POWER PLANT SOLUTIONS 2020

HYUNDAI
POWER PLANT SOLUTIONS

For the Energy Needs of
Today and Tomorrow

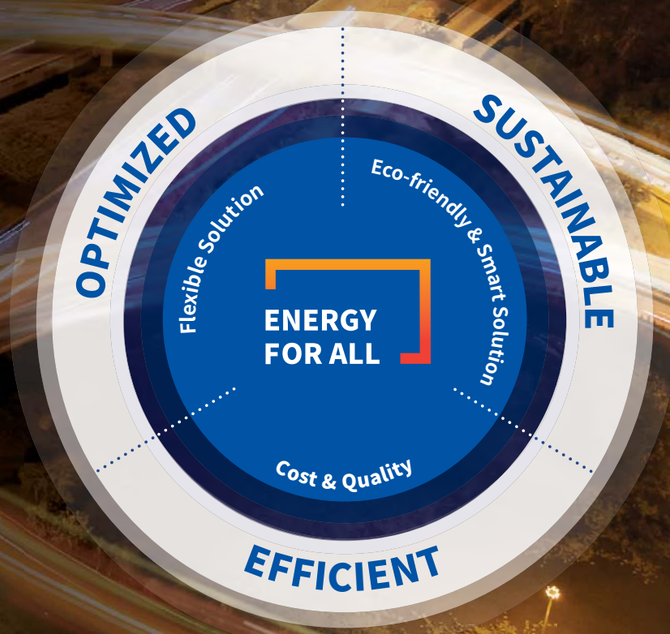
HYUNDAI HEAVY INDUSTRIES | ENGINE & MACHINERY

HiMSEN

HYUNDAI HEAVY INDUSTRIES | ENGINE & MACHINERY

ENERGY FOR ALL

The most reliable and economical power plant
Providing clean, optimized energy solutions to places and people in need
We light up around the world, so no one is left behind the dark.



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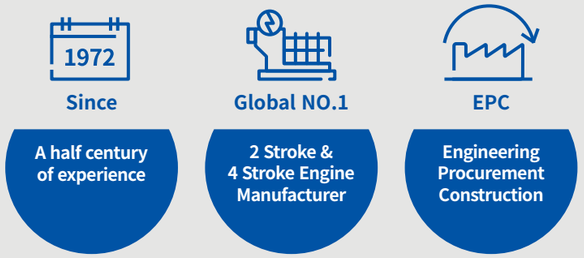
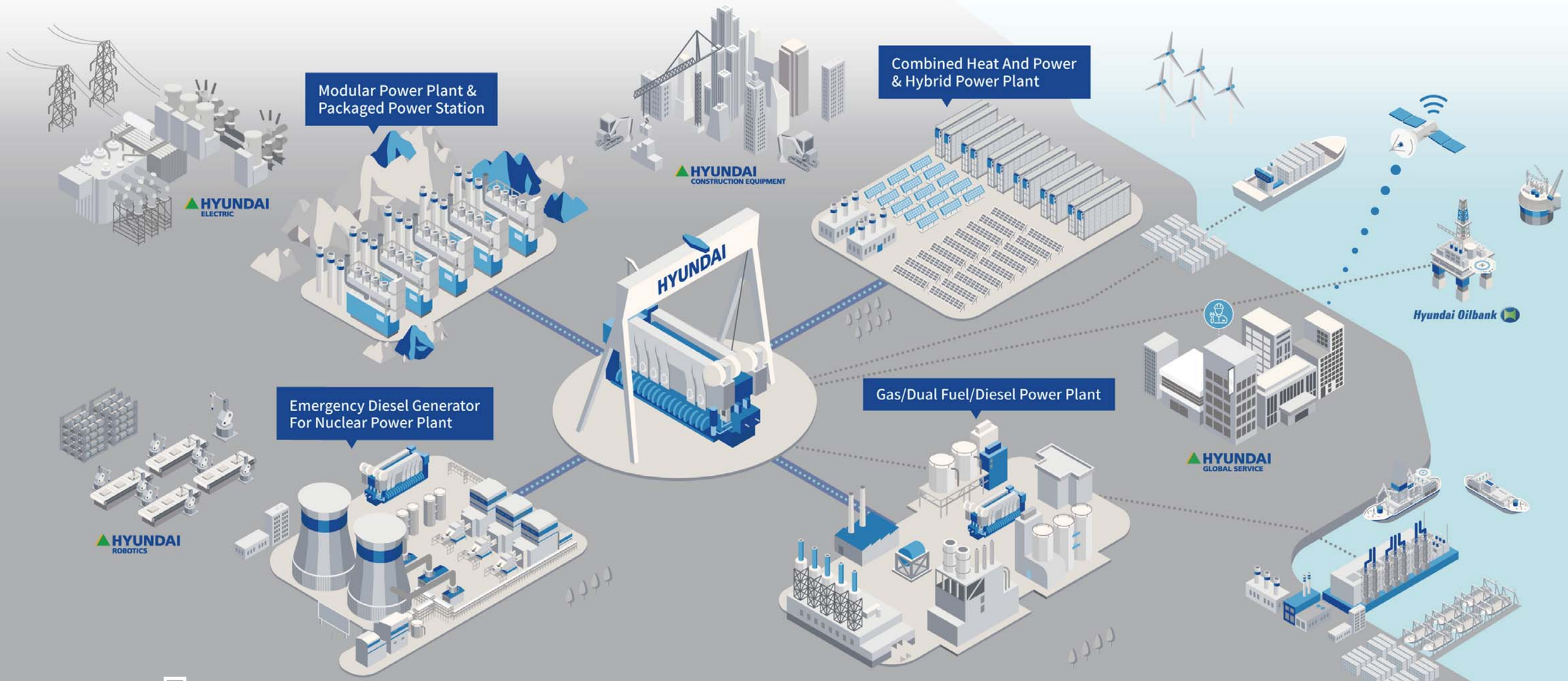
HYUNDAI POWER GENERATION LANDSCAPE

Hyundai Heavy Industries Co., Ltd. (HHI) has been leaving a remarkable footprint in global shipbuilding industry since 1972. In 1978, as one of the business units of HHI, the Engine & Machinery Business Unit (HHI-EMBU) was launched to manufacture marine and stationary engines and has enjoyed the dominant position as the world's leading engine manufacturer until now. HHI-EMBU covers 35% of global 2-stroke engine market with superb performance and has become the forerunner in the sector of engine power generation as well. Now the Hyundai Heavy Industries Group is leading the future growth in various business such as offshore & industrial plants, oil refinery and petrochemical, electric systems, construction equipment, and green energy as well as engine and machinery.





ENERGY FOR **CLEAN CITY**

NEW YORK

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

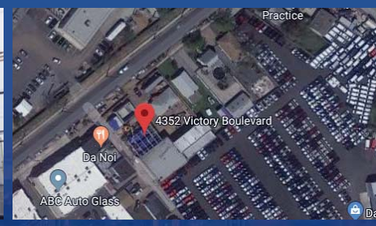
Gas Engine Power Plant

CHP System

Reduce Emission

High Efficiency

The Cubit Power One adopted 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	Continuous
Gensets	12H35/40GV x 2sets
Fuel	Natural Gas
Scope	DG sets
Delivered	2018.05

ENERGY FOR **HIGHEST EFFICIENCY**

PANAMA

HYUNDAI's 2-stroke diesel engine power plant in Panama City, has the highest efficiency in the country with the average operating ratio of 95%.

2-stroke Diesel Engine Power Plant

High Efficiency

Low OPEX

EPC

In March 2011, Autoridad del Canal de Panama(ACP) placed an order to HHI-EMBU for engineering, procurement and construction of stationary power plant consisting of two sets of HYUNDAI-MAN 12K80MC-S engines in order to supply continuous power to Panama Canal and national grid in Panama. This 2-stroke diesel engine power plant has accommodated the fundamental demands for lower operating cost with less replacement parts and longer exchange periods.

KEY FIGURES

Total Output	70MW
Customer	ACP
Operating Mode	Continuous
Gensets	12K80MC-S x 2sets
Fuel	HFO
Scope	EPC
Delivered	2013.11

ENERGY FOR **REVOLUTION**

CUBA

The Cuban government decided to illustrate HYUNDAI's Packaged Power Station(PPS) on their 10 peso note with the quote "Revolution Energetica(Energy Revolution)".

Packaged Power Station & Diesel Power Plant

Energy Revolution

Rapid Construction

30% of CUBA Electricity

In the mid 2000s, Cuba experienced chronic electricity shortages resulting in frequent power outages. To deal with the energy crisis, it set up a plan of upgrading its power infrastructure based on a contract with a foreign supplier. While many companies gave up the project, HYUNDAI eventually won the deal in 2005 and met urgent requirements of Cuba with 576MW Packaged power station and 310MW Diesel power plant across the country. For the first time in history, a company product was illustrated on country's currency.

Cuban currency, 10 pesos

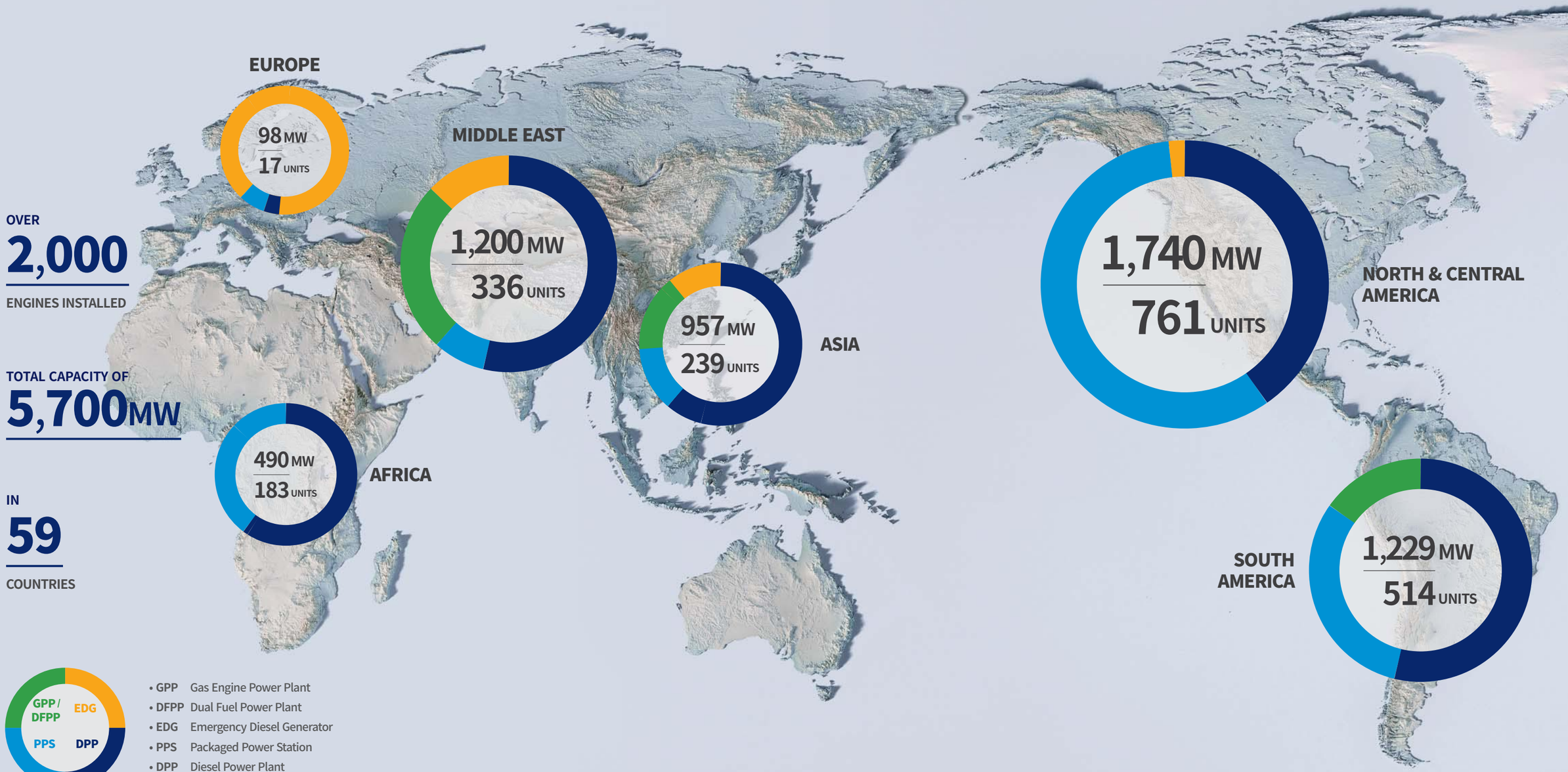
THE FIRST TIME IN HISTORY,
A COMPANY PRODUCT ILLUSTRATED
ON A COUNTRY'S CURRENCY

KEY FIGURES

Total Output	576MW(PPS)	310MW(DPP)
Customer	Energo Import	
Operating Mode	Continuous	
Gensets	9H21/32 x 340sets	9H25/33 x 124sets
Fuel	HFO	
Scope	EP	
Delivered	2005~2009	

EXPERIENCE AS A WORLDWIDE PROVIDER

Total installed capacity of over 5,700MW for 2,000 power stations in 59 countries.



