SECRETARIAT GENERAL OF NATIONAL ENERGY COUNCIL

Energy Emergency Response of Indonesia's

APEC Energy Resiliency Enhancement Project's Symposium

San Francisco, Nov 9th 2023

Dr. Djoko Siswanto
Secretary General of National Energy Council,
The Republic of Indonesia

OUTLINE

- Overview
- National Energy Regulation
- Disaster Mitigation in Energy
- Recommendation

OVERVIEW

To strengthen energy security, ASEAN has declared energy interconnectivity to strengthen **The Trans-ASEAN power grid**. There are 18 potential cross-border interconnections with a cumulative capacity of 33 GW in 2040. One of the Indonesia-Malaysia border electricity interconnection agreements was signed at the Southeast Asia Energy Ministers' meeting in August 2023.

To securing long term Energy Supply for the region, ASEAN will build **The Trans-ASEAN Gas Pipeline (TAGP)** as a physical energy infrastructure project to support new market opportunities, as well as to increase energy security amongst the ASEAN Member States. Rapid increase in economic growth and population in the region has created potential challenges in terms of energy security and sustainability.

International Energy Agency (IEA) has an emergency response to anticipate conditions of energy supply shortages that could be caused by natural disasters. In addition to the oil stock release, the country should do other alternatives, like demand restraint, fuel switching or surge production. **IEA already conducted Emergency Response Review in Indonesia**.

Indonesia already has **regulations and policies related to energy sector** and their derivatives down to the regional level, there are Energy Law (Law No. 30/2007), National Energy Policy (GR No. 79/2014), National Energy Master Plan (Presidential Decree No. 22/2017), Regional Energy Master Plan in each province, Procedures for Determining and Handling Energy Crisis and/or Energy Emergency (Presidential Decree No. 41/2016 and Minister Decree No. 12/2022).

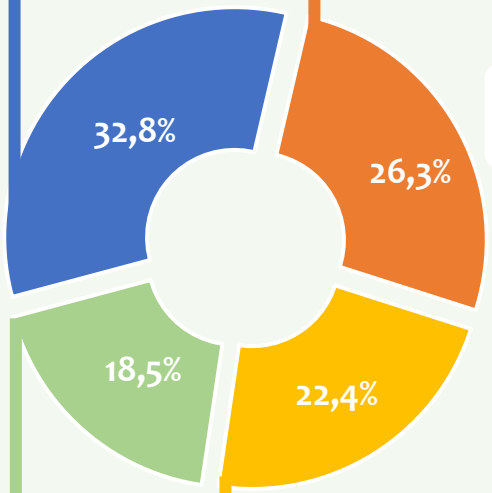
Regulation of energy types also already exists in Indonesia, there are Oil & Gas Law (Law No. 21/2001), Electricity Law (Law No. 30/2009), Mineral & Coal Law (Law No. 3/2020), Geothermal Law (Law No. 21/2014) and is currently being drafted regarding new and renewable energy law.

ENERGI RESILIENCE in GOVERNMENT REGULATION NO 79/2014

ASPECTS & INDICATORS

A. AVAILABILITY
A.1 Fossil Energy Reserves & Productivity
2. Energy Import
3. National Energy Reserves
4. Domestic Energy Supply

B. ACCESSIBILITY
B.1 Electricity Supply & Service
B.2 Fuel Supply & Service
B.3 Supply and Service of Natural Gas and LPG



C. AFFORDABILITY
1. Energy Price Disparity
C.2 Ratio of Energi Expenditures to Income
C.3 Energy Subsidy

D. ACCEPTABILITY
D.1 NRE's Percentage on Energy Mix
D.2 Energy Intensity
D.3 Carbon Emission

Issues

The capacity and reliability of the refinery are not sufficient to meet domestic fuel and LPG demand

High disparities on oil, gas, and coal prices have **impact on subsidies and potential disruption of energy** services

Energy Buffer Stock (CPE) is not available yet

The NRE portion in the energy mix is **still low**.

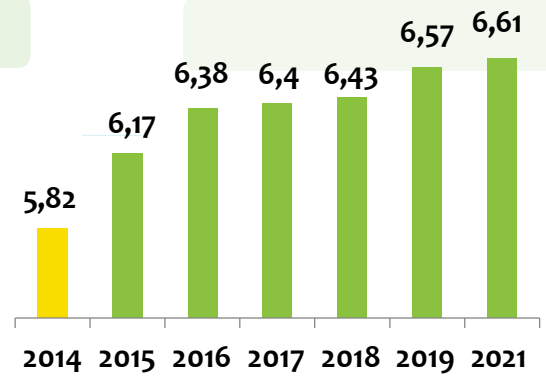
Energy imports (petroleum, fuel, and LPG) are still high

Crude oil production decreased, while consumption of fuel increases

INDONESIA's ENERGY RESILIENCE

condition of guaranteed **availability of energy**, public **access to energy** at **affordable prices** in the long term while still paying attention to **environmental protection**.

