

FY2020 Study on Business Opportunity of High-quality Energy Infrastructure to Overseas LNG Distribution and Power Plants (LDPP) East Indonesia Support Program



**Final Report February 2021
Koei Research & Consulting Inc.**

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Abbreviation (1/3)

API RP	American Petroleum Institute - Recommended Practice
BBTUD	Billion British Thermal Units Per Day
BKPM	<i>Badan Koordinasi Penanaman Modal</i> (Capital Investment Coordinating Board)
BOT	Build-Own-Transfer
BS EN	British Standard version in European Standard
CAPEX	Capital Expenditure
CMEA	Coordinating Ministry for Economic Affairs
CMMAI	Coordinating Ministry for Maritime Affairs and Investments of Republic Indonesia
COD	<i>Commercial Operation Date</i>
COE	Cost of Electricity
DES	Delivered ex-ship
EN	European Standard
Eoi	Express of Interest
EPC	Engineering, Procurement, and Construction
FEED	Front End Engineering Design
FGD	Focus Group Discussion
FPP	Floating Power Plant
FS	Feasibility Study
FSU	Floating Storage Unit
FSRU	Floating Storage Regasification Unit
GLNGC	Global LNG Carrier
GT	Gross Tonnage
HOA	Heads of Agreement
HSD	High-Speed Diesel
ISM	International Safety Management
ISO	International Organization for Standardization

Abbreviation (2/3)

JBIC	Japan Bank for International Cooperation
JC	Japanese Consortium
JV	Joint Venture
JWG	Joint Working Group
KPPIP	<i>Komite Percepatan Penyediaan Infrastruktur Prioritas</i> (Committee for Acceleration of Priority Infrastructure Delivery)
kWh	kilo Watt hour
LDPP	Liquefied Natural Gas Distribution and Power Plants
LNG	Liquefied Natural Gas
MA	Master Agreement
McT	Multi column Tension leg platform technology
MEMR	Ministry of Energy and Mineral Resources
METI	Ministry of Economic, Trade, and Industry of Japan
MMAF	Ministry of Maritime Affairs and Fisheries
MMBTU	Million British Thermal Units
MOC	Memorandum of Cooperation
MOT	<i>Ministry of Transportation</i>
NDA	Non-Disclosure Agreement
NFPA	National Fire Protection Association
MVPP	Mobile Vessel Power Plant
OPEX	Operation Expenditure
OsRU	(small) Onshore Regasification Unit
PGN	<i>Perusahaan Gas Negara</i> (State Gas Company)
PIK	<i>Pembangunan Infrastruktur Ketenagalistrikan</i> (Electricity Infrastructure Development)
PLN	<i>Perusahaan Listrik Negara</i> (State Electricity Company)
PLTG	<i>Pembangkit Listrik Tenaga Gas</i> (Gas-sourced Power Plant)
PLTGU	<i>Pembangkit Listrik Tenaga Gas Uap</i> (Combined Cycle Power Plant)

Abbreviation (3/3)

PLTMG	<i>Pembangkit Listrik Tenaga Mesin Gas</i> (Gas Engine Power Plant)
PLTU	<i>Pembangkit Listrik Tenaga Uap</i> (Coal-fired Power Plant)
PP	<i>Peraturan Pemerintah</i> (Government Regulation)
PPA	Power Purchase Agreement
PSN	<i>Proyek Strategis Nasional</i> (National Strategic Plan)
RUPTL	<i>Rencana Umum Penyediaan Tenaga Listrik</i> (PLN's Electricity Supply Master Plan)
SIUPAL	<i>Surat Izin Usaha Perusahaan Angkutan Laut</i> (Sea Transportation Company's Business License)
SKKNI	<i>Standar Kompetensi Kerja Nasional Indonesia</i> (Indonesia Working Competence Standard)
SKPT	<i>Sentra Kelautan dan Perikanan Terpadu</i> (Integrated Marine and Fishery Center)
SLA	Service Level Agreement
SNI	<i>Standar Nasional Indonesia</i> (Indonesia National Standard)
SPPL	<i>Surat Pernyataan Kesanggupan Pengelolaan dan Pemantauan Lingkungan Hidup</i> (Commitment Statement of Environment Monitoring and Management)
SSLNGC	Small-Scale LNG Carrier
TOR	Term of Reference
VGL	Vertical Gas Liquid

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Background of LDPP Program

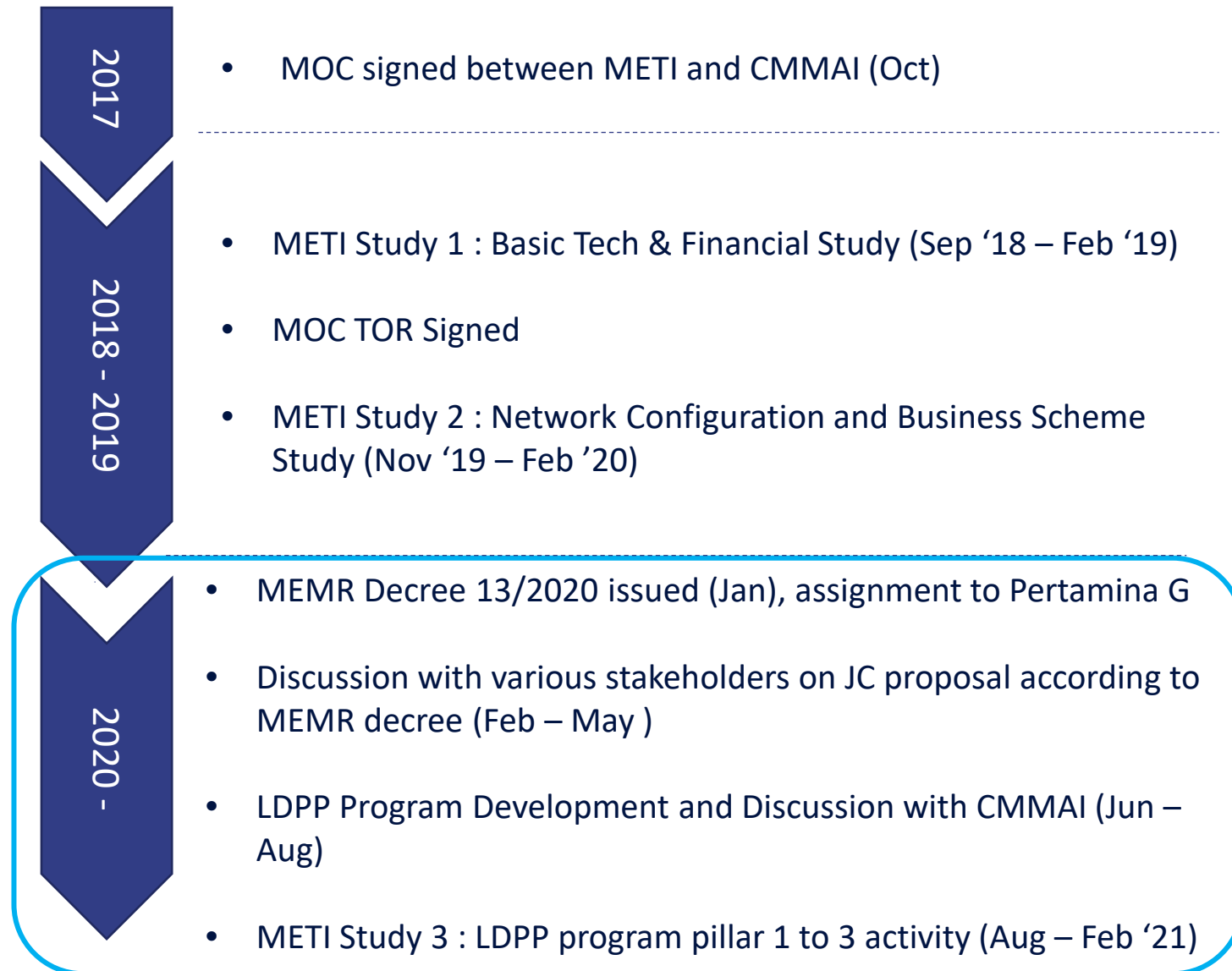
- Eastern Indonesia relies on imported diesel for its electricity generation, despite rich domestic LNG production in the region. This is because of lack of storage and distribution facility (Midstream Infrastructure).
- “Diesel-to-gas” conversion is an important policy for Indonesian government, which would reduce the excess of imports over exports and enhance national security from energy aspect.
- The CMMAI (Indonesia) and the METI (Japan) have signed an agreement under the MOC framework to execute LDPP Program in Eastern Part of Indonesia (Oct. 2017)
- Under the G-to-G MOC framework, LDPP Program was conducted taking advantage of integrated service from upstream to downstream provided by Japanese companies supported by high-quality infrastructure incentive of Japanese Government. Consultant team joined the program since Oct. 2019.
- In January 2020, Ministry of Energy and Mineral Resources (MEMR) issued a decree No.13K/13/MEM/2020, as assignment for PT Pertamina to develop a midstream infrastructure for LNG distribution. Upon the issuance of this decree, LDPP Team with Japanese Consortium have conducted a series of discussions with stakeholders including Pertamina Group.
- In February 2021, PGN (sub-assigned implementer of the MEMR decree) started the tender process.

Explanation

In October 2017, the Coordinating Ministry for Maritime Affairs and Investments (“CMMAI”) of Republic Indonesia and the Ministry of Economic, Trade, and Industry (“METI”) of Japan have signed an agreement under the Memorandum of Cooperation (“MOC”) framework to conduct a study on developing a feasible project structure in executing Liquefied Natural Gas (“LNG”) Distribution and Power Plants (“LDPP”) in Eastern Part of Indonesia.

In this chapter, background of LDPP Program is explained.

Overall Background



Explanation

Overall background and important milestone to be highlighted:

- 1) LDPP is implemented based on the signed MOC (Oct. 2017)
- 2) Two studies were conducted supported by METI from Sep. 2018 to Feb. 2020. Purposes of the studies are basic technical and financial study, and network configuration and business scheme study.
- 3) MEMR decree was issued in Jan. 2020, and LNG distribution project became more practical. Consultant team proposed the contribution area of LDPP to various stakeholders.
- 4) The third METI study was implemented to promote the project by activities composed of three pillars from Aug. 2020 to Feb. 2021.