OVER
2,000
ENGINES INSTALLED

TOTAL CAPACITY OF
5,700MW

IN
59
COUNTRIES

* MW

- **GPP** Gas Engine Power Plant
- **DFPP** Dual Fuel Power Plant
- **EDG** Emergency Diesel Generator
- **PPS** Packaged Power Station
- **DPP** Diesel Power Plant

POWER LINE UP

With full range capacity and fuel flexibility

To meet your power demands.

HYUNDAI Engine in Numbers

170
Million HP
2-Stroke Engine

12,000
Sets
HiMSEN Engines

500
Units / 2-stroke
Annual Production

1,800
Units / 4-stroke
Annual Production

Stationary Gensets

	Fuel	Model	Solution	Power Range
4-Stroke (HiMSEN)	Gas	H35/40G(V)	● ●	2.7~9.3MW
	Dual Fuel	H27DF	● ●	1.7~2.6MW
		H35DF(V)	● ●	2.7~9.3MW
		H54DFV	● ●	17.2~22.9MW
	Liquid	H21/32	● ● ●	1.1~1.7MW
		H21C	● ● ●	1.1~2MW
		H25/33(V)	● ● ●	1.7~6.2MW
		H32/40(V)	● ● ●	2.7~9.2MW
		H32C(V)	● ●	3.4~10.4MW
		H46/60V	● ●	14~21MW
2-Stroke	Liquid	K35MC-S~K98MC-S	●	3.5~77.5MW

● Engine Power Plant
● Packaged Power Station
● Modular Power Plant
● Emergency Diesel Generator

01 ENGINE POWER PLANT OVERVIEW

WHAT WE DO OFFER
FOR YOUR NEEDS

- Eco-friendly
- High-efficiency
- Fast Installation
- Easy Transportation
- High Reliability
- Easy Operation
- Low CAPEX
- Low OPEX

Solutions

- Gas Fuel Power Plant
- Dual Fuel Power Plant
- Diesel Power Plant
- 2-stroke Power Plant
- Hybrid Power Plant
- Emergency Diesel Generator for Nuclear Power Plant
- Emergency & Black start Diesel Generators
- Building Type Power Plant
- Enclosure Type Power Plant
- Modular Power Plant
- Aux. Master Sequence & Ready
- Auto Synchronization And Load Up
- Automatic Fuel Change-over
- Dynamic Monitoring & Smart Early Warning System
- Adaptive Max Power Control System
- Remote Diagnostic Service
- HAM Modules
- CHP Modules

Services

- Pre-sales Technical Consulting
- Logistics
- Conceptual Design
- Installation & Construction
- Basic Engineering Of Main Equipment
- Installation Supervision
- Civil & Architecture Design
- Commissioning Supervision
- Mechanical Process Design
- Noise & Emission Analysis
- I&C / Electrical System Design
- Operation Training
- Procurement
- Operation & Maintenance
- Performance Tests (Shop & Site)
- Remote Diagnostic
- Spare-Parts

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

Engineering Procurement Construction

EPC

Engineering
(Basic + Detail)

Bulk Materials

Equipment Supply

OFFERING TOTAL SOLUTIONS FOR POWER INFRASTRUCTURE

Our professional engineering and manufacturing capability enables flexible and easier solutions for valued customers.

SUSTAINABLE TECHNOLOGY COMPLYING WITH INTERNATIONAL STANDARDS

STANDARDS COMPLIED WITH BY OUR ENGINE

DIESEL ENGINE

- IMO Tier III NOx Limit ✓
- EIAPP Certificate ✓
- EPA 40 CFR part 60,JJJJ ✓
- IFC(World Bank guideline 2007/2008) ✓

GAS/DF ENGINE

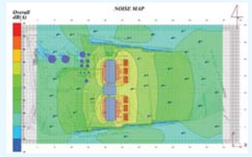
- EPA 40 CFR part 60,JJJJ ✓
- IFC(World Bank guideline 2007/2008) ✓

1 Sustainable (Low Emission)

- All HYUNDAI engines fully comply with the NOx limits specified in IMO environmental regulation.
- The emission of dual fuel engines is a lot less compared with diesel engines.
- HYUNDAI's SCR system can reduce NOx emission by target requirement.

2 Safety

Our power plant is designed to minimize noise levels for providing stress free working environment for plant operators in accordance with “Environmental, Health, and Safety(EHS) Guidelines for Thermal Power Plants 2008”. Also noise mappings can be conducted upon client's request.



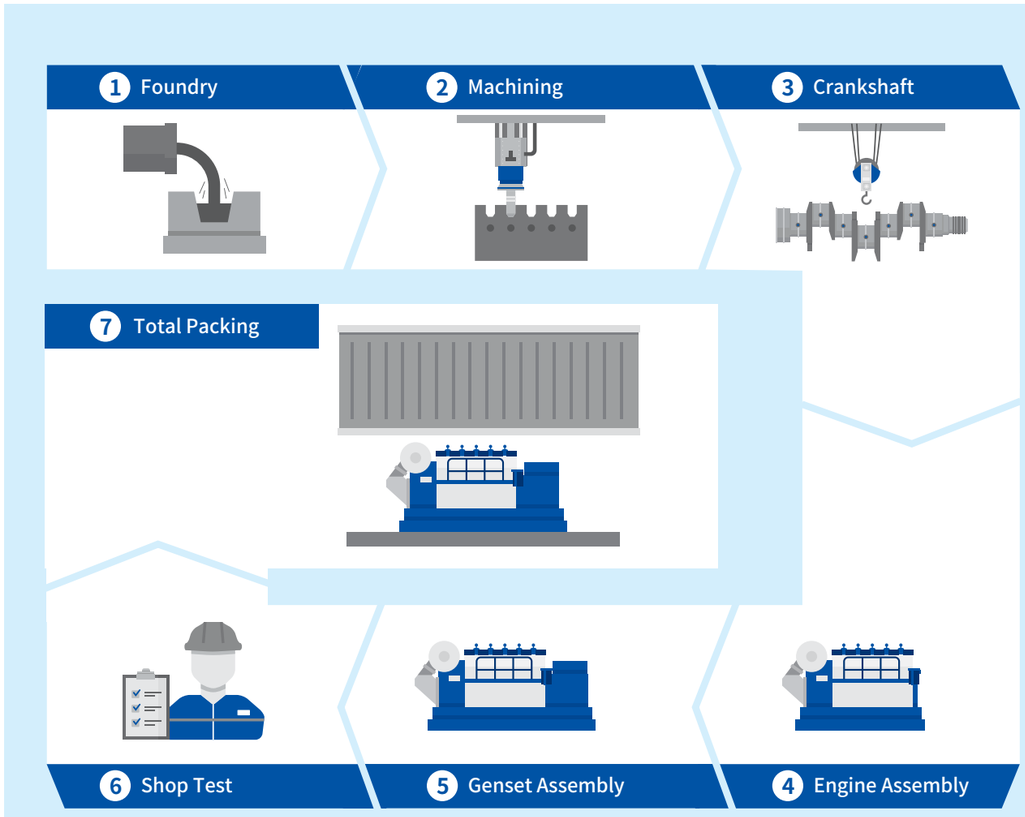
<NOISE GUIDELINES>

FROM MANUFACTURING TO FACTORY TEST
ALL HAPPENS HERE

As world's largest manufacturer of marine and stationary engines,
our experience in integrated manufacturing ensures quality and low cost.

TOTAL PACKAGE PRODUCTION

from foundry and machining to the assembly & shop test



MODULAR DESIGN

‘FASTER, EASIER, AND EVEN BETTER.’

Compared with traditional design, 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.

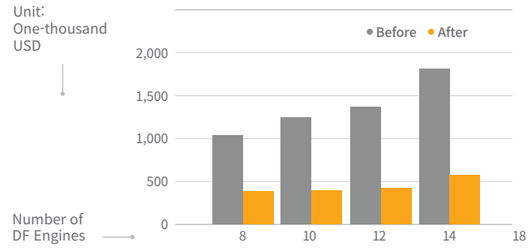
Planning -3 months

- For 10(Ten) 20H35DF Engines

Construction -2 months

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

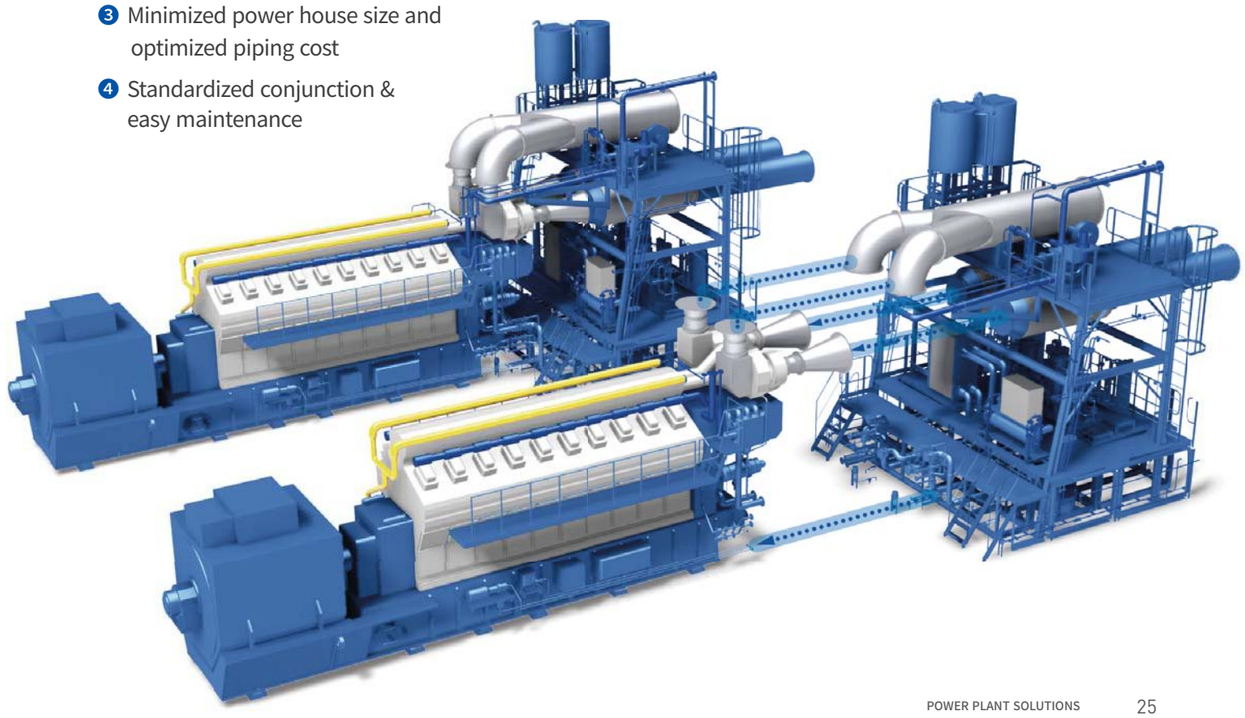
COST SAVING



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

HiMSEN Aux. Module(HAM)

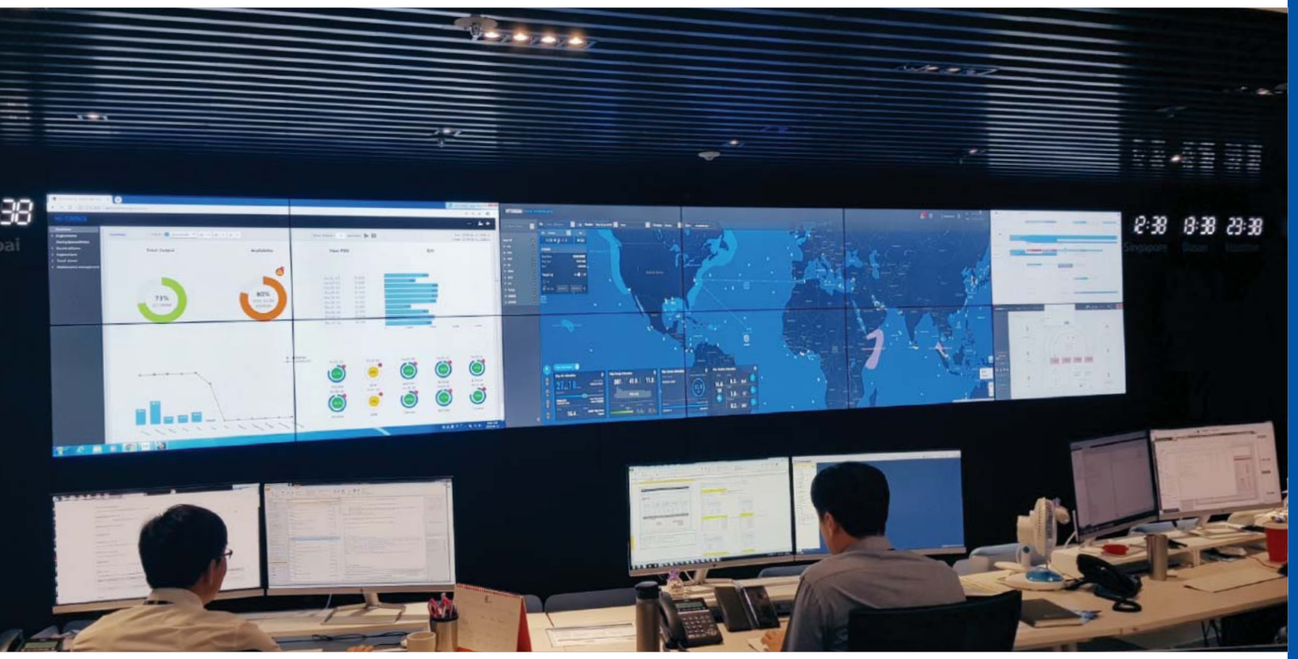
1. Faster and simple construction on site
2. Consistent control
3. Minimized power house size and optimized piping cost
4. Standardized conjunction & easy maintenance



SMART SOLUTION

PLANT O&M MANAGERS CAN BE AT PEACE OF MIND USING OUR SMART PRODUCTS

The power plant operators can control whole power plant efficiently with the Plant Control and Monitoring System(PCMS) featuring various smart functions.