Energy Resilience of Indonesia in 2021 is **Resilience** on numbers **6,61"**



Highly Vulnerable (N<2) | Vulnerable (2≤N<4) | Less Resilience (4≤N<6) | Resilience (6≤N<8) | Highly Resilience (8≤N≤10)

DETERMINATION OF ENERGY CRISIS AND/OR ENERGY EMERGENCY

Presidential Decree Number 41 of 2016 concerning Procedures for Determining and Handling Energy Crisis and/or Energy Emergency

DEFINITION

Energy Crisis : an energy shortage condition

Energy Emergency : a condition in which the supply of energy is disturbed due to disconnection of energy facilities and infrastructures

TYPE OF ENERGY BEING REGULATED

Final Energy for the **Public** needs:

- **FUEL**
- **Natural Gas**
- **LPG**
- **Electricity**

CONSIDERATIONS FOR DETERMINING ENERGY CRISIS AND ENERGY EMERGENCY

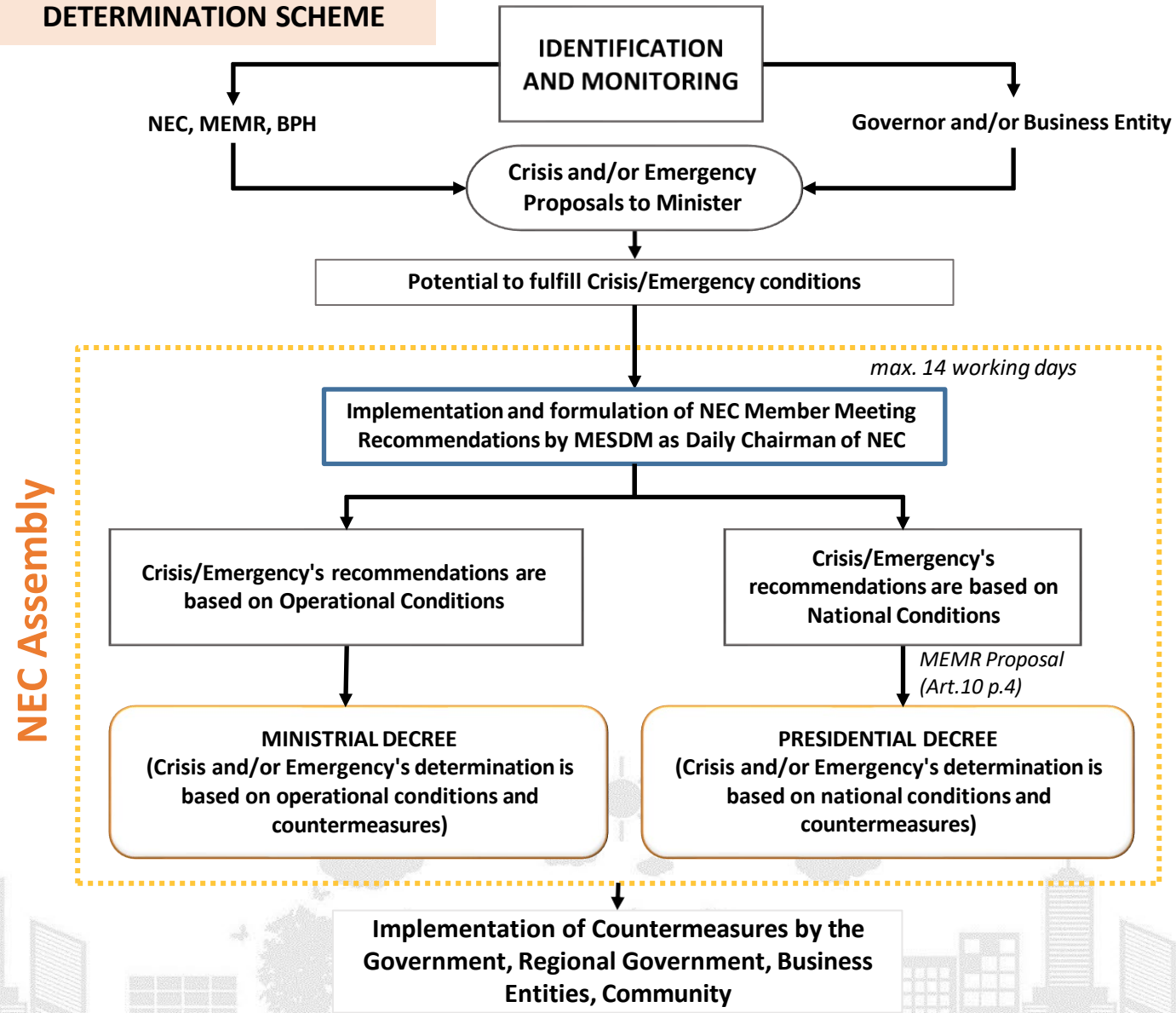
Operational Conditions

- ✓ Energy Crisis consider minimum operational stocks of Fuel, LPG, Electricity System and minimum demand for Natural Gas needs
- ✓ Energy Emergency consider level of difficulty and length of recovery time

National Conditions

- ✓ Disruption of government functions;
- ✓ Disruption of people's social life; and/or
- ✓ Disruption of economic activities

