While turbine power plant shows around 10% derating, gas engine power plant shows only 1% derating. Gas Turbine is also more sensitive at part load.

Ambient Temperature Impact To Gas Turbine & Engine Plant Output



Case ① : GPP

B1
25MW GPP
Iran

The most efficient power plant in the country

The 25MW gas engine power plant in Beshel Industrial Park in the north of Iran is the most efficient plant in the country.
It has the capacity of generating 25MW of electricity for increasing the stability of the grid in the North of Iran.

Total Output	25MW
Customer	BNB
Operating Mode	Base load
Gensets	18H35/40GV x 3sets
Fuel	Natural Gas
Scope	Genset + Equipment
Delivered	2013

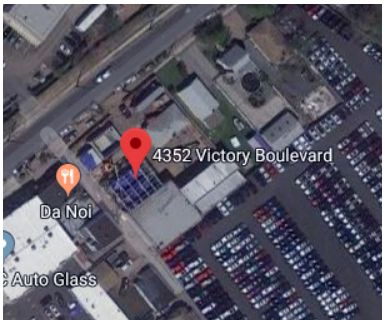
Case ② : GPP

CUBIT
11MW GPP
New York

Eco-friendly and High efficiency power plant

The Cubit Power One adopted HD HYUNDAI's 11MW gas engines(12H35/40GV x 2sets) help reducing air pollution with SCR(Selective Catalytic Reduction) and improving high efficiency with CHP(Combined Heat & Power) system. The Cubit Power One station has shown remarkable performances in stable electric power supply regardless of hot and humid summer and heavily snowing winter in Staten Island.

Total Output	11MW
Customer	Cubit Power One
Operating Mode	Base load
Gensets	12H35/40GV x 2sets
Fuel	Natural Gas
Scope	Genset
Delivered	2018



Case ③ : GPP Enclosure

Brezhnev 12MW GPP **Russia**

Extreme cold condition power plant

This is for IPP project to supply electric power in Kamaz factory.
To catch customer's short delivery time, HD HYUNDAI recommended to use enclosure type power plant and provided full technical support for engineering.
Under HD HYUNDAI's full technical supports, it was successfully constructed within 12 months after the contract.

Total Output	12MW
Customer	NG ENERGO
Operating Mode	Base load
Gensets	9H35/40G x 3sets
Fuel	Natural Gas
Scope	Genset
Delivered	2016

