



29-31 AGUSTUS 2023
YOGYAKARTA

PROJECT SUPPORT DIESEL DUAL FUEL PROGRAM MARINE UNIT PHM

Capt. Somantri M. Mar

PROJECT BACKGROUND

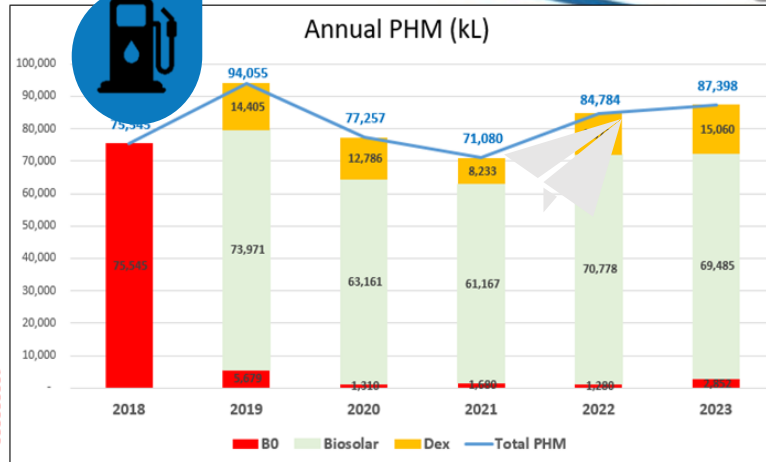


IKATAN AHLI FASILITAS PRODUKSI MINYAK DAN GAS BUMI INDONESIA

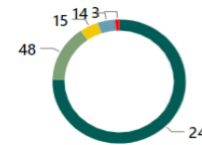


RKAP 2023 170.07 MUSD
RKAP 2024 233.48 MUSD

FUEL	88.66	150.58
VESEL	62.34	61.91
TRANSPORTATION	19.07	20.99



327 Units
 VESSEL IN OPERATION (PHM AREA)

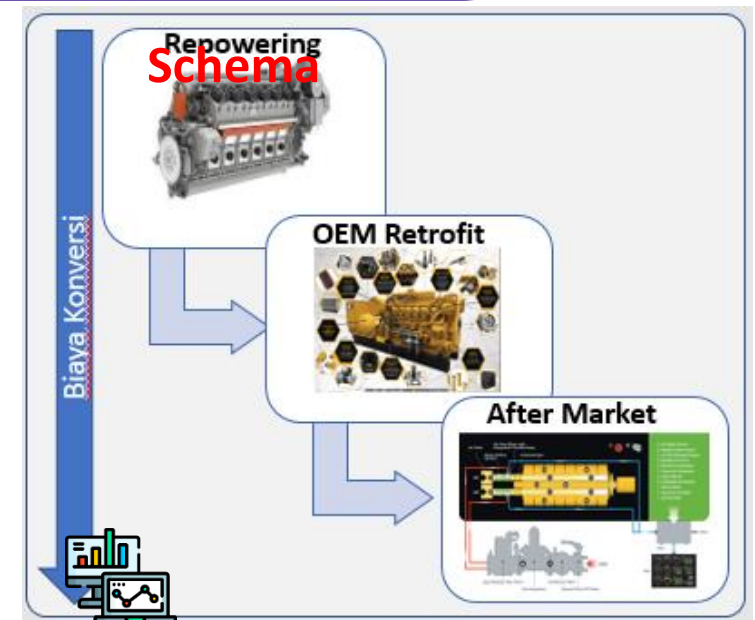
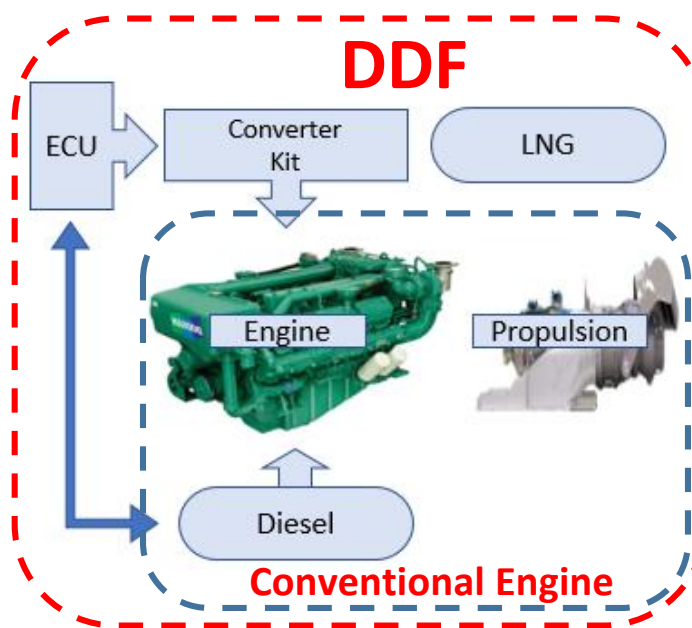