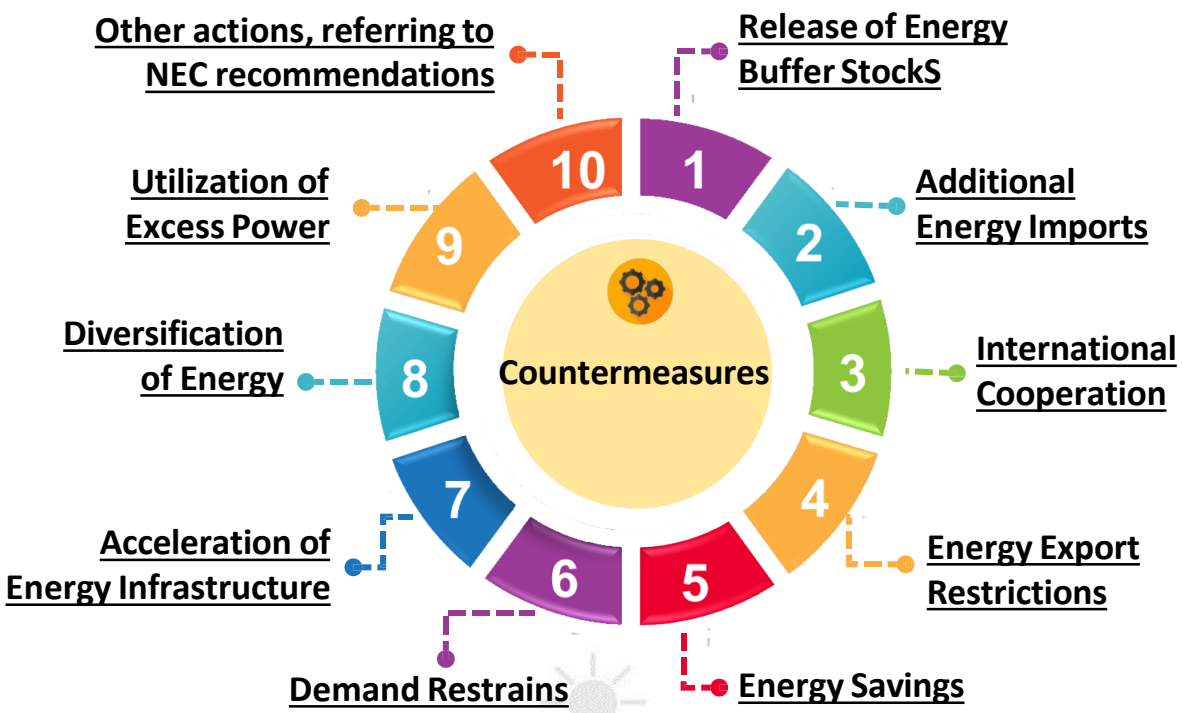
DETERMINATION SCHEME



COUNTERMEASURES

Presidential Decree Number 41 of 2016

The Central Government is obliged to carry out countermeasures based on the countermeasures stipulated in the Decree of NEC.



The Central and Regional Governments are obliged to provide facilities at least in terms of permits, procurement of goods and services, and land acquisition for the implementation of countermeasures.

MINISTER AUTHORITY

In Implementing Countermeasures

coordinate with ministries/institutions, governors, business entities, and other related parties;

obtain data and information from agencies, business entities and other related parties;

prepare a work plan to overcome the Energy Crisis and/or Energy Emergency;

instruct the Business Entity to take certain steps in accordance with its business field;

supervise the implementation of countermeasures;

take other actions in accordance with the President's instructions.

NATURAL DISASTER
In Indonesia

Geographically, Indonesia is an archipelagic country located at the **confluence of four tectonic plates** (Asian continental plate, Australian continental plate, Indian Ocean plate and the Pacific Ocean plate. In the southern and eastern parts of Indonesia there is a **volcanic arc** that extends from the islands of Sumatra - Java - Nusa Tenggara - Sulawesi, the sides of which are old volcanic mountains and lowlands, some of which are dominated by swamps. (NDMA)

This condition has **potential to disasters** such as

volcanic eruptions

earthquakes

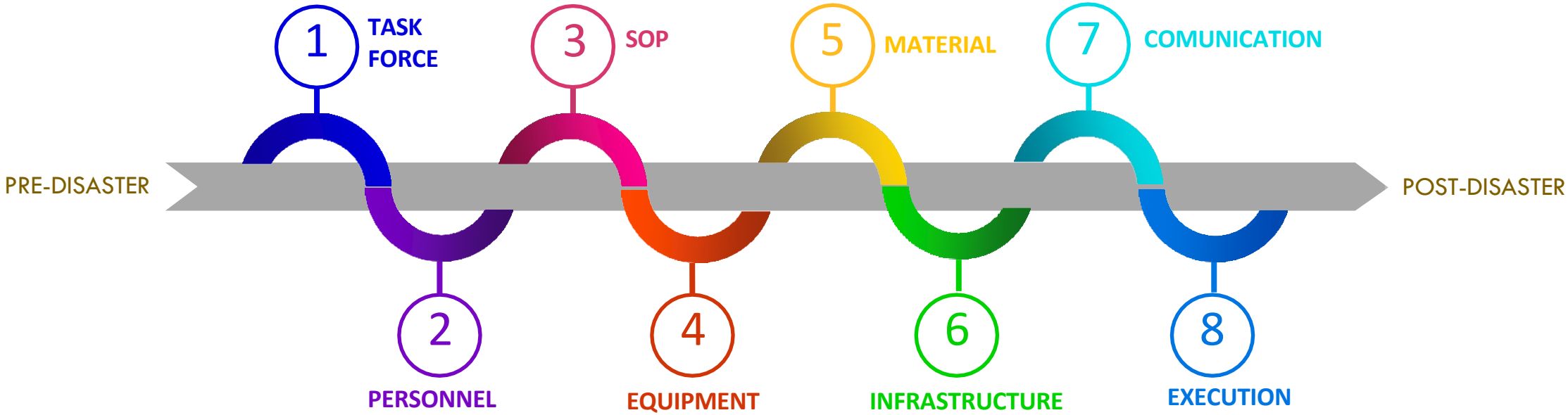
tsunami

floods

landslides

drought

DISASTER MITIGATION CONCEPT in electricity



EMERGENCY ANTICIPATION AND RESPONSE

Electrical Sector

- **Recovering electrical systems** affected by disasters
- Prepare **personnels** who will be assigned
- Prepare **material requirements**
- Organizing technical electricity restoration **training for employees**

Logistics & Equipment

- **Providing facilities, services, materials and equipment**
- Carry out reception, storage, distribution and transportation of **logistical assistance and equipment**
- Carry out **public kitchen support** for Disaster Rescue Team
- Facilitate **health services and medicines**