Key Contents of MEMR Decree No.13K/13/MEM/2020



MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA

KEPUTUSAN MENTERI ENERGI DAN SUMBER DAYA MINERAL
REPUBLIK INDONESIA

NOMOR : 13 K/13/MEM/2020

TENTANG

PENUGASAN PELAKSANAAN PENYEDIAAN PASOKAN DAN PEMBANGUNAN
INFRASTRUKTUR LIQUEFIED NATURAL GAS (LNG), SERTA KONVERSI
PENGUNAAN BAHAN BAKAR MINYAK DENGAN LIQUEFIED NATURAL GAS
(LNG) DALAM PENYEDIAAN TENAGA LISTRIK

DENGAN RAHMAT TUHAN YANG MAHA ESA

MENTERI ENERGI DAN SUMBER DAYA MINERAL REPUBLIK INDONESIA,

Menimbang : bahwa dalam rangka menjamin ketahanan energi nasional dan perbaikan neraca perdagangan nasional serta mempercepat terwujudnya diversifikasi energi melalui percepatan pemanfaatan gas di sektor ketenagalistrikan dengan mengurangi penggunaan Bahan Bakar Minyak jenis *High Speed Diesel*, perlu menetapkan Keputusan Menteri Energi dan Sumber Daya Mineral tentang Penugasan Pelaksanaan Penyediaan Pasokan dan Pembangunan Infrastruktur *Liquefied Natural Gas* (LNG), serta Konversi Penggunaan Bahan Bakar Minyak Dengan *Liquefied Natural Gas* (LNG) Dalam Penyediaan Tenaga Listrik;

1. Assignment to PT Pertamina (Persero) in implementing the **infrastructure for gas supply to the PLN's power plant** (The list of PLN's Power Plants are stipulated in Appendix)
2. Assignment to PT PLN in purchasing the gas from PT Pertamina for their power plants in order to convert the usage of Diesel to gas.
3. **PT Pertamina may assign its subsidiary or affiliation** that has experience in the development of LNG midstream infrastructure (i.e. reception, storage, and regasification).
4. Obligation of PT Pertamina in conducting assignment of LNG supply and infrastructure development:
 - a) to provide **COE of using gas that lower than the COE of using high-Speed Diesel**;
 - b) to **provide gas at plant gate (after regasification)** with volume as stated in Appendix;
 - c) to submit progress report of the completion of LNG infrastructure in every 6 months to the Minister of MEMR through DG Oil and Gas and cc to DG Electricity.
5. These Assignments shall be completed within a maximum 2 years since this Ministerial Decree is stipulated.
6. If there are changes in completion target, power plants target, target volume gas required, shall be agreed between PT Pertamina and PLN and reported to the Minister for approval.
7. This Ministerial Decree shall come into effect upon its stipulation date, i.e. January 10th, 2020.

Explanation

According to this MEMR decree, the outline of the assignment to Pertamina is shown in the left part.

Capacity and LNG demand of target sites are stipulated in the Appendix (next page) of the decree.

To estimate the plant gate price of LNG, midstream infrastructure cost and transportation cost are obliged to be included. This is a precondition to calculate the Cost of Electricity (COE).

Appendix of the MEMR Decree No. 13K/13/MEM/2020

- The Overall sites of Power Plants

There are 20 Sites that in-line with LDPP's targeted sites, with total Capacity of 320 MW (24.29 BBTUD of volume gas or equivalent to 8,422 BBTU/year)

	NO.	PEMBANGKIT	KAPASITAS (MW)	INDIKATIF VOLUME GAS (BBTUD)
Aceh	1.	Krueng Raya	165	14,64
N. Sumatera	2.	Nias	25	5,17
	3.	MPP Jeranjang	50	3,60
NTB	4.	PLTMG Sumbawa	50	6,13
	5.	PLTMG Bima	50	6,13
	6.	PLTMG Maumere	40	2,90
NTT	7.	PLTMG Alor	10	1,30
	8.	PLTMG Kupang	40	2,90
	9.	PLTMG Waingapu	10	1,30
West Kalimantan	10.	MPP Kalbar Jungkat	50	6,00
	11.	Pontianak Peaker	100	3,44
	12.	PLTG Siantan	30	1,00
N. Kalimantan	13.	Tanjung Selor	15	0,66
N. Maluku	14.	MPP Ternate	30	2,75
	15.	Ambon Peaker	30	2,28
Maluku	16.	PLTMG Langgur	20	1,78
	17.	PLTMG Seram	20	1,01
Papua	18.	PLTMG Merauke 2	20	1,52
	19.	PLTMG Merauke	20	1,63
	20.	PLTMG Timika	10	0,95
Maluku	21.	PLTMG Namlea	10	0,85
	22.	PLTMG Saumlaki	10	0,64
	23.	PLTMG Dobo	10	0,73
Papua	24.	PLTMG Serui 1	10	0,95

	NO.	PEMBANGKIT	KAPASITAS (MW)	INDIKATIF VOLUME GAS (BBTUD)
Papua	25.	PLTG Timika 2	30	3,75
	26.	PLTG Timika 2	10	
W. Papua	27.	MPP Fak-Fak	10	0,62
Maluku	28.	PLTMG Bula	10	0,42
N. Maluku	29.	PLTMG Bacan	10	0,96
	30.	PLTMG Morotai	10	0,65
W. Papua	31.	PLTG Kaimana	10	0,62
	32.	PLTMG Tobelo	10	0,47
N. Maluku	33.	PLTMG Sofifi	10	0,47
	34.	PLTMG Ternate 2	30	1,71
Gorontalo	35.	PLTG Malco	100	17,52
SE. Sulawesi	36.	PLTMG Nii Tanasa	59	7,48
	37.	PLTMG Bau Bau	39	2,67
NTT	38.	PLTMG Rangko (Flores)	23	1,65
Bali	39.	PLTG Gilimanuk	134	7,90
	40.	PLTMG Sorong	50	8,45
	41.	PLTMG Sorong	50	
W. Papua	42.	MPP Manokwari	20	5,83
	43.	PLTMG Manokwari 2	20	
	44.	PLTMG Manokwari 3	20	
	45.	MPP Nabire	23	2,34
	46.	PLTMG Nabire 2	10	
	47.	PLTMG Nabire 3	10	
	48.	PLTMG Biak	15	2,27
W. Papua	49.	PLTMG Biak 2	10	
	50.	PLTMG Jayapura	59	12,30
	51.	PLTMG Jayapura	40	
	52.	PLTMG Jayapura 1	50	
		Jumlah	1.697	166,98

Explanation

As stipulated in the Appendix of MEMR Decree No.13K/13/MEM/2020, there are 52 target sites (with total capacity of 1,697 MW and required gas volume of 166.98 BBTUD). Most of the sites are located in the eastern part of Indonesia.

Shown in the red boxes are the sites aligned with the LDPP's targeted site. Some other sites (Sorong, Jayapura, etc.), which were analyzed before, are included again in the distribution target sites after the issue of MEMR decree.

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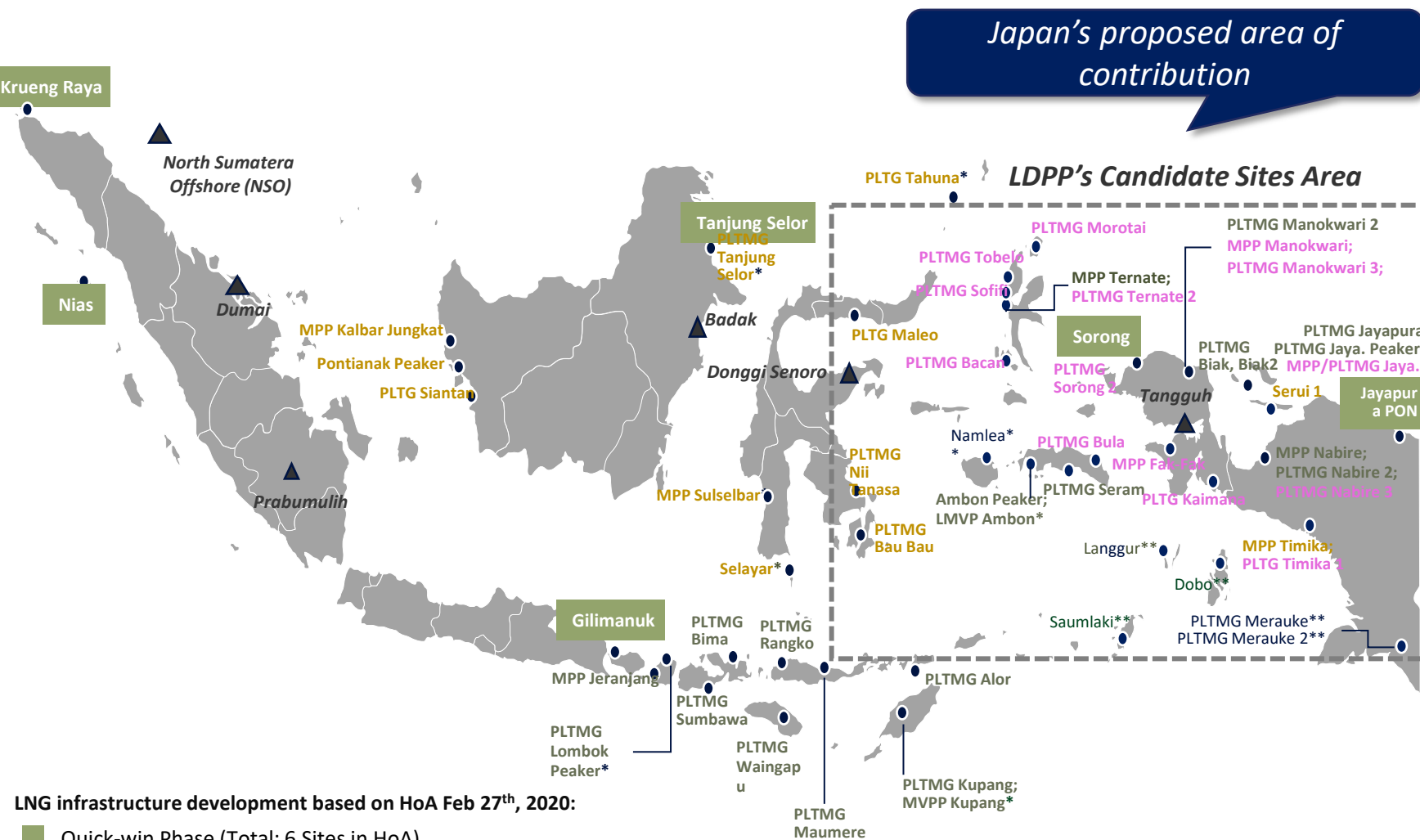
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MEMR Decree is a “Packaged Assignment” including East Indonesia, which was LDPP Study Scope



Explanation

There are 52 sites stipulated in MEMR Decree, which are distributed across the country. In terms of the implementation, these sites are divided into four criteria affected by power plant readiness (operation/construction) and the readiness of the engineering data/design (Front End Engineering Design / Invitation to Bid) for the required gas infrastructure. These categories are:

