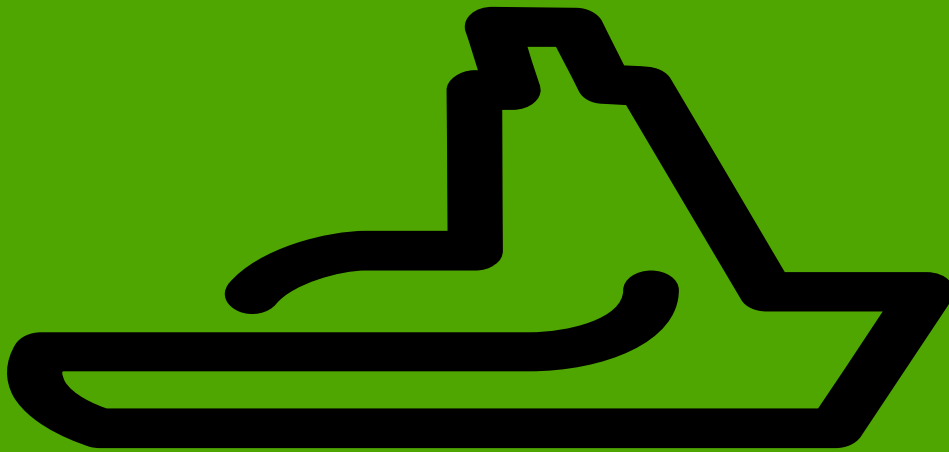


Power Management System Used on Vessel



Presented By

Jane GOH

Services Director

Schneider
Electric

Type of Ship

- **1. Dry Cargo** : Bulk carrier, Container ship, Refri Container ship, Roro ship, Heavy lift ship.



- **2. Tanker** : Oil tanker, Chemical tanker, LNG/LPG carrier.



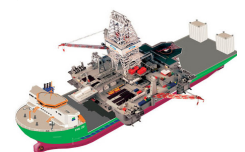
- **3. Passenger** : Cruise ship, Ferry, Ocean liner.



- **4. Support** : Dive support, Fireboat, Supply vessel, Drill Tender, Tugboat.



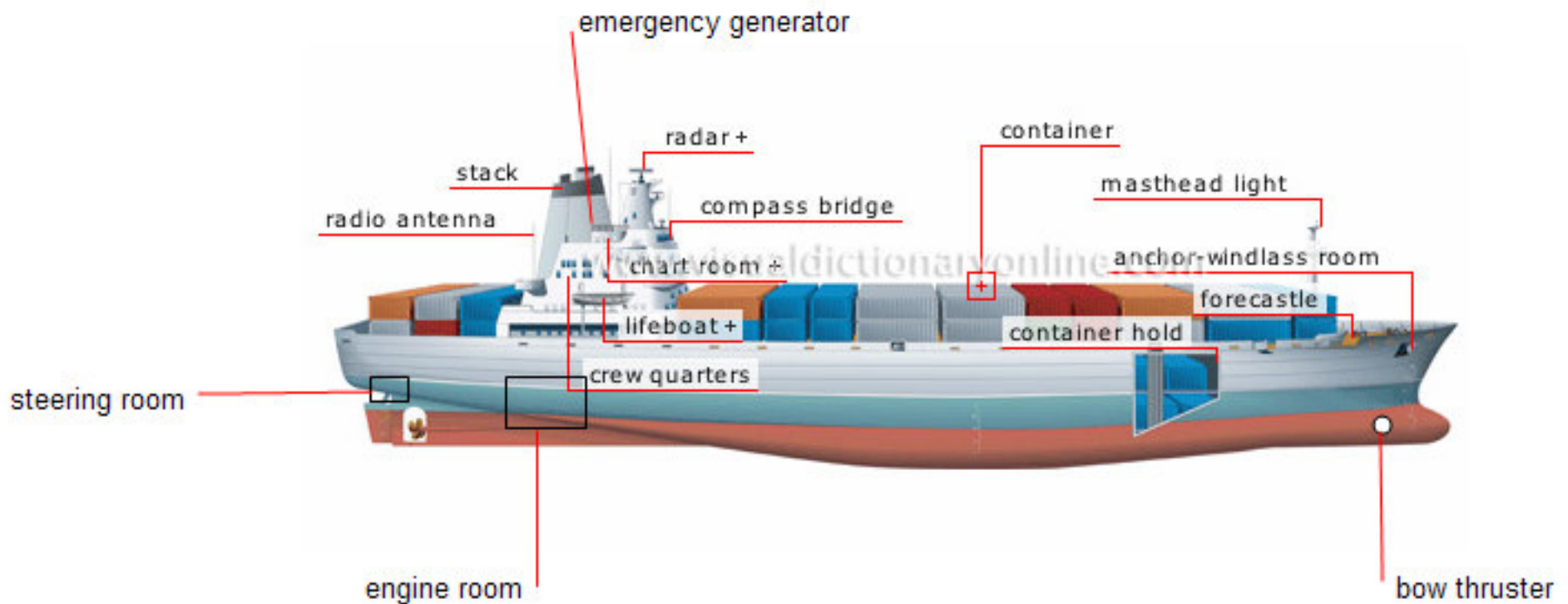
- **5. Other** : Cable laying ship, Crane Barge, Drillship, Fishing vessel, Icebreaker, Merchant submarine, Research vessel.



- **6. Yachting.**



Cargo ship – Container ship



1. Emergency Electric Distribution

- **Diesel generator**

- situation on the top of the ship
- Low voltage , power between 300KW and 1 MW
- use for emergency components, steering gear, radio, lighting, lifeboat, fire pump.
- use to supply all auxiliaries to start one main generator: air compressor, fuel pump.
- Automatic start when the ship lose the main power.

- **UPS**

- power 20KW maxi
- use for essential marine components
- UPS type : online/offline