Operational

- **Mobilization of personnel and equipment**
- **Mapping disaster-affected areas** and recommend operational patterns to the Disaster Rescue Team Leader
- **Establish a field command post**
- **Report all developments** in the disaster management process to the command center

source : PLN

STANDARD OPERATIONAL PROCEDURE (SOP) OF EMERGENCY RESPONSE READINESS

Preparedness Stage

1. Disaster Identification
2. Report to Rescue Team
3. Personnel, Network Assets, Movable assets / not

Rehabilitation & Reconstruction Stage

1. Emergency Assistance (Posts, Medicine, Food & Drinks, Clothing, kitchen etc.)
2. Medical officer
3. Search & Locate victims
4. Damage inventory
5. Damage Evaluation
6. Recovery
7. Reconstruction

Pre-disaster Stage

1. Map of Disaster Potential Areas
2. Natural Disaster Early Warning
3. Socialization

Emergency Response Stage

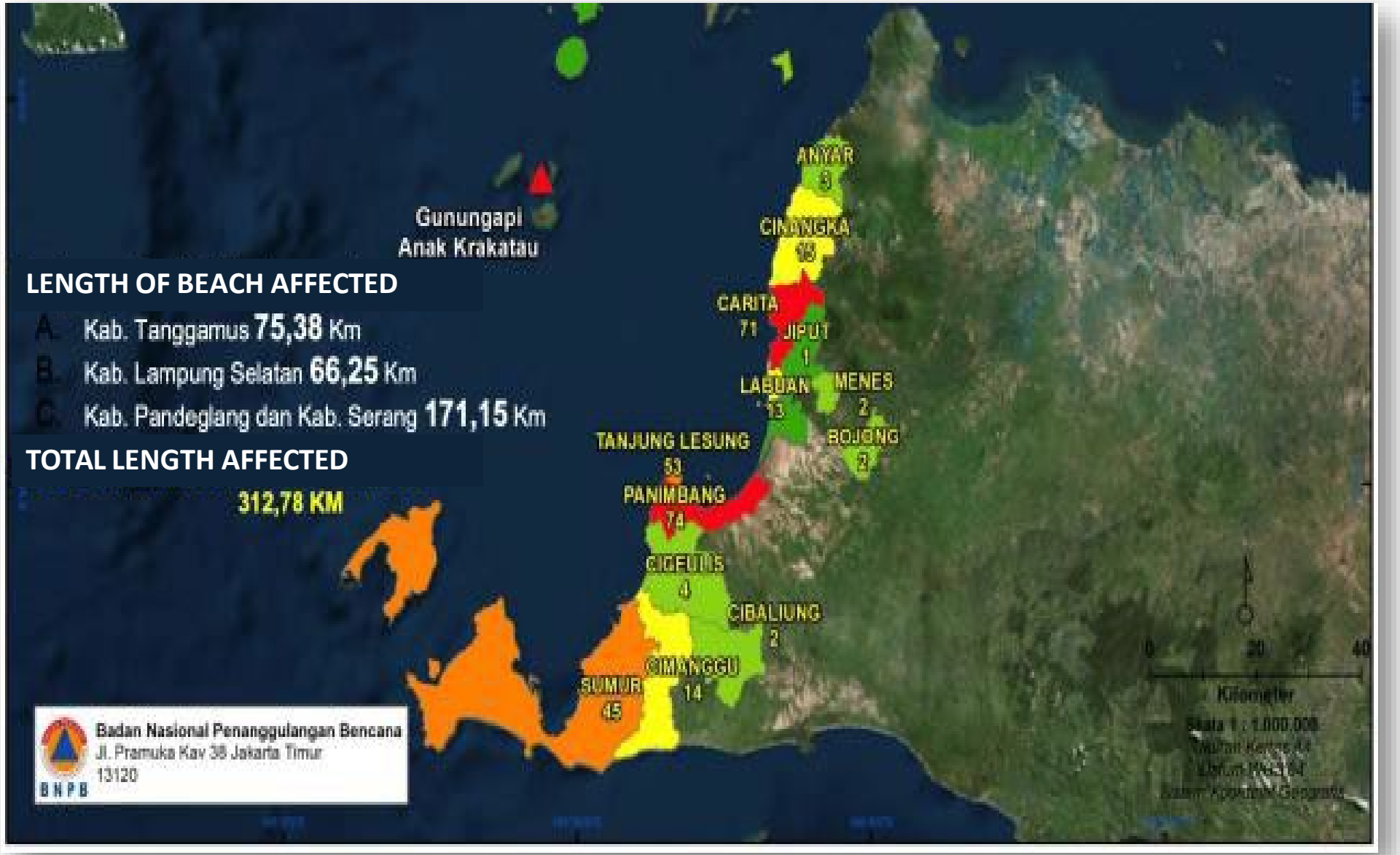
1. Personnel Rescue
2. Document Rescue
3. Asset Rescue

Evaluation & Monitoring Stage

1. Post rehabilitation & Reconstruction evaluation
2. Post-disaster monitoring
3. External Communication
4. Report to Supervisor/GM

source : PLN

MAP OF EARTHQUAKE AND TSUNAMI POTENTIAL AREAS, BANTEN PROVINCE



source : PLN

PERSONNEL AND EQUIPMENT READINESS BANTEN DISTRIBUTION UNIT

1.369 PERSONNEL

12 PRIORITY STANDBY LOCATION

include 4 worship places, 4 transportation zone, 1 port, 1 boarding school, 1 airport, 3 squares, 1 fuel terminal

EQUIPMENT & SUPPORT

22 genset mobile, 4 UPS, 29 UGB, 105 Yantek Car, 92 ULC motorcycle, 5 Cranes, 4 UKB, 17 Charging Station, 6 Skylift, 5 PDKB