Case ④ : DFPP

Termonorte 93MW DFPP **Colombia**

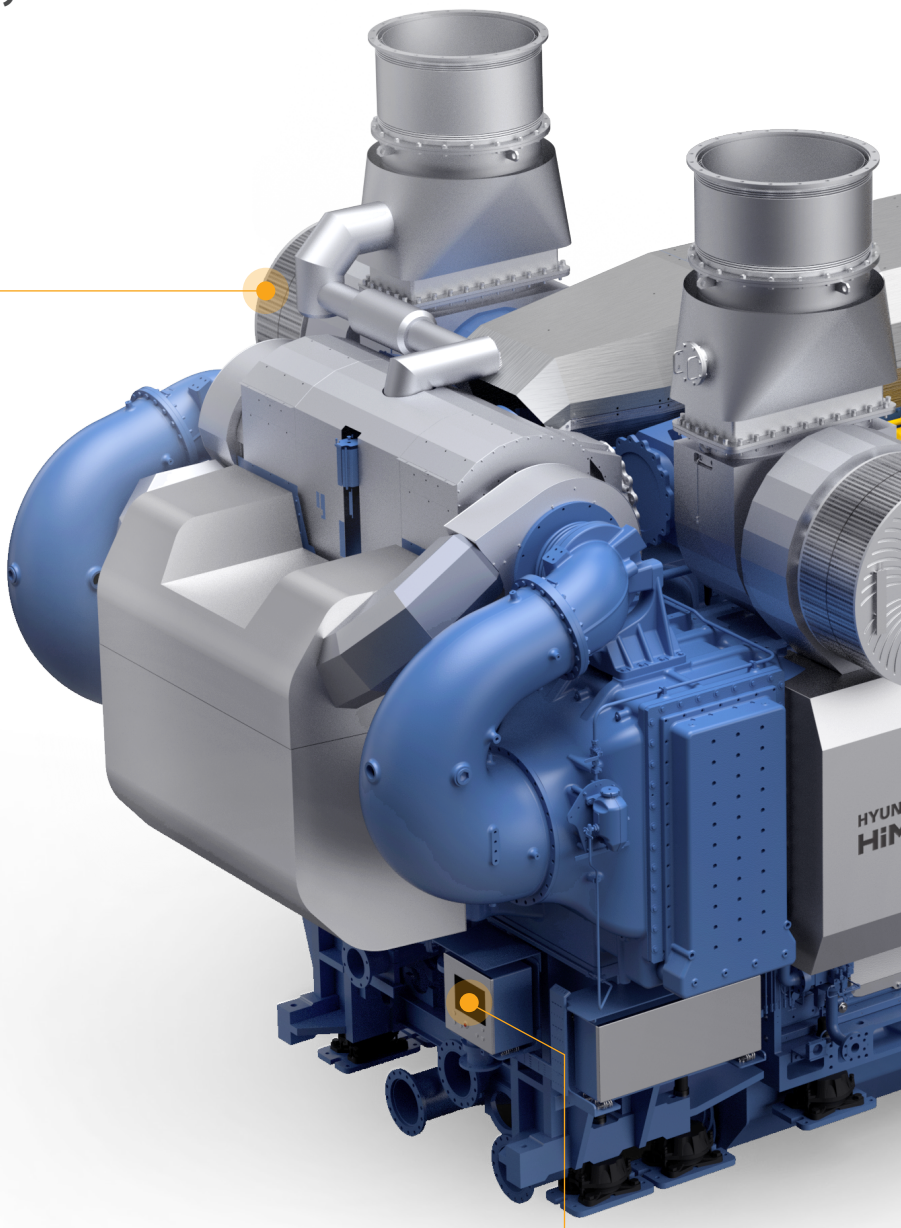
The biggest dual fuel engine power plant in Colombia

In February 2017, HD HYUNDAI received an order from TERMONORTE S.A.S E.S.P., for engineering, procurement and construction. The contract consists of 10 sets of HiMSEN dual fuel engine generator to supply continuous power to national grid in Colombia, South America.
The power plant was handed over in November 2018 to the customer and is currently under commercial operation.

Total Output	93MW
Customer	TERMONORTE
Operating Mode	Base load
Gensets	20H35DFV x 10sets
Fuel	Natural Gas, Diesel Oil, Heavy Fuel Oil
Scope	EPC
Delivered	2018.11

MAKING YOUR POWER PLANT WITH THE LATEST TECHNOLOGY

HD HYUNDAI DF Engine, H54DFV



Two-Stage T/C System 1

High efficiency and no derating even for sites with high ambient temperature and altitude

Extreme miller cycle, Two-stage T/C

- Advanced IVC
- Effective compression ratio
- Higher Engine efficiency
- Decreased NOx emission