PHM Operation 2023



System dual diesel-fuel (DDF), yang dipilih adalah model konversi mesin diesel menjadi mesin dengan bahan bakar ganda (Solar dan LNG) sehingga bisa menggantikan solar hingga 50%-80%

Pilot project DDF pada tahun 2023: **2 units Crew Boat**, dengan potensi diperbanyak dengan tambahan 8 Crew Boat & 2 AHTS



DIESEL DUEL FUEL PROGRAM



Procurement
 Kontraktual dengan PNEP 08/2021
 Pengadaan LNG dengan PGN
 09/2022

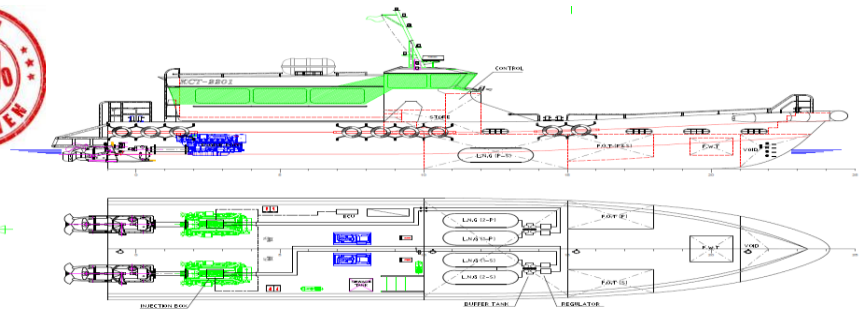
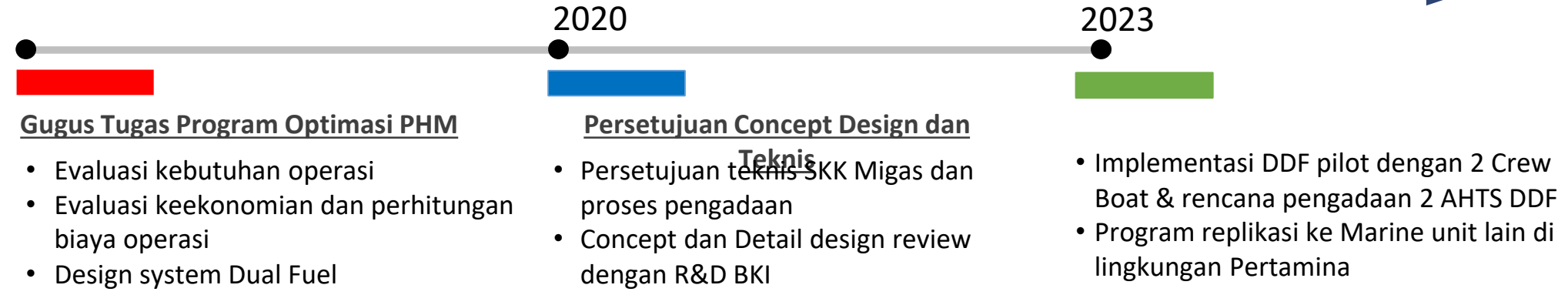
Instalasi
 Instalasi unit DDF pada crew boat
 dari Januari – Desember 2022

Commissioning/Implementasi
 HAZID/HAZOP Review
 Survey Penetapan Class

Study dan concept design

Rencana Pengembangan ke depan

[Class Approval](#)