- **Batteries**

- 220vDC or 24/12vDC
- use for lighting



2. Main Electric Distribution

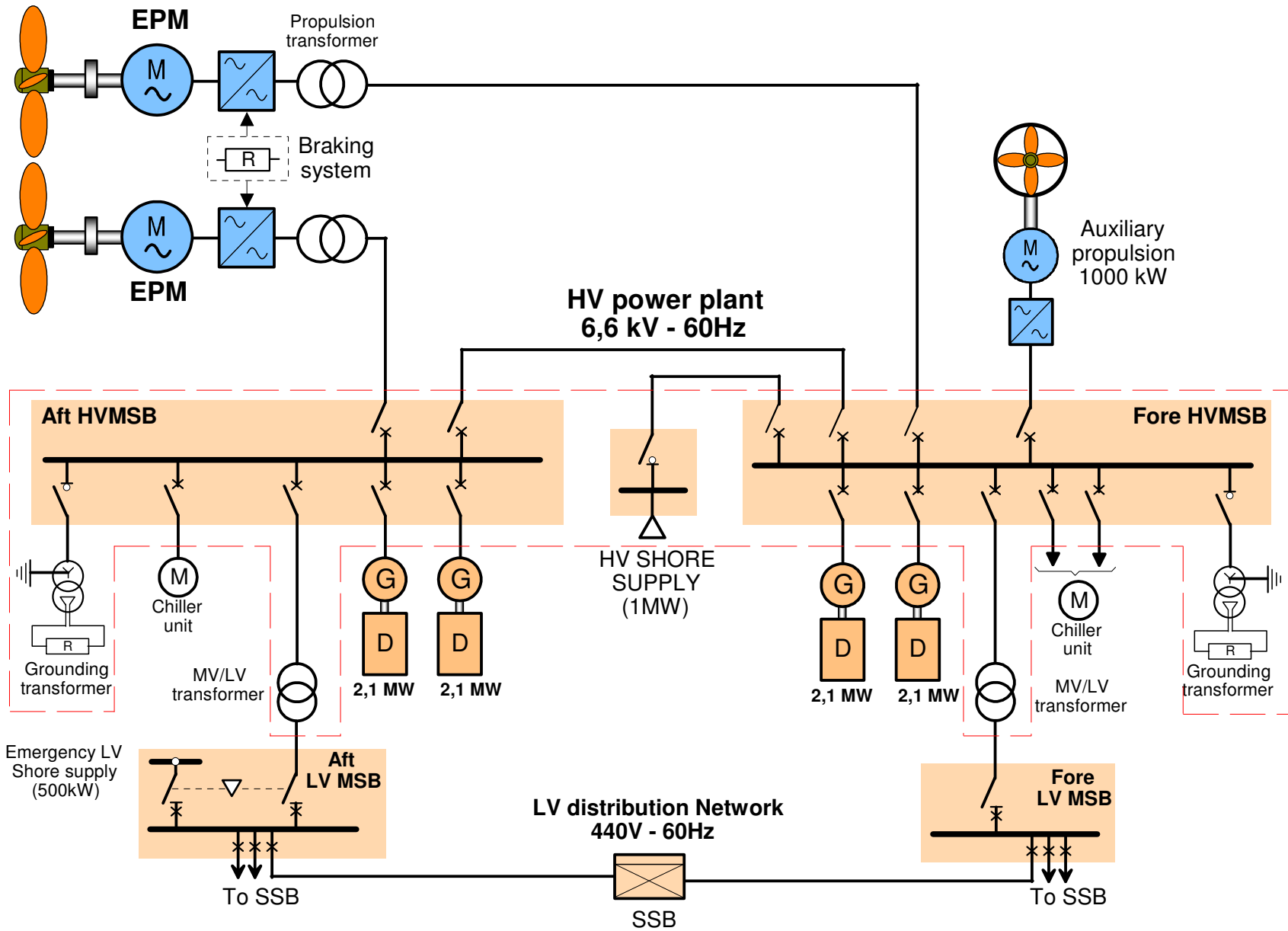
1. Low voltage 380v 50Hz or 440v 60Hz

- Diesel generator
 - use for cargo ship when the power is below 3 or 4 MW
- Shaft generator
 - use for bow and aft thruster and at sea for ship distribution.
- Turbo generator
 - Exhaust gas boiler
 - Steam ship (LNG carrier)

2. High voltage 5.5Kv , 6.6Kv, 7.2Kv.

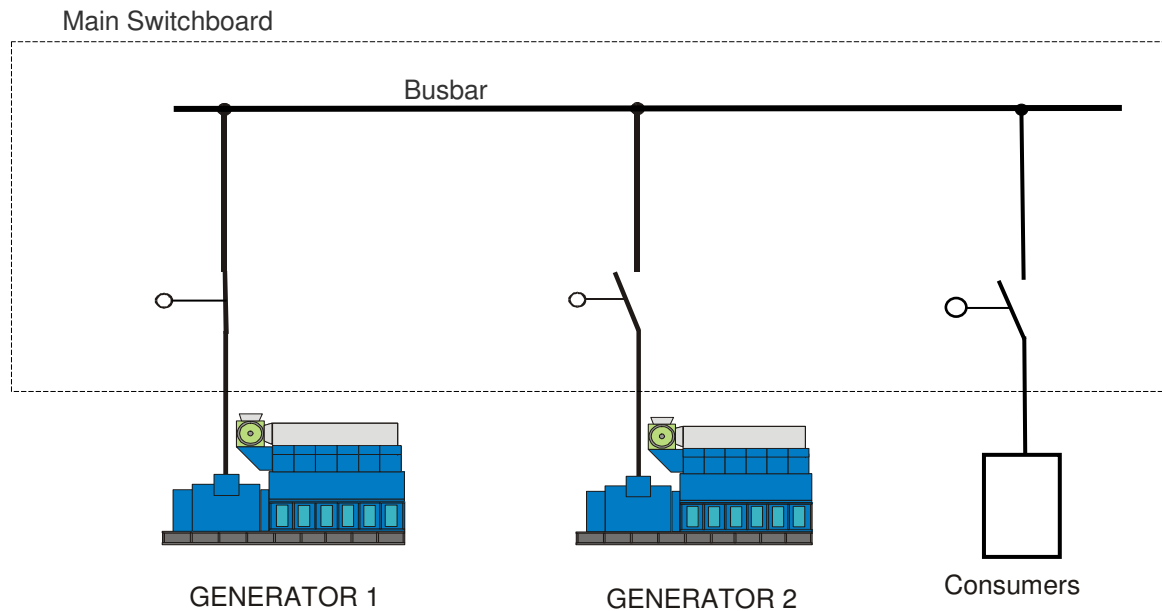
- Ship with Diesel propulsion
 - Diesel generator use for power over 4 MW
- Diesel Electric propulsion
 - Electric power between 20 and 110 MW
- Gas turbine
 - use on cruise ship for electric propulsion