∗ Hi-TIMMS
Hyundai Heavy Industries - Totally Integrated Monitoring & Management System

- Adaptive Max. Power Control System
- Dynamic Monitoring & Smart Early Warning System
- Auto Aux. Master Sequence & Ready
- Auto Synchronization & load up
- Automatic Fuel Changeover
- Remote diagnostic service(Hi-TIMMS*)
- Mobile Monitoring System

02 ENGINE POWER PLANT SOLUTIONS

Gas & Dual Fuel Power Plant

Powered by natural gas, HYUNDAI's GPP and DFPP produce significantly less emission and have high efficiency in energy production. Dual fuel power plant offers total fuel flexibility, switching from gas to diesel whenever needed.

Diesel Power Plant

HYUNDAI provides diesel power plant using 2-stroke low speed and 4-stroke medium speed engines.
HYUNDAI HiMSEN 4-stroke engine has the most advanced design and latest technology.

Modular Power Plant & PPS

Enclosure and container-type power stations are easy to transfer, cheaper to operate, and faster to install.

Emergency & Black Start Diesel Generator

When backup power is needed due to power outage, HYUNDAI's diesel generator guarantees uninterrupted power supply and safe shutdown, as well as maintaining hot standby condition for quick restart.

Emergency Diesel Generator for Nuclear Power Plant

HYUNDAI can provide reliable and powerful solutions for nuclear power plant.
With fast start-up time and stable output, HYUNDAI's diesel engine provide you the best solutions for emergency generators.

CHP & HYBRID

HYUNDAI CHP solutions guarantee high fuel efficiency. With CHP modules, heat recovery becomes faster and the efficiency increases up to twice as a result.
Hybrid power plant can supply stable power through balance between power sources from the PV plant as well as the generator. Regardless of weather or period of daytime, power will be constantly supplied.

Gas & Dual Fuel Power Plant

LOWEST CAPEX LOWER EMISSION AND HIGH EFFICIENCY

In order to protect our natural habitat, HYUNDAI is always looking for improved technology for our products and services. Our natural gas and dual fuel solutions with lower emission will help to maintain clean planet for our children and for the future.

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?

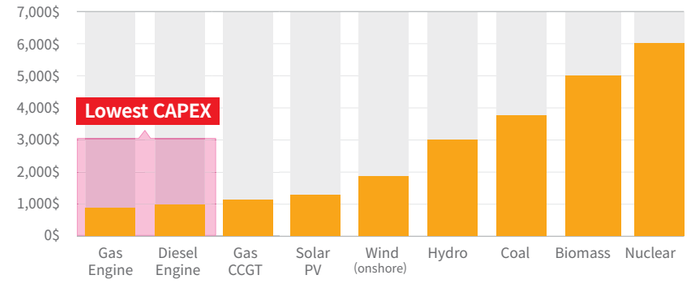
1. LOWER EMISSION

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 plant running on different fuels.

CAPEX For Various Power Sources



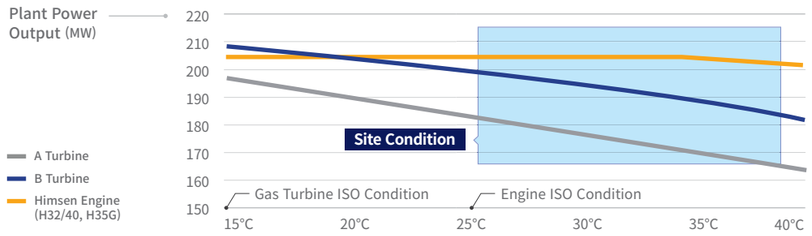
3. QUICK START TIME

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



HYUNDAI'S GAS & DUAL FUEL POWER PLANT

"HYUNDAI's gas and dual fuel power plant ensures not only safety of the power plant but also eco-friendly environment. 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 HYUNDAI, are installed and prepared for safe gas operation.

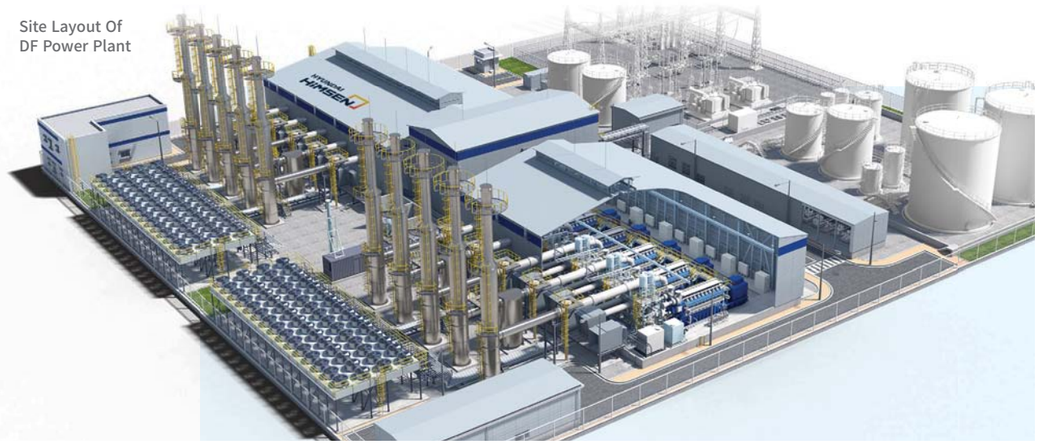
Eco-friendly

The gas/dual fuel power plant has the advantage of reducing the emission rate. 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



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 supply
Delivered	2013

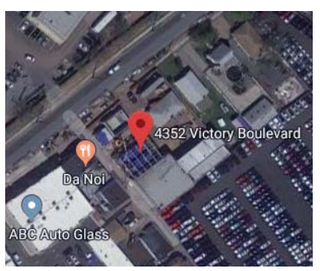
Case ② : GPP

CUBIT
11MW GPP
New York

Eco-friendly and High efficiency power plant

The Cubit Power One adopted 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 supply
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, HYUNDAI recommended to use enclosure type power plant and provided full technical support for engineering.
Under 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 supply
Delivered	2016

Case ④ : DFPP

Termonorte 93MW DFPP **Colombia**

The biggest dual fuel engine power plant in Colombia

In February 2017, 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

PRODUCE POWER ANYWHERE, ANYTIME

We provide steady power, around the clock, to meet the continuous electricity demand of the customer. Owing to high efficiency and modularity, we represent an optimal solutions.

Diesel Power Plant

Who Is It For?

- For those who are looking for efficient, economical power plant.
- For those who are willing to run power plant on various fuel oil.
- For those who want low CAPEX.

Why Are They Good?

1. FUEL FLEXIBILITY

HYUNDAI's diesel engine power plant provides a variety of selection of fuels, ranging from HFO, LFO, Crude oil to Emulsified oil.

2. QUICK START TIME

Diesel engines have a shorter start time compared to turbines.
It takes up to 15 to 40 minutes for turbines to start,
whereas diesel engine only takes 2 minutes.

3. HIGH RELIABILITY

We provide robust, reliable engine generator set and auxiliary equipment, which are proven in the most challenging nations and environmental conditions.

Scope of Supply

❶ **Diesel Generator set**

❷ **Mech. Aux. equipment**

❸ **Elec. Aux. equipment**

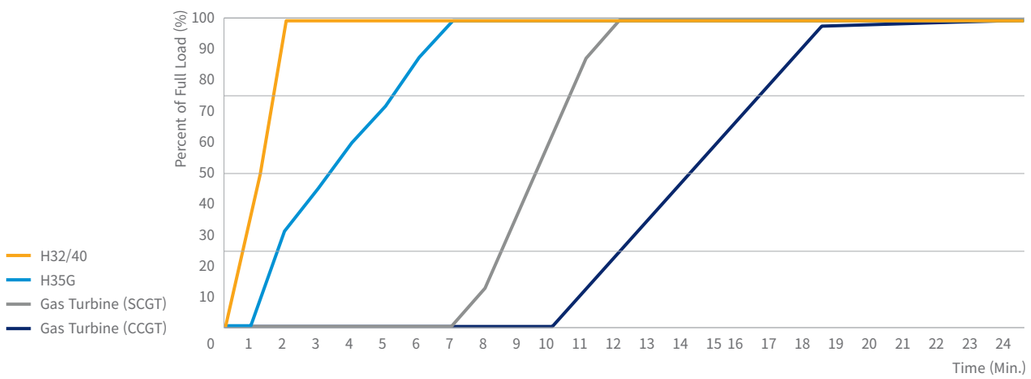
❹ **I&C Aux. equipment**

❺ **Basic & Detail Engineering**

❻ **Construction**

❼ **Supervision of Installation & commissioning**

Start-up time comparision(HiMSEN engine vs Turbine)



Case ①

BERA 70MW DPP **Bangladesh**

Peak shaving power plant for Bangladesh power grid

HYUNDAI was an EPC and turnkey contractor for Bangladesh Power Development Board. Under a turnkey contract, HYUNDAI had to deliver a complete power generation plant to the client with 2 years warranty and 4 years long term service.
HYUNDAI delivered excellent results by working in close collaboration with the BPDB and the suppliers, competent engineering team and cost effective solutions.

Total Output	70MW
Customer	BPDP
Operating Mode	Base load
Gensets	18H32/40V x 9sets
Fuel	Heavy Fuel Oil
Scope	EPC
Delivered	2012

Case ②

JARAMIJO 150MW DPP **Ecuador**

Short delivery for 18 gensets within 5 Months

HYUNDAI made the contract for supplying 18 sets of 18H32/40V rating 8,294kWe per set and its auxiliary equipment on 25th April, 2011.
Under very tight schedule, HYUNDAI successfully delivered gensets in 5 months through partial shipment after contract commencement.
From 5th May 2012, the power plant started commercial operation after commissioning and testing for reliability and performance.

Total Output	150MW
Customer	EQUITATIS
Operating Mode	HFO operation
Gensets	18H32/40V x 18sets
Fuel	Heavy Fuel Oil
Scope	Genset + Equipment supply Engineering
Delivered	2012

Case ③

GLOBAL I&II 300MW DPP **Brazil**

Stand by power plant for Brazil power grid

With 300MW of installed capacity in Brazil, HYUNDAI is the country's leading provider of power generation equipment. HYUNDAI's scope of supply is generating sets with basic auxiliary equipment.
The baseload power plant supplies energy to Brazil's national grid to increase the availability of liquid oil in the power system.

Total Output	300MW
Customer	CANDEIAS ENERGIA
Operating Mode	Base load
Gensets	9H25/33 x 120sets
Fuel	Heavy Fuel Oil
Scope	Genset + Equipment supply
Delivered	2011

Case ④

NOVA 23MW DPP **Angola**

Stable & Reliable power supply to boost up infrastructure of Africa

The NOVA Power plant, which belongs to NOVA CIMANGOLA, has been built in 2017. HYUNDAI has supplied the two sets of 18H32/40 diesel engine generating sets, producing more than 23MW of electricity.
So far, seamless operation has contributed to self-generation of cement factory.

Total Output	23MW
Customer	NOVA CIMANGO
Operating Mode	Isochronous
Gensets	18H32/40 x 2sets
Fuel	Heavy Fuel Oil
Scope	Genset
Delivered	2017

SETTING NEW STANDARDS FOR ‘FAST & EASY’

Enclosure and container-type power plant can shorten and simplify the construction process and make transportations easier for future needs.

Modular Power Plant & PPS

Who Is It For?

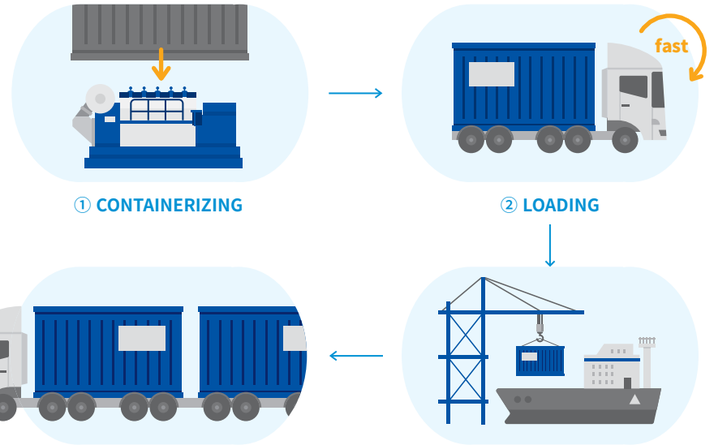
- Small IPPs(Independent Power Producers) who can afford small investment to start their businesses
- Those who need power sources fast track
- Those who are not connected to the national grid
- Places where it is difficult to have infrastructure(e.g. high voltage transmission line)
- Small towns and isolated areas

Why Are They Good?

1. FAST DELIVERY AND INSTALLATION

All the process of manufacturing, transportation, installation, and commissioning for a 20MW PPS takes just 9 months.