General Info

Bore/Stroke

540/600mm

EFFICIENCY _TSTC

50.8%

OUTPUT RANGE

16.8~22.4MWm

* TSTC : Two Stage Turbo Charger
SSTC : Single Stage Turbo Charger

Control System 5

Safe and optimal engine operation

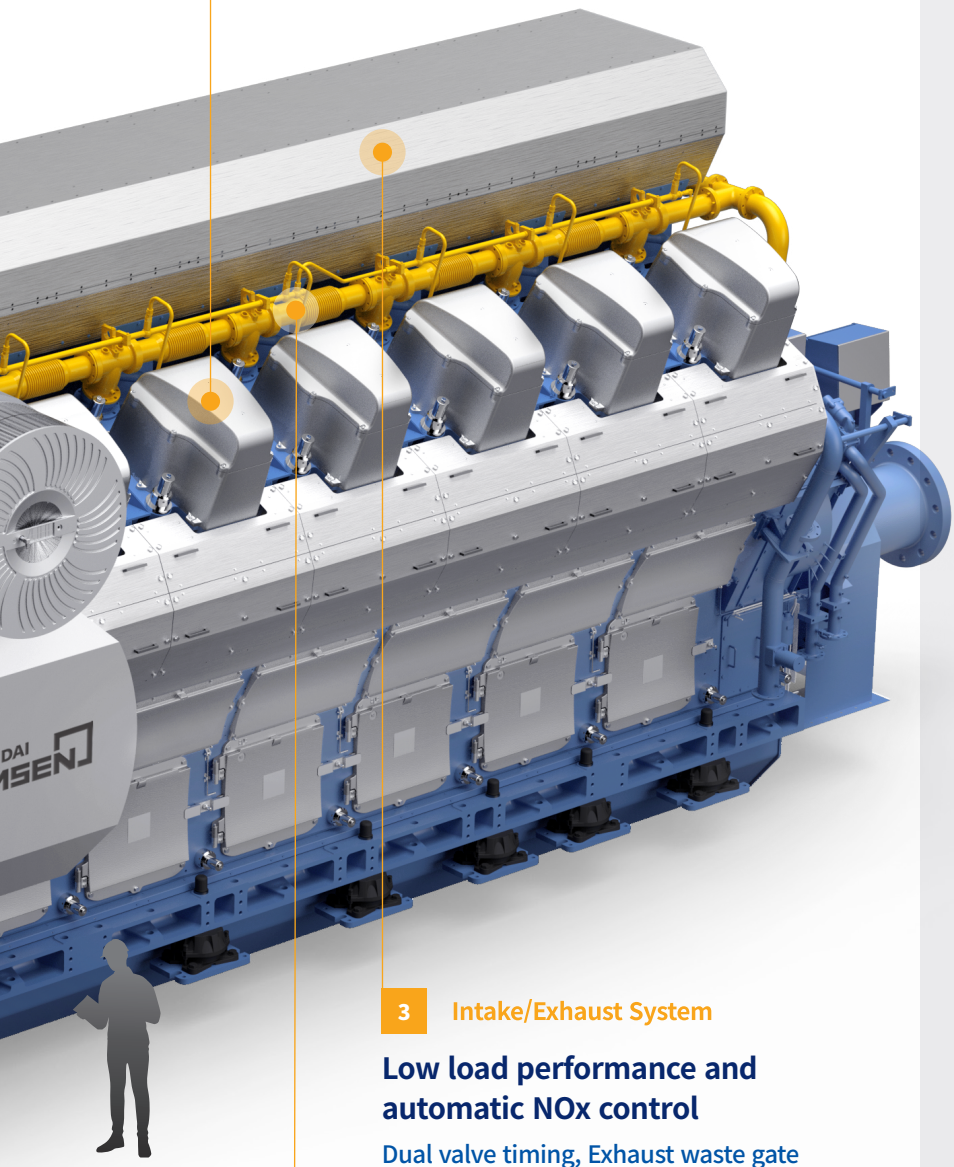
HI-MECS, Cylinder balancing, Knock control

2 Combustion System

High power and efficiency

MP/Main injector, Piston bowl, Gas/Diesel combined simulation

- Output / Cylinder : 1400kWm
- Engine Cycle : 4-stroke
- Bore : 540/600mm
- Engine Speed : 600rpm



