PLN Nusantara Renewables

Indonesia Case Study
Cirata Solar Power Plant Development

12 September 2024

www.ptplnnr.com

PT PLN Group Structure

PLN Nusantara Renewables

100%

Owned by The Government

99,99%

PLN ownership in each subsidiary

- PT PLN Nusantara Power
- PT PLN Indonesia Power
- PT PLN ICON Plus
- PT PLN Energi Primer Indonesia
- PT PLN Batam
- PT PLN Enjiniring
- PT PLN Tarakan
- PT Majapahit Holding BV
- PT Haleyora Power
- PT Energy Management Indonesia
- PT Mandau Cipta Tenaga Nusantara

PT PLN Nusantara Power Group Structure

PLN Nusantara Renewables

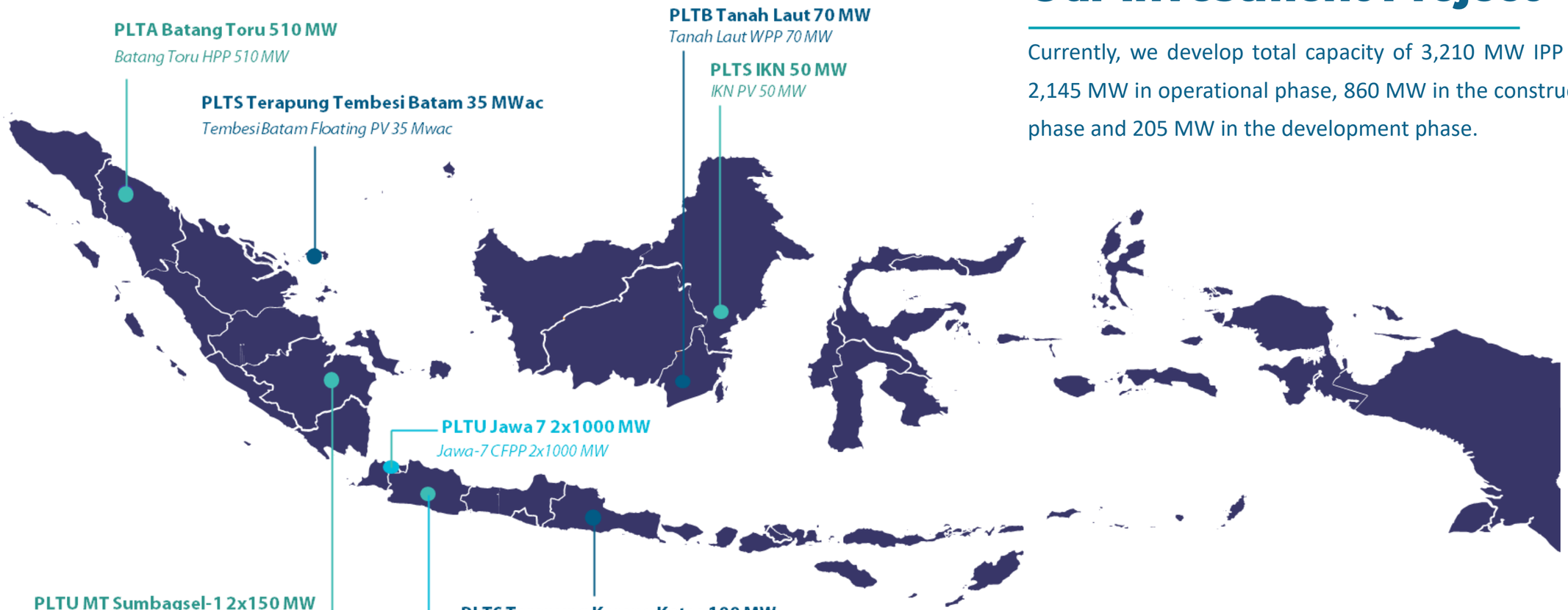
- 5 Subsidiaries
- 11 Associated Companies
- 4 Second to Third-Tier Subsidiaries
- 5 Upcoming Associated Companies

"With the support of its subsidiaries and affiliates, PLN Nusantara Power offers **end to end** Business Solutions starting from **Investment, EPC Contractors, O&M Services, and Spareparts supplier & Importer**"