EASY TO TRANSPORT



The PPS can be installed in a 40 feet container, so it can be stacked on containerships at sea and be easily carried by trailers on land.

Simple installation steps give time savings.

5 months for manufacturing, 1.5 months for transportation, 1.5 months for installation, 1 months for commissioning.

2. EASILY TRANFERABLE

Reinstallation of 1 PPS unit takes just 2 weeks. Even with more units, no additional time is required.

3. LOW OPERATION COST

30~70% lower operation cost compared to high speed gensets.

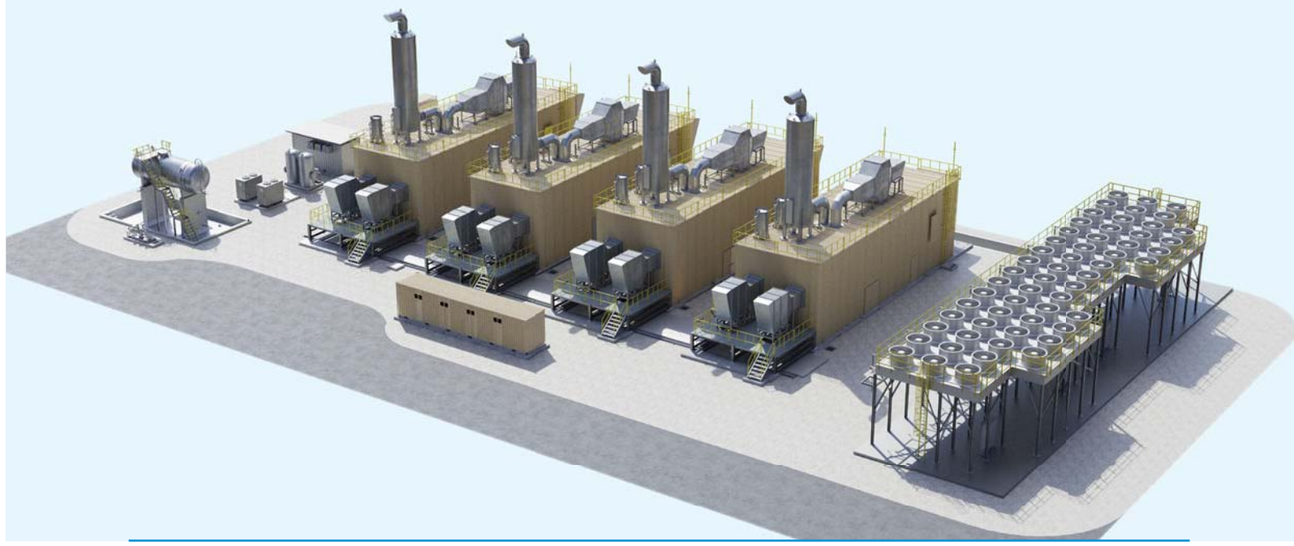
4. EASY OPERATION

The smart control system gives easy & efficient site operation for O&M managers.

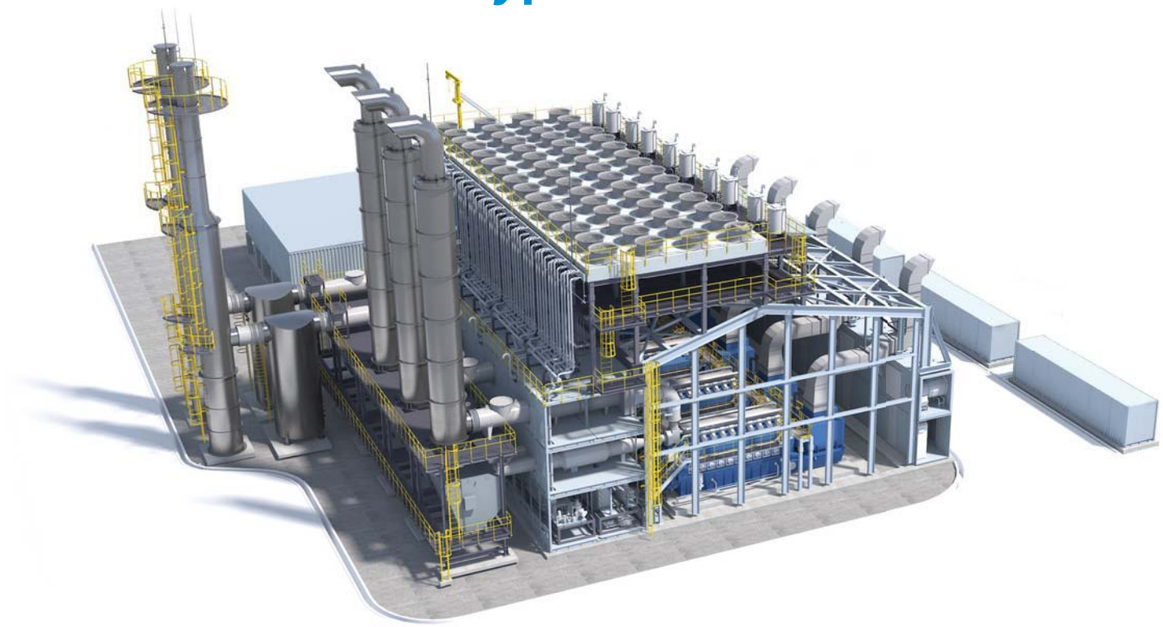
Modular Power Plant

MODULAR POWER PLANT

Enclosure Type Power Plant



Containerized Type Power Plant



Case ① : Enclosure type power plant

UHP 16MW Black Start Diesel Generator **Qatar**

WHEREVER
POWER SUPPLY FOR HOT AND HUMID DESERT

Power plant for a 50°C desert in Qatar only took 3 months to construct.

Total Output	16MW
Customer	Samsung C&T
Operating Mode	Black Start
Gensets	9H32/40 x 4sets
Fuel	Diesel Oil
Scope	Genset + Equipment supply
Delivered	2015

Plant View

Inside view of Enclosure(Pre-fabricated type)

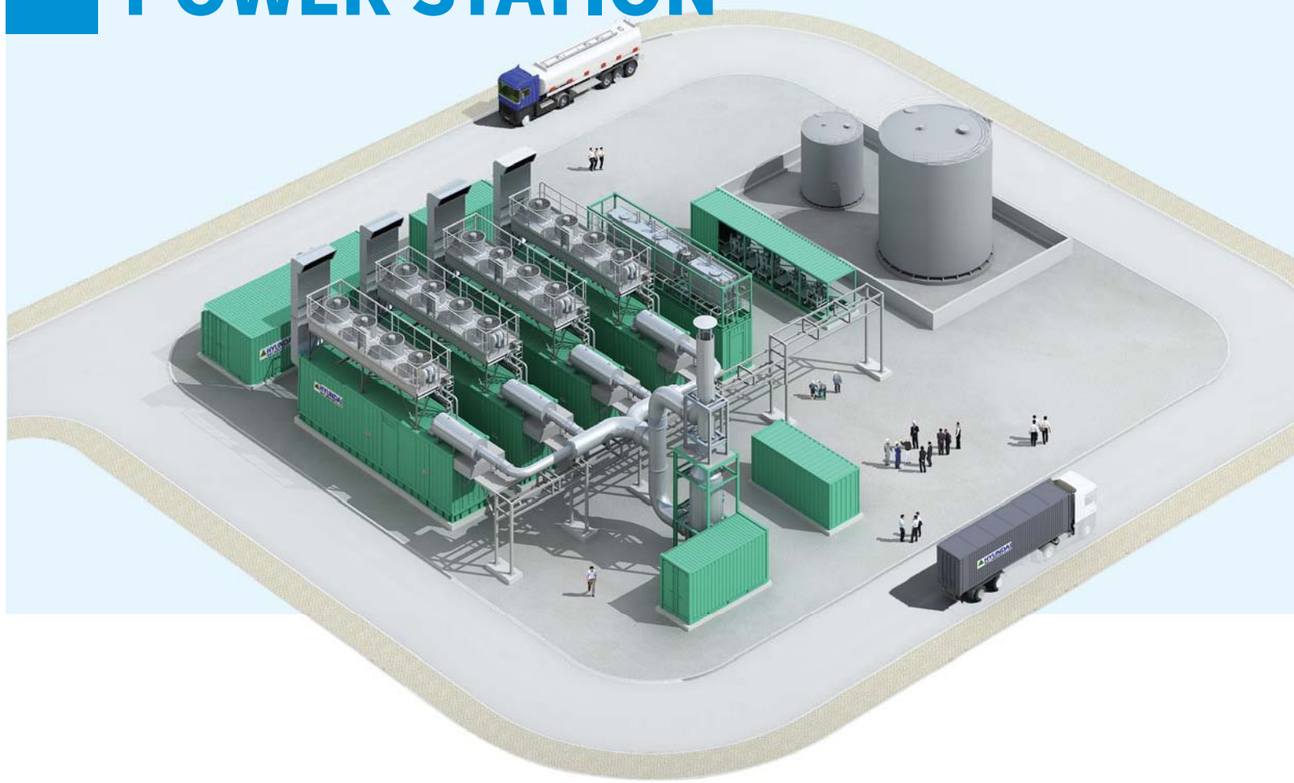
In 2015, HYUNDAI provided 16MW black start emergency diesel generator of Facility D project in Qatar. It is the fully equipped enclosure type of BSEDG.

HYUNDAI has supplied a diesel generator with pre-fabricated type of enclosure and built-on type auxiliary system for easy and fast installation at site.

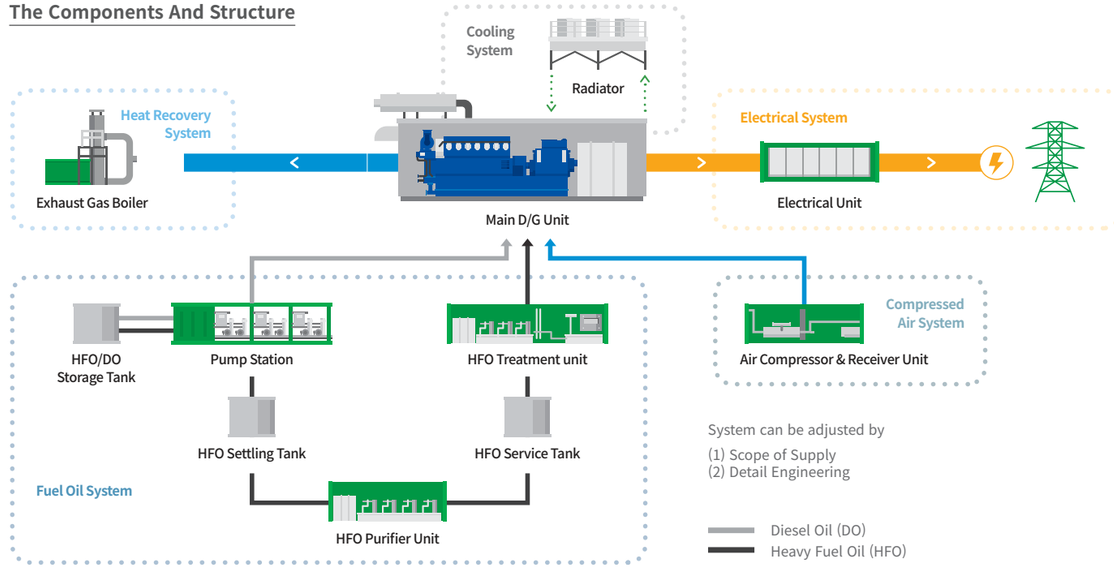
Sound attenuating enclosure is applied for noise reduction and equipment protection. Each genset and its auxiliary equipment are installed inside of enclosure.

PPS

PACKAGED POWER STATION



The Components And Structure



Case ②： Packaged Power Station(PPS)

JINRO 57MW PPS **Panama**

FAST DELIVERY & INSTALLATION FOR CUSTOM REQUIREMENTS

"

We were in a hurry, and HYUNDAI's PPS made it possible to meet our short delivery time.

— Jinro, Project Manager

"

Total Output	57.8MW
Customer	JINRO POWER
Operating Mode	Base load
Gensets	9H21/32 x 34sets
Fuel	Heavy Fuel Oil
Scope	Genset + Equipment supply
Delivered	2015

Jinro Corporation bought their IPP which had a very short time until the COD(Commercial Operating Date). They wanted to find a company which could match their demands for fast procurement, fast construction, reasonable price and easy operation and decided to move forward with HYUNDAI.
With the products and full technical support by HYUNDAI, the power plant was successfully constructed in only 9 months after the contract.

Plant View

Fuel Tank

Case ③： Packaged Power Station(PPS)

HAITI 61MW PPS **Haiti**

EARTHQUAKE-RESISTANT **RELIABLE** POWER PLANT

"

HYUNDAI's power stations were the only power stations to successfully supply power to areas near Haiti's capital Port-au-Prince, which damaged by the 7.0-magnitude quake in January.

— MK Business News

"

Total Output	61MW
Customer	EDH
Operating Mode	Grid Back-up
Gensets	9H21/32 x 36sets
Fuel	Heavy Fuel Oil
Scope	Genset + Equipment supply
Delivered	2008

HYUNDAI's PPS remained intact and well ran in its full capacity throughout the catastrophic earthquake of Haiti in 2010.

Many power facilities were damaged by 7-magnitude earthquake of Haiti in 2010. The sturdy power plant provided by HYUNDAI were undamaged and ran continuously. HYUNDAI gained trust for its stability and safety by the Haitian government.
In 2008, HYUNDAI provided a 34MW power plant for Haiti's capital Port Au Prince. This power plant produces power with 40% less cost than other power plants do.