3 Intake/Exhaust System

Low load performance and automatic NOx control

Dual valve timing, Exhaust waste gate

4 Gas Supply System

Even mixture distribution & Low knocking

Gas mixer optimization, Port flow CFD

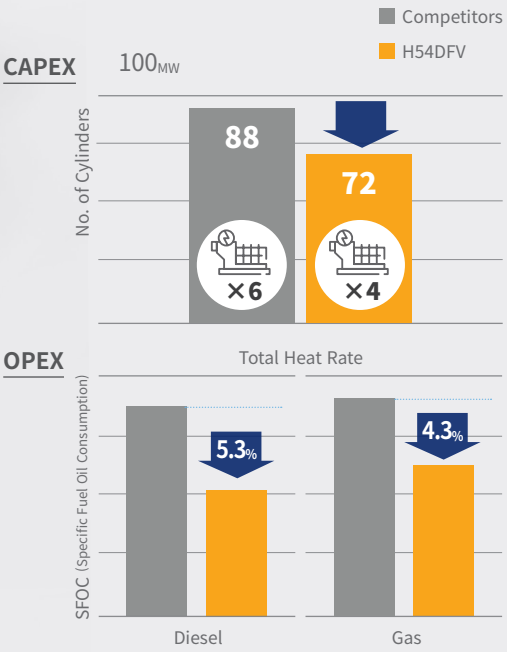
BENEFITS FOR YOU

- **Steady Performance**
  One of the major important factors of an engine is its consistancy in performance. HiMSEN engine's professional engineering can assure stable power output even after many years.

- **Easy Maintenance**
  HD HYUNDAI engines are thoughtfully modularized for easy maintenance. Many O&M managers working on HD HYUNDAI's power plant comment that the intuitive and stable engine design makes the site easier to be operated. Also, the pipeless design can prevent deformations.

- **Eco-friendly**
  HiMSEN engines have been designed with the environmental issues in mind. HD HYUNDAI always looks for various ways to protect the environment. Low NOx emissions / Smokeless at whole operation range / Low vibration & noise.

- **High Efficiency**



MODULAR DESIGN

‘FASTER, EASIER, AND EVEN BETTER.’

Compared with traditional design, HD HYUNDAI's prefabricated modules shorten and simplify the procurement and installation process, even with lower price.

TIME SAVING

Enable to reduce 5 to 6 months of time in planning and construction.