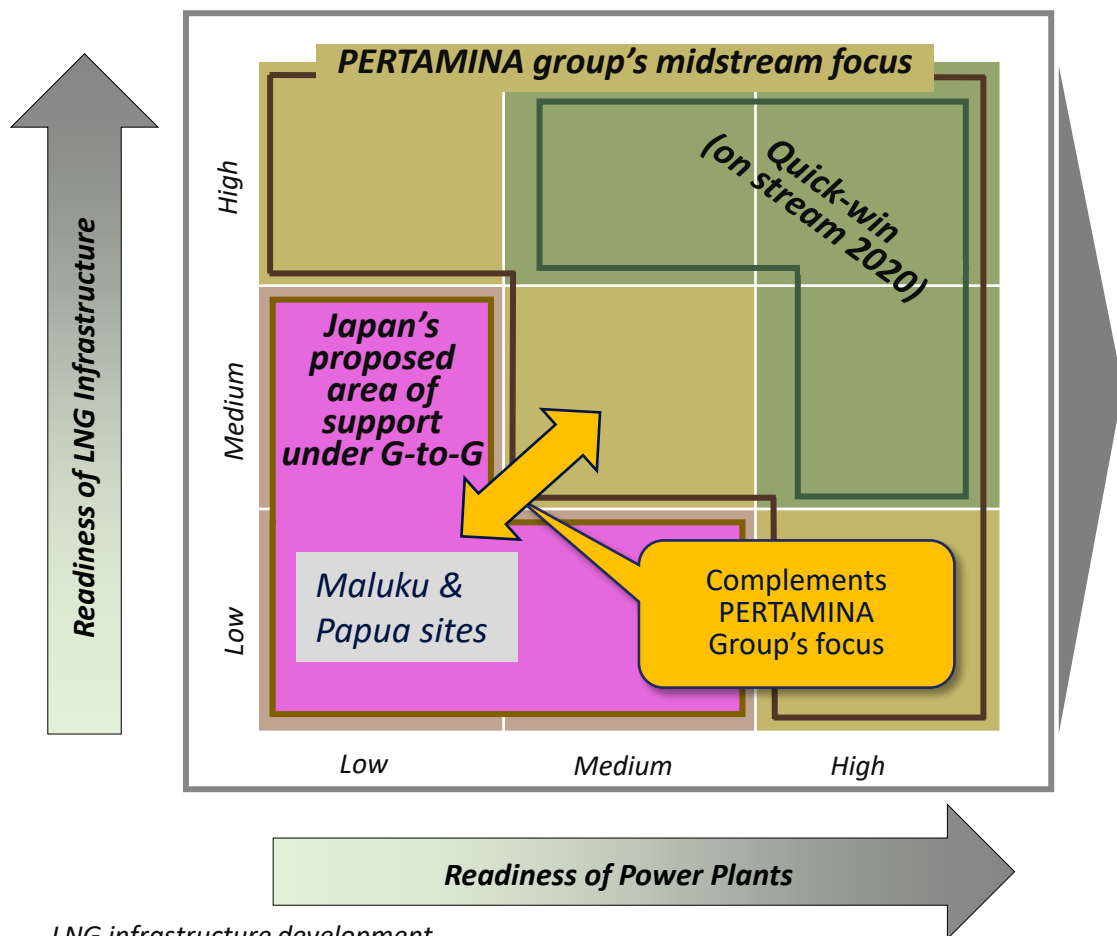
1. Quick win (implementation target Q3 2020),
2. Phase 1 (implementation target Q4 2020),
3. Phase 2 (implementation target Q2 2021),
4. Phase 3 (implementation target Q4 2021).

The Japan's proposed area of contribution as reflected in the LDPP program, are mostly implemented in Phase 3.

In its development of cooperation between PGN and PLN, the Heads of Agreement (HOA) has been signed on February 27th, 2020 as well as the Master Agreement (MA) on October 5th, 2020.

The propose of these agreements is to have preliminary fixed sites as the basis for the demand and COE calculation.

Japan's Proposed area of Support under G-to-G Framework



LNG infrastructure development
(based on Jan-Feb information from Pertagas):

- Phase 1
- Phase 2
- Phase 3

Source: Consultant Team

Value Proposition

• For PERTAMINA Group:

- Japan's support in Maluku and Papua area can complement Pertamina group's long term focus sites, which have geographical difficulties and low preparedness of power plants development.
- Allows PERTAMINA Group to focus on Quick Win/Phase1/Phase2 sites

• For GOI:

- Achievement of Electrification Ratio improvement for remote areas in Eastern Indonesia, with synergies for fishery and tourism development
- Allows "package solution" for all sites in MEMR decree for Diesel-to-Gas conversion to be achieved earlier (parallel processing of Phase3)
- A new type of LNG distribution permanent solution, combining SSLNGC (Small Scale LNG Carrier) and micro distribution

Explanation

Japan's proposed areas of support under LDPP Program (which mostly in the Maluku and Papua area), have aligned with the targeted sites stipulated in the MEMR Decree No.13K/13/MEM/2020.

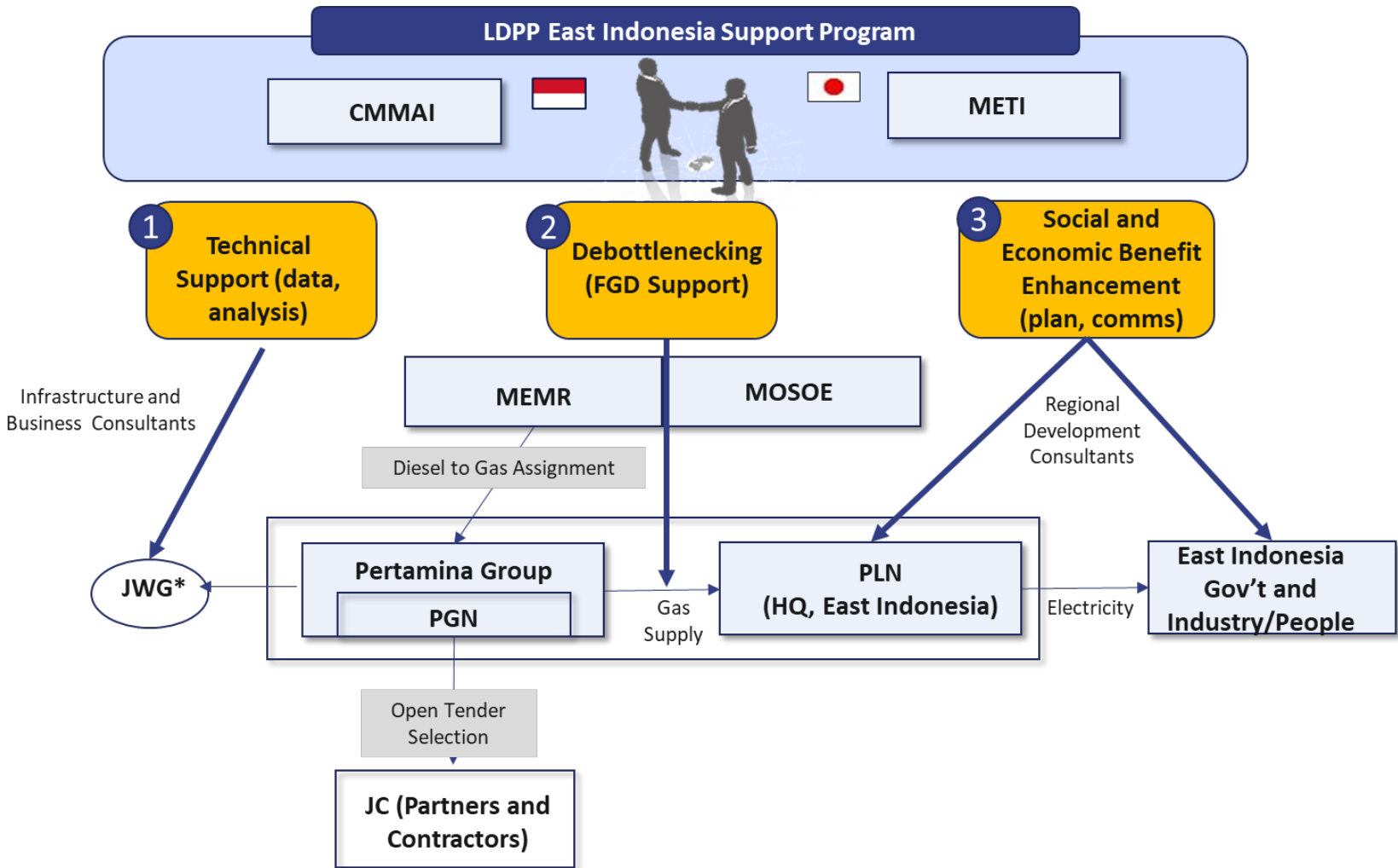
The Pertamina Group's short-term to middle-term focus sites are Quick-Win and Phase 1,2 sites. Phase 3 sites are focused in long-term plan as its difficulty of provision. Corporation between Japanese companies would fill the gap to complete their whole target.

The value proposition for Pertamina group that can be highlighted is that to support Pertamina group in providing immediate LDPP study especially for the sites in the Phase 3. Thus, the completion target can be achieved smoothly.

Furthermore, the value proposition for the Government of Indonesia is to achieve the Electrification Ratio target for remote areas in Eastern Indonesia, with the synergy for fishery and tourism development as the economic benefit of the program.

This proposal has been conveyed and acknowledged in series of discussion with CMMAI, MEMR, and Pertamina Group.

Original LDPP Program TOR (3 Pillars)



Explanation

The proposed original structure of LDPP Program's TOR as shown in this slide has been conveyed to the CMAI and MEMR during the discussion in the period of February-May 2020