PLN
Nusantara Renewables

Our Investment Project

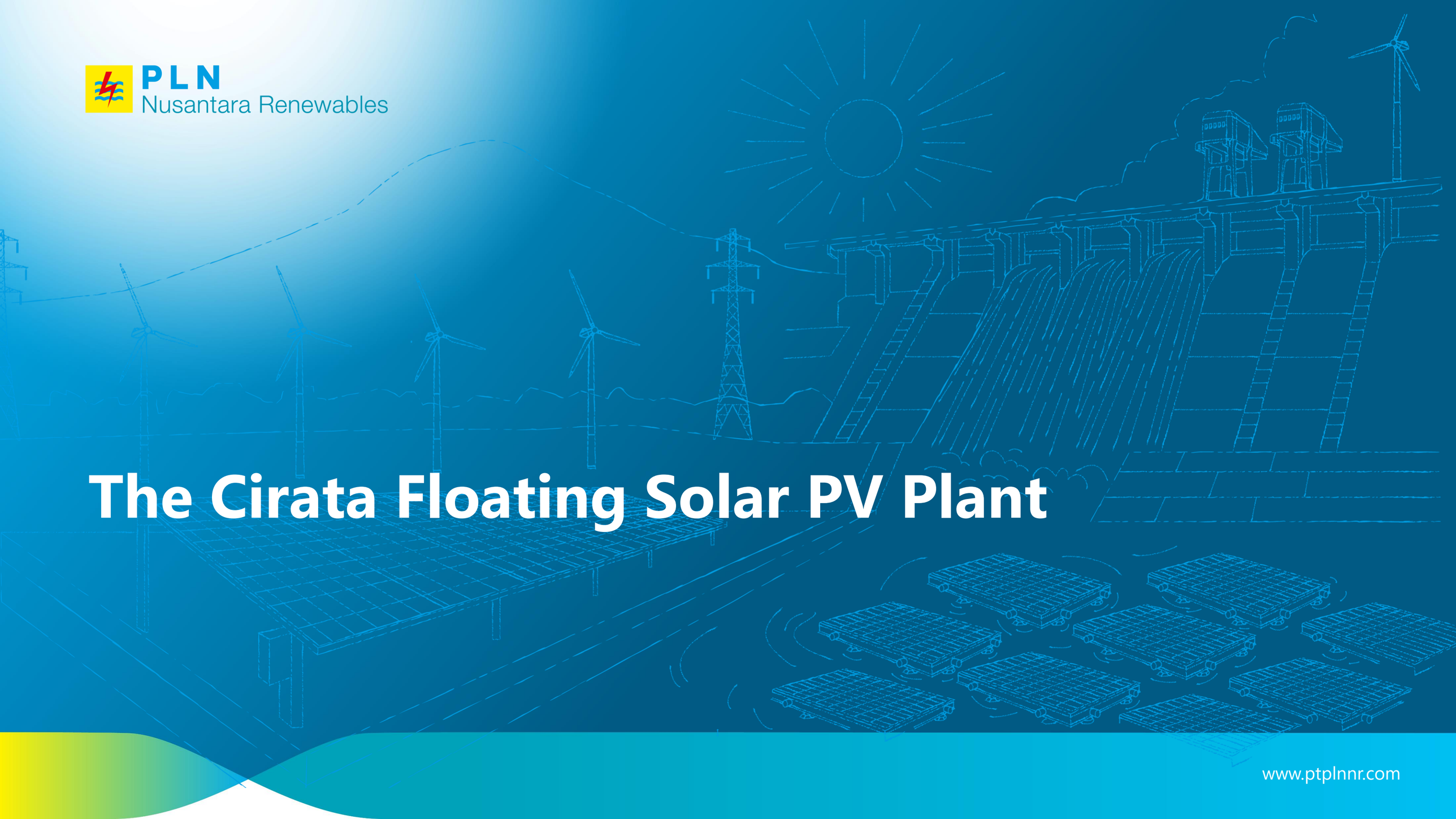
Currently, we develop total capacity of 3,210 MW IPP with 2,145 MW in operational phase, 860 MW in the construction phase and 205 MW in the development phase.



Development Phase	205 MW
Construction Phase	860 MW
Operation Phase	2,145 MW
Total	3,210 MW

PLN
Nusantara Renewables

The Cirata Floating Solar PV Plant



www.ptplnnr.com

Why Cirata Floating PV (FPV) Project?