Planning

-3 months

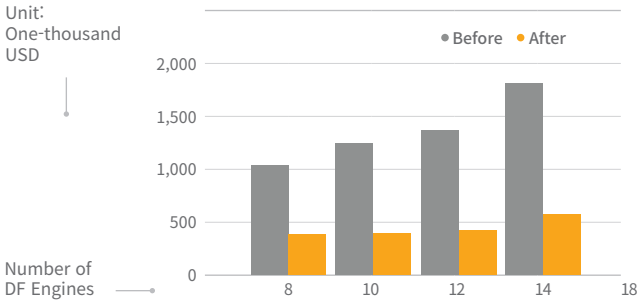
• For 10(Ten) 20H35DF Engines

Construction

-2 months

• For Engines Inside DG Building + Aux.Equipment + Piping

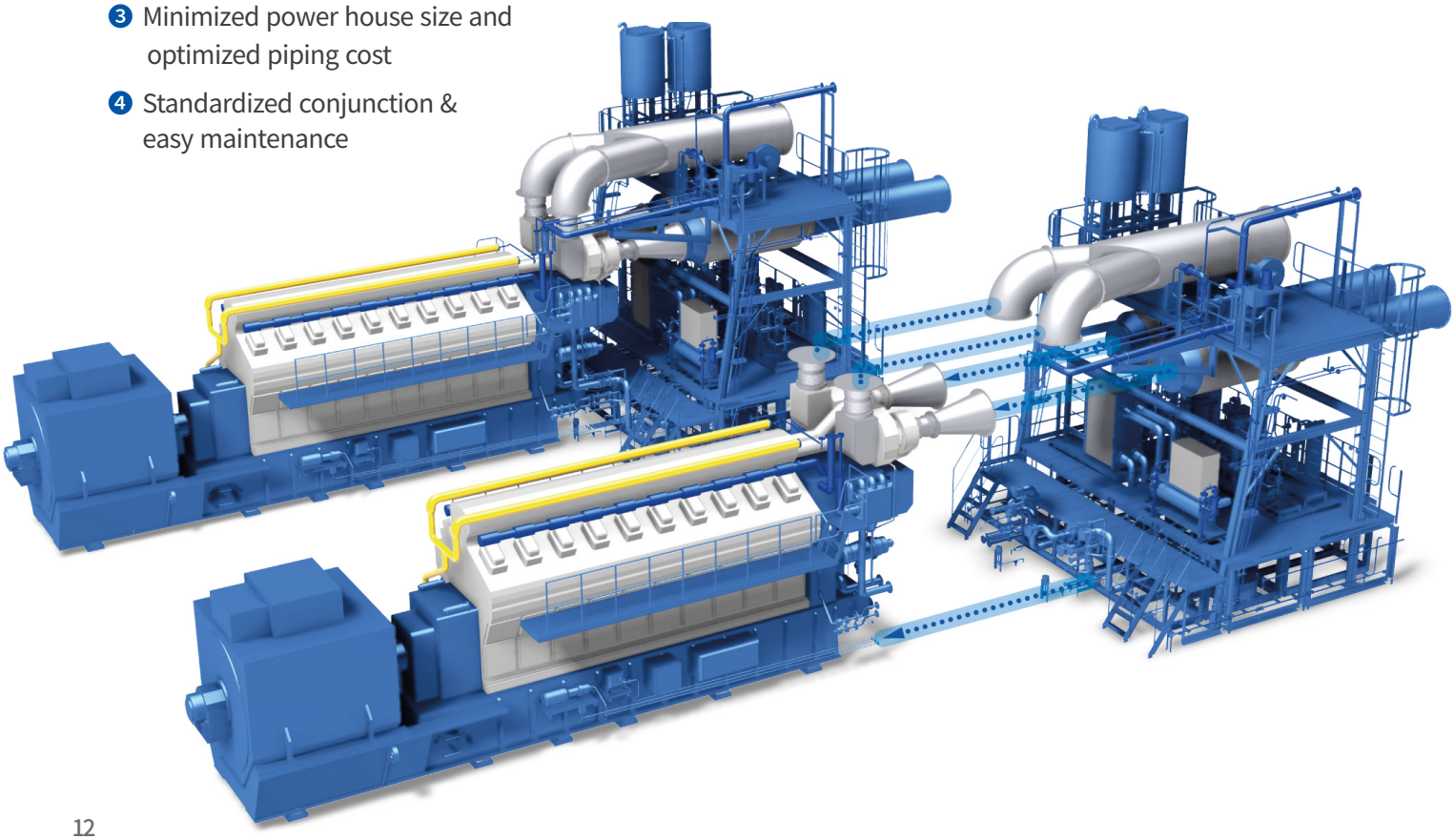
COST SAVING



∗ The estimated numbers are for cases where there are IPP/EPC contracts (DF Engine), and it may differ among countries.

HiMSEN Aux. Module(HAM)

1. Faster and simple construction on site
2. Consistent control
3. Minimized power house size and optimized piping cost
4. Standardized conjunction & easy maintenance

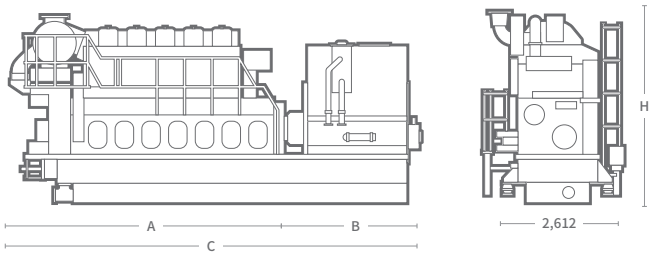


HiMSEN Engine Line-up for Stationary Gensets

'HiMSEN'® is the registered brand name of HD HYUNDAI's own design engine and the abbreviation of 'Hi-touch Marine & Stationary ENgine'.

Gas Fuel

H35G Bore: 350mm Stroke: 400mm

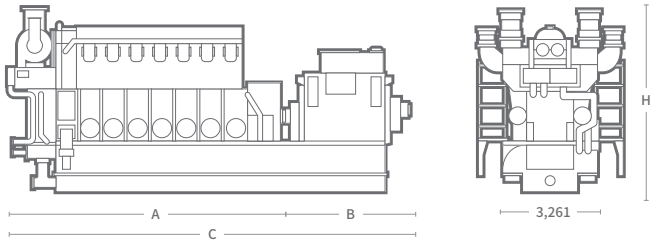


Main Data

Speed	720rpm		750rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
6H35/40G	2,880	2,764	3,000	2,880	5,760	3,130	8,890	3,959	33.7	68.6
7H35/40G	3,360	3,225	3,500	3,360	6,112	3,374	9,486	4,130	38.6	77.1
8H35/40G	3,840	3,705	4,000	3,860	6,602	3,594	10,196	4,130	41.5	82.0
9H35/40G	4,320	4,168	4,500	4,342	7,092	4,097	11,189	4,130	44.6	89.1

Based on alternator efficiency of 96~96.5%.