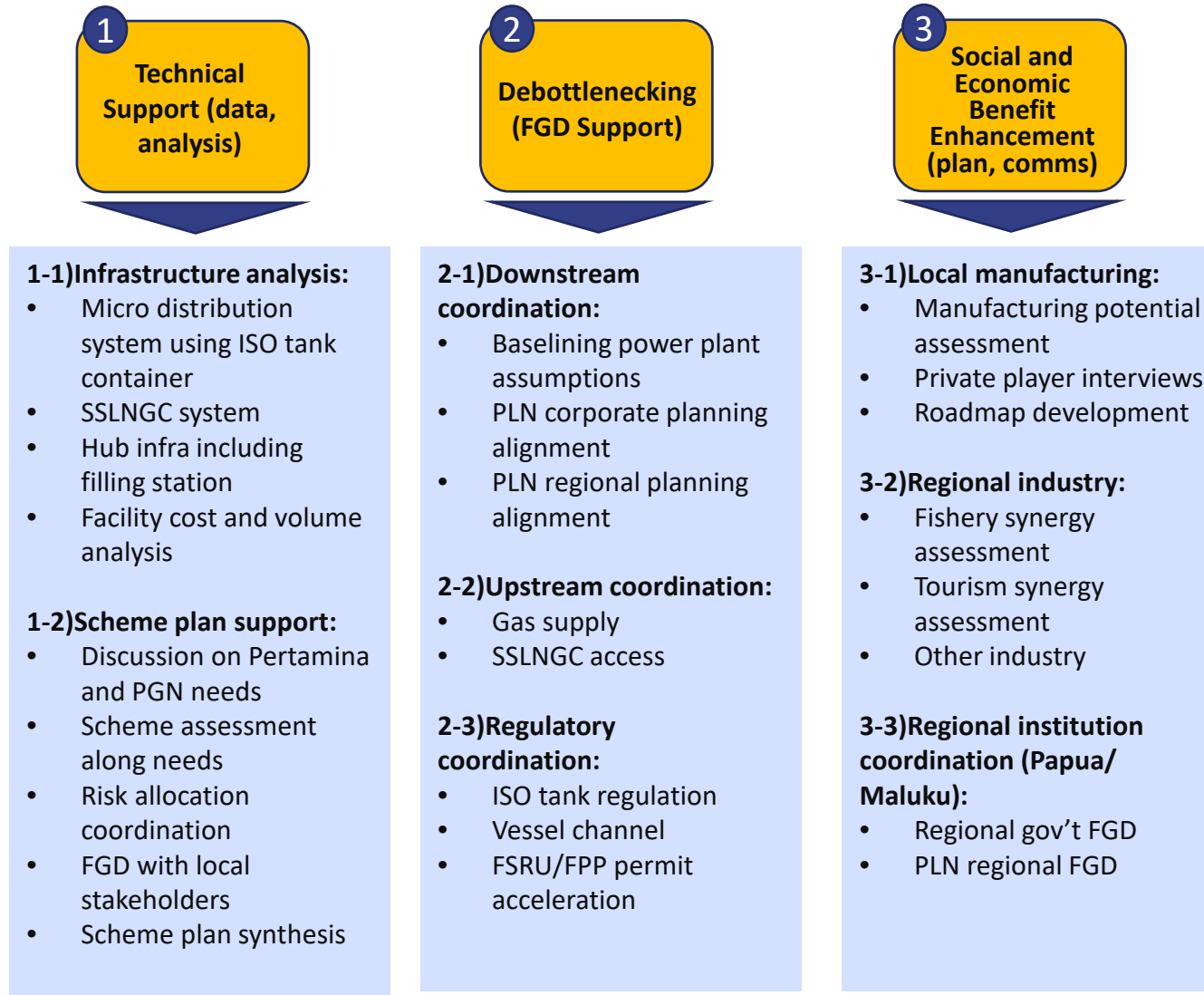
This structure describes the that LDPP Program under the G-to-G framework of METI and CMAI, will be conduct through various activities as defined in the TOR which is: Pillar 1 (the Technical Support in terms of data and analysis; Pillar 2 (Debottlenecking, which one way is to support the FGD between the relevant stakeholders, i.e. PGN and PLN); Pillar 3 (the Enhancement of Social and Economic Benefit (to analyze and plan the potential economic benefit from the LDPP Program).

In principle, these pillars activities are intended to support the relevant institution/stakeholders in the implementation of MEMR Decree No.13K/13/MEM/2020.

For example, the pillar 1 activity is to support the Pertamina group under the Joint Working Group by studying technical and financial aspects of midstream infrastructure; The Pillar 2 activity is to conduct debottlenecking activities to promote pillar 1 activity; and the Pillar 3 is to support the PLN as well as the East Indonesia Government and industry/people in enhancing the social and economic benefit aspects.

*Joint Working Group (JWG)

Original LDPP Program TOR (3 Pillars)



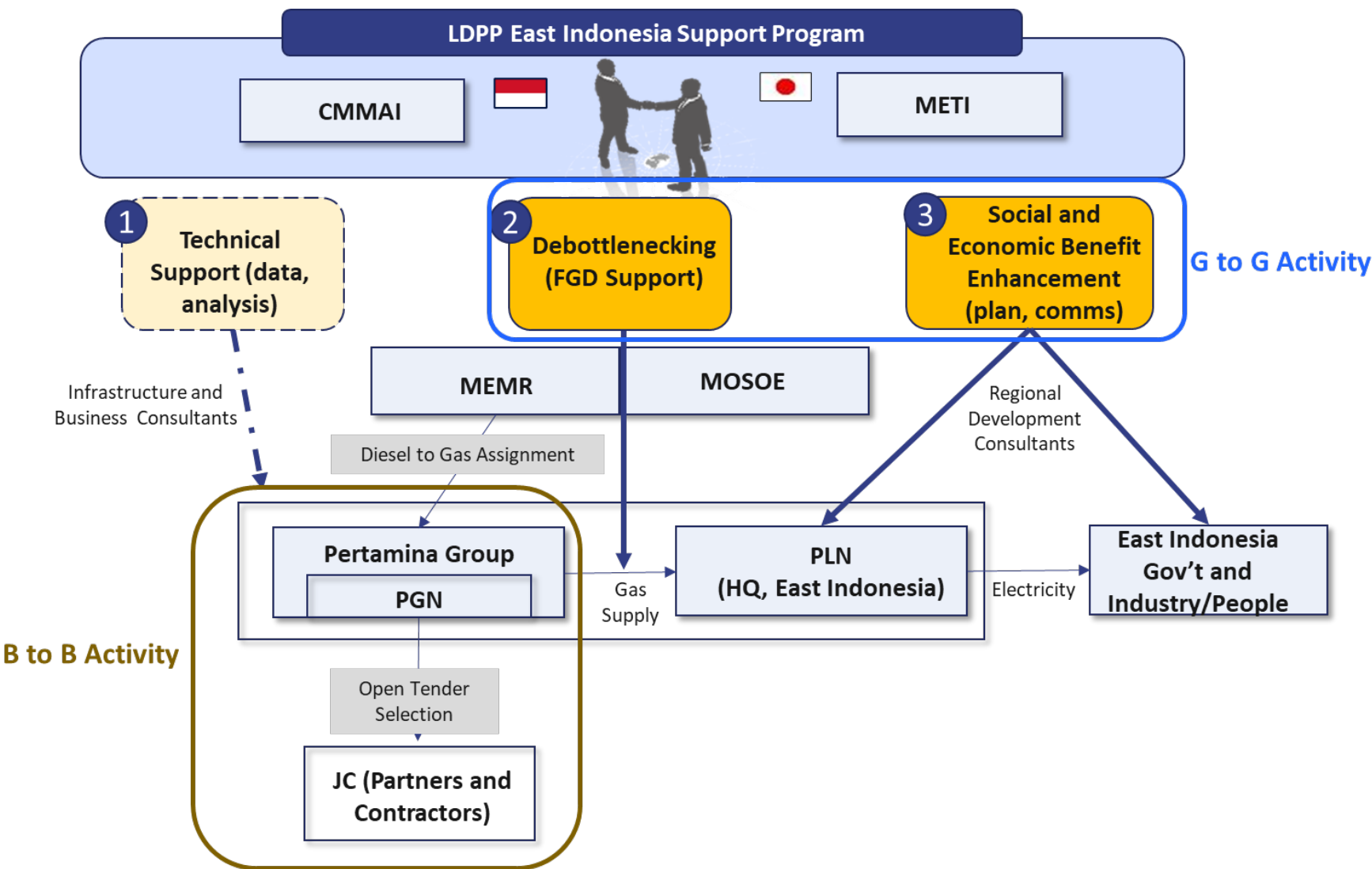
Explanation

The objectives of each pillars are described in this slide:

- The objective of activity under Pillar 1 is to support the technical aspect in analyzing the micro distribution system using ISO tank container, the Small-Scale LNG Carrier (SSLNGC) system, Hub infrastructure and filling station, including the analysis of facility cost and demand volume.
- On Pillar 2, the main objective is to maintain a good coordination between relevant stakeholders in the downstream (i.e. power plant assumptions agreement and alignment with the PLN's RUPTL (Rencana Usaha Penyediaan Tenaga Listrik/ Electricity Supply Business Plan)), Upstream (i.e. gas supply mechanism and SSLNGC access), as well as compliance with the Indonesian regulation (required permits).
- On Pillar 3, since the objective is to enhance the social and economic benefit, thus the assessment of the potential local manufacturing involvement and regional industries such as fishery, tourism, and smelter are conducted.

This TOR has been conveyed to the relevant stakeholders (i.e. CMMAI, MEMR, and Pertamina Group).

Modification of LDPP Program Framework



Explanation

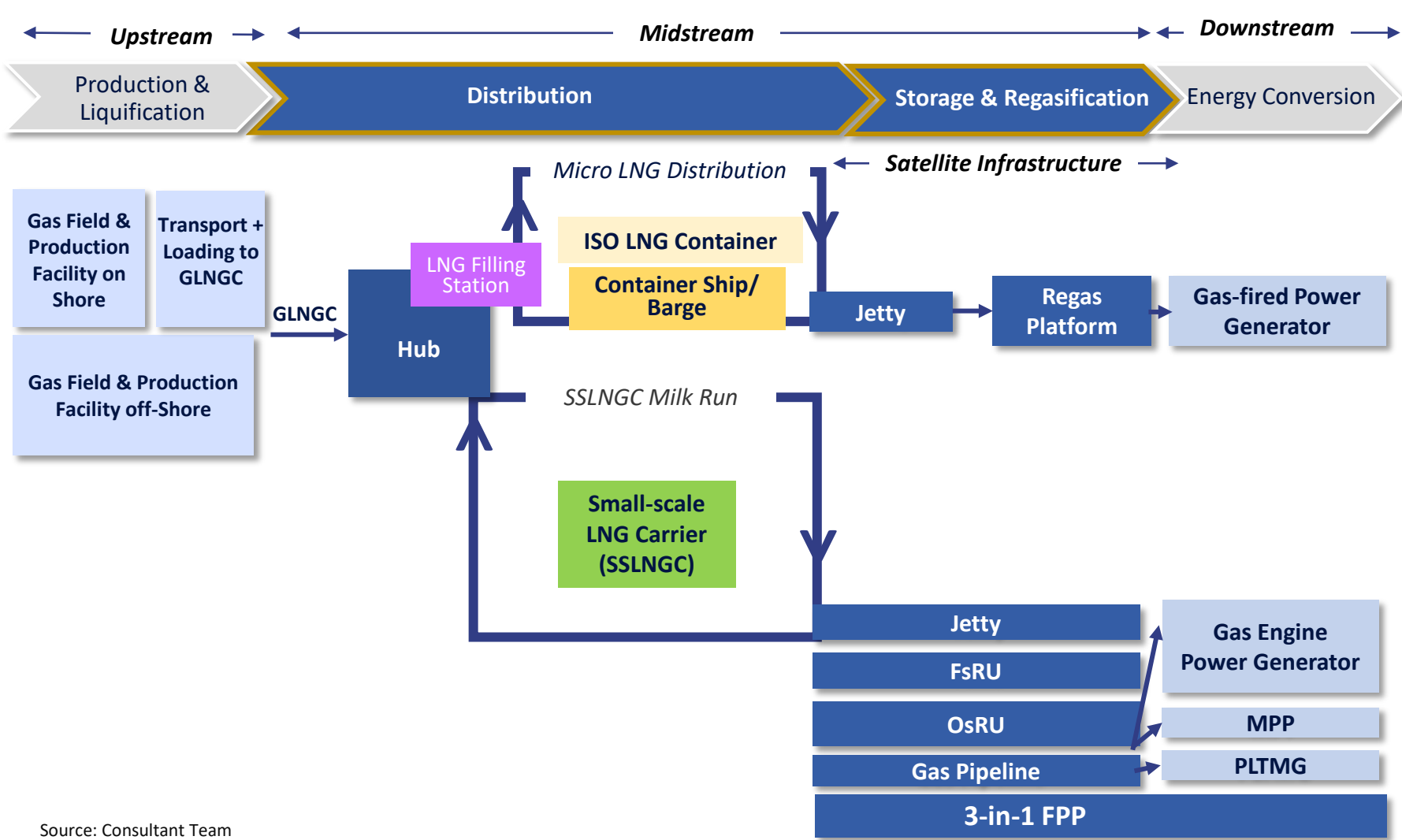
As preparation of open tender selection by Pertamina group (PGN) proceeds, the need to clearly demarcate B-to-B activity and G-to-G activity became stronger in order to ensure transparent, accountable tender process.