PLN Nusantara Renewables

01 easier space acquisition

02 Conserve useful land for other use

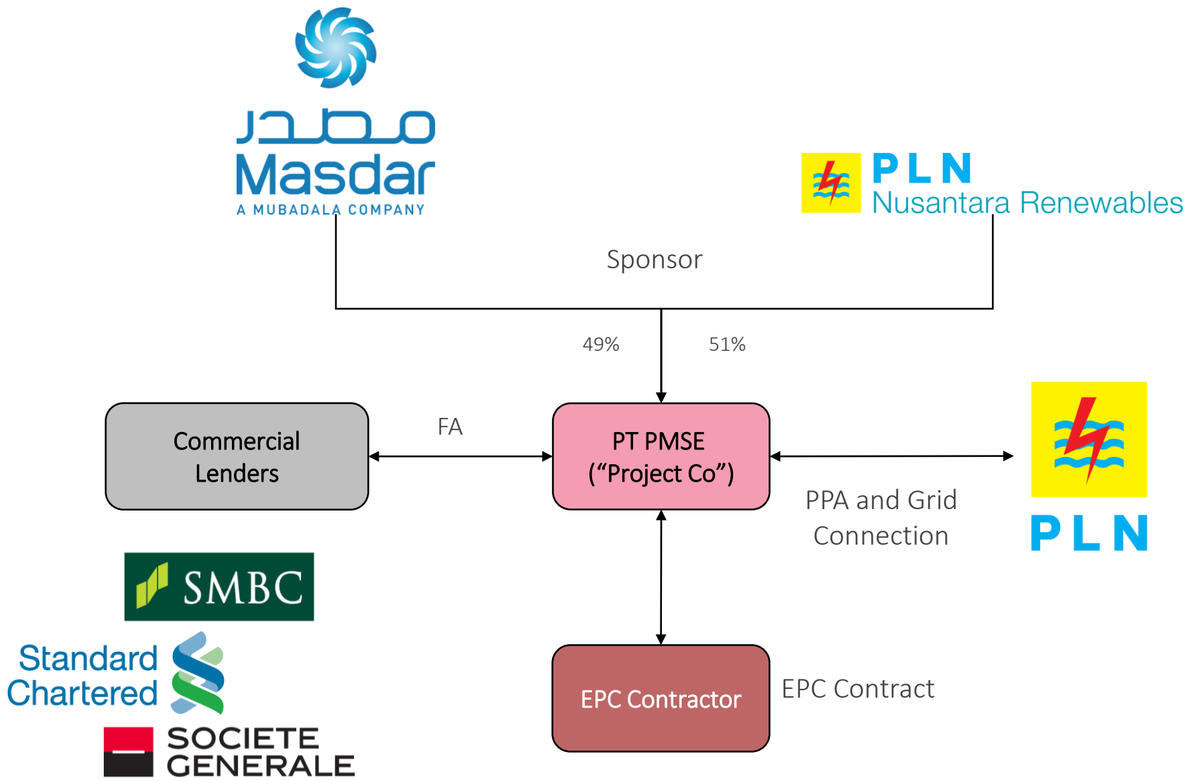
03 Conserve water by reducing evaporation

04 Good combination with hydroelectric

05 Higher energy production per installed capacity

06 Numerous potential in Indonesia

Cirata FPV Project Structure



1. PT PMSE is a consortium / joint venture company between PT PLN Nusantara Renewables **(PT PLN NR)** and Abu Dhabi Future Energy Company – Masdar **(Masdar).**
2. Cirata Floating PLTS 145 MW (Project) funded by equity from sponsors and a consortium of international commercial banks through PT PMSE
3. The International Bank Consortium are:
   a. Standard Chartered Bank
   b. Sumitomo Mitsui Banking Corporation
   c. Societe Generale

Cirata FPV Project Profile

PLN Nusantara Renewables

Project Location
West Java Province, Indonesia

Capacity
145MWac / 192 MWp

PPA Scheme
PLN as off taker with 25 years duration

Construction
Started in Q2 2021 and finished in Q3 2023

Strategic Goal
For kick starting large scale solar project in Indonesia to achieve 2060 net zero emission goverment target

Up to 1400 jobs
Created during the construction and operations

Project Cost
USD143 Million overall project cost

Area Coverage
250 Ha or 5% of Cirata Reservoir area



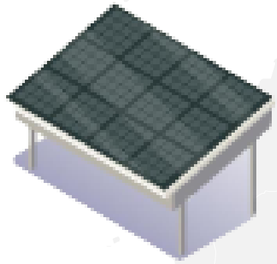
FPV Cirata 145 MW at a Glance (1/2)

PLN Nusantara Renewables

Contribution to NZE (Net Zero Emissions)

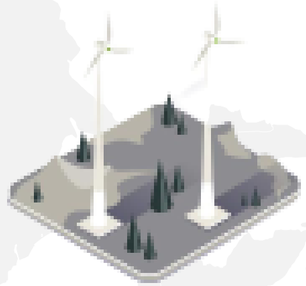
- 245 GWh/ Year Green Energy Production
- Reduction of 214,000 tons CO_2 every year