H35/GV Bore: 350mm Stroke: 400mm

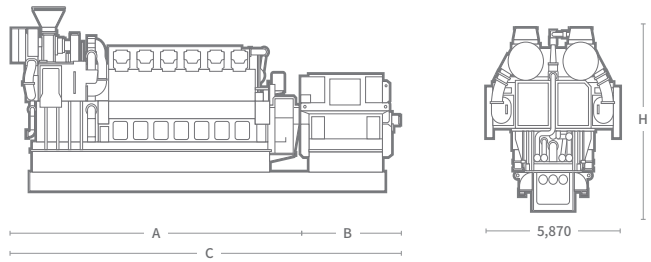


Main Data

Speed	720rpm		750rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H35/40GV	5,760	5,558	6,000	5,790	6,624	3,760	10,384	4,723	56.0	108.8
14H35/40GV	6,720	6,518	7,000	6,790	7,295	3,860	11,155	4,723	63.3	121.3
16H35/40GV	7,680	7,449	8,000	7,760	7,914	3,479	11,393	4,723	69.1	130.9
18H35/40GV	8,640	8,380	9,000	8,730	8,585	3,859	12,444	4,794	76.3	141.2
20H35/40GV	9,600	9,312	10,000	9,700	9,344	3,659	13,003	4,794	84.0	153.9

Based on alternator efficiency of 96.5~97%.

H54GV Bore: 540mm Stroke: 600mm



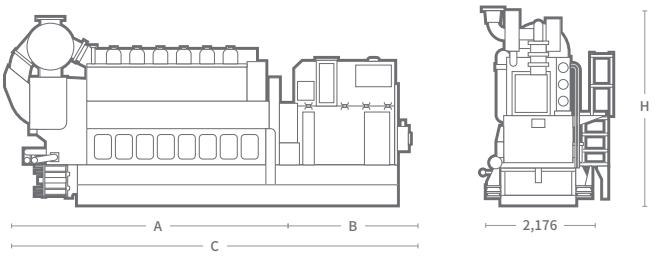
Main Data

Speed	600rpm		600rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H54GV TSTC [1]	16,800	16,380	16,800	16,380	12,511	4,638	17,149	7,994	294.0	381.0
14H54GV TSTC	19,600	19,110	19,600	19,110	13,661	4,582	18,243	7,994	324.0	421.0
16H54GV TSTC	22,400	21,840	22,400	21,840	15,086	4,757	19,843	8,383	361.1	467.0

Based on alternator efficiency of 97.5%.
1)TSTC : Two Stage Turbo Charger

Dual Fuel

H27DF Bore: 270mm Stroke: 330mm

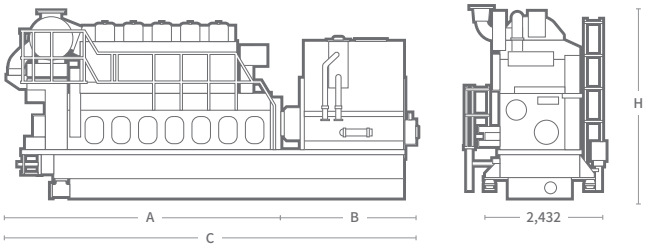


Main Data

Speed	900rpm		1,000rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
6H27DF	1,710	1,624	1,860	1,767	4,414	2,262	6,676	2,835	21.2	30.8
7H27DF	1,995	1,905	2,170	2,072	4,794	2,262	7,056	3,241	23.5	34.9
8H27DF	2,280	2,177	2,480	2,368	5,311	2,340	7,651	3,371	25.1	40.5
9H27DF	2,565	2,462	2,790	2,678	5,691	2,490	8,181	3,371	27.2	46.0

Based on alternator efficiency of 95~96%.