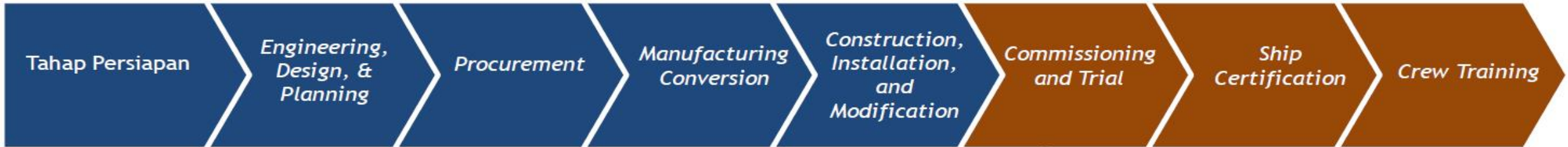
- Mendukung Usaha Penurunan Emisi Karbon di Kegiatan Hulu Migas.
- Dapat di replikasi di lingkungan Pertamina, K3S, Pemerintah atau Swasta, Sinergi BUMN
- Menggantikan 50%-80% Solar dengan LNG
- Overall cost saving 25% per kapal
- Proses konversi dilakukan di galangan dalam negeri



Gandaria Office Tower, 5th Floor
 Jl. Sultan Iskandar Muda, Jakarta 12240



PROJECT DDF MILESTONE



Desember 2021

- Kick-off meeting.
- Proses pengadaan dimulai



Februari 2022

- First transfer LNG ke Cylinder.
- First running DDF engine conversion.



Agustus 2022

- Instalasi DDF converter vessel KCT 2022 dimulai.



September 2022

- DDF workshop pertama dengan BKI, PHM dan pihak terkait lainnya.



Oktober 2022

- Running Test Engine Onboard



November 2022

- Workshop dengan SHU, Pertamina, BKI, PHM, dan pihak terkait lainnya.

- ✓ Main engine and conversion kit safety device test (Done)
- ✓ Main engine running test on board (Done)
- ✓ Fire fighting system test (Done)
- ✓ Alarm and monitoring system test (Done)

WORK IN PROGRESS

- Inclining test
- Bunkering and LNG Storage system safety device test
- Emission and pollution test
- Sea trial and performance test after conversion

SWITCHING FROM CONVENTIONAL DIESEL ENGINE

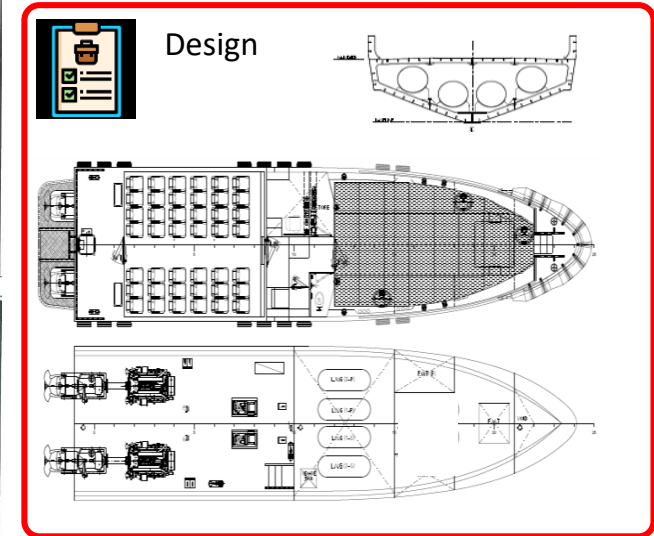
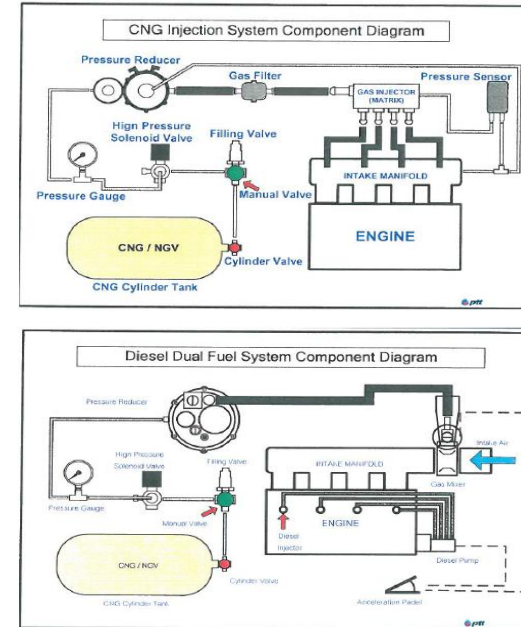
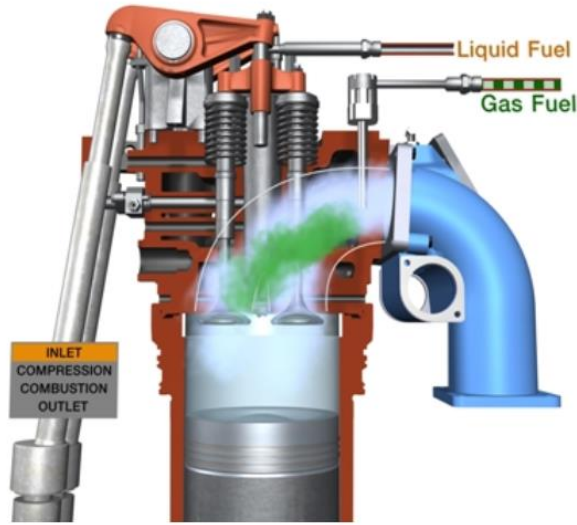
2 types of Conversion System :