Power Mgt Systems, General Overview

- Simple ship

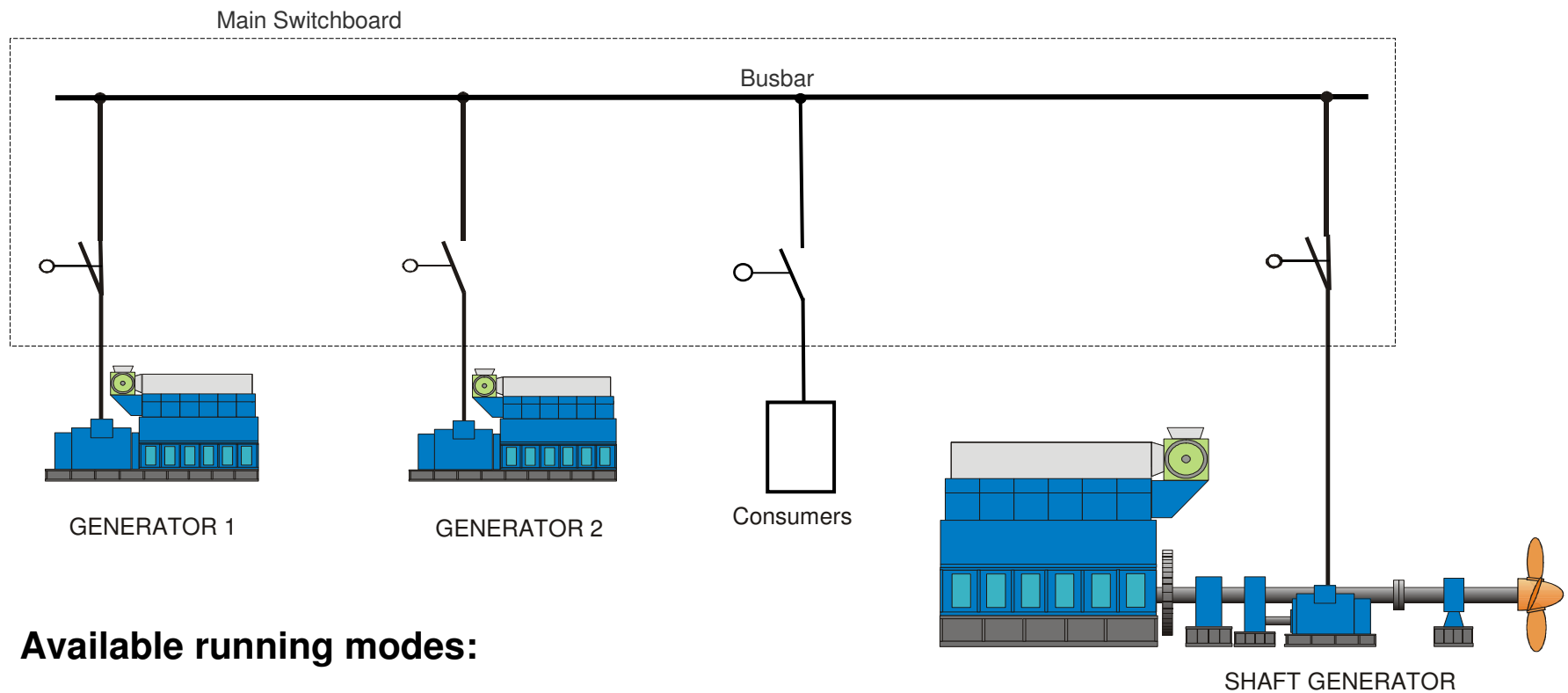


Available running modes:

- DG (Diesel Generator)

Power Mgt Systems, General Overview

- Shaft generator

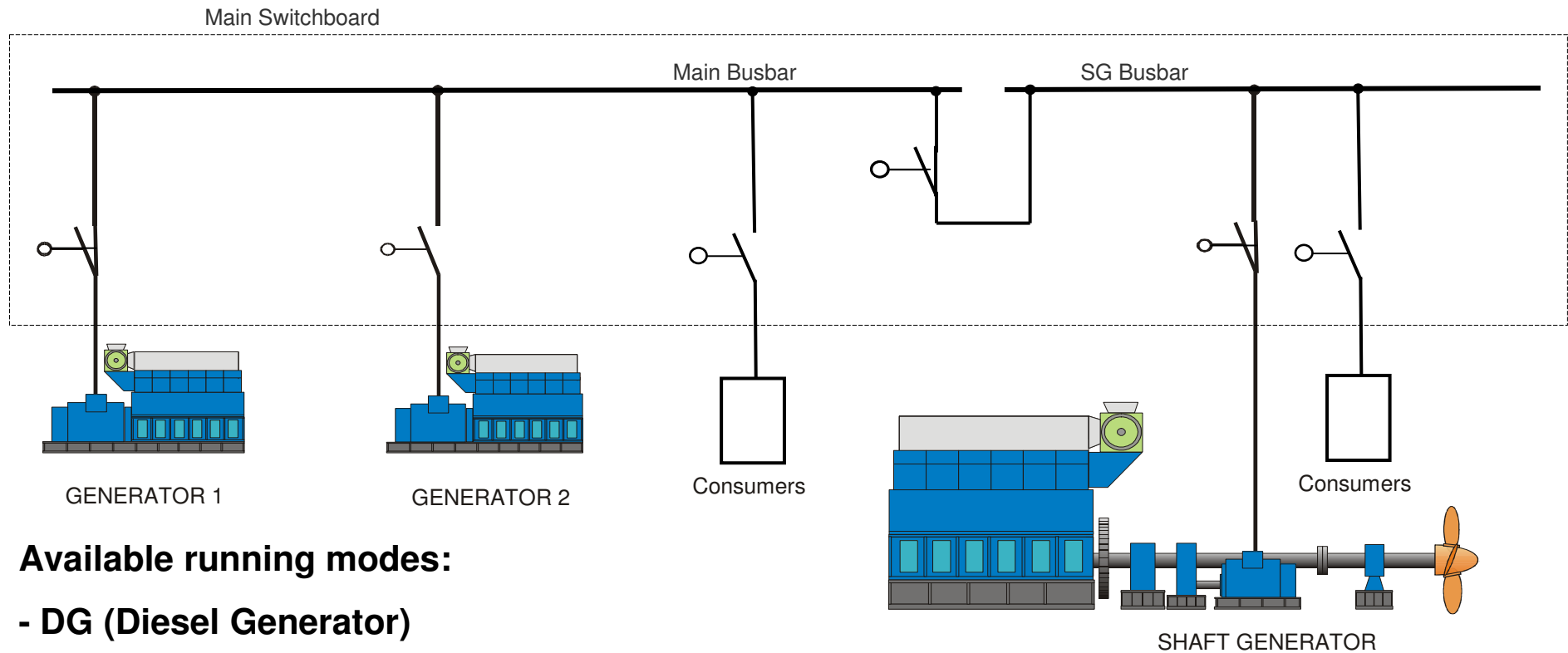


Available running modes:

- DG (Diesel Generator)
- SG (Shaft Generator)