The first Utilities scale floating power plant in Southeast Asia, with low tariff



- The first Utilities scale and largest floating power plant in Southeast Asia.
- Capacity 145 MW Ac, or equivalent 192 MWp
- Occupies a reservoir Area of 200 hectares
- Competitive rate USD 5.8 cents/ kWh

Engaging Local Communities



- Approximately 1,400 workers from the local community around the project.
- Involving micro, small and Medium Enterprises (MSMEs) from locations around the project

High Technology achievement of Floating PV

- Challenging reservoir depth 80 – 100 meters, with a slope of 5-20 degree
- Variation of reservoir water elevation level up to 15 m
- Special design for Achoring and Mooring cause by The muddy bottom of the reservoir

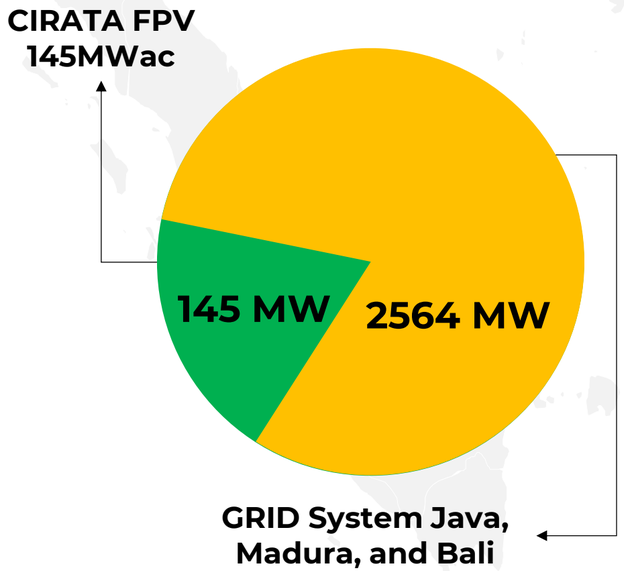
Partnership with world-class partners and supported by reputable lenders

- Partner is MASDAR (UAE company) which is a worldwide Renewable Company
- Backed by 3 Reputable Lenders
- Increasing FDI (Foreign Direct Investment) in Indonesia (Project Cost of USD 143 million.

FPV Cirata 145 MW at a Glance (2/2)

PLN Nusantara Renewables

Java Madura Bali Renewables Energy Capacity Target by 2030



In a 10-year period, other EBT development plans in Indonesia PLTS Cirata contribute 5.6% of 145 MW of the planned 2,564 MW from other EBT generators in 2030.

Floating Solar PV Cirata Contribution to West Java

Cirata is able to supply electricity needs for more than 50,000 households in West Java.

Floating Solar PV Cirata Carbon Reduction Contribution

The carbon that will be produced by PLTS Cirata opens up opportunities for demand for carbon credits

Cirata FPV Project Timeline

PLN Nusantara Renewables

Start Construction
17 May 2021

First operational year begins

PRE-2020 | 2021 | 2022 | 2023

Project Development

Construction Period

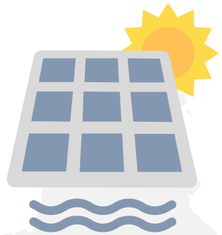
Renewable Energy Challenge

PLN Nusantara Renewables

01

New Technology (Pioneer)

Technical aspect of Dam, TKDN Compliance for PV Modul and Floater



03

Environment

Environment and Social Impact Analysis, Resettlement action plan etc.

02

Financing

World Bank Negative Pledge, Permen ESDM 48/2017.

04

Permitting and Land Acquisition for Transmission

Business Process adjustment due to Omnibus Law. IPPKH, IMB.

