



**PLN**  
Nusantara Power

# Cirata Green Ecosystem (CGE)

The Integration of a clean source energy



Hydro Power Plant  
Cirata Solar Power Plant  
Energy Forestry  
Biomass Machine Instalation

# CGE (the integration of a clean source energy)

## Cirata Solar Power Plant

Production Capacity of 1040 kWP

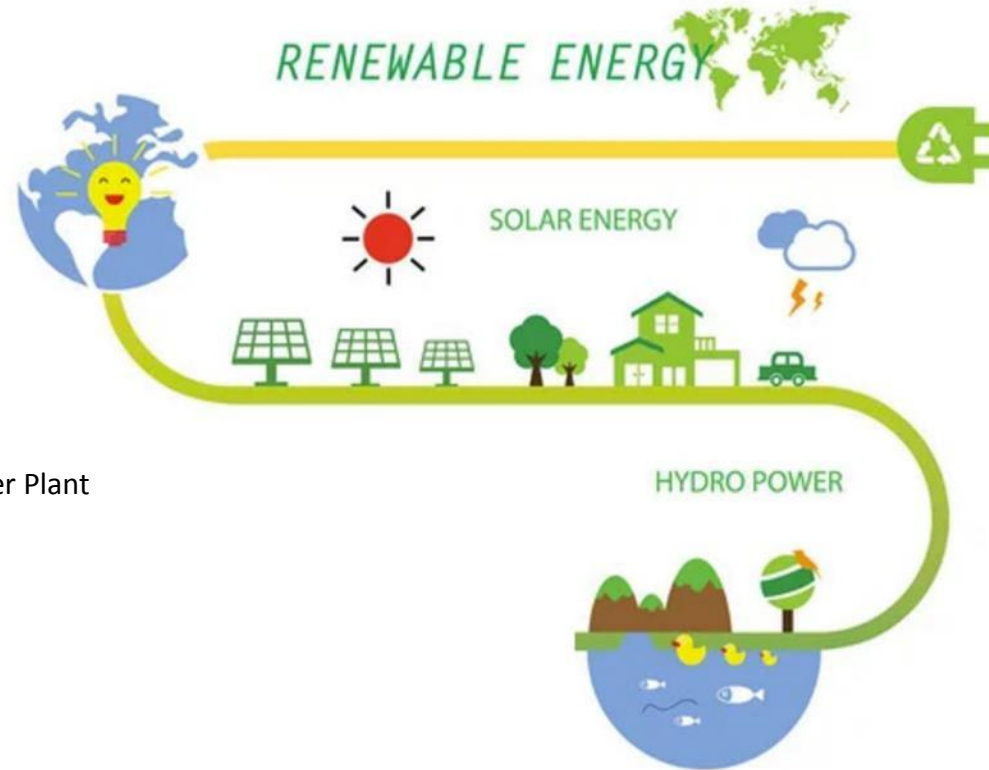
Daily production capacity of 3500-4000 kWh/day

Battery storage and bidirectional inverter facility

### **Provides energy to biomass machines**

Solar energy research facility

- ★ Ground mounted, rooftop and dual axis tracker Photovoltaics
- ★ String, central and bidirectional Inverter
- ★ Preliminary research for floating PV Solar Power Plant 192MWp in Cirata



## Cirata Hydro Power Plant

The pioneer of the largest power plant in 1988

Production capacity of 1428 GWH/year

Generates electricity for 8 units of each 126 Mw or 1008 MW

Black start facility

## Energy Forestry

Trees have been planted

- ★ 25Ha/112.500 in 2021
- ★ 100,5 Ha/339750 in 2022
- ★ 125Ha/422574.6269 in 2023

713,72 Ha Potential energy forest area

Carbon absorption has reached until 2023.

- ★  $125\text{ha} \times 153.87 \text{ ton/ha} = 19,233.75 \text{ tonCO}_2$

## Biomass Machine Instalation

**Cirata Solar Power Plant Provides energy to biomass machines**

10.5 tons per day products into co-firing raw materials

26 tons of end product in the form of sawdust have been supplied to PLTU Indramayu



# We are CGE

- ★ Cirata Green Ecosystem
- ★ Integration of a clean energy
- ★ CGE is a highly competent and certified operation & maintenance resource for maintaining its hydro and solar power plants
- ★ CGE always grows and has a wide chance of energy storage development based on clean energy
  - CGE plans to conduct a research-scale hydrogen plant that will be integrated with an existing solar power plant and expanded to produce 1-2 MW of energy.
  - Energy forestry plantation to be continued at 189,000 tons per year until covering 713 Ha of ground.

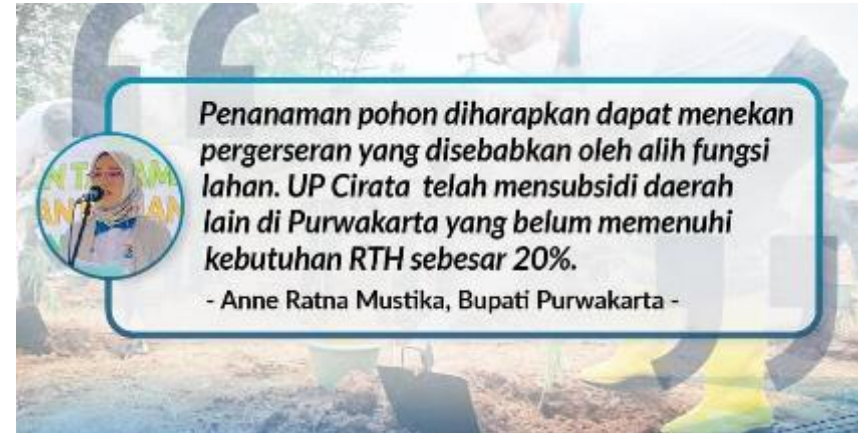


Click Here to Watch CGE Cirata Green Ecosystem  
<https://youtube.com/@CirataGreenEcosystem>