56 POST & SUBPOST PLN UID BANTEN LOCATION

UNIT	POSKO	PERSONIL	TRANS PORT	CRANE	SPKLU	UPS	PDKB	UGB	UTB	GENSET	UKB TM	CARAVAN	DETEKSI	PERAHU KARET
BANTEN SELATAN	20	309	78	1	-	-	1	4	-	16	-	-	-	1
BANTEN UTARA	24	282	60	-	-	-	1	8	-	8	-	-	-	1
CIKOKOL	1	77	7	1	2	-	-	2	1	7	1	-	-	-
CIKUPA	2	112	11	-	1	-	1	5	1	4	2	-	-	1
SERPONG	2	141	15	1	4	-	1	6	1	4	1	-	-	-
TELUK NAGA	2	149	12	1	1	-	1	3	3	1	-	-	-	-
UP2D	5	298	14	1		3	-	-	-	-	3	-	4	1
UID BANTEN	-	-	-	-	1	-	-	-	-	-	-	-	-	1
TOTAL	56	1220	197	5	15	3	5	28	6	40	7	-	4	5

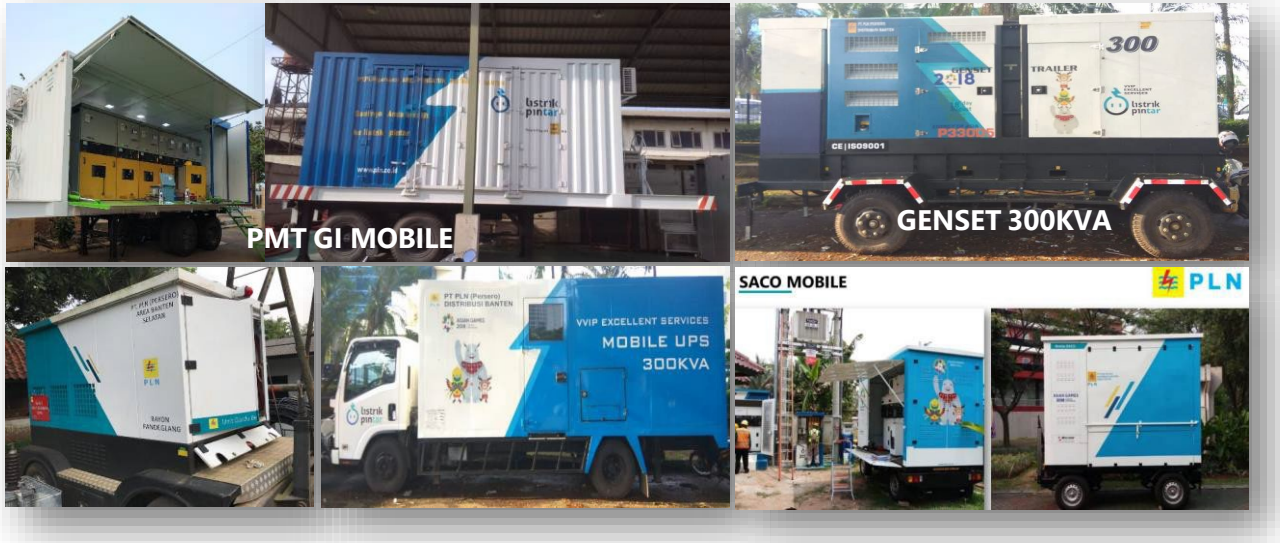
source : PLN

PREVENTIVE EFFORTS FOR ELECTRICAL SECURITY

1. DISASTER PREPAREDNESS TEAM

1239 flood alert personnel & 89 flood alert equipment

2. MOBILE BACKUP EQUIPMENT



source : PLN

MITIGATING THE RISK OF WEATHER CONDITIONS IN SERPONG UNIT

1 bad weather & flood history

Heavy Rain Potential

Alert

- Serpong Area
- Cisauk
- Legok
- Jambe
- Manis Raya

Flood Potential

Standby

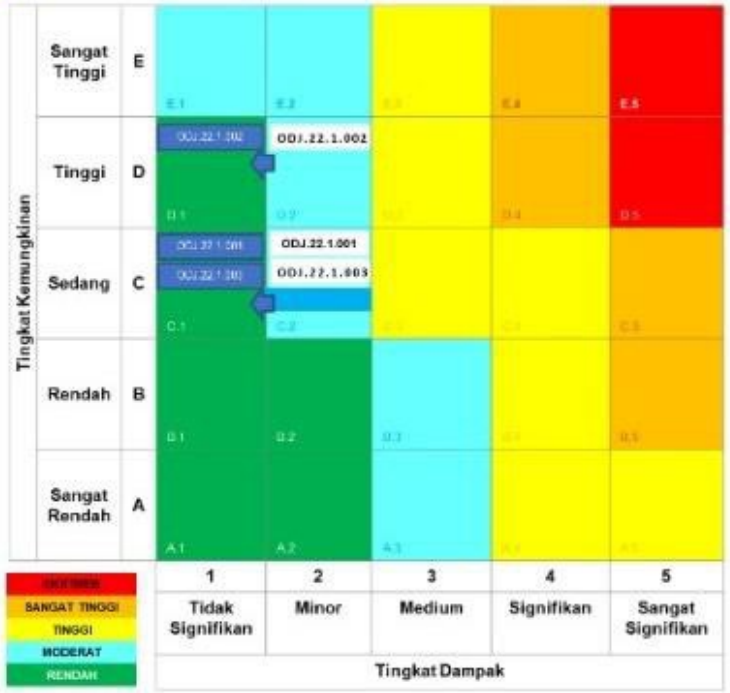
- Manis Area
- Graha Raya House Complex
- Pinang House Complex
- Lippo House Complex

Landslide Potential

Standby

- Cisauk
- Jambe

2 risk map and risk shift after mitigation



ID RISK	DESKRIPSI RISIKO	KEMUNGKINAN	DAMPAK	TINGKAT RISIKO
ODJ.22.1.001	Potensi Hujan Lebat	C. Sedang	2. Minor	Moderat (C2)
ODJ.22.1.002	Potensi Banjir	D. Tinggi	2. Minor	Moderat (C2)
ODJ.22.1.003	Potensi Tanah Longsor	C.Sedang	2. Minor	Moderat (D2)