IPSDA (Permen PUPR 1 / 2016), dll

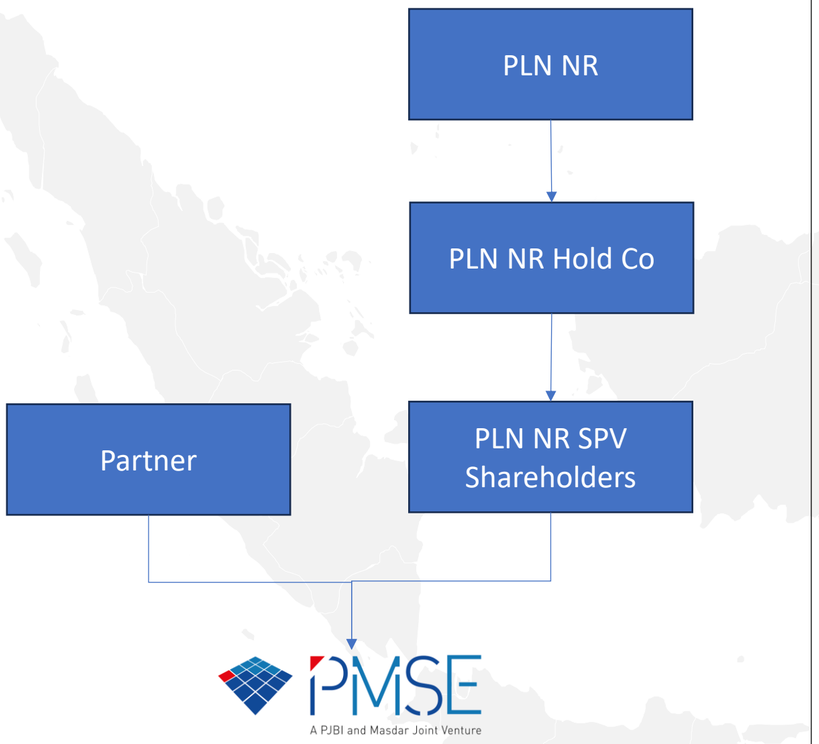
05

Regulation

Regulation Compliance

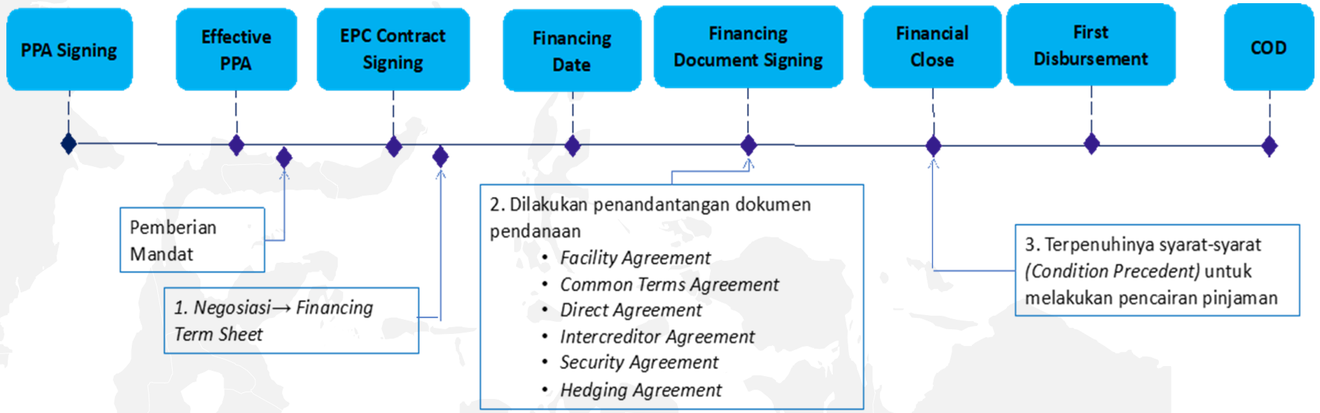
Challenges in FPV Cirata (1/2)