Power Mgt Systems, General Overview

- Shaft generator with bustie breaker

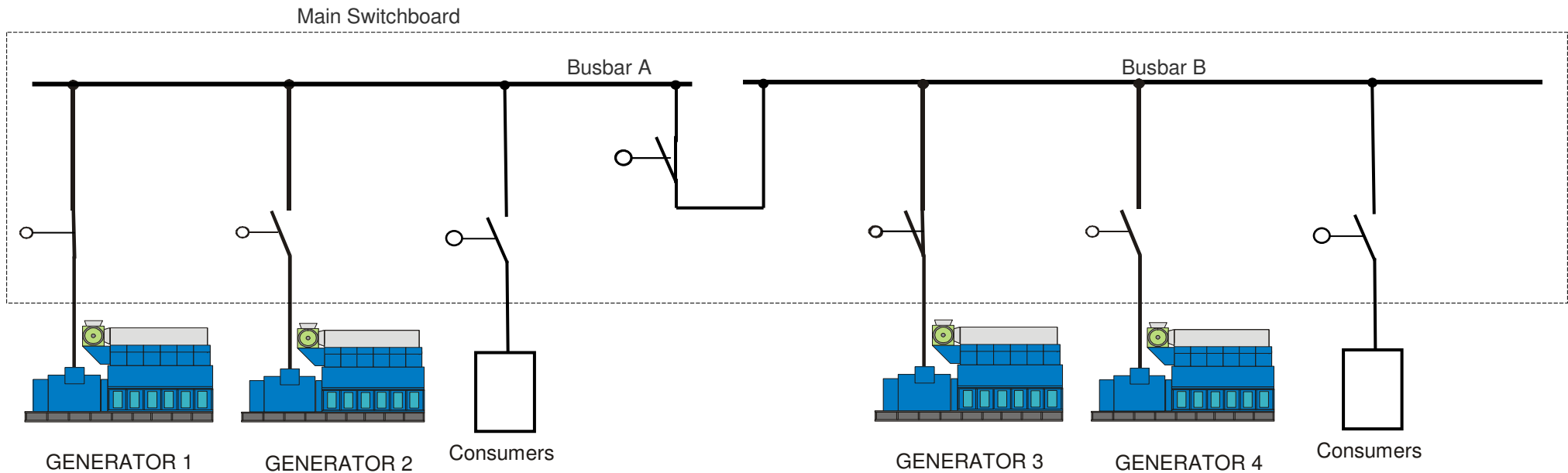


Available running modes:

- DG (Diesel Generator)
- SG (Shaft Generator)
- Split (Diesels on left side, Shaft Generator on right side)

Power Mgt Systems, General Overview

- Diesel generators with bustie breaker

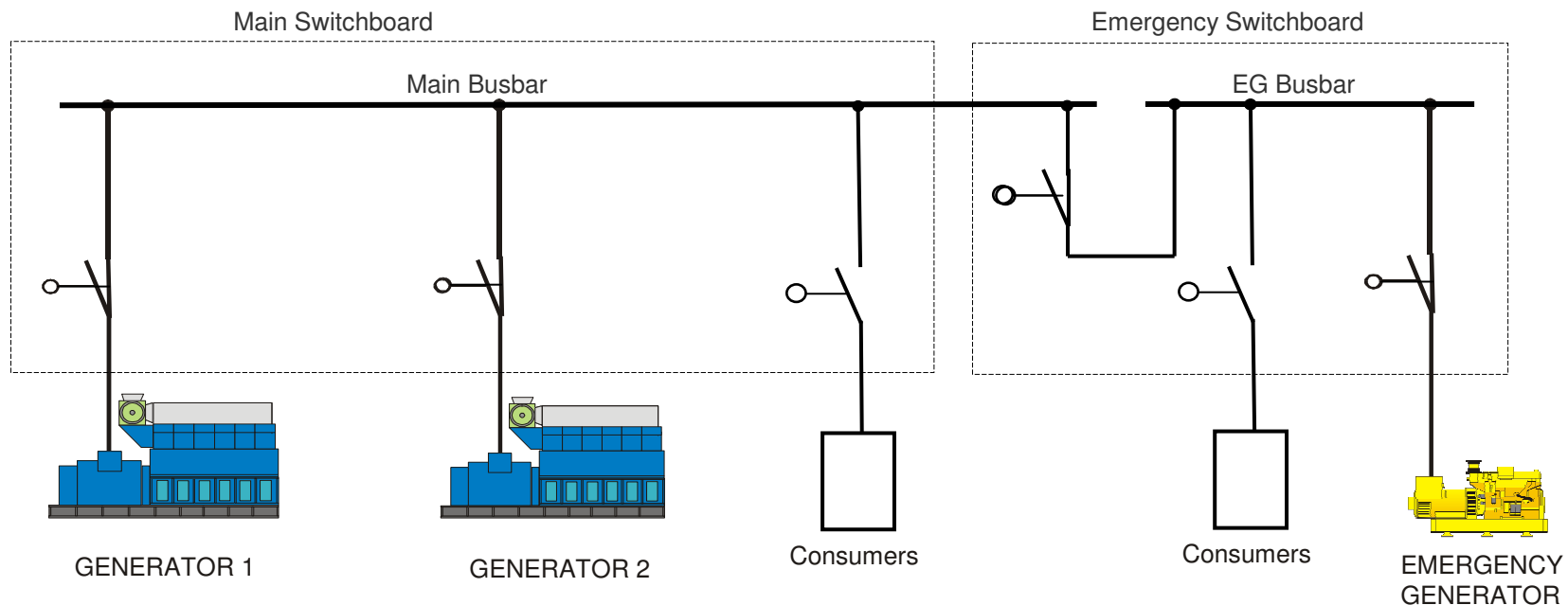


Available running modes:

- DG (Diesel Generators)
- Split (Diesels on either side operates independently from the other side)