Accordingly, LDPP program framework has been modified. Through pillar 1, indirect support will be provided to B-to-B activity wherein Pertamina G and Japan consortium directly communicate. Pillar 2 and 3 remains the same.

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Scope of Midstream Infrastructure



Explanation

In this study, midstream infrastructure consists of distribution part and storage & regasification part.

Distribution infrastructure covers 1) FSU that receives and stores LNG from Global LNG Carrier, 2) LNG Filling Station that fills LNG to ISO container, 3) ISO LNG Container Ship/Barge for micro distribution (designated for smaller demand sites), 4) Small-scale LNG Carriers designated for larger demand sites.

Storage and regasification part covers Satellite infrastructure that includes Jetty, storage and regasification unit, gas pipeline located at distribution target sites.

Satellite infra for SSLNGC target sites varies depending on geographic profile and power plant types.

Source: Consultant Team

GLNGC: Global LNG Carrier; SSLNGC: Small Scale LNG Carrier; FPP: Floating Power Plant;
MPP: Mobile Power Plant; PLTMG: Gas Engine Power Plant; FsRU: (small) Floating Storage Regasification Unit;
OsRU: (small) Onshore Regasification Unit

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Discussion on Pertamina and PGN's needs on Business implementation scheme

The estimated Pertamina and PGN's needs on Implementation scheme base on the discussion with PGN and the information acquired from PGN are shown in the figure below.



Explanation

Based on the discussion with PGN, it is estimated that PGN does not wants to take demand risk. They prefer use or pay scheme, which demand risk is taken by PLN.

Also, Pertamina/PGN is expecting the investors to create the LNG demand in the East Indonesia where many of the LNG distribution sites are located.

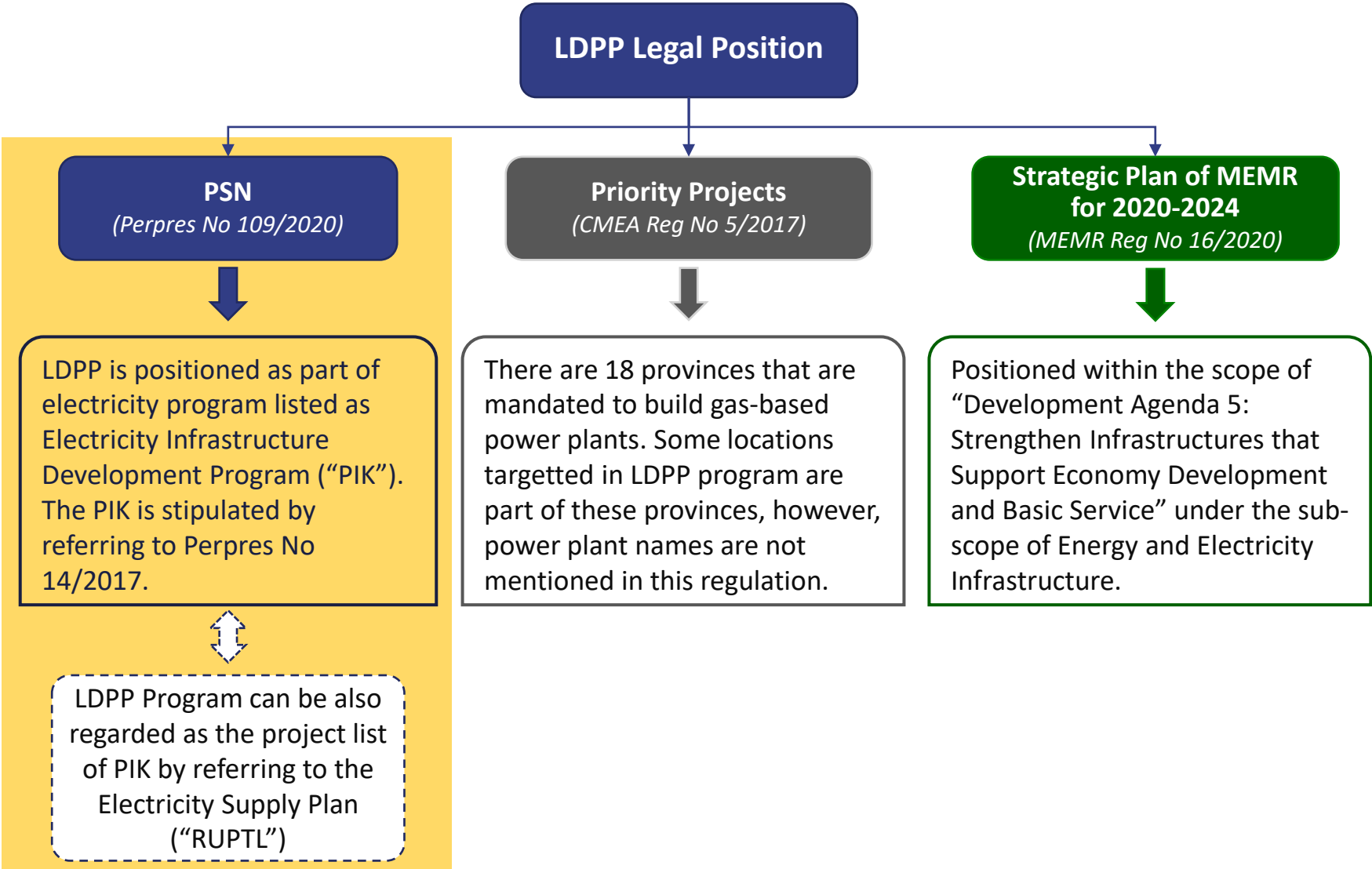
Lastly, Pertamina/PGN is seeking that the investors obtain the finance for the necessary initial investment.

The business implementation scheme needs to be developed based on above-mentioned Pertamina/PGN's needs.

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LDPP Program as Part of PSN Project



Explanation

Even though the LDPP's proposed projects of electricity development are not part of project list of PIK as shown in the KPPIP's website, PT PGN within their material presented to the Minister of MEMR¹, mentioned that Electricity Conversion from fossil-fueled to gas-fueled power plant has been approved by the President as part of PSN.

An unofficial interview with a KPPIP officer was conducted. The result says that **LDPP program can be regarded as the project list of PIK by referring to the Electricity Supply Planning ("RUPTL") by PT PLN**. A draft of RUPTL 2020-2029 was acquired and it shows that some of targetted LDPP locations are included in the draft RUPTL 2020. The sites included in the draft RUPTL 2020 can be seen in next slides.

For Energy and Electricity Infrastructure of Strategic Plan, there are two strategies related to LDPP program which are

- PLTG/GU/MG/MGU development in smaller system to use platform generation concept (not barge) with milkrun transportation mode
- Assignment to Pertamina to convert diesel to gas in 52 locations under Kepmen No 13/2020

Footnote: ¹PT PGN, 2020, Gas Provision from LNG Regasification for Electricity Generation Updates to the Minister of MEMR.
Source: President Regulation (Perpres) No. 109/2020; CMEA Regulation No.5/2017; MEMR Regulation No.16/2020

PLTMG/PLTG based on draft RUPTL 2020 that aligned with LDPP Site (Sulawesi)

No	Sites	Province	Installed capacity (MW)	Type	Developer	Status
1	Minahasa	N. Sulawesi	150	PLTMG	PLN	Tender stage Target COD: 2022
2	Maleo	Central Sulawesi	N/A	N/A	N/A	N/A
3	Bau bau	SE Sulawesi	30	PLTMG	N/A	Operation stage (existing)
4	Nii Tanasa	SE Sulawesi	N/A	N/A	N/A	N/A

PLTMG/PLTG/PLTD Dual Fuel (Diesel and Gas) based on draft RUPTL 2020 that aligned with LDPP Sites (N. Maluku)

No	Sites	Province	Installed capacity (MW)	Type	Developer	Status
5	Halmahera (Halmahera 1)	N. Maluku	60	PLTMG	PLN	Planning stage Target COD: 2025
6	Ternate 2	N. Maluku	20	PLTMG	PLN	Planning stage Target COD: 2022
6	MPP Ternate	N. Maluku	N/A	N/A	N/A	N/A
7	Sofifi	N. Maluku	10	PLTD Dual Fuel	PLN	Procurement stage Target COD: 2021
8	Tobelo (Tobelo 2)	N. Maluku	20	PLTMG	PLN	Planning Stage Target COD: 2022
9	Bacan	N. Maluku	10	PLTD Dual Fuel	PLN	Procurement Stage, Target COD: 2021
10	Sanana	N. Maluku	10	PLTD Dual Fuel	PLN	Procurement Stage, Target COD: 2021
11	Morotai (Morotai 2)	N. Maluku	10 (PLTD Dual Fuel) 20 (PLTMG)	PLTDDual Fuel (Morotai) PLTMG (Morotai 2)	PLN for Both	PLTD Dual Fuel: Procurement Stage, Target COD: 2021 PLTMG: Planning Stage, Target COD: 2023,

PLTMG/PLTG/PLTD Dual Fuel (Diesel and Gas) based on draft RUPTL 2020 that aligned with LDPP Sites (Maluku)

No	Sites	Province	Installed capacity (MW)	Type	Developer	Status
12	Ambon Peaker	Maluku	30	PLTMG	N/A	Operation stage (existing)
12	MFPP Ambon 2	Maluku	50	PLTMG	PLN	Planning Stage, Target COD: 2022
13	Saparua	Maluku	2	PLTD Dual Fuel	PLN	Planning Stage, Target COD: 2021,
14	Seram	Maluku	20	PLTMG	N/A	Operation stage (existing)
15	Bula	Maluku	10	PLTD Dual Fuel	PLN	Tender Stage, Target COD: 2021
16	Dobo	Maluku	10	PLTMG	PLN	Construction Stage, Target COD: 2021,
17	Saumlaki	Maluku	10	PLTMG	PLN	Construction Stage, Target COD: 2021,
18	Langgur	Maluku	20	PLTMG	N/A	Operation stage (existing)
19	Namlea	Maluku	10	PLTMG	PLN	Construction Stage, Target COD: 2021

PLTMG/PLTG/PLTD Dual Fuel (Diesel and Gas) based on draft RUPTL 2020 that aligned with LDPP Sites (Papua/W. Papua)