Financing Security and Lender Requirement



Conditional Pledge Share, Share Transfer Undertaking and Layering Company

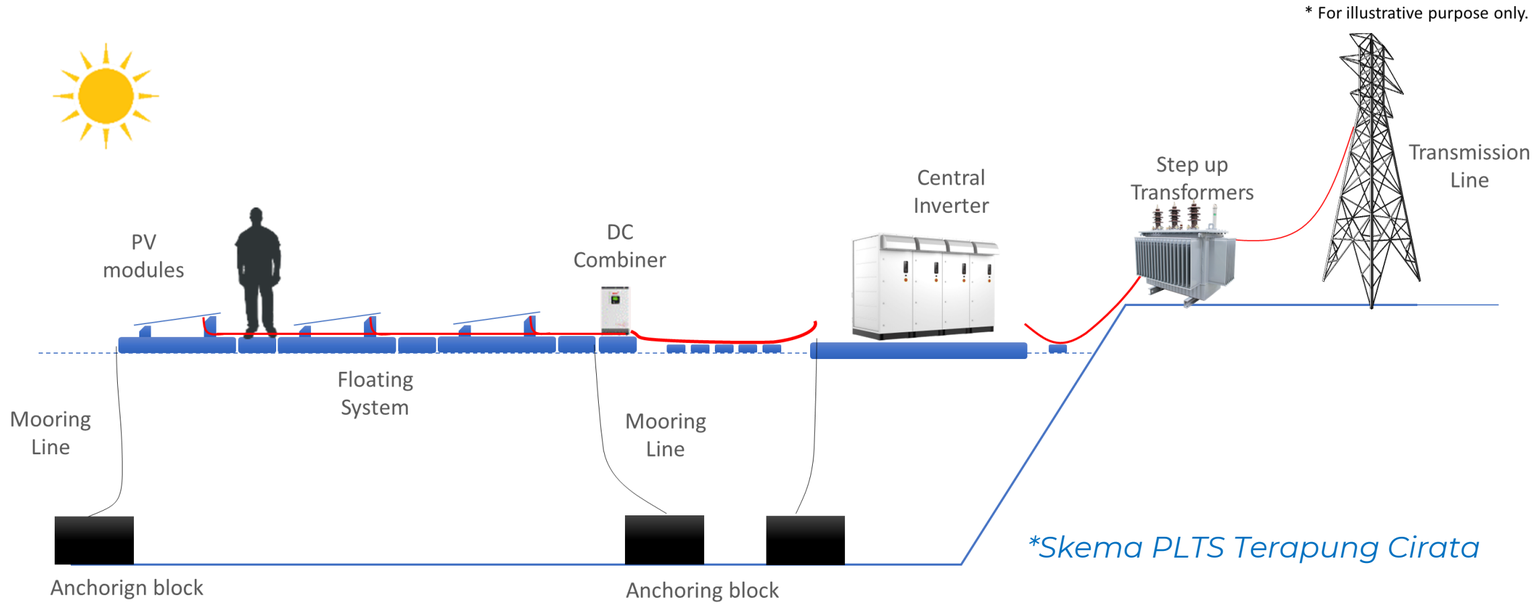
- WBNP
- MEMR 48



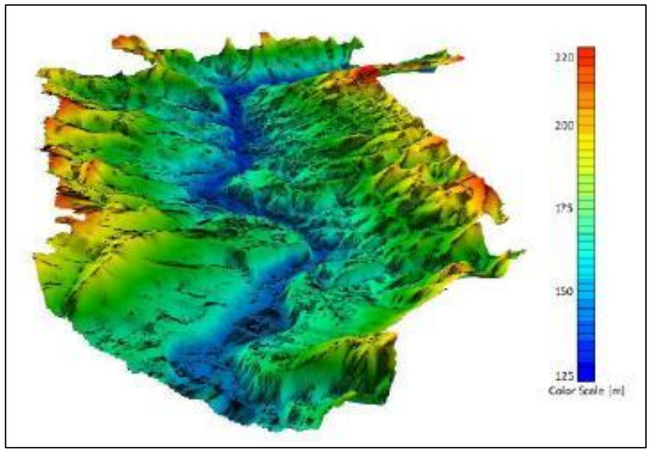
1. Environmental and Social Impact Analysis
2. Land Acquisition and Resettlement Action Plan
3. Fulfillment the requirement such as Permit IPSDA, IPPKH and others

Challenges in FPV Cirata (2/2)

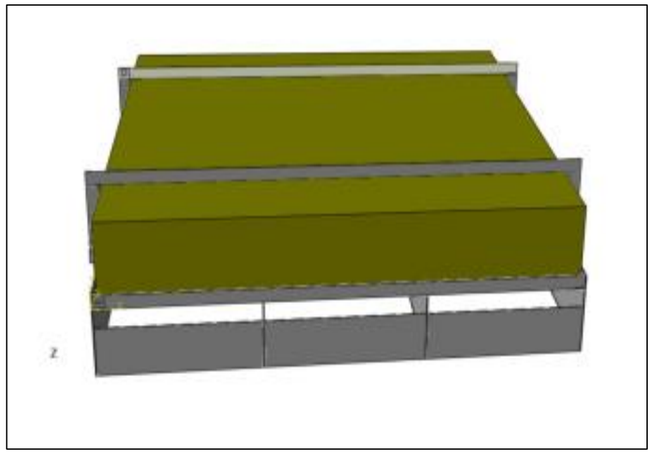
PLN Nusantara Renewables



Skema PLTS Terapung Cirata



Bathymetri Data



Concrete Block + Shear Key

➢ Cirata Reservoir

1. 80 – 100 m water depth
2. 5 to 20 degrees slope
3. 15 m water level variation

➢ Technology

1. Special galvanized chain and polyester rope for Mooring lines
2. Usage of shear-key concrete blocks
3. Bi-Facial Double Glass Technology of Solar PV Module

Key Point for Renewable Energy Development

PLN Nusantara Renewables

Bankability PPA

Power Purchase Agreement accepted by the Lender

Support from Lender and Institution (Grant)

Support from the Lender with competitive rate and grant provided to the Project.