H35DF Bore: 350mm Stroke: 400mm

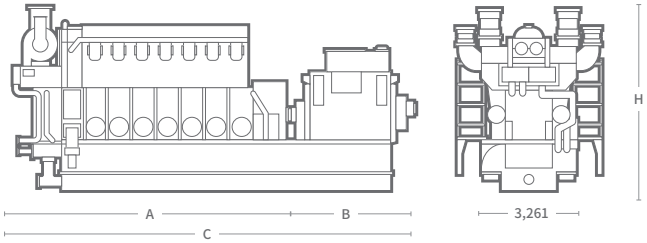


Main Data

Speed	720rpm		750rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
6H35/40G	2,880	2,764	2,880	2,764	5,760	3,130	8,890	4,367	34.7	69.6
7H35/40G	3,360	3,225	3,360	3,225	6,112	3,374	9,486	4,583	39.6	78.1
8H35/40G	3,840	3,705	3,840	3,705	6,602	3,594	10,196	4,583	42.5	83.0
9H35/40G	4,320	4,168	4,320	4,168	7,092	4,097	11,189	4,583	45.6	90.1

Based on alternator efficiency of 96~96.5%.

H35DFV Bore: 350mm Stroke: 400mm

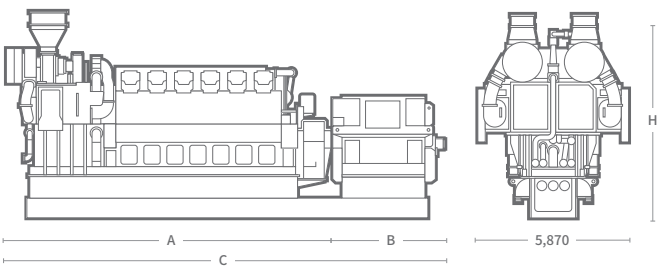


Main Data

Speed	720rpm		750rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H35DFV	5,760	5,558	5,760	5,558	6,624	3,760	10,384	4,723	58.0	110.8
14H35DFV	6,720	6,518	6,720	6,518	7,295	3,860	11,155	4,723	65.3	123.3
16H35DFV	7,680	7,449	7,680	7,449	7,914	3,479	11,393	4,723	71.1	132.9
18H35DFV	8,640	8,380	8,640	8,380	8,585	3,859	12,444	4,794	78.3	143.2
20H35DFV	9,600	9,312	9,600	9,312	9,344	3,659	13,003	4,794	86.0	155.9

Based on alternator efficiency of 96.5~97%.