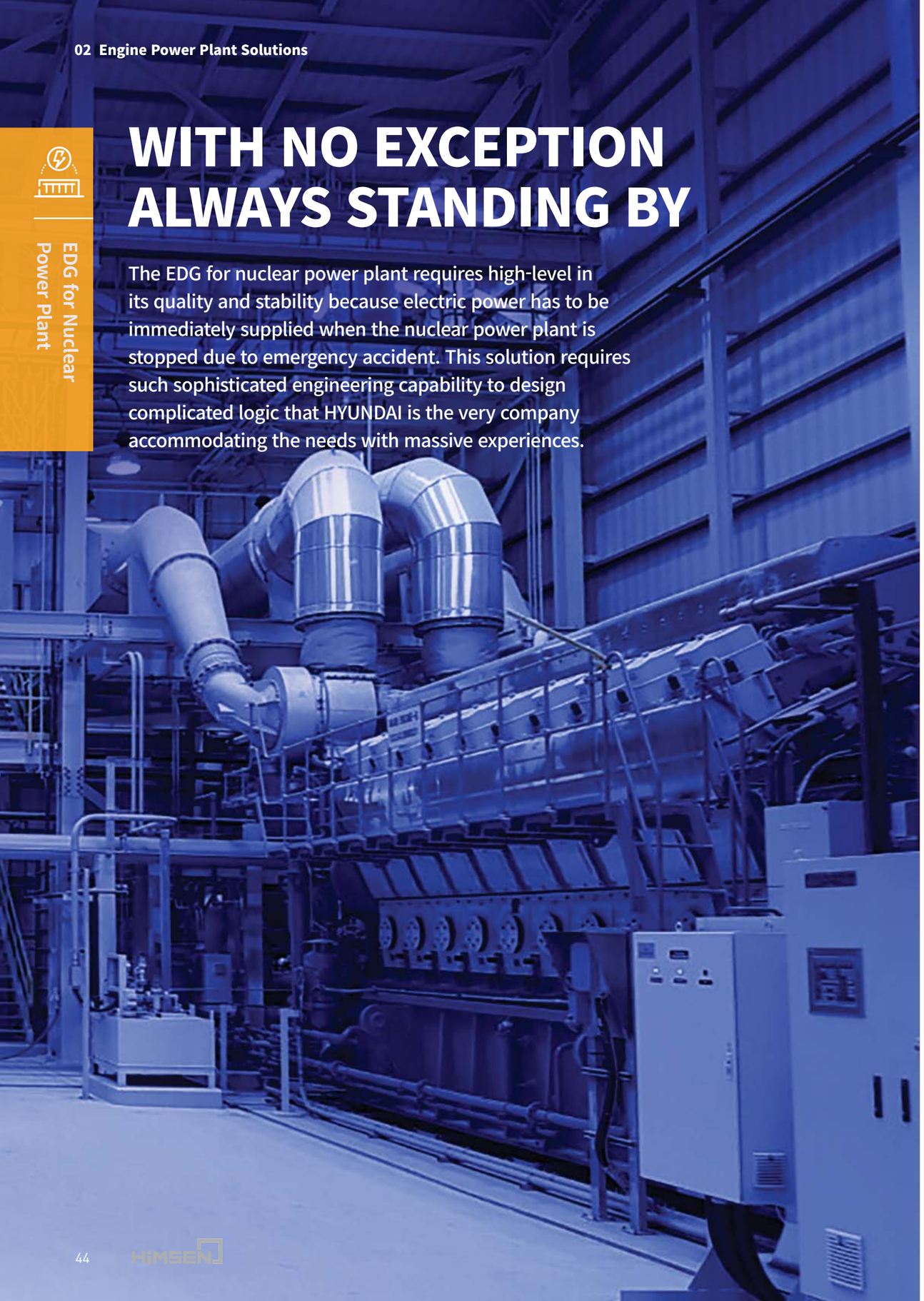
Plant View

Plant View

EDG for Nuclear Power Plant

WITH NO EXCEPTION ALWAYS STANDING BY

The EDG for nuclear power plant requires high-level in its quality and stability because electric power has to be immediately supplied when the nuclear power plant is stopped due to emergency accident. This solution requires such sophisticated engineering capability to design complicated logic that HYUNDAI is the very company accommodating the needs with massive experiences.



Why EDG?

Emergency diesel generators are started when the NPP unit is disconnected from the grid. Emergency diesel generators safeguard the power supply to vital consumers such as the reactor cooling system so that a controlled reactor shutdown can be guaranteed.

Who Is It For?

Nuclear Power Plant

Why Are They Good?

1. RELIABILITY AND HIGH PERFORMANCE

HYUNDAI has been supplying emergency diesel generators(EDGs) for nuclear power plant for more than 30 years. With EDG systems supplied to 6 nuclear power plants, we have not only gained a wealth of experience and expertise, but also gained reputation for products that deliver outstanding reliability and performance.

2. CUSTOMIZATION FOR EACH PROJECT

Since every project has different requirement, HYUNDAI has developed a major NPP-based engineering with specialists capable of handling every aspects of project-specific NPP requirements and matching any customer's complicated needs.

3. ENSURING QUALITY STANDARD

All EDG projects are organized and implemented in line with NPP-related quality standards such as KEPIC QAP and ASME NQA-1. Our EDGs are safety-classified to meet the strictest regulations in the nuclear power industry, with qualifications in line with IEEE 387.

Scope of Supply

1. **Diesel Generator set**
2. **Mech. Aux. equipment**
3. **Elec. Aux. equipment**
4. **I&C Aux. equipment**
5. **Supervision of installation & commissioning**

Case ①

BARAKAH NPP EDG **U.A.E**

Proven Technology for Complex Nuclear Power Plant

Total Output	78.3MW
Customer	ENEC
Operating Mode	Emergency
Gensets	20H32/40V × 9sets
Fuel	DO
Scope	Genset + Equipment supply
Delivered	2017

Engine Shipment(1)

Engine Shipment(2)

On November 2011, HYUNDAI-EMBU received an order to supply total nine(9) sets of Emergency Diesel Generators and AC Diesel Generator(Engine model : 20H32/40V) from Korea Electric Power Corporation(KEPCO).

The EDG for nuclear power plant requires high-level in its quality and stability because electric power has to be immediately supplied when the nuclear power plant is stopped due to emergency accident. This solution requires such sophisticated engineering capability to design complicated logic that HYUNDAI is the very company accommodating the needs with massive experiences.

Reference List

Total Quantity of **38units**

Total Deliver of **328MW**

As of April, 2018

NO.	Project Name	Engine	Quantity	Country	Capacity(MW)	Year
1	60MW KKNPP (EDG)	16H32/40V	10	India	60	2022
2	30MW SKN #5,6 (EDG)	18H32/40V	4	S. Korea	30	2017
3	83.7MW UK HPC (EDG)	20H32/40V	9	UK	84	2016
4	48MW PAKISTAN K2/K3 NPP (EDG)	20H32/40V	5	Pakistan	48	2015
5	78.3MW UAE BARAKAH (EDG)	20H32/40V	9	UAE	78	2011
6	9MW KORI (EDG)	9H32/40	2	S. Korea	9	2010
7	19.2MW EMERGENCY (EDG)	12V240RVR	8	S. Korea	19	1987

Emergency & Black Start Diesel Generator

OPTIMIZED, RELIABLE, PROVEN SOLUTION FOR EDG & BSDG

HYUNDAI engine is designed to provide backup power generation for unexpected incidents. This solution requires sophisticated engineering and the ability to model complicated logic, which HYUNDAI is very capable of.

Why EDG?

In loss of all internal and external power source, the emergency diesel generators supplies emergency power for safe shutdown and maintain hot standby conditions for quick restarting of main power resources. For safe shutdown, EDG supply power for essential auxiliary equipment.

Why BSDG?

If all of the station's own generators are shut down, station service power should be provided from the grid. However, in the absence of grid power, black start needs to be performed to start immediately at any time.

Who Is It For?

Where emergency power is required such as Combined Cycle Power Plant and other Factories.

Why Are They Good?

1. PROVEN SOLUTION AND HIGH PERFORMANCE

HYUNDAI has been supplying EDG & BSDG for more than 130MW in total. We have not only gained a wealth of experience and expertise, but also gained reputation for products that deliver outstanding reliability and performance.

2. OPTIMIZED, RELIABLE, SOLUTION

HYUNDAI offers optimized and reliable solution that will meet your requirements no matter what steam turbine, gas turbine manufacturer, size or system(single steam turbine, gas turbine or with cogeneration).
HYUNDAI offers a complete turnkey and customized solution based on a modular design and the highest quality standards in the industry.

3. OPTIMIZED LOGIC FOR EACH CUSTOMER

Every project has different requirements. With HYUNDAI's highly experienced engineers, we are capable of matching any customer's complicated needs and analyze the site condition for more suitable solutions.

Scope of Supply

1. **Diesel Generator set**
2. **Mech. Aux. equipment**
3. **Elec. Aux. equipment**
4. **I&C Aux. equipment**
5. **Basic & Detail Engineering**
6. **Construction**
7. **Supervision of installation & commissioning**

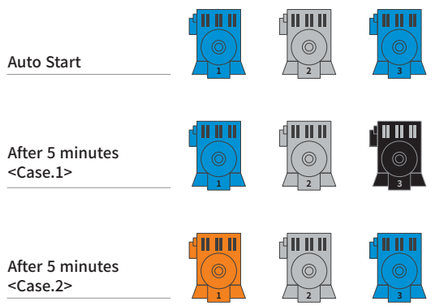
Case ① EDG for Thermal Power Plant

Jeddah South Thermal Power Plant EDG **Saudi Arabia**

Customized Emergency Power Solution

D/G room

Jeddah South Thermal Power Plant Stage-I



Total Output	26MW
Customer	Saudi Electricity Company
Operating Mode	Emergency
Gensets	20H32/40V x 3sets
Fuel	DO
Scope	Genset + Equipment supply + Engineering
Delivered	2016

Client's special requirements we carried out

When unit #1 or #2 Steam turbine is shutdown, EDG #1(main) and #3 (stand-by) start and synchronize with parallel operation automatically.
<Case. 1> After 5 minute, If EDG #1 has no alarm, EDG #3 will stop automatically.
<Case.2> If there are any alarms in EDG #1 for 5 minutes, EDG #3 will keep running condition.

Reference List

Total Quantity of **23units**

Total Deliver of **138.6MW**

As of Dec. 2018

NO.	Project Name	Engine	Quantity	Country	Capacity(MW)	Year
1	DUBA 24MW BSEDG	18H32/40V	3	Saudi Arabia	24	2017
2	UHP 16MW BSEDG	9H32/40	4	Qatar	16	2016
3	QURAYAT III 6.3MW BSDG	16H32/40V	1	Saudi Arabia	6.3	2015
4	ARAR IV 6.3MW BSDG	16H32/40V	1	Saudi Arabia	6.3	2015
5	JEDDAH SOUTH 26MW EDG	20H32/40V	3	Saudi Arabia	26	2014
6	AZ-ZOUR North 15MW BSEDG	20H32/40V	2	Kuwait	15	2014
7	QURAYAT II 5MW EDG	12H32/40V	1	Saudi Arabia	5	2013
8	WADJH 5MW EDG	12H32/40V	1	Saudi Arabia	5	2013
9	SHAROURAH 4MW EDG	12H32/40V	1	Saudi Arabia	4	2012
10	AZZOUR WDC II 12MW EDG	14H32/40V	2	Kuwait	12	2012
11	RAFHA 5MW EDG	12H32/40V	1	Saudi Arabia	5	2012
12	HAIL 4MW EDG	12H32/40V	1	Saudi Arabia	4	2012
13	HYOSUNG 10MW EDG	14H32/40V	2	Iran	10	2011

CHP & Hybrid

MAKE MORE PROFIT WITH TWICE THE EFFICIENCY

At sites with high temperature or low temperature, a lot of energy is wasted on heat recovery. HYUNDAI's Combined Heat & Power(CHP) Modules help the heat recovery and increase the efficiency up to twice as much.

Why CHP

The economics of engines in on-site power generation applications often depend on effective use of the thermal energy contained in the exhaust gas and cooling systems, which generally represents 60 to 70 percent of the inlet fuel energy.

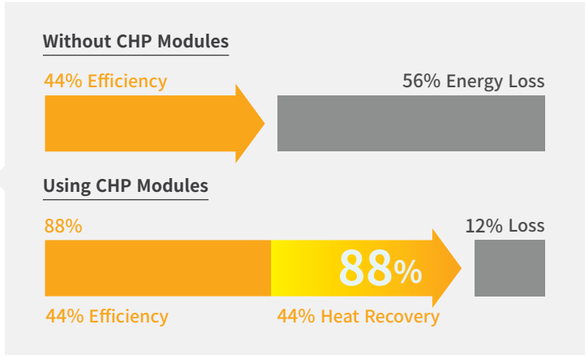
Most of the waste heat is available in the engine exhaust and jacket coolant, while smaller amounts can be recovered from the lube oil cooler and the turbocharger's intercooler and after cooler(if so equipped).

Why Are They Good?

1. MORE PROFIT WITH BETTER EFFICIENCY

The fuel efficiency can grow about twice as much when using CHP modules.