Government Support

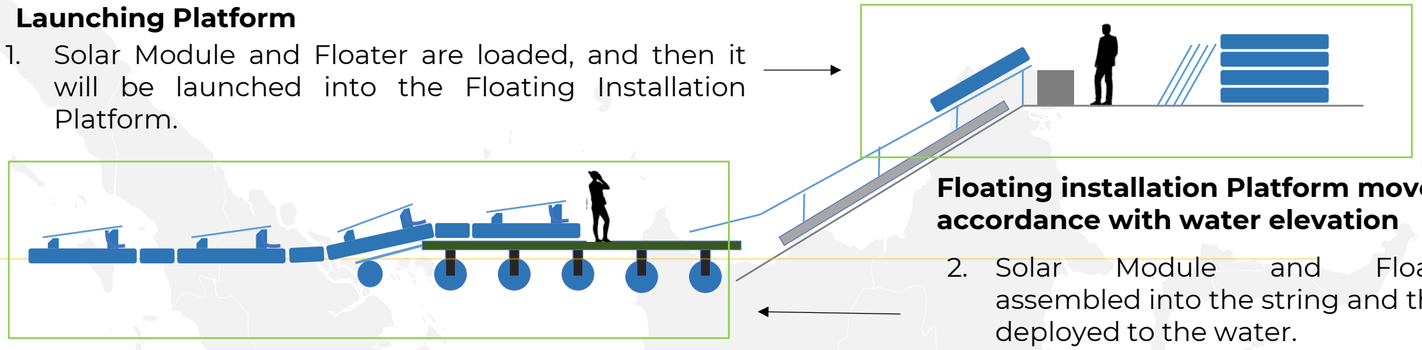
1. Regulation from government
2. TKDN requirement

How We Accelerate The Construction

Adding More Launching Platforms

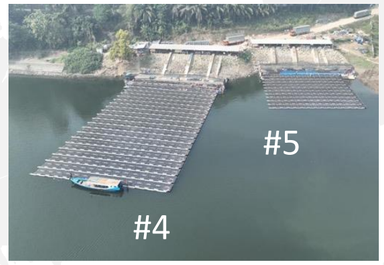
Launching Platform

1. Solar Module and Floater are loaded, and then it will be launched into the Floating Installation Platform.



Floating installation Platform move in accordance with water elevation

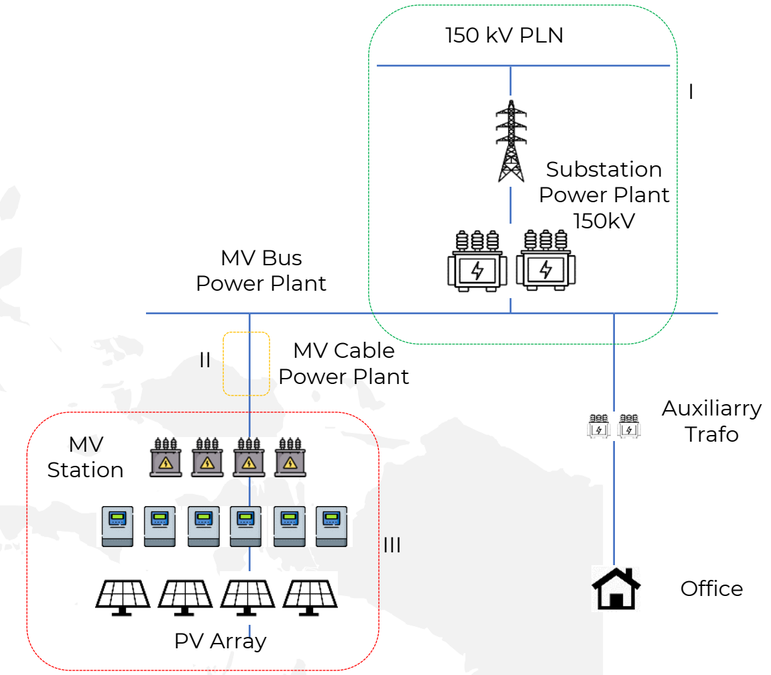
2. Solar Module and Floater assembled into the string and then deployed to the water.