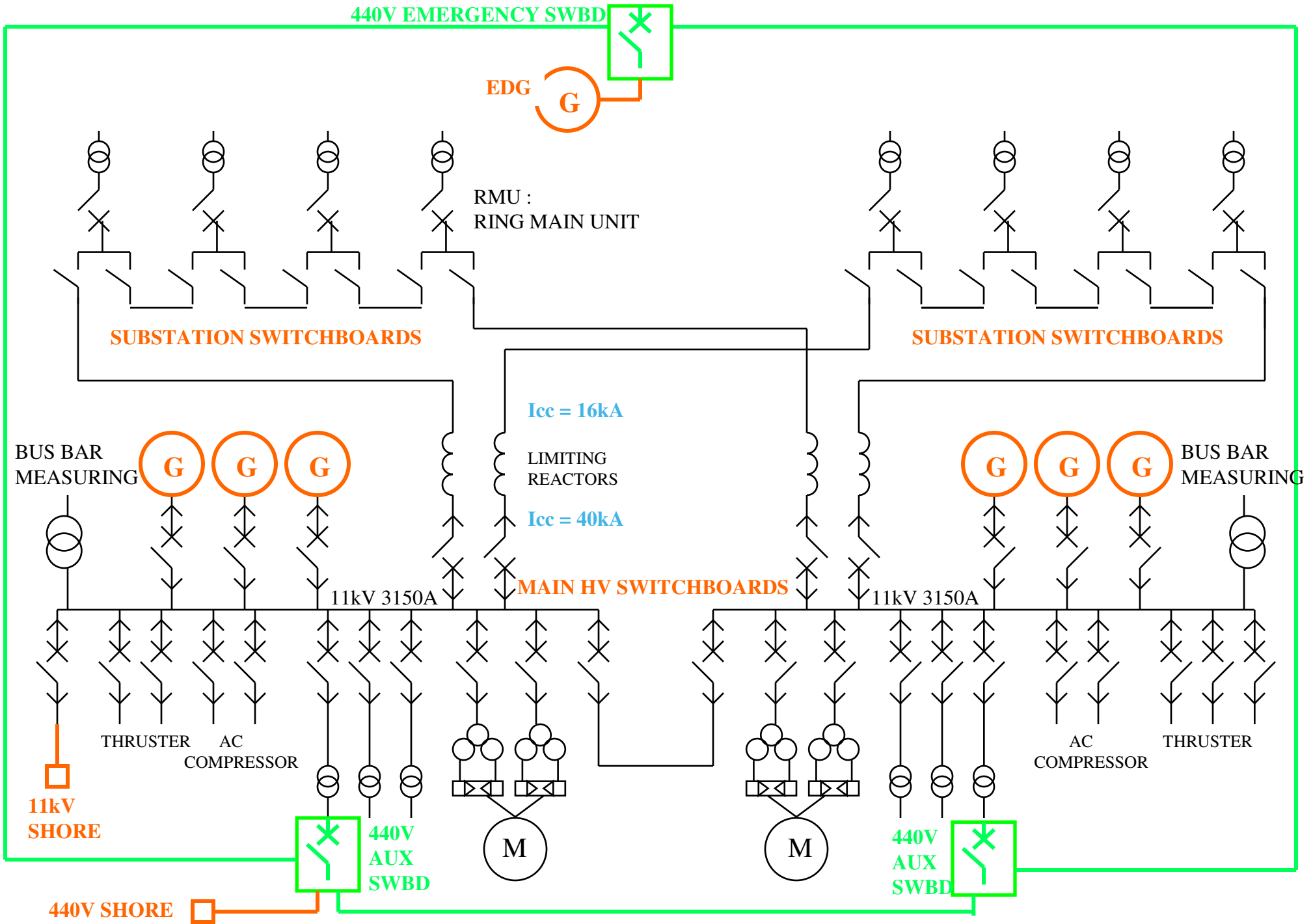
Power Mgt Systems, General Overview

- Emergency generator / harbour generator



Available running modes:

- DG (Main Diesel Generators)
- EDG (Emergency Diesel Generator, main diesels have failed, tie breaker is open)
- Harbour (Emergency Diesel Generator is feeding the system alone, main diesels are stopped, tie breaker is closed)



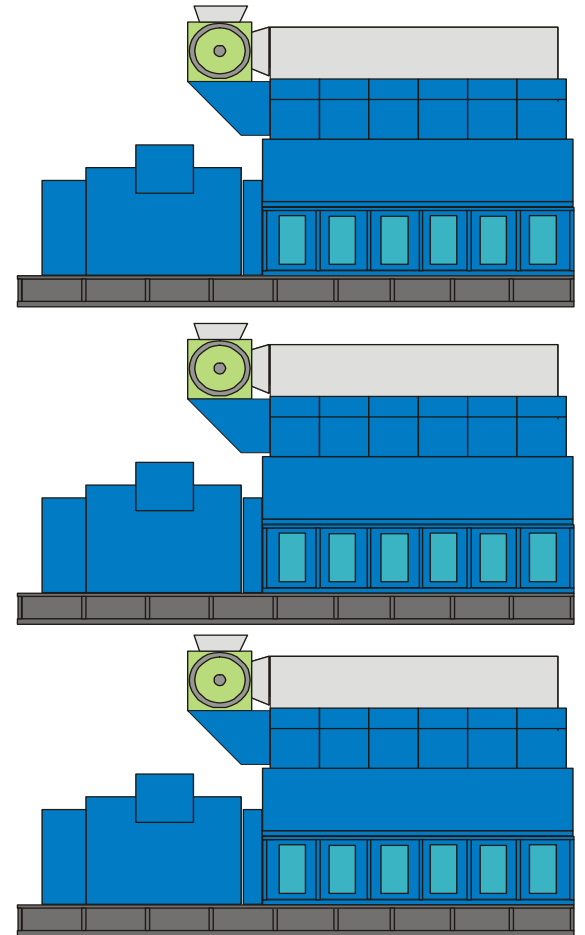
Objectives of Power management

Main Task:

1. Control the load of the generators
2. Start and stop generators dependend on the power demand
3. Control synchronisation and load sharing in the plant
4. Make sure that blackouts do not appear

Benefits:

1. Keep generators running at the best efficiency
2. Keep number of starts and stops at a minimum
3. Equal running hours across all generators
4. Save money



An APPLICATION

By
SESG

CONOCOPHILLIPS NORTH BELUT PROJECT



PROJECT BACKGROUND

CUSTOMER:



PT. NIPPON STEEL CONSTRUCTION INDONESIA



PT. TECHNIP INDONESIA

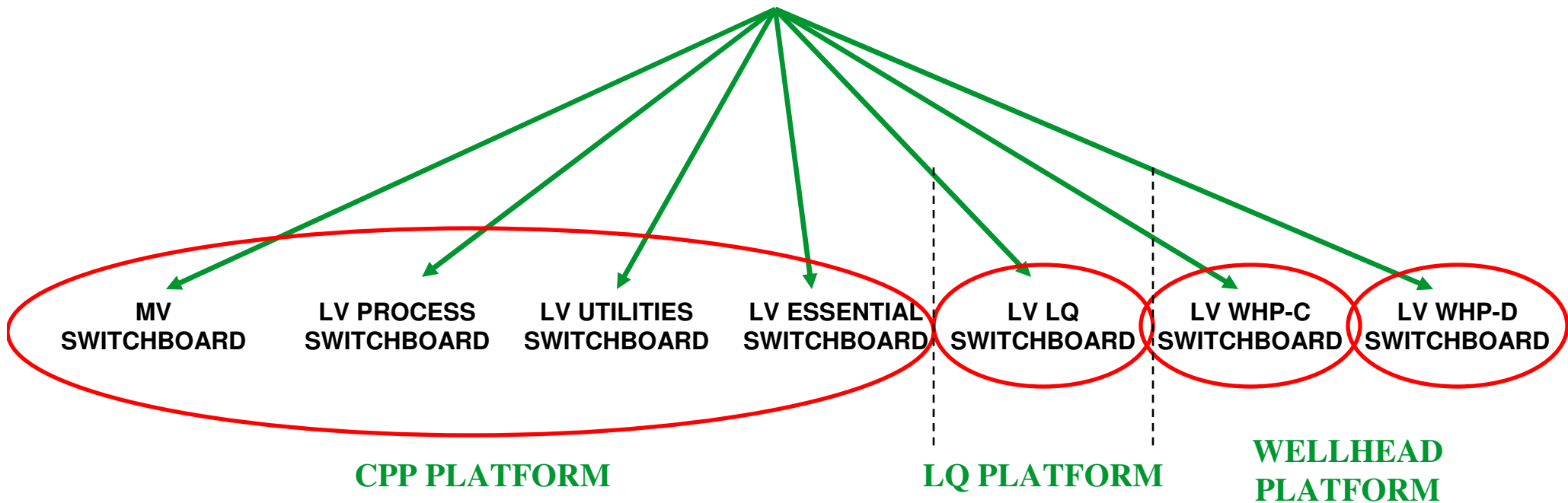
END USER:



PT. CONOCOPHILLIPS INDONESIA

SYSTEM SOLUTION

ELECTRICAL CONTROL & MONITORING SYSTEM



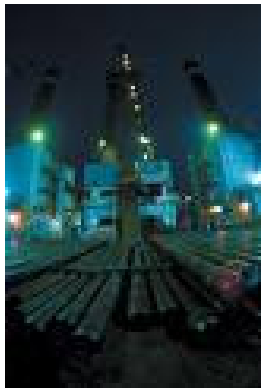
SYSTEM FUNCTION:

- LOAD SHEDDING
- MOTOR CONTROL COMMAND
- MONITORING
- RECORDING (TRENDS, ALARM)

KEY CHALLENGES



- To complete customer requirement: load shedding if under frequency condition and fast load shedding when some generators fault
- To start/stop motor through communication within 2 sec execution time.
- Innovativeness using communication for around 500 Tsys-T to control motors using Sis Gateway device
- Develop HMI for control and monitoring includes:
 - Event handling
 - Alarm Handling
 - Event-time tagging
 - Trend & Archive Handling
 - Report



=S= SOLUTION ADVANTAGES

- **To start/stop motor and devices through communication**
- **An open ended and easily upgradeable solution (new devices, new communication, etc)**
- **Industrial PLC and remote IO modules enable:**
 - **specific automatic function,**
 - **analog digital information and other devices connection**
- **Standard communication (Modbus, Ethernet TCP) allows components linked to the system**
- **Standard data processing components and principles allow transferring data to/from other systems**
- **Intelligent Electrical Devices to protect, gathering necessary data for monitoring and control of electrical devices (ie: Tesys for motors, SEPAM as intelligent protection relays)**

SYSTEM SUPPLIES

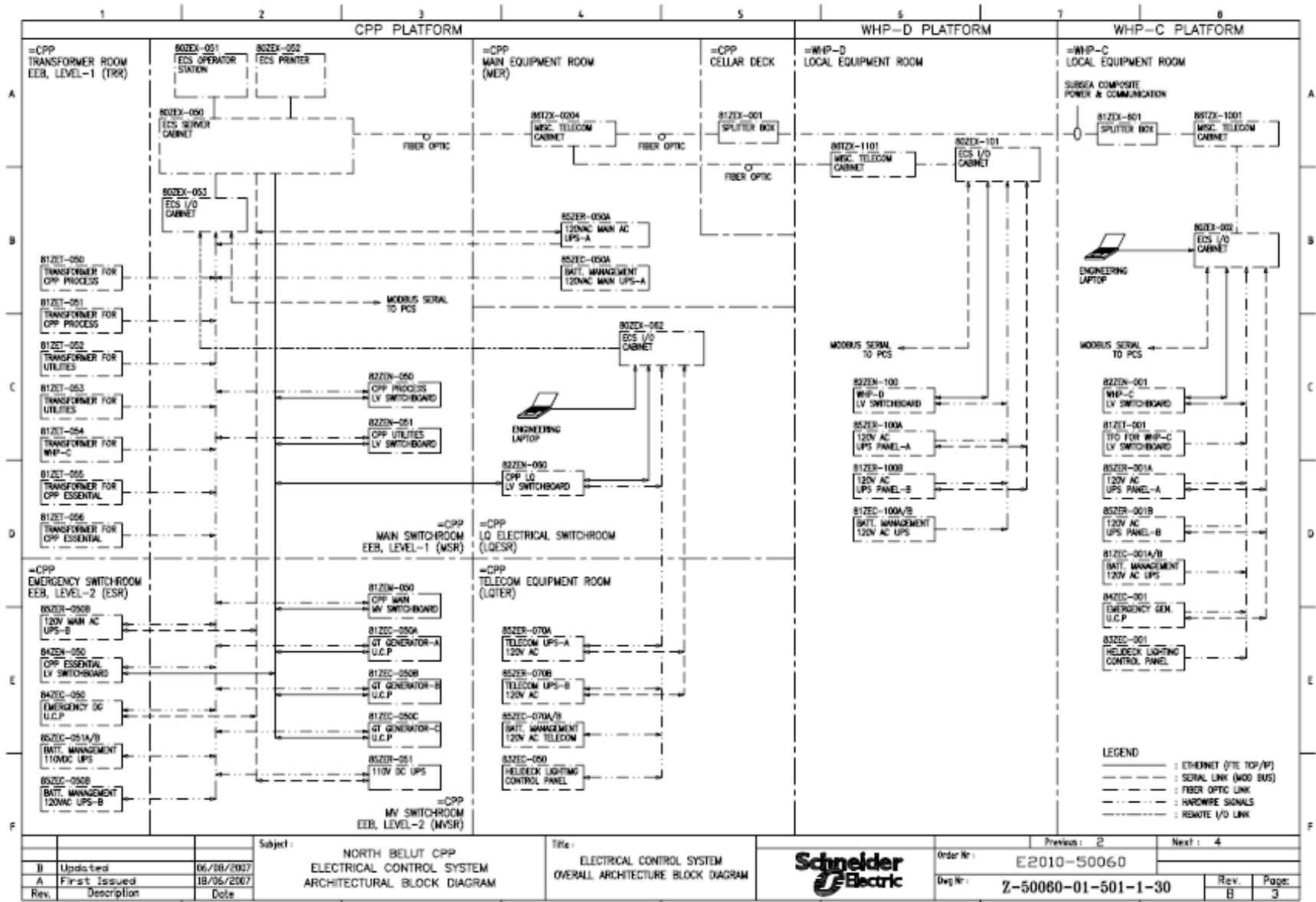
HARDWARE

- 3 HOT STANDBY QUANTUM
- 5 RIO DROP
- 501 TSYS T
- 16 SIS GATEWAY
- 43 SEPAM
- 2 SERVER
- 1 OPERATOR WS
- 2 ENGINEERING WS
- 7 MAGELIS XBTGT
- 80 Okken Panel