1. System bi-fuel

using gas and gasoline fuel in different time.

2. System dual-fuel

using gas and diesel fuel in the same time, the system to mixing fuel source with estimate composition 10%-30% Diesel and 70%-90% Gas.



DIESEL DUAL FUEL (DDF)

- Simultaneous Consumption Diesel Fuel & Natural Gas
- Variety of Gas – Diesel Fuel Ratio (50:50 , 60:40, 70:30)
- Natural Gas fed through mini **LNG** regasification
- New concept of Diesel Liter Equivalent (*Liter Setara Diesel*, LSD)
- In the absence of Natural Gas, engine runs on 100% Diesel Fuel

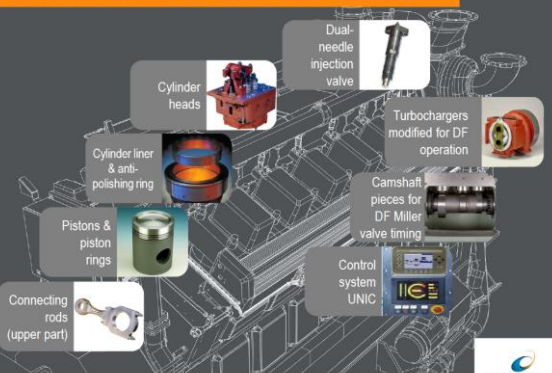


ENGINE CONVERSION SCHEME

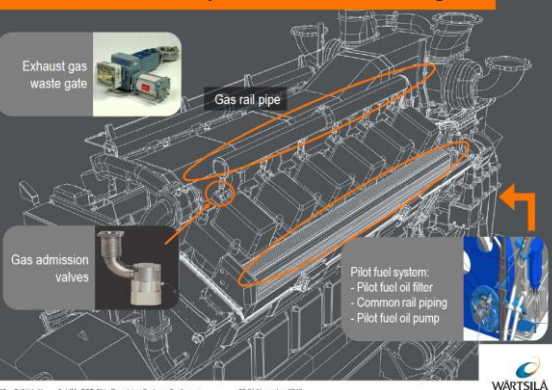
1

OEM Conversion By Engine Maker

DF conversion – Parts which will be exchanged



DF conversion – Components added on the engine



2

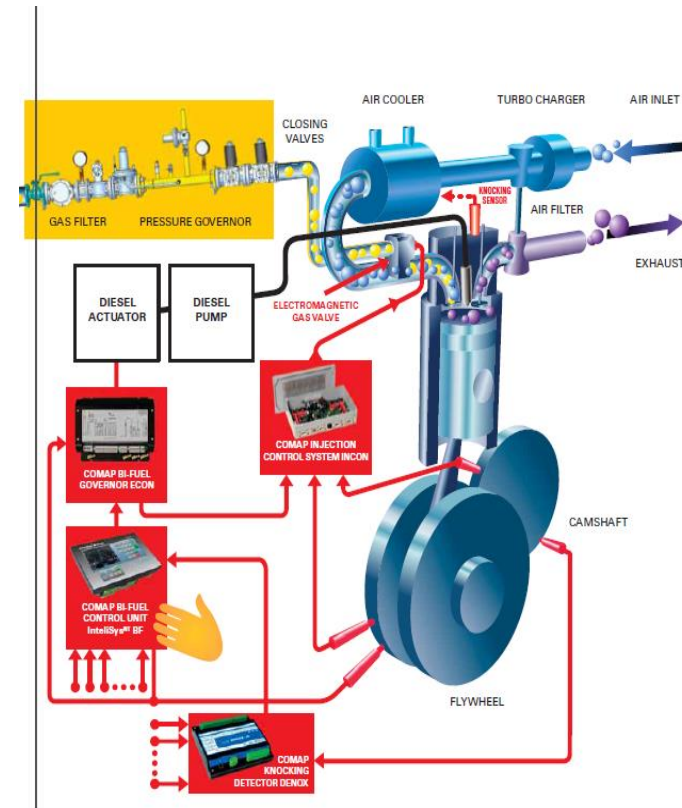
Re-powering with DDF engine



3

✓ Dipilih untuk DDF

Aftermarket Converter Kit