7 Mitigation Action in 2022

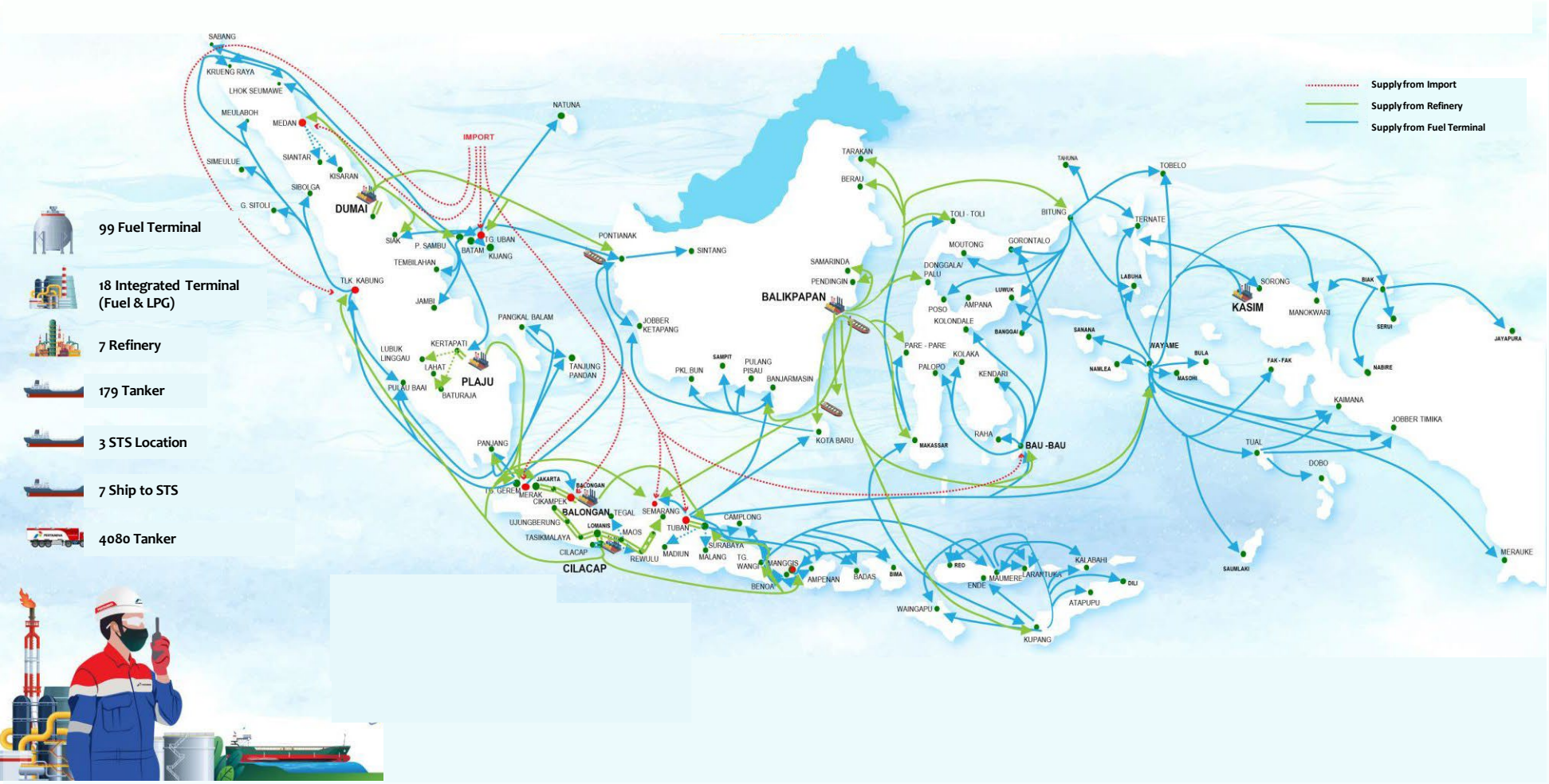
1. Keep 1 rubber boat ready for areas with potential flooding
2. Standby personnel and equipment
3. Raise the foundations for 10 electrical substations
4. Work on raising cubicle stands for 27 substations
5. Floor/substation foundation elevation work
6. Separate load breaker TR routes for areas that have the potential for flooding and for water pump installations at tg232c and tg232a substations
7. Tree cutting and felling activities in networks prone to heavy rain or strong winds
8. Carry out updated mapping of the condition of PLN substations and environments that are prone to flooding
9. Readiness of reserve materials to anticipate disruptions
10. Synergy with regional disaster management agencies, police, army and developers

4 Personnel & Equipment

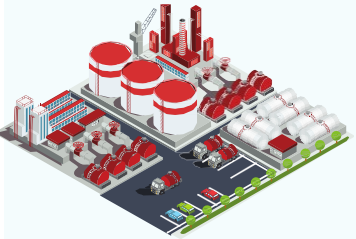
SERPONG	:	24	pln
PELAYANAN TEKNIK	:	121	Ytk
MITRA KERJA	:	43	Ptgs
PDKB - TM	:	1	Tim
POSKO BSD	:	5 mtr / 4	mbl
POSKO CURUG	:	4 mtr / 2	mbl

source : PLN

FUEL SUPPLY MAP



To fulfill domestic demand, Pertamina imports Fuel (mainly Gasoline) to certain receiving terminals.