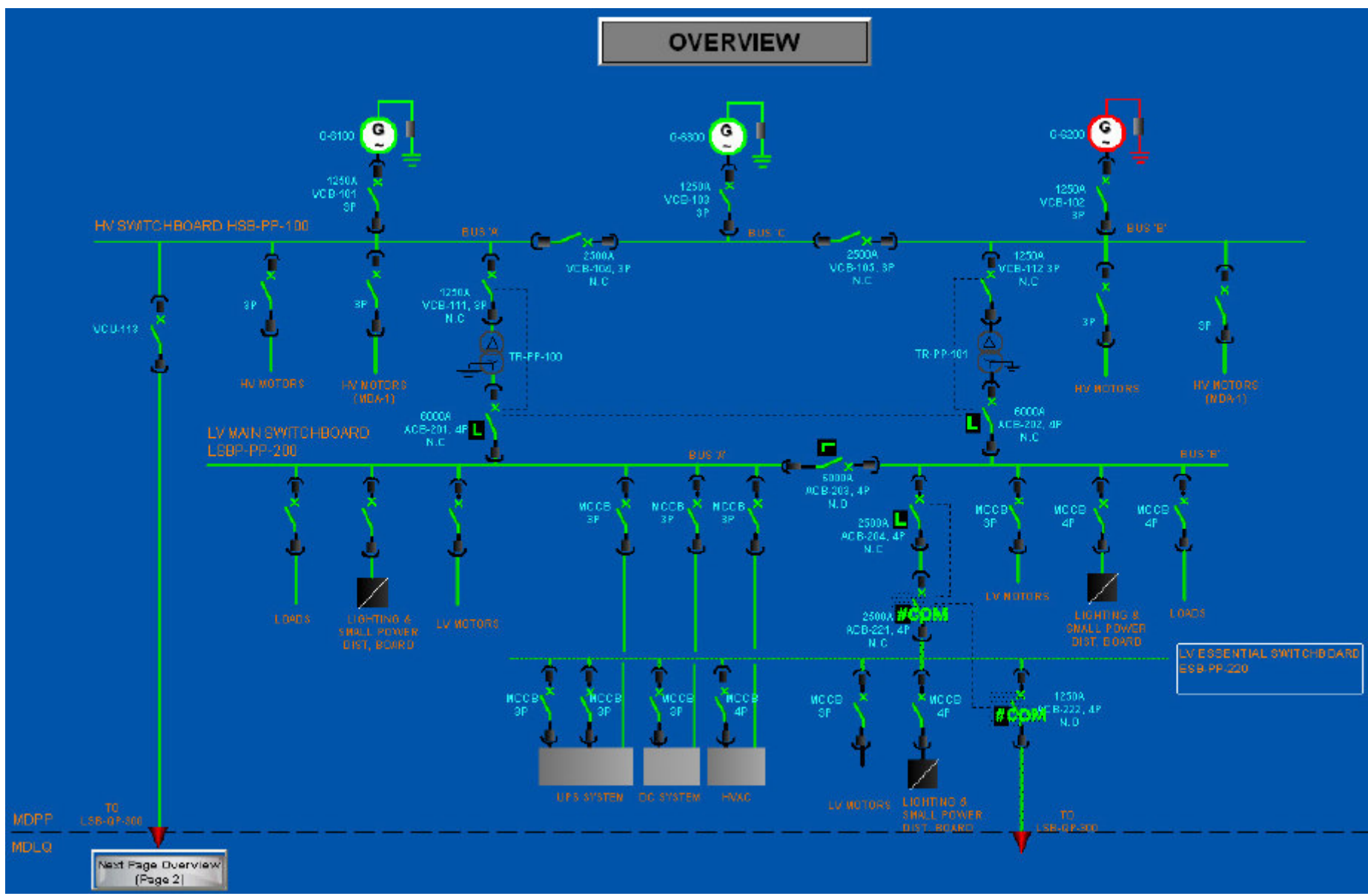
SOFTWARE

- UNITY PRO XL
- 2 VIJEO CITECT SERVER 5000 PTS
- 1 VIJEO CITECT DISPLAY 5000 PTS
- SFT 2481, SEPAM CONFIGURATOR
- VIJEO DESIGNER
- SIS CONFIGURATOR