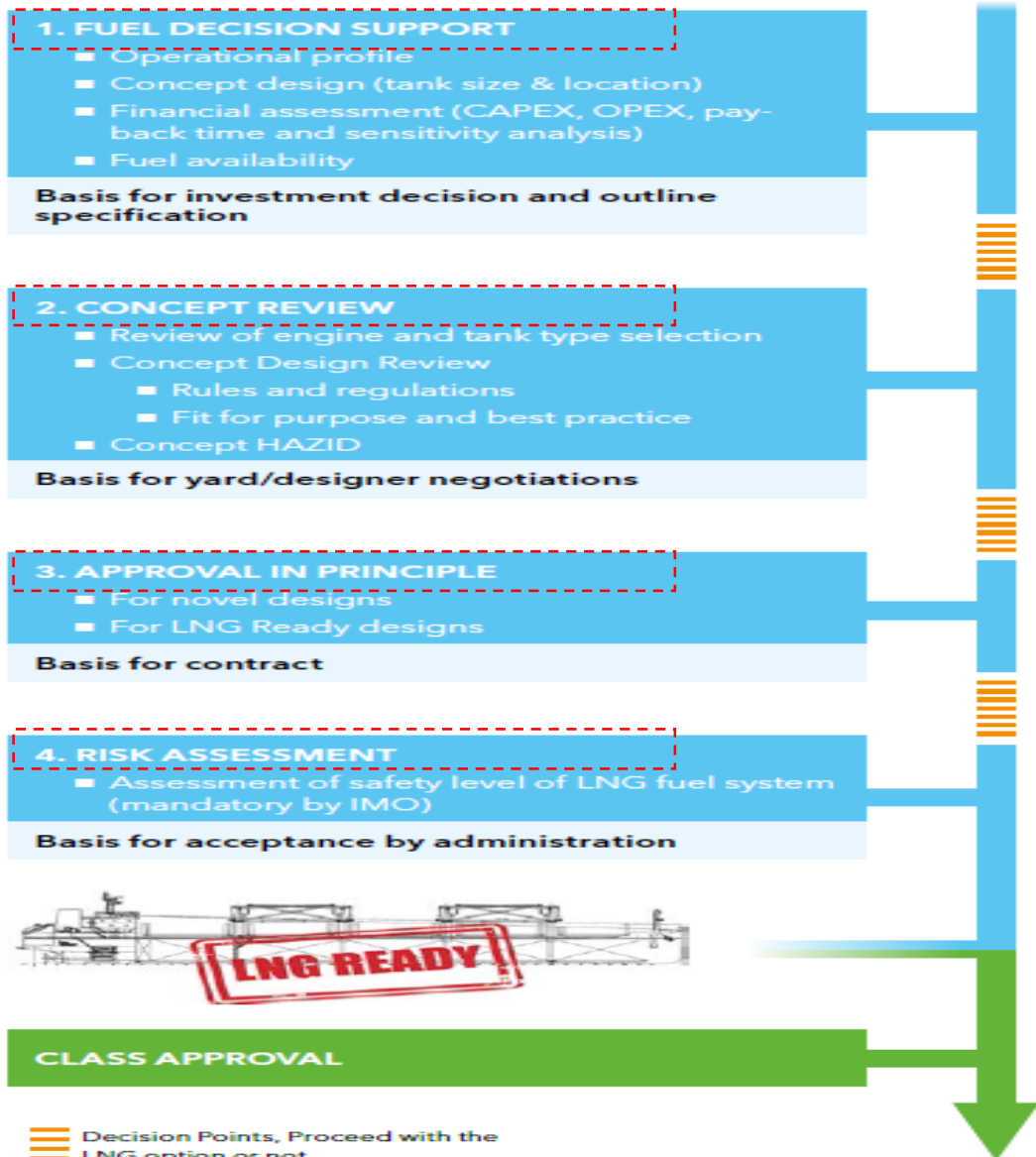


Option 1 :
Engine model dependent,
intensive upgrade required

Option 2 :
Intensive upgrade required

Option 3 :
Add on unit on existing engine

CONVERSION ROADMAP



Sertifikat Persetujuan Klas

- Sertifikat komponen Klas
- NOx technical file
- Laporan dan catatan pengujian

Pengujian Mesin

Pengujian sesuai dengan aturan klas serta standard IGF Code termasuk juga pengujian emisi

Persiapan Test Bench

- Infrastruktur bahan bakar LNG
- Adaptasi test bench dengan kebutuhan pengujian sistem dual fuel di mesin



Persiapan Mesin Konversi

Mesin yang akan dikonversi dapat menggunakan second-hand engine atau dari mesin di kapal

Evaluasi Kondisi Mesin

- Dengan melakukan pengujian sea trial (jika memakai mesin kapal)
- Dengan pengujian di test bed (jika memakai mesin second-hand)
- General overhaul (bila hasil kurang)

Desain Sistem Dual Fuel

- Desain pipa double wall mesin dan GUV