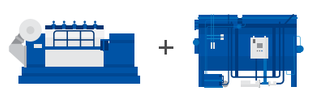
Efficiency can be more than **88%**



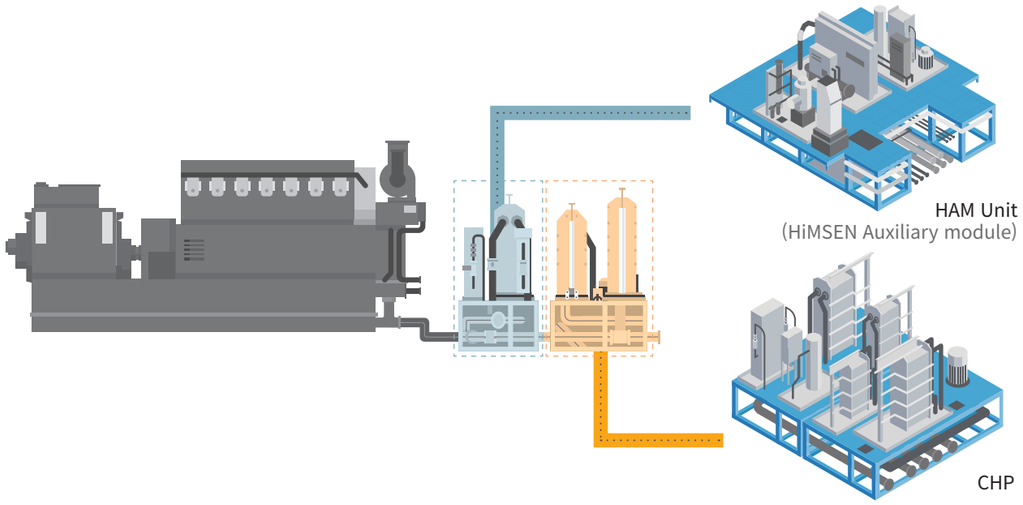
2. EASY AND FAST INSTALLATION

The units are carefully modularized so that transportation and installation can be easier and provided faster. Also, the CHPs are pre-designed, so that they can be instantly provided upon request.

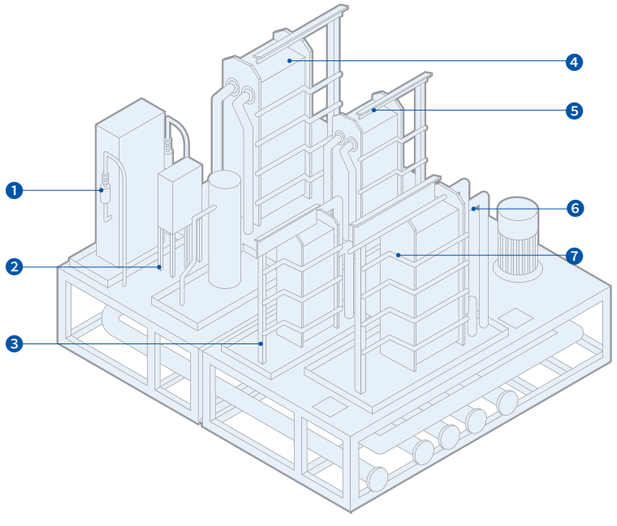
3. EASY CUSTOMIZATION

PP Power Plant		Electricity
CHP Combined Heating Power Plant		Electricity Heat
CCHP Combined Cooling, Heating & Power plant		Electricity Heat Cooling
WHRS Waste Heat Recovery System		Electricity + α Heat
WHRCS Waste Heat Recovery Cooling System		Electricity + α Cooling

Combined Heat & Power
Modules



The Components of
CHP Modules

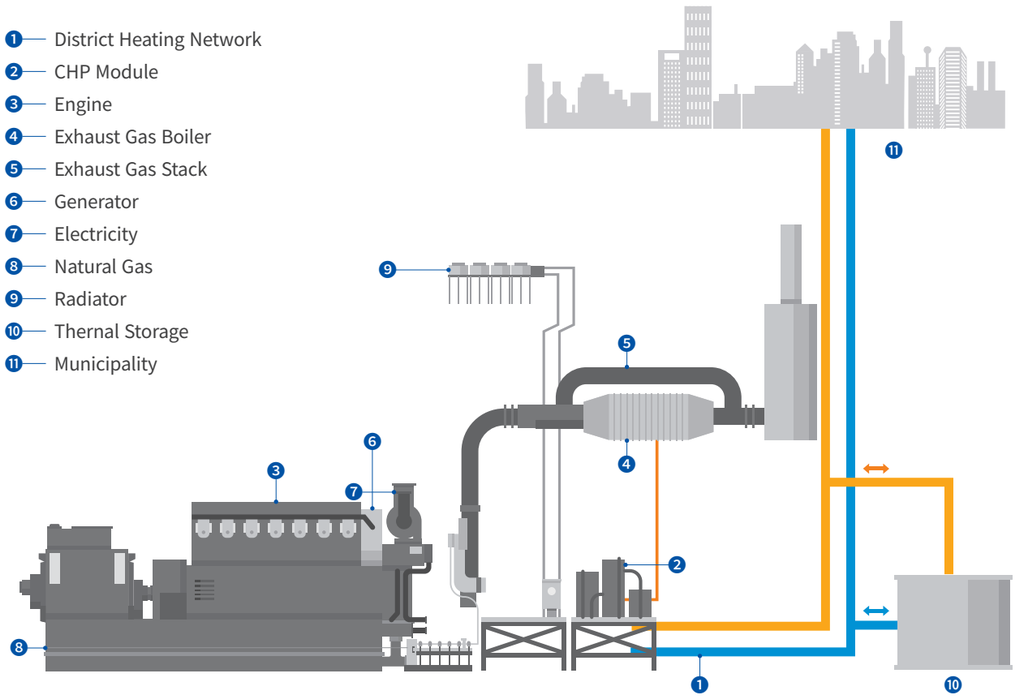


1. JW Preheater
2. LO Preheating Unit
3. HT Heat Exchanger
4. LO Cooler
5. HT Back-up Cooler
6. CHP Feed Pump
7. LT Heat Exchanger

The CHP is attached to the HAM module which is attached to the engine.

Operation Flow of
CHP

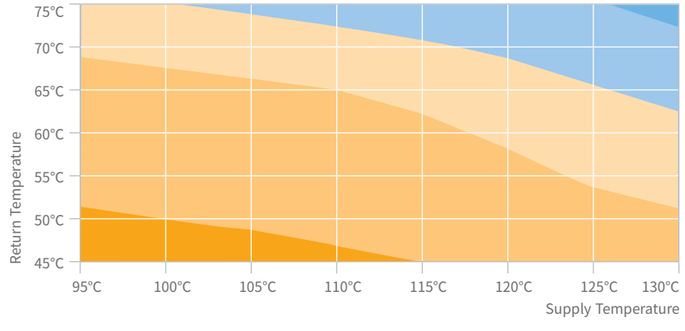
1. District Heating Network
2. CHP Module
3. Engine
4. Exhaust Gas Boiler
5. Exhaust Gas Stack
6. Generator
7. Electricity
8. Natural Gas
9. Radiator
10. Thernal Storage
11. Municipality



CHP takes the exhaust gas through the WHRB(Waste Heat Recovery Boiler) which has the Cooling Water compartment and Heat exchanger

The Return Temperature Depending On The Supply Temperature

- 82% - 84%
- 84% - 86%
- 86% - 88%
- 88% - 90%
- 90% - 92%

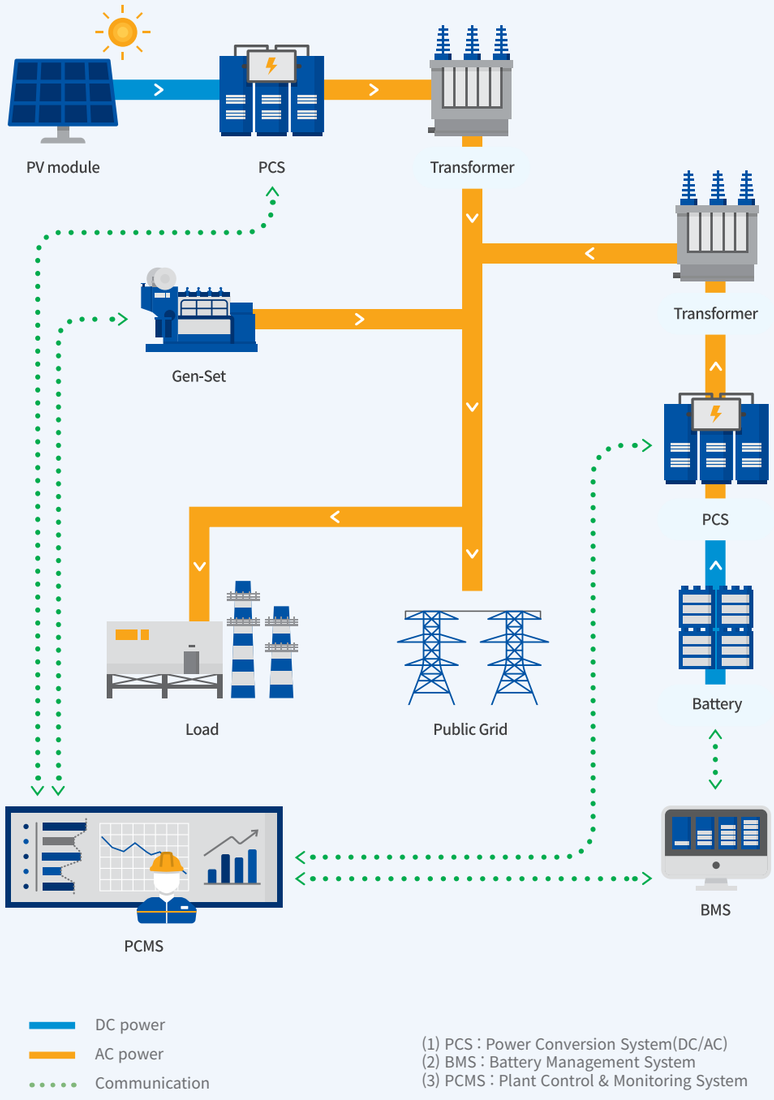


HYBRID

HYBRID POWER PLANT
SOLAR + ENGINE POWER

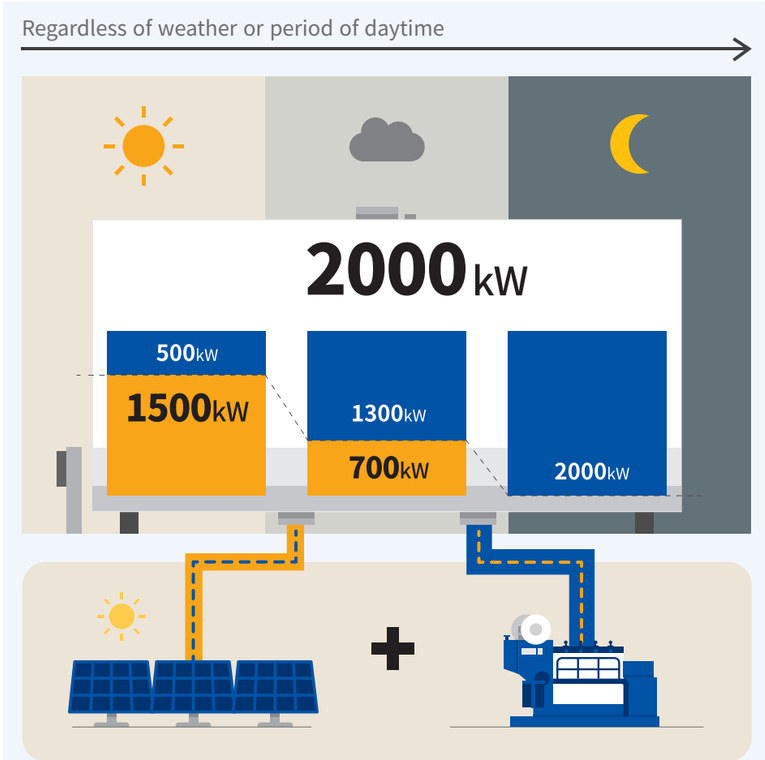
Hybrid power plant can supply stable power through balance between or among the power source. Regardless of weather or natural condition, it produces constant power.

Hybrid power plant overall scheme

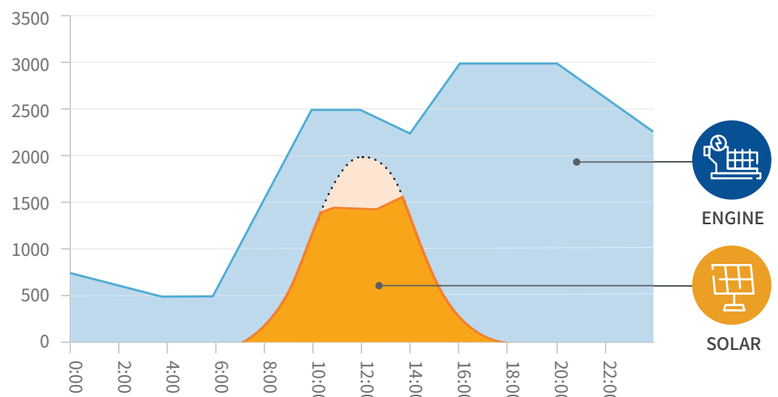


SOLAR PV POWER + GEN-SET PROFILE

How a typical day could look like



24h load and PV energy generation profile



03

ENGINES

Global No.1 ENGINE MANUFACTURER

All Operation available

- Base Load
- Island mode
- EDG for Nuclear Power Plant
- BSDG/EDG for Combined Cycle Power Plant

Designpreis Deutschland 2011 NOMINEE

reddot design award winner 2010

iF product design award 2010

PIN UP DESIGN AWARDS

"For the first four years, we were running 95% on time, which means that it was at its finest point. We had the highest efficiency in the entire country."