Currently State Own Enterprise (Pertamina) operates around **121 fuel terminals and 23 LPG terminals** operating throughout Indonesia with an independent operation scheme and collaboration with related partners.

source : Pertamina

SUPPLY & DISTRIBUTION BUSSINESS PROCESS

1 Supply & Distribution Planning

Develop a Supply & Distribution Strategy

- Review product supply & demand
- Plan distribution needs
- Identify distribution constraints
- Develop distribution performance standards
- Develop a logistics strategy

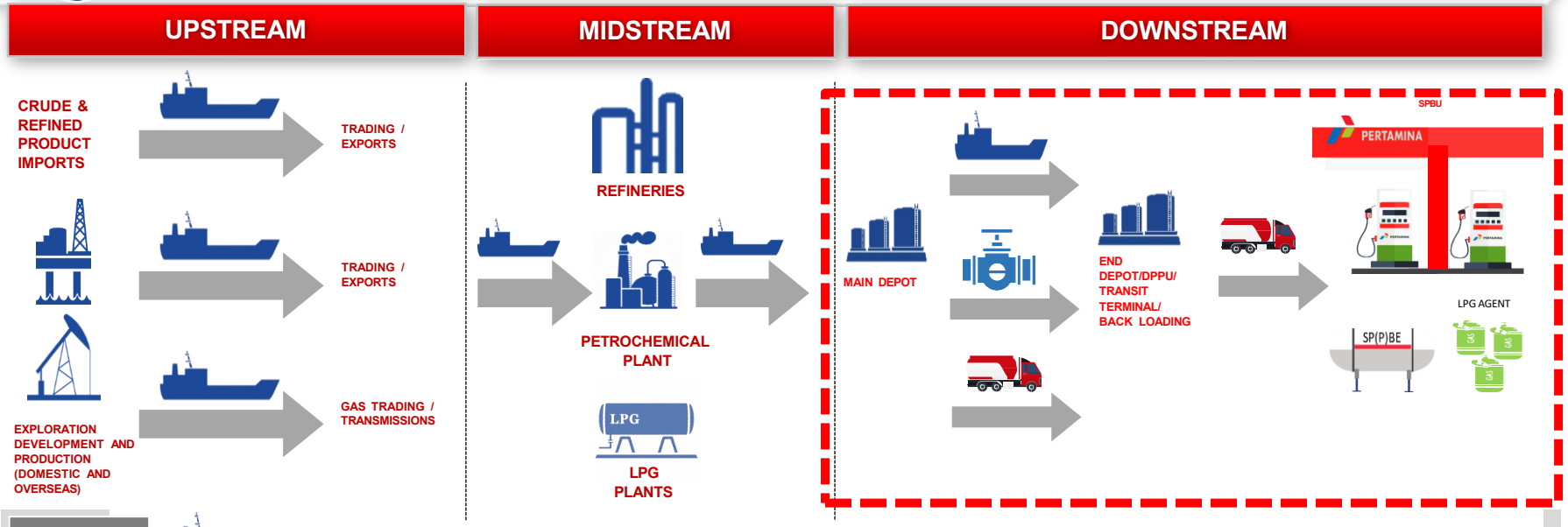
Supply Chain Evaluation

- Analysis of terminal constraints and transport routes (draft, flow, etc.)
- Analysis of transport routes and modes of transport
- Freight cost analysis per route and per mode of transportation
- Selection of the best Supply Pattern

Developing a Master Program

- Determination of Loading/Unloading Schedule
- Cargo Nomination (Product Type and Volume)
- Ship & Fleet Assignment

2 Implementation of Supply & Distribution



MODE

Water Transportation
Field ➔ Refineries ➔ Main Depot ➔ End Depot

289 Ships/Vessels

Land Transportation
Main Depot ➔ End Depot ➔ Gas Station/LPG Station/Agent
Fuel: 3.930 unit
LPG: 1.534 unit

Pipeline
Main Depot ➔ End Depot

Fuel Pipe 1.772 KM

3 Ship Management, Storage, Ports, Infrastructure Development

Ship Performance & Claim Management

Management of 69 Owned Vessels
Technical dan Cost Management, Ship Crew, Maintenance, Quality, HSE

Management of 136 Terminals :
- 117 Fuel Terminal
- 20 LPG Terminal

Management of Inflow, Stockpiling, Outflow and Returns

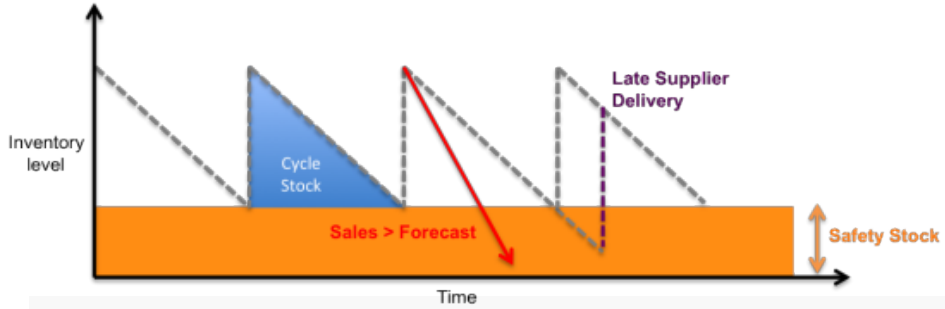
Management of 104 Port (port operator)
193 mooring facilities :
- 169 Jetty
- 13 SPM
- 11 CBM

Development & Management of Infrastructure Reliability
Reliability of existing infrastructure and development of infrastructure projects

source : Pertamina

SAFETY STOCK METHODS and CALCULATIONS

The Safety Stock Calculation Methodology has accommodated potential distortions from the demand side and logistics dynamics in each TBBM, both Main TBBM and End TBBM.