- Desain kontrol dan safety
- Evaluasi part mesin yang dimodifikasi atau diganti

CONCEPT DESIGN REVIEW

Proses evaluasi pada level yang sesuai untuk memenuhi ketentuan standar kapal marine dengan bahan bakar gas atau bahan bakar lain yang memiliki titik nyala rendah

DETAIL DESIGN REVIEW

Pematangan proses tambahan pada level sebelumnya

Kategorisasi kelompok komponen dari bagian desain baru untuk memenuhi aturan BKI

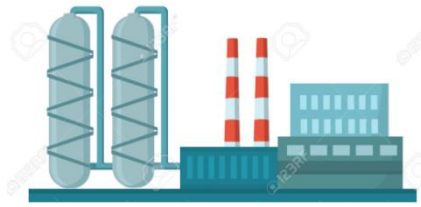
Pada tahap ini proses desain disepakati dan komponen yang akan dipasang dikapal telah diidentifikasi dan disetujui untuk dipasang diatas kapal

INSTALASI

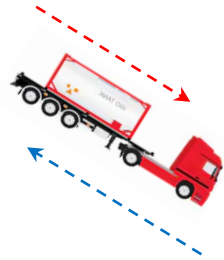
Bagian terakhir dari persiapan kapal berbahan bakar ganda.

Pada bagian ini setelah approval design dilaksanakan dan komponen yang akan dipasang sudah disetujui serta pemasangan diatas kapal dilaksanakan dengan pengawasan survey terkait proses modifikasinya.