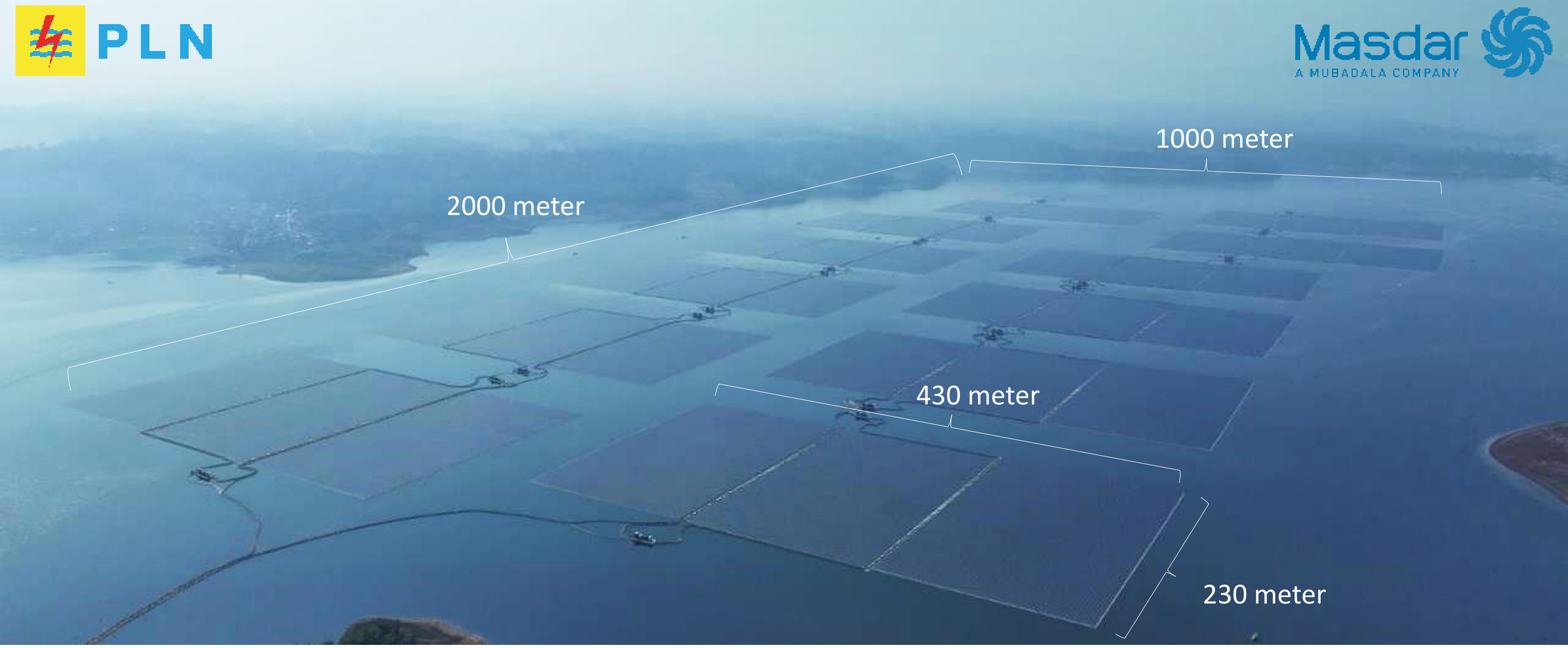
In order to increase the speed of assembly of the Solar PV Module and **two additional launching platforms (LP #8 & #9),** . Currently, Cirata has nine active launching platform resulting in the speed of installation of Solar PV Module and Floater reaching **±3,5 MWp per day**.

The enhancements are also implemented by **adding working time on the night shift**. Four of 9 launching platforms are implemented and as a result, the total speed reach **±3,82 MWp per day.**

Partial SLO



There are three categories in **SLO** (Transmission, Distribution and Power Plant) with a total of **74 items**. To accelerate the speed of the construction process, parallelly **testing and commissioning per island** are conducted without waiting for all of the offshore installation finish.



- Located in the Cirata Reservoir, West Java, indonesia
- Total coverage +- 250 Hectares
- Cirata Floating PV consist of 13 islands
- 1 island measuring 10 hectares
- The capacity of 1 island is 15.7 MWp
- Electricity production 250 - 300 GWh / year

- Total modules > 343.000
- Installed capacity 192 MWp / 145 MWac, largest in ASEAN
- Consist of 25 offshore MV station
- Held by 2200 anchoring & mooring system to lake bed
- Depth up to 100 meters
- CO2 avoidance up to 50.000 ton / year

PLN
Nusantara Renewables

Thank you

www.ptplnnr.com