MINIMUM OPERATIONAL STOCK = SAFETY STOCK + CYCLE STOCK

Reference : *Chopra, S., & Meindl, P. (2013). Supply Chain Management : Strategy, Planning, and Operation Global Edition. Pearson Education, Inc*

Safety Stock = Z(Score) × √(Avg. Lead Time × Stdev. DOT²) × (Stdev. Lead Time² × Avg. DOT²)
Safety stock is needed to anticipate stockouts due to variations/uncertainty in supply and demand

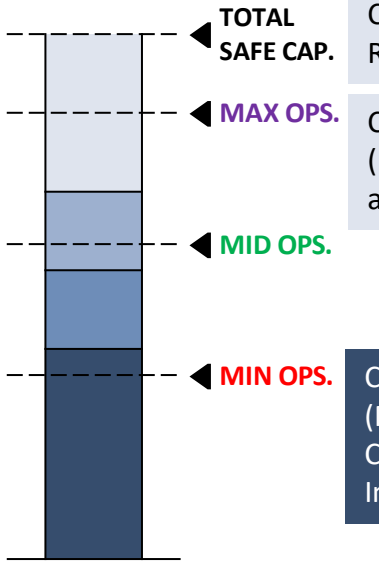
Cycle Stock = Supply Period × (Avg. DOT)

AVERAGE LEAD TIME: The average time interval between one supply and the next supply
ROUND TRIP DAYS (RTD = A + B + C) Transportation time required from TBBM to the supply point and back to the TBBM to supply
AVERAGE DOT: Average realization of Sales & Backloading per day
ASSUMPTIONS IN CALCULATIONS

- **Service Level Value**: 95% with a Z(Score) value of 1,645
- **Max. Capacity Constraint**: 70% of Safe Tank Capacity
- **Data used**: Realization data for the last 6 months (August 2020 – January 2021)
- **Supply Period**: There are 2 alternatives for calculating Cycle Stock, namely the first alternative uses a supply period of 1 x Round Trip Days and the second alternative uses 1 x Avg. Lead Time

STOCK LEVEL DETERMINATION

Pertamina's Operational Stock Reserves are modeled as integrated from the supply point to the distribution point to ensure the reliability of the Refinery - Import - Shipping – Fuel Terminal supply chain



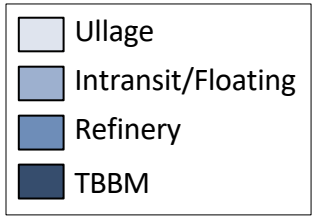
TOTAL SAFE CAP. Consists of the total tank capacity at TBBM and Refinery Unit tanks

MAX OPS. Consisting of the total maximum operational stock (Max. Hold Stock) located at TBBM (70% Safe Capacity) and Refinery Unit as well as average Intransit stock

MID OPS.

MIN OPS. Consisting of the total minimum operational stock (Min. Hold Stock) located in TBBM (Safety Stock + Cycle Stock) and Refinery Unit as well as average Intransit stock

Economy's Stock Volume The operational stock of fuel in the TBBM storage tank, Refinery Unit, and stock which is still in Intransit / Floating



source : Pertamina

REGULAR – ALTERNATIVE – EMERGENCY (RAE) SCHEME

Regular Operation Scheme

Operational activities for the supply and distribution of fuel/LPG are carried out under normal conditions in accordance with routine operational planning or those that have been planned regularly.

Alternative Operation Scheme

Operational mitigation activities for fuel/LPG supply and distribution are carried out in conditions where normal conditions cannot be implemented, so adjustments to the operating scheme are required.

Emergency Operation Scheme

Operational mitigation activities for fuel/LPG supply and distribution are carried out in conditions where alternative operations cannot be carried out and require large efforts in a short time to ensure energy availability.

Developing RAE Strategy

- Review product supply & demand
- Planning tonnage needs for ship and tank
- Evaluate refinery for fuel production
- Identify supply & distribution constraints
- Determination of nominations and cargo lifting schedules

The measure of success of Alternative Emergency (AE) supply & distribution is the delivery of fuel according to the destination in an orderly, safe, on time, right quality, right quantity, right destination and smoothly and fulfills:

1. Comply in administration according to procedures and documented.
2. Safe in accordance with HSSE regulations.
3. Cost effectiveness.

source : Pertamina

RECOMMENDATIONS FOR ENHANCEMENT OF ENERGY SECURITY

Increasing NRE Percentage

NRE acceleration in power plants (Geothermal PP, Rooftop PV, Co-Firing Steam PP – Biomass)

Encouraging the use of Biofuels for vehicles (accelerating the E-10 and B-35 programs)

Preparation for the construction of a nuclear power plant (NEPIO Regulation Acceleration)

Increasing Crude Oil Production

Encouraging increased production from a technical perspective and issuing regulations to increase investment in upstream oil and gas

Encouraging the increase in the acquisition of potential oil and gas fields overseas through technical negotiations

Reduction of Import of LPG, Crude & Gasoline

Utilization of carbonated **coal briquettes.**

Socialization of the **use of electric stoves**

Accelerating the **use of electric vehicles (EV)**

Accelerate the realization of **coal gasification into DME** and the interconnection of natural gas networks.

Construction of **LNG/CNG carriers**

Price Disparity

Reducing subsidies gradually and implementing subsidies on target at the same time as applying fair economic selling prices

Energy Buffer Stock

Stipulation of the EBS Presidential Decree as the legal protection

Preparing **storage facilities** (optimization of existing storage facilities and excess capacity) and **budget allocations**

Encouraging assignments to Business Entities to manage Energy Buffer Stock.

Energy Emergency Response

Conduct exersice to mitigate energy supply disruption whenever natural disaster occurs, through regional cooperation **among ASEAN economies**

Improving Refinery Capacity

Accelerating RDMP Project

Acceleration of **the construction of new refineries** and **integration with industrial zones**

Provide **incentives** for expansion of energy infrastructure

SECRETARIAT GENERAL OF NATIONAL ENERGY COUNCIL

Thank You