No	Sites	Province	Installed capacity (MW)	Type	Dveloper	Status
20	Sorong	W. Papua	20	PLTMG	IPP	Planning stage Target COD: 2026
21	Manokwari	W. Papua	20	(MPP) PLTMG	PLN	Tender stage Target COD: 2021
21	Manokwari 2	W. Papua	20	PLTMG	PLN	Construction stage Target COD: 2020
21	Manokwari 3	W. Papua	20	PLTMG	PLN	Planning stage Target COD: 2024
22	Fak-Fak	W. Papua	10	PLTMG	PLN	Planning Stage, Target COD: 2024
23	Kaimana	W. Papua	10	PLTD Dual Fuel	PLN	Procurement Stage, Target COD: 2021
24	Raja Ampat	W. Papua	10	PLTMG	PLN	Planning Stage, Target COD: 2021
25	Jayapura	Papua	50	PLTMG	PLN	Planning stage Target COD: 2022
25	Jayapura Peaker	Papua	40	PLTMG	N/A	Operation stage (existing)
25	MPP Jayapura/ Jayapura	Papua	50	MPP	N/A	Operation stage (existing)

PLTMG/PLTG based on draft RUPTL 2020 that aligned with LDPP Sites (Papua)

No	Sites	Province	Installed capacity (MW)	Type	Developer	Status
26	Biak	Papua	7.5	PLTMG	PLN	Construction stage Target COD: 2020
26	Biak 2	Papua	10	PLTMG	N/A	Operation stage (existing)
27	Nabire	Papua	20	(MPP) PLTMG	N/A	Operation stage (existing)
27	Nabire 2	Papua	10	PLTMG	N/A	Operation stage (existing)
27	Nabire 3	Papua	N/A	N/A	N/A	N/A
28	Merauke	Papua	20	PLTMG	N/A	Operation stage (existing)
28	Merauke 2	Papua	20	PLTG/MG	N/A	Operation stage (existing)
29	Serui 1	Papua	10	PLTMG	PLN	Construction Stage Target COD: 2021
30	MPP Timika	Papua	10	PLTMG	PLN	Construction Stage Target COD: 2020
30	Timika 2	Papua	30 + 10	PLTMG	PLN	Planning Stage, Target COD: 2021
30	Timika 3	Papua	20	PLTMG	PLN	Planning Stage Target COD: 2024

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CO2 Emission Reduction Estimation based on Master Agreement Sites

Assumption:

- Capacity Factor : 60%
- Availability Factor: 95%
- Unit avoided emission compared to Diesel fuel generation : 110 gCO²eq/kWh
- Social Cost of Carbon: 30USD/tCO²

Scope	Number of Sites (Power plants)	Total Plant Capacity (MW)	Annual Electricity Generation (MWh)	Yearly Avoided Emission (tCO ₂)	Yearly Avoided Social Cost of Carbon (USD mil.)
Whole Indonesia	52 ¹	1,602	7,999,106	879,902	26
Eastern Indonesia ²	39	995	4,968,234	546,506	16

Note:

1: Excludes Quick-win three sites

2: Sites (Power plants) whose Hub/Filling Station is Ambon or Train 3 Tangguh as designated in Master Agreement.

Explanation

The project will have positive environmental impact by reducing greenhouse gas emission. Compared to diesel fuel, LNG fuel would emit lower carbon, bringing social benefits to the country.

ICPP (2018)¹ estimates the emission of gas (combined cycle) is 490 gCO²eq/kwh (median), which is 110 gCO²eq/kWh lower than diesel-fired electricity generation.

Based on power plants sites stipulated in Master Agreement between PLN and PGN, annually 879,902 tCO² emission could be avoided compared to the diesel-fired case. Of which 546,506 tCO² are from Eastern Indonesia sites.

Applying generally accepted social cost of carbon 30 USD/tCO², 26 million USD (16 million USD for Eastern Indonesia) worth of CO² could be reduced.

1: https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_annex-iii.pdf

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Potential Local Players Identifications for Midstream Infrastructure

No	Players	Category	Track Record	Company size	Product specs
1	PT Aneka Gas Industri Tbk. (Samator Group)	Transport and Storage of Cryogenic Fluids	8 locations in Sulawesi for Depot (3), Filling Stations (2), and Factory & Filling Stations (3)	Revenue: IDR 2.2 Trio (2019) +6.3% Total Assets: IDR 7.02 Trio (2019)	N/A
2	PT PAL Indonesia (PERSERO)	FSRU*; SSLNGC*; LNG Carrier; Barge	- Production Capacity: 1,600 ton/month (~3 ships / year) - 26 years of shipping manufacturing - Dual Fuel Barge Mounted Power Plant (BMPP)	Revenue: IDR 1.62 Trio (2019) +3.11% Total Assets: IDR 6.5 Trio (2019)	Capacity For LNG Carrier: 24,000 LTDW. Claimed to have their own tank design and regasification system
3	PT Meindo Elang Indah	FSRU EPC	- 30 years experience, 150+ Oil&Gas Projects - EPC for Jawa-1 FSRU (consortium w/ General Electric and Samsung), responsible on marine construction (incl. jetty, gas pipes, water cooling pipes)	N/A	FSRU Spec: LNG Storage 170.150 m3, regasification capacity 300 MMscfd
4	PT Lintech Duta Pratama (Lintech)	LNG ISO Tank	- Fabrication & Assembly of Tank Thickener RH Feed 38M - EPC Lime Plant 400tpd Sibelco Padalarang	N/A	LNG ISO Tank 20'/40' Certification: IMO/ISO 1496/ASME VIII Div1, Depnaker Indonesia
5	PT Matesu Abadi	LNG ISO Tank, VGL	30+ years in industry	N/A	Effective Liquid Capacity: 165 L (VGL), 18,800-21,000 L (ISO)

Explanation

There are several companies in Indonesia that have an experience handling LNG or other cryogenic fluids. However, many of the companies are EPC focused and seems to have engaged with foreign partners to carry out some of their previous projects.

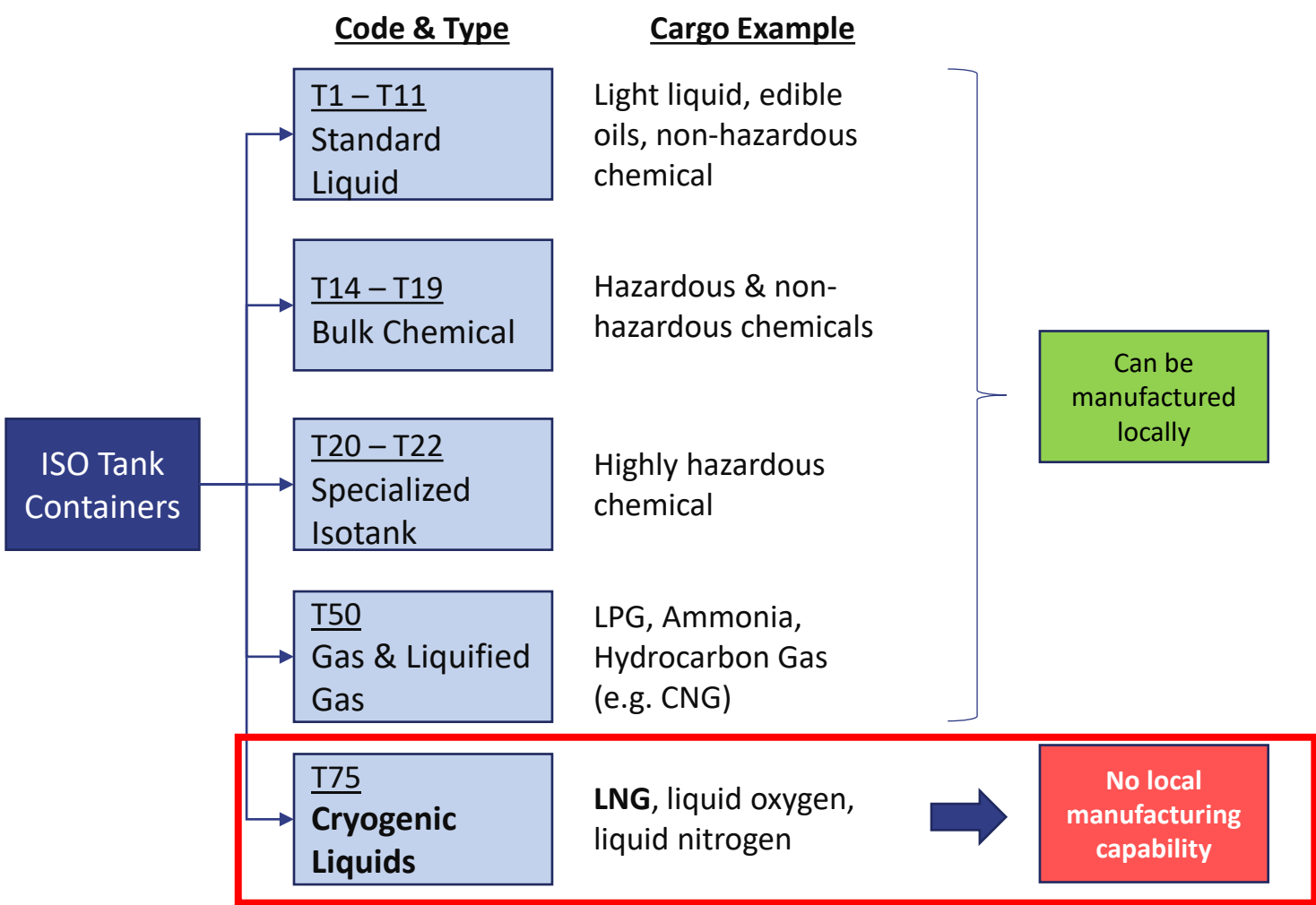
Unfortunately, it is difficult to obtain details of the partnership arrangements of the past projects. Therefore, the contribution of the local players could not be assessed sufficiently.

Notes: *) PT PAL claims they have capability to construct FSRU and Small LNG Carrier

Source: <https://www.dunia-energi.com/pal-indonesia-minta-dukungan-pemerintah-untuk-jadi-produsen-small-size-lng-carrier-dan-fsru/>

There is currently no Cryogenic ISO Tank Manufacturing Capability in Indonesia

Isotank is classified into “T” code system, largely based on the type of cargo it is design to carry the required specifications (e.g. shell thickness, pressure, etc).