H54DFV Bore: 540mm Stroke: 600mm



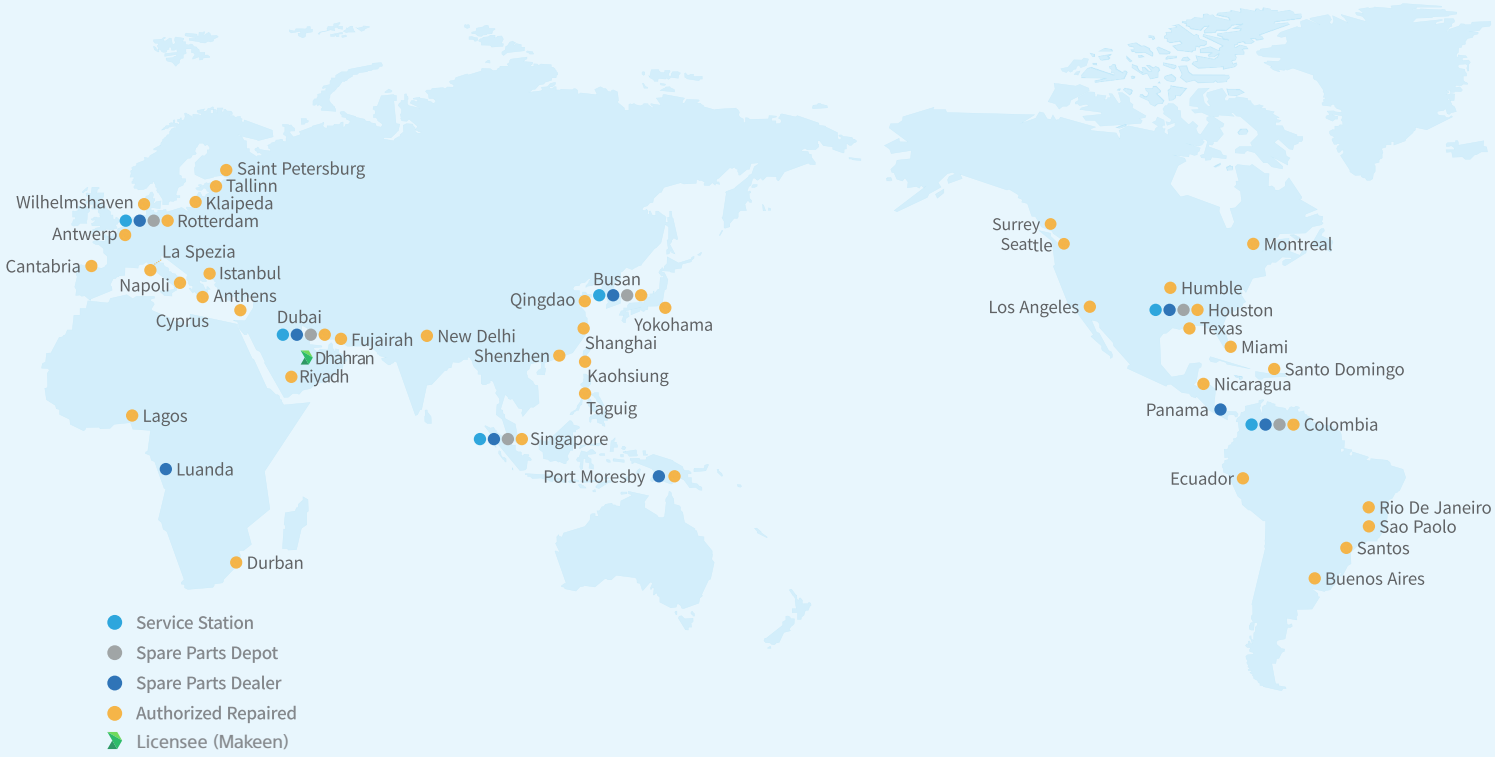
Main Data

Speed	600rpm		600rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H54DFV TSTC [1)]	16,800	16,380	16,800	16,380	12,511	4,638	17,149	7,994	303.0	391.0
14H54DFV TSTC	19,600	19,110	19,600	19,110	13,661	4,582	18,243	7,994	335.0	431.0
16H54DFV TSTC	22,400	21,840	22,400	21,840	15,086	4,757	19,843	8,383	373.0	480.0

Based on alternator efficiency of 97.5%.
1)TSTC : Two Stage Turbo Charger

RELIABLE & POWERFUL SUPPORT AROUND THE WORLD

- Optimized Solutions For Each Customer's Needs
- Genuine Spare Parts From The Original Equipment Manufacturer
- Fast and Reliable Response Through Our Global Service Network
- 24/7, Immediate Support



Contact Us

Power Plant

Engine Power Plant Sales Department
1000, Bangeojinsunhwan-doro, Dong-gu, Ulsan, Korea
(Zip Code: 44032)
Tel +82.2.479.6084 **E-mail** hi_pin@hd.com

Customer Service

HD Hyundai Global Service Co. Ltd
477, Bundangsuseo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
HD Hyundai Group Global R&D Center(Zip Code : 13553)
Tel +82.2.479.9912 **E-mail** powerplant@hd.com

Korean-English 24/7 Call Center
Tel +82.70.8670.1122

HYUNDAI HiMSEN

Global Leader
www.hyundai-engine.com