PROJECT SUPPORT INSTALLASI FILLING STATION



LNG Plant



LNG Pump



LNG Station

LNG



Marine Units

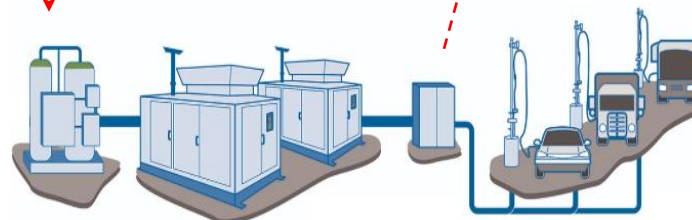


Power generator

CNG



Heavy equipment

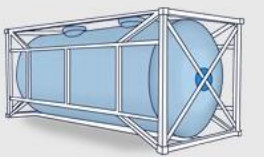
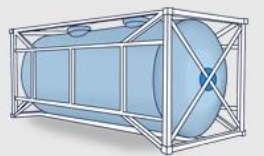


Degassing System

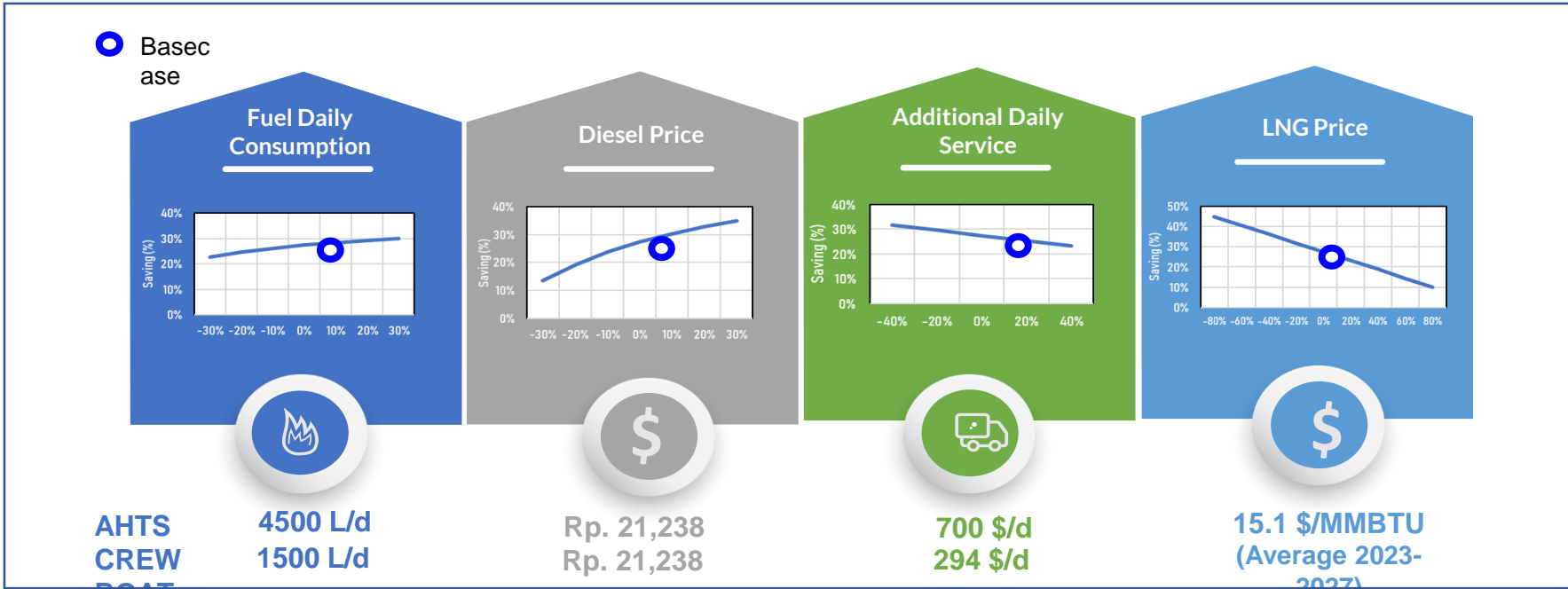
Land Transportation Units



LNG Storage



KAJIAN ECONOMIC SENSITIVITY CREW BOAT (10 Vessels) & AHTS (2 Vessels)



RESULT 10 Crewboat

Saving (5 years contract)	
Total Saving DDF	15.1 MM\$
% saving DDF	38%
Total Saving PHM	9.71 MM\$
% saving PHM	25%

RESULT 2 AHTS

Saving (5 years contract)	
Total Saving DDF	9.04 MM\$
% saving DDF	38%
Total Saving PHM	6.5 MM\$
% saving PHM	27%

% DDF: 60% LNG consumption
ICP Price: as per WP&B 2023
(SRT-0162/SKKME0000/2022/S1)