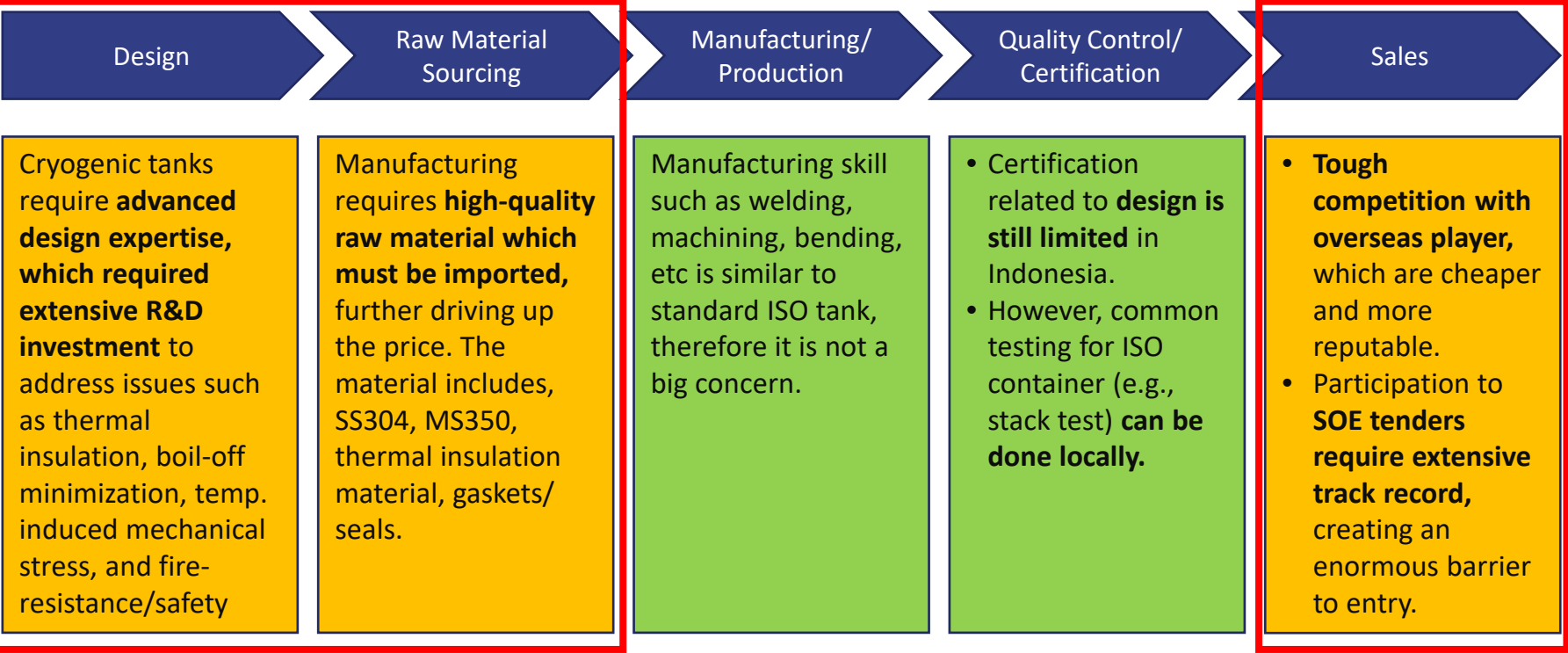
Explanation

There are several types of ISO tank containers, which is identified by the “T” code standard. The general categorization includes standard liquid, bulk chemical, gas, and cryogenic tanks. Each of these class has different specification such as the thickness of shell, pressure vessel rating, pressure relieve valves, thermal insulation, corrosion resistance, etc.

While the local ISO tank industry is able to produce most types of ISO tank, there is still no capability to produce Cryogenic ISO tank in Indonesia. Cryogenic vessel manufacturing is more technically challenging due to the stringent heat retention requirement, and material resistance to high fluctuation in temperature.

Main Challenges in the Domestic LNG ISO Tank Manufacturing Sectors

Simplified Manufacturing Stages/Process



Explanation

The challenges in the sector to produce ISO LNG tank are identified along each manufacturing & sales flow.

The first challenge in on the technical know-how to manufacture the product itself. Cryogenic ISO tank production has unique, advanced technical requirements, not comparable to other ISO tank products.

Another key challenge is the raw material sourcing. Materials required for production are mostly imported, which drives up the cost.

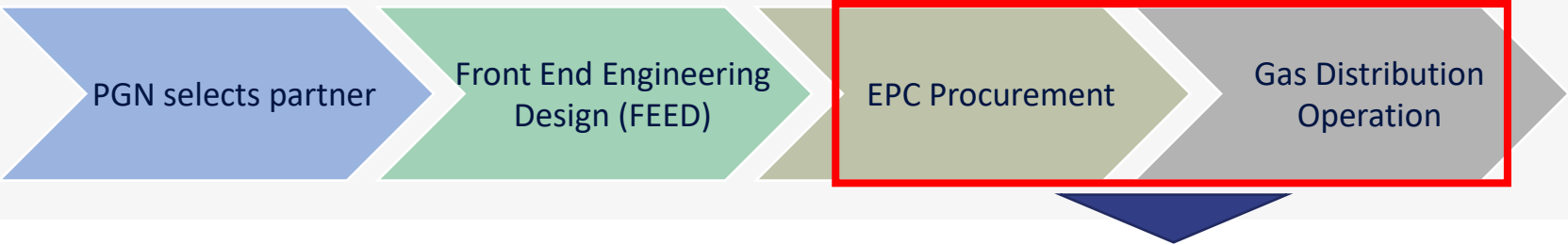
Lastly, the key challenge is on the market competition itself. There are many international players that has extensive expertise and able to deliver the product with lower price, creating a tough market to enter.

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Roadmap on Local Companies Development

Midstream Infrastructure Development Steps



Intervention Options to promote Local Content

Option 1: EPC Procurement Process

After partner selection, the area which local companies has competitiveness should be studied in detail and local contents should be discussed (while promoting local company development, it is important to continue competitiveness of among bidder is important.)

Option 2: Gas Distribution Operation

ISO tank would be procured throughout operation period. It is difficult for local companies to provide ISO tank in the beginning stage. Therefore, the procurement should be considered in long-term plan. Providing Gov. support is worth considering to make them competitive.

Explanation

Currently there are limited local players that manufacture equipment required throughout the midstream infrastructure value chain. In the future, the Government intends to stimulate growth of this supporting sector following midstream infrastructure development.

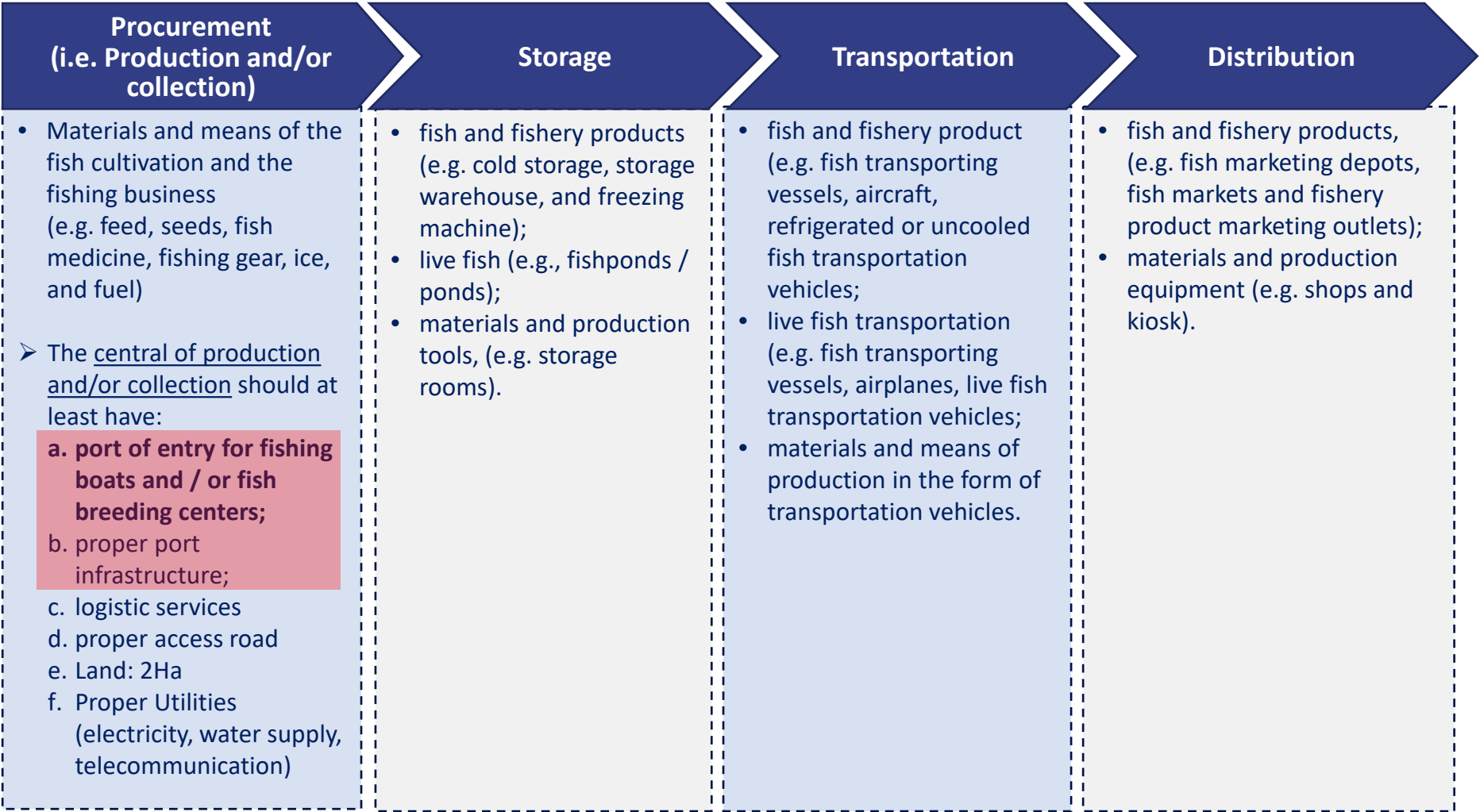
To achieve such goal, Government should consider about local contents at 1) EPC Procurement Process, or 2) Gas Distribution Operation.

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Characteristics/Value Chain of Fishery sector

According to **Regulation of Ministry of Maritime Affairs and Fisheries (MMAF) No.5/2014** on National Fishery Logistic System/ *Sistem Logistik Ikan Nasional (SLIN)*, the value chain of national fishery sector is as follows:



Explanation

The value chain of national fishery sector according to MMAF Regulation No.5/2014 on National Fishery Logistic System is categorized into four stages i.e., Procurement (including production and/or collection), Storage, Transportation, and Distribution.

The production and/or collection center of fish sector should at least have facility of entry port for fishing boats and/or fish breeding centers, as well as proper port infrastructure. These facilities are explained in the next slides.

Considering the condition of the fishery sector, the synergy of LDPP program with the national fishery sector, can be done in the stage of Procurement (i.e. port – the jetty/dock) and Storage (e.g. cold storage, ice machine).