ECS SYSTEM ARCHITECTURE

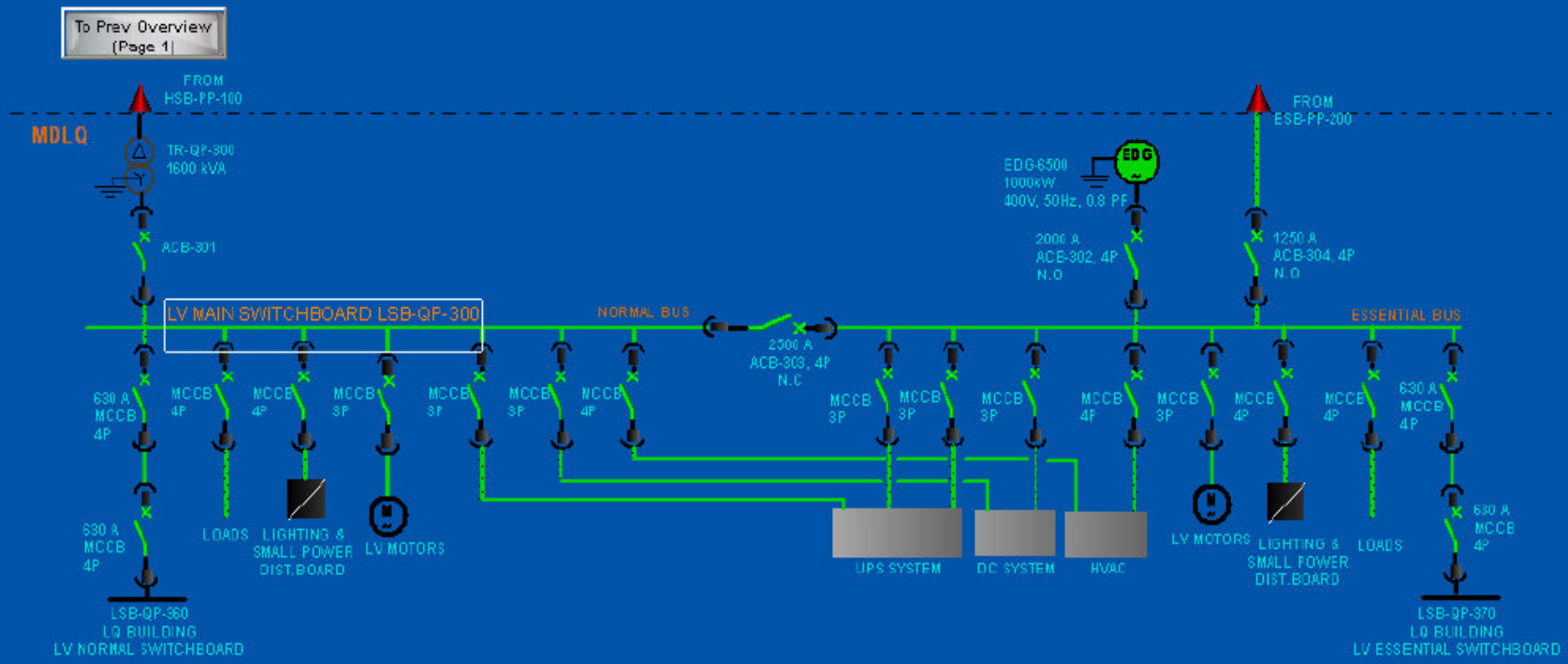


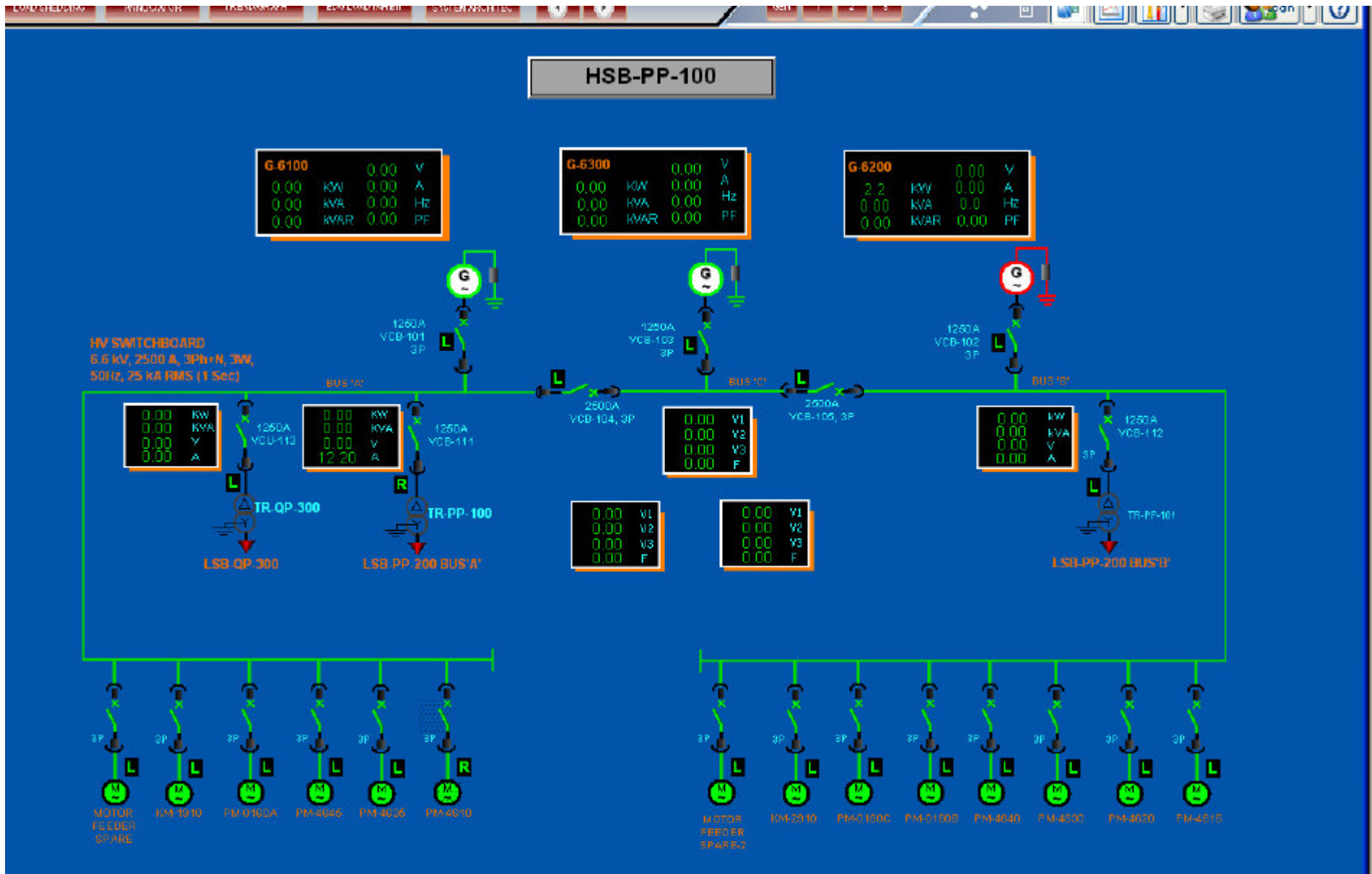
OVERVIEW



Next Page Overview
(Page 2)

OVERVIEW (Page 2)





SYSTEM OVERVIEW HESP PP 100 LSB PP 200 ESB PP 220 AC DC UPS SIMULATE
 LOAD SHEDDING MANU CONTROL TRENDRAPH EMS LOAD INHIBIT SYSTEM ARCHITE GEN 1 2 3

LOAD SHEDDING

0

Nominal Load	Motor Running	Inhibit	Shedding Status	Priority	
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4630 Seawater Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4635 Seawater Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4640 Seawater Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4645 Seawater Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-0160A Produced Water Injection Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-0160B Produced Water Injection Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-0160C Produced Water Injection Pump Motor
0.00 KW	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4090 Produced Water Booster Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4095 Produced Water Booster Pump Motor
0.00 KW	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4100 Produced Water Booster Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	KM-1910 VRU Compressor Monitor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	KM-2910 VRU Compressor Monitor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4610 Cooling Medium Circulation Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4615 Cooling Medium Circulation Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4620 Cooling Medium Circulation Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4810 Heating Medium Circulation Pump Motor
0.00 KW	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4815 Heating Medium Circulation Pump Motor
0.00 KW	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4820 Heating Medium Circulation Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4710 Low Grade Heating Medium Circ. Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	PM-4715 Low Grade Heating Medium Circ. Pump Motor
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0	TR-QP-300 1600 kVA Power Transformer
0.00 KW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	PM-4105 Sand Jetting Pump Motor

LA TEST MODE SELECTION

TEST NORMAL

GENERATOR STATUS

G-6100 RUNNING

G-6200 RUNNING

G-6300 RUNNING

SPINNING RESERVE

G-6100 #COM kW

G-6200 #COM kW

G-6300 #COM kW

MAX SPINNING RESERVE

G-6100 6500 kW

G-6200 ##### kW

G-6300 ##### kW