DDF | ECONOMIC ASSUMPTION

- ICP Price: as per WP&B 2023, 1 Sep 2023 (SRT-0162/SKKME0000/2022/S1)
- Diesel price assumption: 21,238 IDR/L
- Gas price component
 - Molecule Price: 11% ICP (Spot price assumption)
 - Pertagas Fee : 5.37 \$/MMBTU
 - LMAN : 0.22 \$/MMBTU
 - PT. Badak op. : 0.56 \$/MMBTU

skkmigas

SATUAN KERJA KHUSUS
PELAKSANA KEGIATAN USAHA HULU MINYAK DAN GAS BUMI
(SKK MIGAS)

Lampiran Surat
Nomor : SRT-0162/SKKME0000/2022/S1

LAMPIRAN 2
DAFTAR KELENGKAPAN DOKUMEN USULAN WP&B 2023

Asumsi	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
ICP (USD)	76.8	73.7	74.54	74.81	73.94	73.56	73.43	73.29	73.15	73.04
Kurs 1 USD (Rp)	14,750	14,750	14,750	14,750	14,750	14,750	14,750	14,750	14,750	14,750



2240 % DDF: 60% LNG consumption

PROJECT VALUE

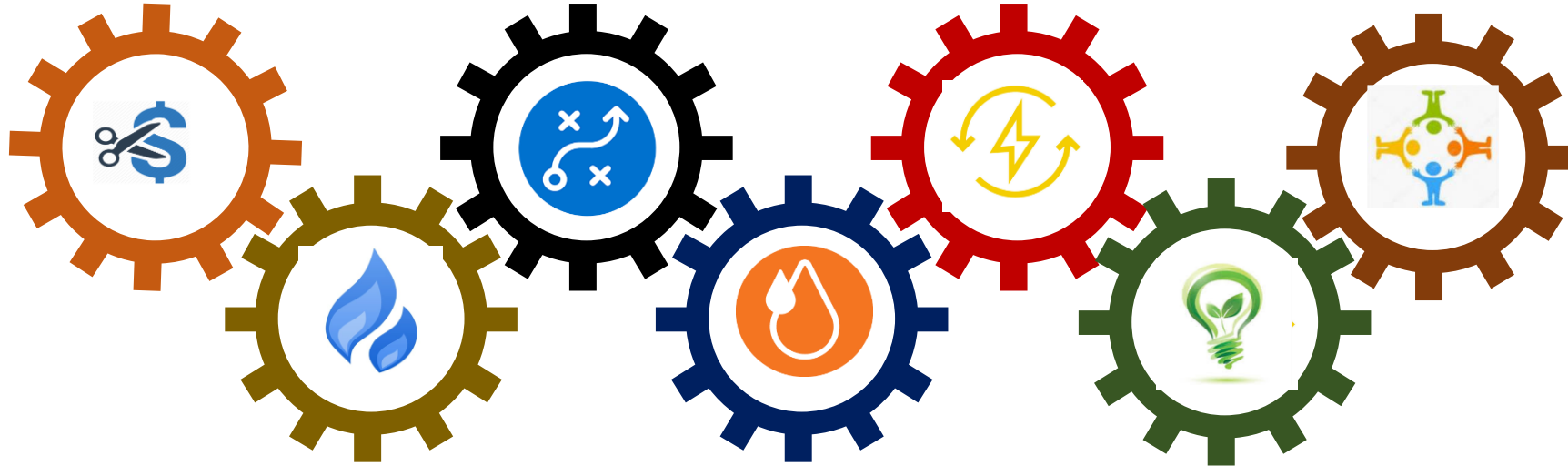


Sustainability is a dominant challenge faced by PHM, with **COST OPTIMIZATION** as one of the key elements

PHM believes in alternative solutions leading to **VALUE CREATIONS**

LNG replacement for diesel fuel in PHM operation is a **GAME CHANGER** in the Oil and Gas industry

PERTAMINA SYNERGY by having partner with PTK



PHM is a **SIGNIFICANT PRODUCER** of Natural Gas

LNG as marine fuel is **INDUSTRIALLY PROVEN**, with experience Portfolios available

Reduce emission and **ENVIRONMENTALLY FRIENDLY**



TERIMA KASIH



Energizing You

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