— ACP, General Manager

"The engines are easy to operate and the start time is excellent."

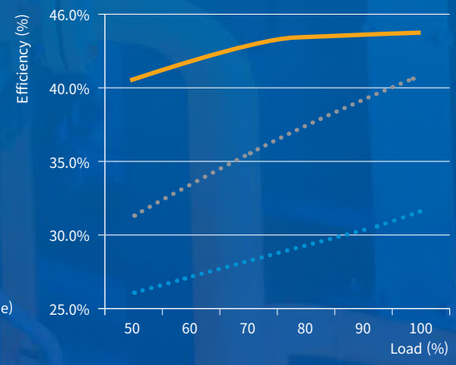
— Axia, O&M Manager

To match the level of demand

Generation Source	Delivery (months)
Engine Power Plant	~ 20
Combined Cycle Turbine	36 ~
Hydro	36 ~

Gas Turbine versus Engine

One Unit Performance on Part load



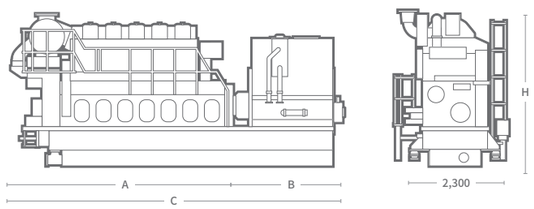
ENGINES

HiMSEN Engine Line-up for Stationary Gensets

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

Gas Fuel

H35/40G Bore: 350mm Stroke: 400mm

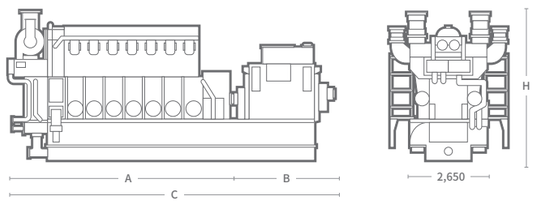


Main Data **Dimensions**

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	3,959	33.7	68.6
7H35/40G	3,360	3,225	3,360	3,225	6,112	3,374	9,486	4,130	38.6	77.1
8H35/40G	3,840	3,686	3,840	3,686	6,602	3,594	10,196	4,130	41.5	82.0
9H35/40G	4,320	4,147	4,320	4,147	7,092	4,097	11,189	4,130	44.6	89.1

Based on alternator efficiency of 96%.

H35/40GV Bore: 350mm Stroke: 400mm



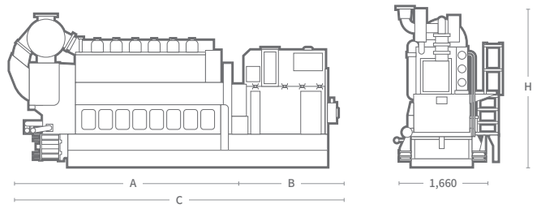
Main Data **Dimensions**

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	5,760	5,558	6,624	3,760	10,384	4,723	56.0	108.8
14H35/40GV	6,720	6,518	6,720	6,518	7,295	3,860	11,155	4,723	63.3	121.3
16H35/40GV	7,680	7,449	7,680	7,449	7,914	3,479	11,393	4,723	69.1	130.9
18H35/40GV	8,640	8,380	8,640	8,380	8,585	3,859	12,444	4,794	76.3	141.2
20H35/40GV	9,600	9,360	9,600	9,360	9,344	3,659	13,003	4,794	84.0	153.9

Based on alternator efficiency of 96.5~97.5%.

Dual Fuel

H27DF Bore: 270mm Stroke: 330mm

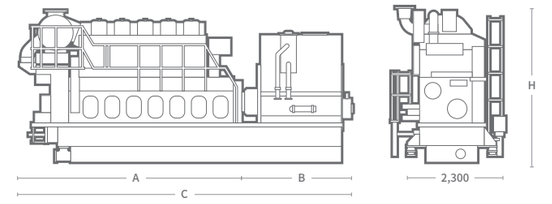


Main Data **Dimensions**

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	3,103	23.5	33.7
7H27DF	1,995	1,895	2,170	2,061	4,797	2,262	7,059	3,241	27.7	37.7
8H27DF	2,280	2,177	2,480	2,368	5,311	2,340	7,651	3,371	34.0	44.8
9H27DF	2,565	2,462	2,790	2,678	5,691	2,490	8,181	3,371	36.2	47.2

Based on alternator efficiency of 95~96%.

H35DF Bore: 350mm Stroke: 400mm

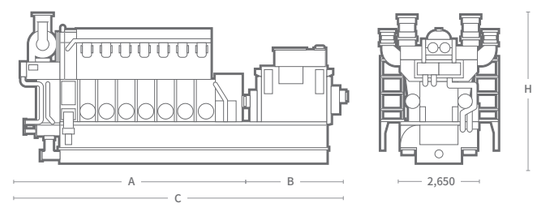


Main Data **Dimensions**

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	3,959	33.7	68.6
7H35/40G	3,360	3,225	3,360	3,225	6,112	3,374	9,486	4,130	38.6	77.1
8H35/40G	3,840	3,686	3,840	3,686	6,602	3,594	10,196	4,130	41.5	82.0
9H35/40G	4,320	4,147	4,320	4,147	7,092	4,097	11,189	4,130	44.6	89.1

Based on alternator efficiency of 96%.

H35DFV Bore: 350mm Stroke: 400mm

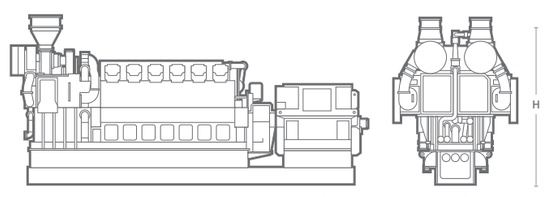


Main Data **Dimensions**

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	5,760	5,558	6,624	3,760	10,384	4,723	56.0	108.8
14H35/40GV	6,720	6,518	6,720	6,518	7,295	3,860	11,155	4,723	63.3	121.3
16H35/40GV	7,680	7,449	7,680	7,449	7,914	3,479	11,393	4,723	69.1	130.9
18H35/40GV	8,640	8,380	8,640	8,380	8,585	3,859	12,444	4,794	76.3	141.2
20H35/40GV	9,600	9,360	9,600	9,360	9,344	3,659	13,003	4,794	84.0	153.9

Based on alternator efficiency of 96.5~97.5%.

H54DFV Bore: 540mm Stroke: 600mm



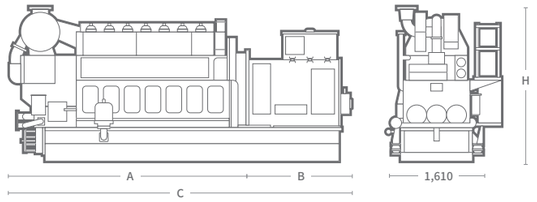
Main Data **Dimensions**

Speed	600rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	50/60Hz							
	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H54DFV TSTC	17,640	17,199	12,416	4,393	16,809	8,319	300.9	398.4
14H54DFV TSTC	20,580	20,066	13,566	4,337	17,903	8,319	331.8	438.8
16H54DFV TSTC	23,520	22,932	14,991	4,522	19,513	8,614	371.1	488.8
18H54DFV TSTC	26,460	25,799	16,141	4,692	20,833	8,614	402.7	531.7

Based on alternator efficiency of 97.5%.

Liquid Fuel

H21/32 Bore: 210mm Stroke: 320mm

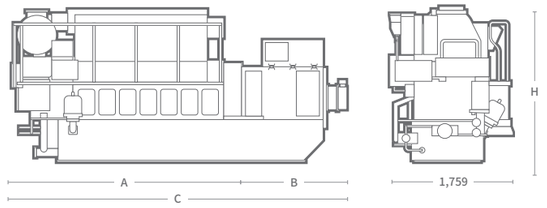


Main Data

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
6H21/32	1,200	1,128	1,200	1,128	3,781	2,180	5,961	2,781	15.1	25.1
8H21/32	1,600	1,512	1,600	1,512	4,453	2,345	6,798	2,911	18.4	29.9
9H21/32	1,800	1,710	1,800	1,710	4,783	2,423	7,206	2,911	19.8	31.9

Based on alternator efficiency of 94~95%.

H21C Bore: 210mm Stroke: 330mm

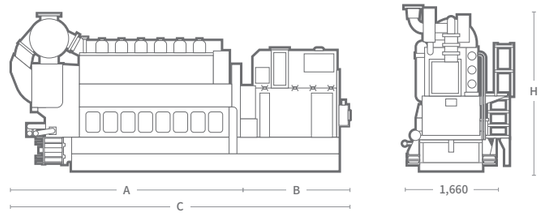


Main Data

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
5H21C	1,200	1,128	1,200	1,128	3,735	2,249	5,984	2,600	14.3	22.1
6H21C	1,440	1,353	1,440	1,353	4,085	2,249	6,334	2,600	16.0	24.9
7H21C	1,680	1,587	1,680	1,587	4,435	2,305	6,740	2,600	17.8	28.3
8H21C	1,920	1,824	1,920	1,824	4,785	2,305	7,090	2,653	19.4	30.2
9H21C	2,160	2,052	2,160	2,052	5,135	2,450	7,585	2,653	21.0	33.6

Based on alternator efficiency of 94~95%.

H25/33 Bore: 250mm Stroke: 330mm

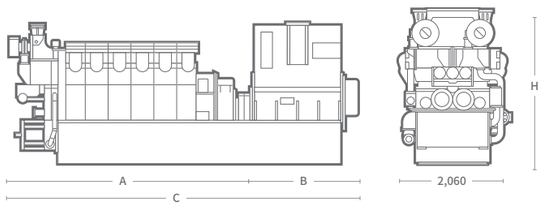


Main Data

Speed	900 rpm		1000 rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60 Hz		50 Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
6H25/33	1,740	1,653	1,800	1,710	4,414	2,262	6,676	2,961	20.2	30.2
7H25/33	2,030	1,928	2,100	1,995	4,797	2,262	7,059	3,241	22.5	32.7
8H25/33	2,320	2,215	2,400	2,292	5,311	2,340	7,651	3,371	24.1	34.9
9H25/33	2,610	2,505	2,700	2,592	5,691	2,490	8,181	3,371	26.2	37.2

Based on alternator efficiency of 95~96%.

H25/33V Bore: 250mm Stroke: 330mm

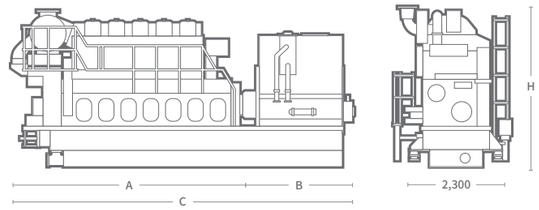


Main Data

Speed	900rpm		1000rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H25/33V	3,840	3,696	3,840	3,696	5,524	3,334	8,858	3,750	33.5	58.2
14H25/33V	4,480	4,300	4,480	4,300	5,944	3,504	9,448	3,750	36.5	63.4
16H25/33V	5,120	4,915	5,120	4,915	6,364	3,682	10,046	3,750	39.5	69.6
18H25/33V	5,760	5,558	5,760	5,558	6,784	3,772	10,556	3,750	42.5	77.5
20H25/33V	6,400	6,208	6,400	6.208	7,204	3,727	10,931	3,750	45.5	79.5

Based on alternator efficiency of 96~97%.

H32/40 Bore: 320mm Stroke: 400mm

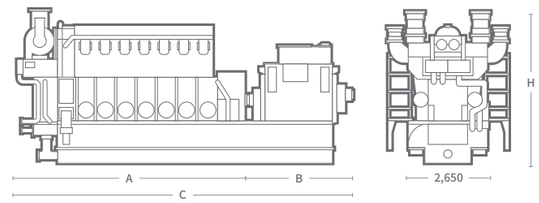


Main Data

Speed	720 rpm		750 rpm		Dimension(mm)				Dry Mass(ton)	
Frequency	60 Hz		50 Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
6H32/40	2,850	2,736	2,850	2,736	5,760	3,130	8,890	3,959	33.7	68.6
7H32/40	3,325	3,192	3,325	3,192	6,112	3,374	9,486	4,130	38.6	77.1
8H32/40	3,800	3,648	3,800	3,648	6,602	3,594	10,196	4,130	41.5	82.0
9H32/40	4,275	4,104	4,275	4,104	7,092	4,097	11,189	4,130	44.6	89.1

Based on alternator efficiency of 96%.