Facilities Requirements for the Fishing Port

According to **MMAF Regulation No.8/2012** on Fishing Port/ *Kepelabuhan Perikanan*, the facilities of fishing port should have at least:

Category	<i>Primary</i>	<i>Functional</i>	<i>Supporting</i>
Min. required facilities	1. Land availability 2. Dock 3. Pool Port 4. Access road and drainage	1. Administration office 2. Fish marketing place 3. Utilities (water supply, electricity installation)	1. Guardhouse and Toilet
additional facilities	5. Jetty 6. Breakwater, revetment, and groin 7. Shipping channel	4. navigation and telecommunications 5. Installation for fuel filling station, and ice. 6. Ship workshop 7. Transit shed and quality guidance laboratories. 8. trucks for fish conveyance 9. Wastewater treatment, TPS (temporary landfill), etc.	2. Fishermen meeting hall 3. Operator's mess 4. Fisherman's mess 5. Social facilities (e.g. place of worship and toilet) 6. Shopping complex

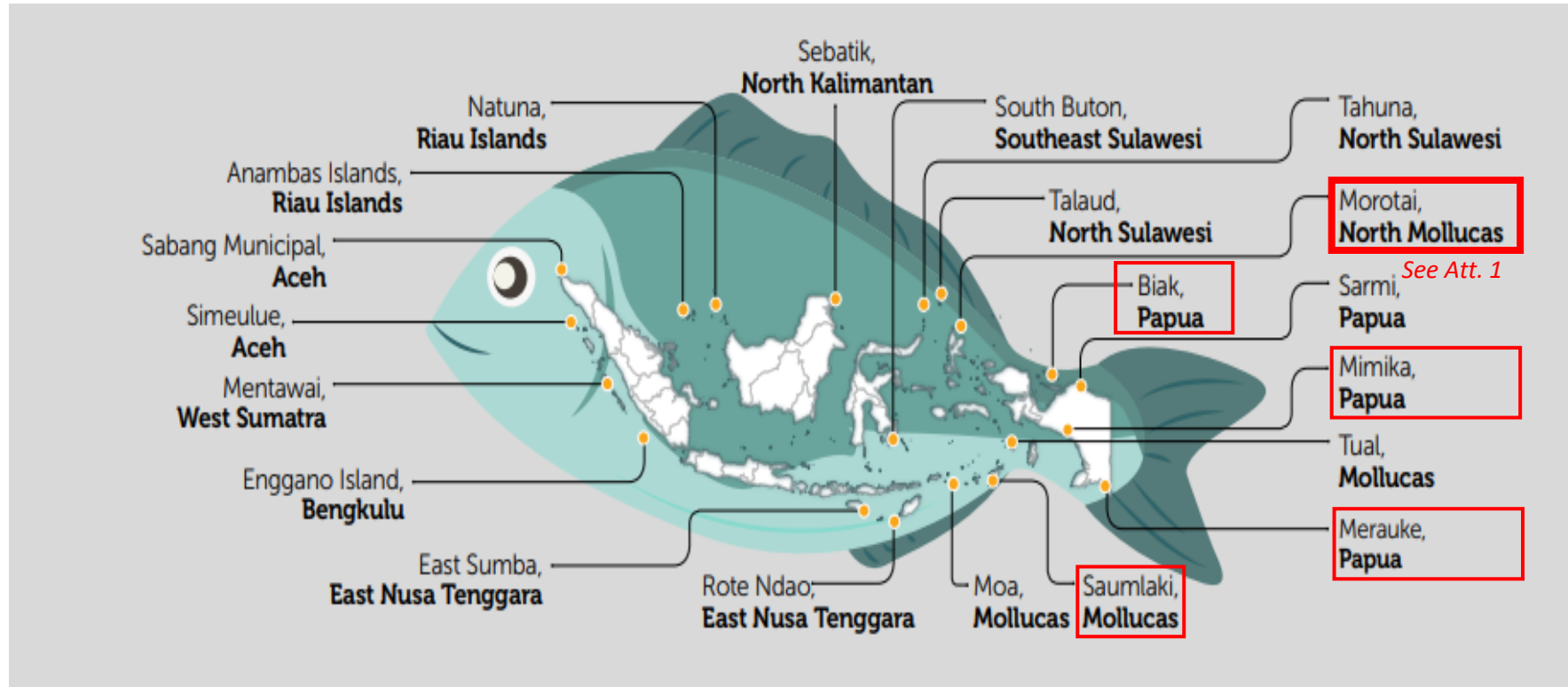
Explanation

The requirement of the fishing port according to MMAF Regulation No.8/2012, is categorized into three sections i.e., Primary, Functional, and Supporting. Each of these sections have the minimum or basic facilities requirement that needs to be fulfilled.

These standardized fishing port should be existed in each SKPT (Sentra Perikanan Kelautan Terpadu/ Integrated Marine and Fishery Center). The detail of SKPT will be explained in the next slide.

SKPT (Integrated Marine and Fishery Center) Distribution based on MMAF Decree No. 51/2016

□ Align with LDPP candidate sites



Explanation

SKPT (Sentra Perikanan Kelautan Terpadu/ Integrated Marine and Fishery Center) is a program from MAFM to develop and integrate community-based marine and fisheries business processes through optimizing the use of marine and fishery resources. One of its strategy is construction and development of an integrated marine and fishery facilities.

The distribution of the SKPT according to MMAF decree No. 51/2016 is shown in this slide.

5 out of 20 SKPT are aligned with the LDPP sites and can be benefit from the LDPP program. These 5 sites are Biak (Papua), Morotai (North Maluku), Saumlaki (Maluku), Mimika (Papua), and Merauke (Papua).



5 out of 20 SKPT aligned with LDPP candidate sites, can be benefit from the LDPP Program

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Indonesia Main Tourism Destination based on RPJMN



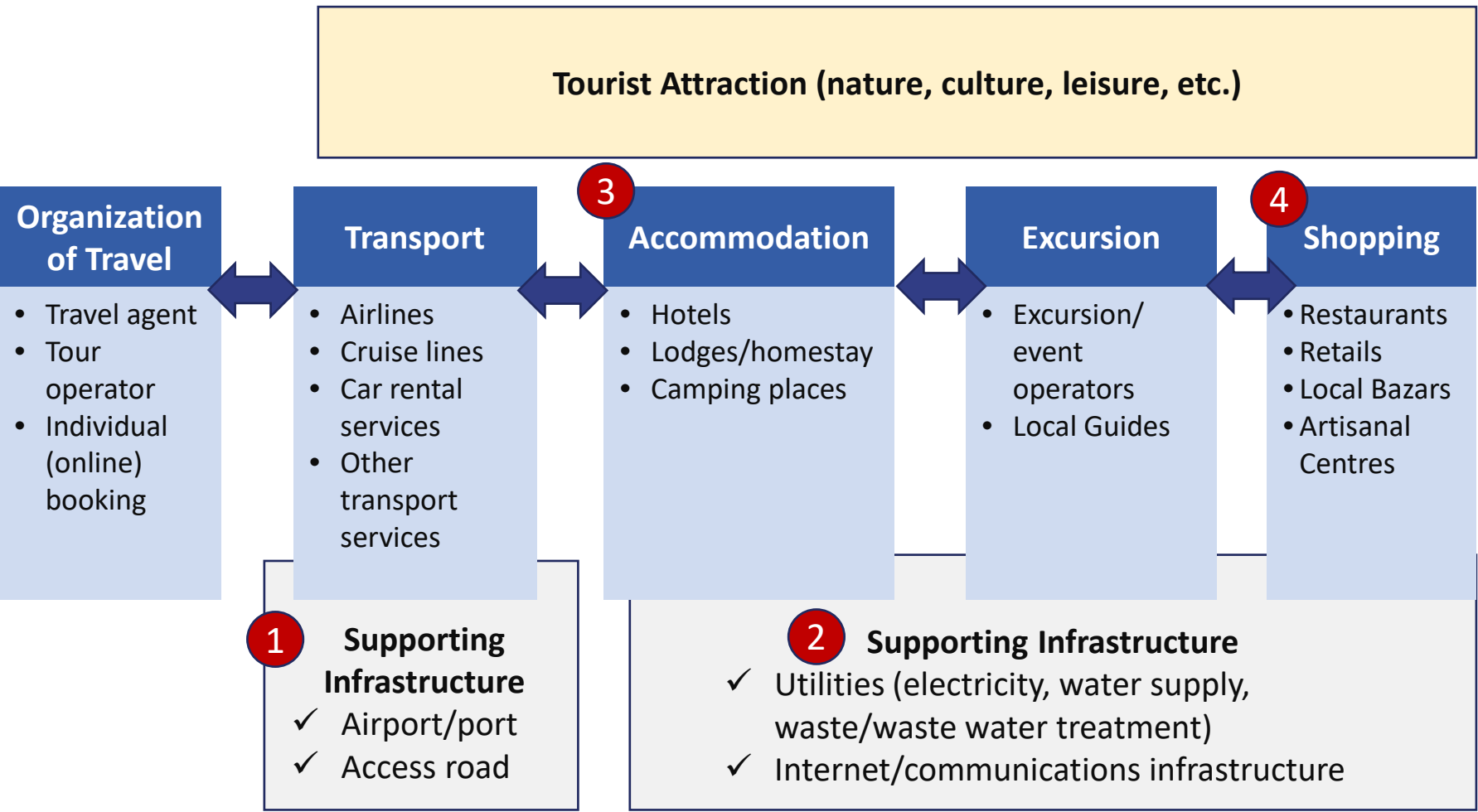
Explanation

Indonesia has rich and diverse natural assets, whose tourism remains underutilized. Direct contribution of the tourism industry as a share of GDP of Indonesia is at 4.8% in 2018.

As stipulated in the 2020-2024 National Medium Term Development Plan (RPJMN), the Government of Indonesia is targeting to further increase the direct contribution of tourism to GDP to 5.5% in 2024 by setting 10 Priority Tourism Destination, 11 New Priority Tourism Destination and 1 Revitalization as can be seen in this chart.

Two Priority New Tourism Destinations, namely Morotai and Raja Ampat are aligned with LDPP area and can be benefited from LDPP program.

Characteristics/Value Chain of Tourism Sector



Explanation

Tourism value chain activities refer to a series of interrelated activities which create values that are experienced by tourist during their trip.

The values of these interrelated activities not only are subjects to tourist attractions but also highly depends on the available supporting infrastructure.

Furthermore, the quality of supporting infrastructure often becomes the key consideration for tourists in deciding whether they will go to certain tourist attraction or not.

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 - 5.1. Conclusion and Next Supporting Activities

Conclusion of the LDPP Program

1

Technical Support

- Consultant team has been directly or indirectly supporting the proposal of JC (distribution network, technical outline of Hub and satellite facilities, business scheme, tentative gas price).
- PGN started tender process by issuing RFI. Outline, clarification points and proposal strategy of RFI are analyzed and discussed.
- Advantages of JC were identified, and practical activities are proposed for the preparation of the tender.

2

Debottlenecking

- Gas demand was reduced in Master Agreement between PGN and PLN compared with MEMR decree caused by COVID-19 pandemic.
- JC proposed higher Capacity Factor to economize the COE. Whereas, estimated Capacity Factors used in RUPTL are assumed to be lower than the expected values.
- Further discussion is necessary among stakeholders regarding the DES price and availability of SSLNGC access to Tangguh.
- Related regulations and permits are studied. Safety standard of ISO LNG tank should be further confirmed.

3

Social and Economic Benefit Enhancement

- Benefit of CO2 reduction induced by LDPP program was quantified.
- Social and economical benefits provided by LDPP program were confirmed through interviews to key persons of fishery and tourism sectors.
- Demand creation of smelter companies are analyzed which would contribute to gas price reduction and government support alleviation to the LNG distribution service.
- Further discussions will be necessary to the above issues.