H32/40V Bore: 320mm Stroke: 400mm

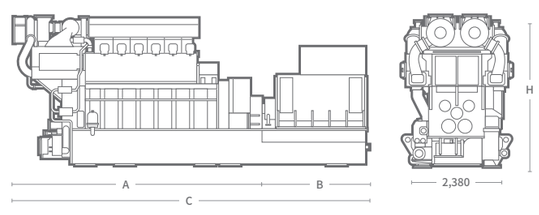


Main Data

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
12H32/40V	5,700	5,500	5,700	5,500	6,624	3,760	10,384	4,723	56.0	108.8
14H32/40V	6,560	6,450	6,650	6,450	7,295	3,860	11,155	4,723	63.3	121.3
16H32/40V	7,600	7,372	7,600	7,372	7,914	3,479	11,393	4,723	69.1	130.9
18H32/40V	8,550	8,293	8,550	8,293	8,585	3,859	12,444	4,794	76.3	141.2
20H32/40V	9,500	9,262	9,500	9,262	9,344	3,659	13,003	4,794	84.0	153.9

Based on alternator efficiency of 96.5%.

H32CV Bore: 320mm Stroke: 450mm

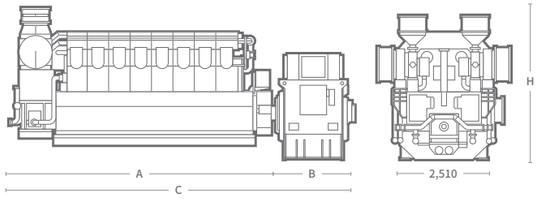


Main Data

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
12H32CV	7,200	6,948	7,200	6,948	7,526	3,900	11,426	4,362	78.0	121.2
14H32CV	8,400	8,106	8,400	8,106	8,126	4,100	12,226	4,362	88.0	137.9
16H32CV	9,600	9,264	9,600	9,264	8,726	4,300	13,026	4,448	96.0	152.6
18H32CV	10,800	10,422	10,800	10,422	9,326	4,500	13,826	4,448	106.0	169.3

Based on alternator efficiency of 96.5%.

H46/60V Bore: 460mm Stroke: 600mm



Main Data

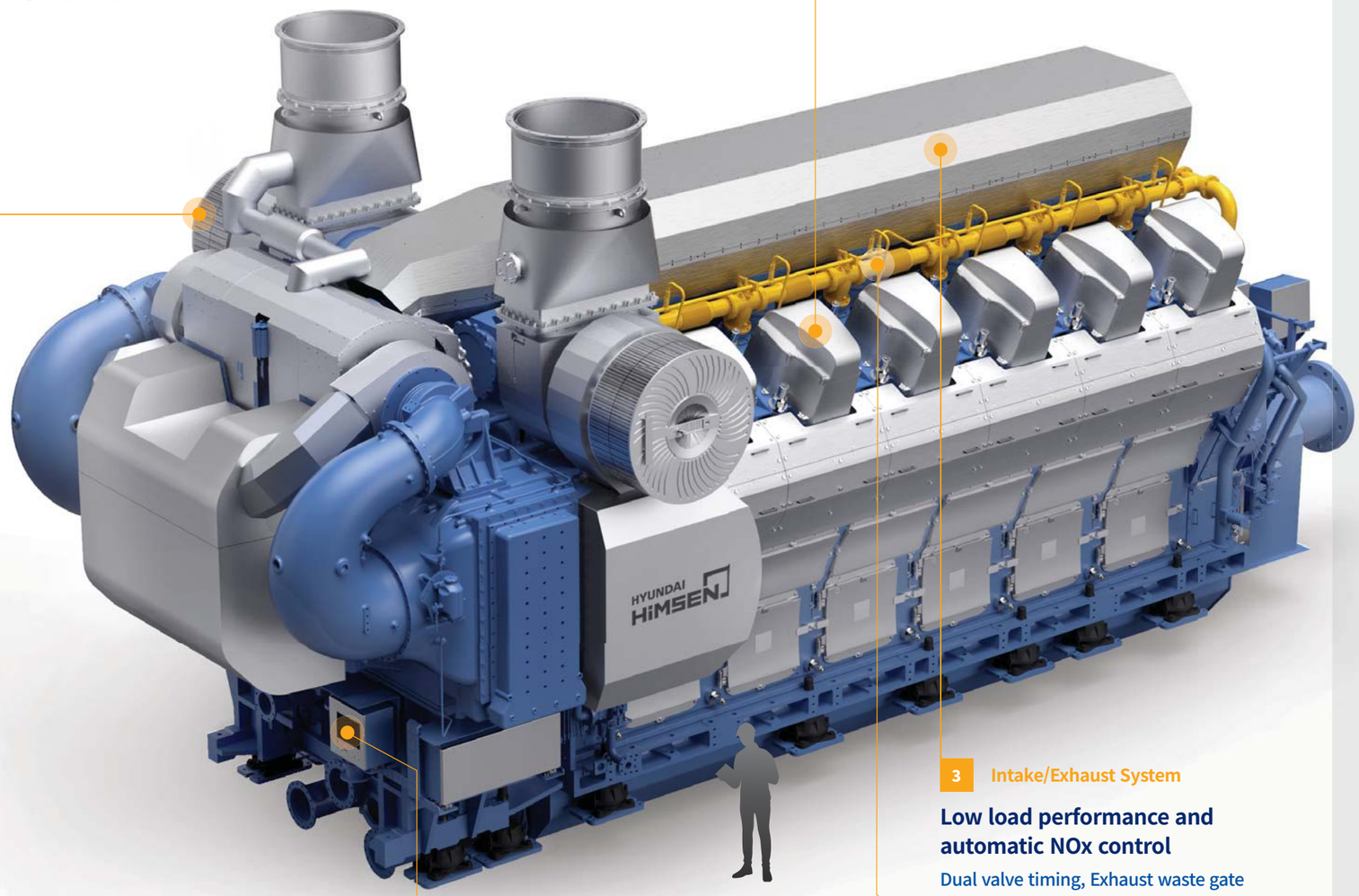
Speed	600rpm		600rpm		Dimension(mm)				Dry Mass (ton)	
Frequency	60Hz		50Hz							
	Eng.(kW)	Gen.(kW)	Eng.(kW)	Gen.(kW)	A	B	C	H	Engine	GenSet
12H46/60V	14,400	14,040	14,400	14,040	10,410	3,627	14,037	4,975	205.3	256.4
16H46/60V	19,200	18,720	19,200	18,720	12,410	3,724	16,134	4,975	227.8	286.6
18H46/60V	21,610	21,060	21,600	21,060	13,410	3,625	17,035	5,288	239.0	313

Based on alternator efficiency of 97.5%.

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).
Note) All dimensions and weight are approximate value and subject to change without prior notice.

MAKING YOUR POWER PLANT WITH THE LATEST TECHNOLOGY

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

2 Combustion System

High power and efficiency

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

- Output / Cylinder : 1470kWm
- 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

Control System 5

Safe and optimal engine operation

HI-MECS, Cylinder balancing, Knock control

General Info

EFFICIENCY _TSTC	51.2%
EFFICIENCY _SSTC	50.2%
OUTPUT RANGE	17.6~26.5 MWm

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

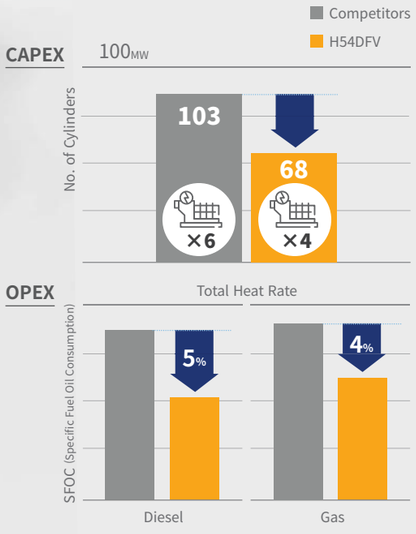
BENEFITS FOR YOU

- **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 the years.

- **Easy Maintenance**
HYUNDAI engines are thoughtfully modularized for easy maintenance. Many O&M managers working on 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. HYUNDAI always looks for various ways to protect the environment. Low NOx emissions / Smokeless at whole operation range / Low vibration & noise.

- **High Efficiency**



* Specifications are subject to change without prior notice.

04 SERVICES

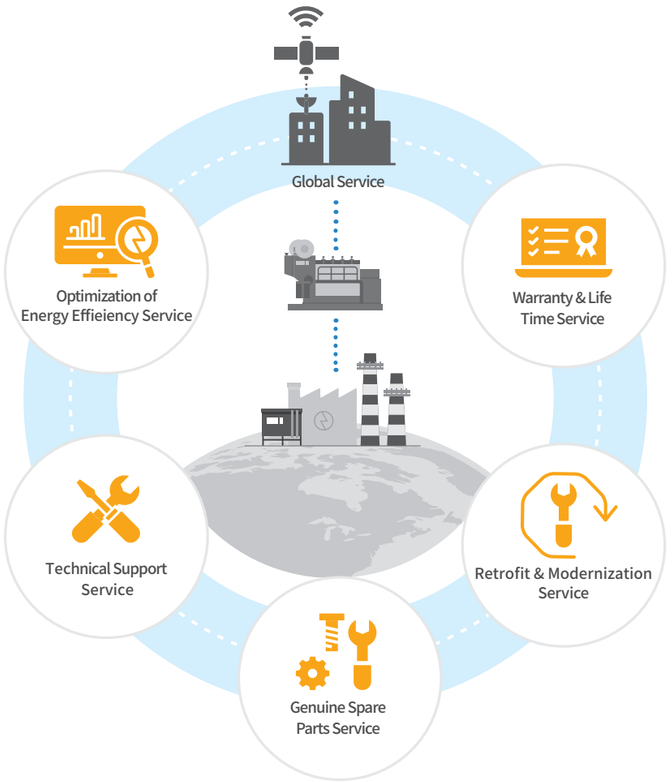
KEEP YOUR ENGINE RUNNING
WE'RE RIGHT NEAR BY

All of your services will be provided through HGS, a professional single service channel who understands all your needs.

STANDING BY 24/7
WORLDWIDE

MAXIMISING PROFITABILITY & POWER AVAILABILITY

HYUNDAI is set to embark on a new journey by setting up an integrated A/S unit. As an unique service-specialized company of Hyundai Heavy Industries group, Hyundai Global Service(hereinafter "HGS") is a total solution service company for HYUNDAI's products.
Through refinements to repair techniques, HGS ensures on the leadership and experience as an single contact point of the entire services united under HYUNDAI.



Optimized Solutions For Each Customer's Needs

HYUNDAI has been supplying EDG & BSDG for more than 130MW with 23 units.
We have not only gained a wealth of experience and expertise, but also gained reputation for products that deliver outstanding reliability and performance.

24/7, Immediate Support

Regardless of the guarantee period, Hyundai Global Service will make it a rule to support the clients with immediate service by e-mail or through web. The scheduling of the technical support can be adjusted flexibly depending on the seriousness of the damage or the customer's schedule.
We offer free technical support 24/7.

Genuine Spare Parts From The Original Equipment Manufacturer

HGS's authorized sales agents will supply our customers with original HYUNDAI spare parts with competitive price, delivery time, and quality. Please do not hesitate to contact our sales agent with inquiry.

Fast Response Through Our Global Service Network

HGS is very proud of its well-organized global service network which is efficiently and systematically designed to meet every requirement of the clients.

LONGTERM TECHNICAL POWER PARTNER

Powerplant lifecycle service Workscope

Project Development & investments

Engineering Procurement Construction

Post Construction Services

Warranty

HGS provides the warranty service for engine power plants. We regularly fulfill lifetime services and feedback for main power plant sites. All our engineers have the outstanding ability and experiences.

- Processing 2-stroke & 4-stroke engine claim.
- Technical service for major trouble and assistance for precaution.
- Lifetime service and feedback for main power plant site.
- Providing engine operation guide and the periodical technical service letters.
- Providing technical consultation with our outstanding engineers regularly.

Spare parts Supply

We have delivered all the spare parts for engine and auxiliary equipment including the boiler, air compressor, purifier, and more. Especially, it is only HGS that can provide the genuine spare parts for all engines and machineries.

Training and Education

From theoretical lecture to customized training program, our highly experienced experts provide educational services for HiMSEN engine and other BOPs in Global Academy, South Korea.

Operation and Maintenance

Based on more than 10 years of experience in all parts of the world, your plant can be efficiently and safely operated through the HGS's O&M. All our service includes Full O&M, Supervision service, Long Term Service Agreement, repair service. So the life of power plant can be extended by responding constantly changing with our variable services.

Retrofit

RETROFIT

Based on the know-how for O&M and service experience, our new engine can be retrofitted into the state of the art.

ENGINE & BOP UPGRADE

The upgraded parts can be adapted according to continuously improved design.

EXTENSION

In situation of power capacity extension, the power plant can be extended with satisfying client's demand by supplying additional engine. All equipment and control system are to be well combined and harmonious.

Lubricants Oil Supply

HGS provides the high quality lubricant that is made with Hyundai affiliate's most advanced base oil and chemical technology to meet and exceed the rigorous demands of industrial lubricants.

PROVEN TECHNOLOGY COMES FROM NUMEROUS TEST

HYUNDAI has many centers for running quality tests for our products.
We ensure that immaculate tests make our products world-class.

HiMSEN TECHNO CENTER

At the HiMSEN Techno Center, HYUNDAI conducts various tests such as Inclination tests for offshore vessel. Water spray test for KORI #1 EDG, and more. Also, all HiMSEN prototypes are installed for testing.

FACILITIES

- Modern R&D test facility
- Max. 25MW, 26m x 72m
- Pilot power plant
- Training room

Inclination Test for Off shore Vessel

Water Spray Test for Kori #1 EDG

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

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+82.52.204.7742 (Stationary)
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