# CGE (Clean Source Energy)

## Energy Forestry and Biomass Machine Instalation



★ RTH Ruang Terbuka Hijau / Green open space (GOS)

★ Source : <https://www.plnnusantarapower.co.id/optimalkan-lahan-untuk-pohon-energi-pjb-dukung-kelestarian-lingkungan-dan-target-ebt/>



# CGE (provide energy for bright future)

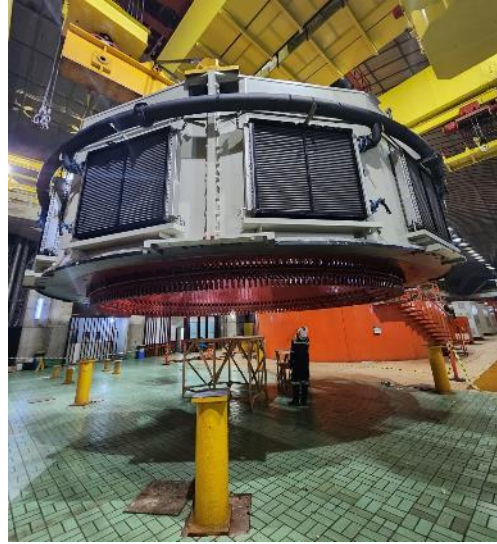
## Advantages Integration Power Plant

The green ecosystem's technological breakthroughs offer 5 major advantages, which are:

1. Financial Benefit
2. Partnership
3. Research and Technology Development
4. Renewable Energy Support
5. Community Development and Empowerment



# 1. Financial Benefit



Hydro Power Plant

## Hydro Power Plant and Cirata Solar Power Plant

Production in 2022

1.649.362,50 MWh Hydro power plant

892,15 MWh Solar Power Plant



Cirata Academy Campus

## Production Solar Power Plant 892.150,13 kWh

892.150,13 kWh x Rp 2.466,- kwh import price  
(equal to IDR 2,2 billion)

847.542,62 kWh will be used for station service utility  
1260 KWH/day for biomass machine installations



Solar Power Plant



Biomass Machine Installations



## 2. Partnership

The development of clean energy human capital continues to be developed in collaboration with national and multinational companies, among others



# 3. Research and Technology Development

## CIRATA SOLAR POWER PLANT

Solar energy  
research facility

- ★ Dual axis  
tracker  
Photovoltaics



### Solar PV

- Thin Film CIS (Copper Indium Selenide) 170wp eff:13.47%.
- quantity 25 pcs



### Solar Inverter

- Transformerless, on grid inverter, 5kVA, single phase



### Control Tracker & Sensor

- The solar pv tracking controller uses a microcontroller development board (arduino) with sun position data as data base
- the sensor uses slew drive motor encoder, IMU Sensor, Proximity sensor, and wind velocity sensor



### Motor DC Slew Drive

- Azimuth Power is 24.5 watt
- Atitude Power is 44 watt





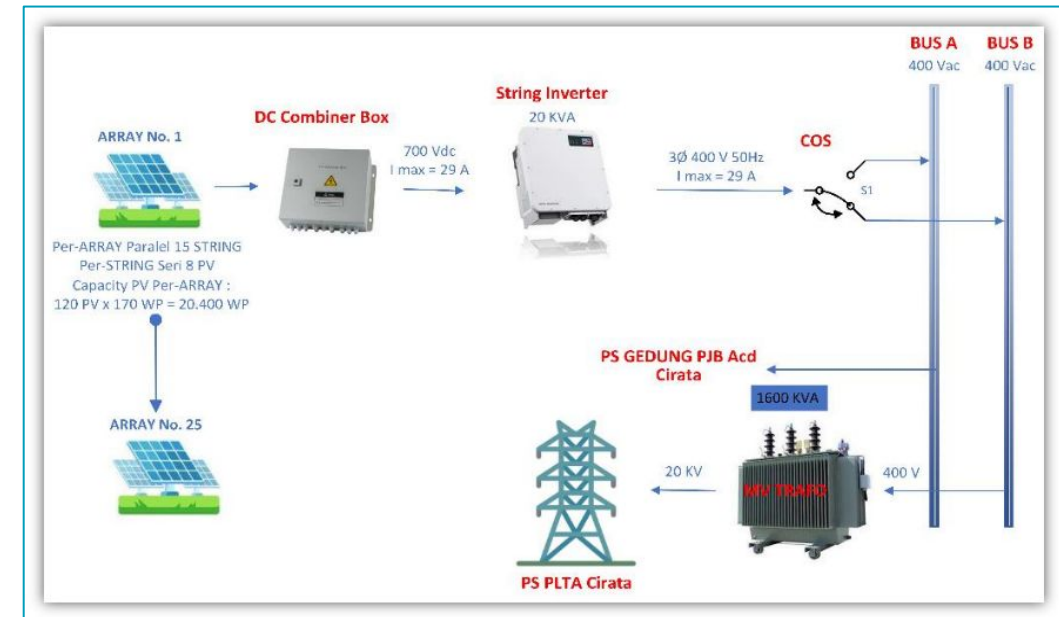
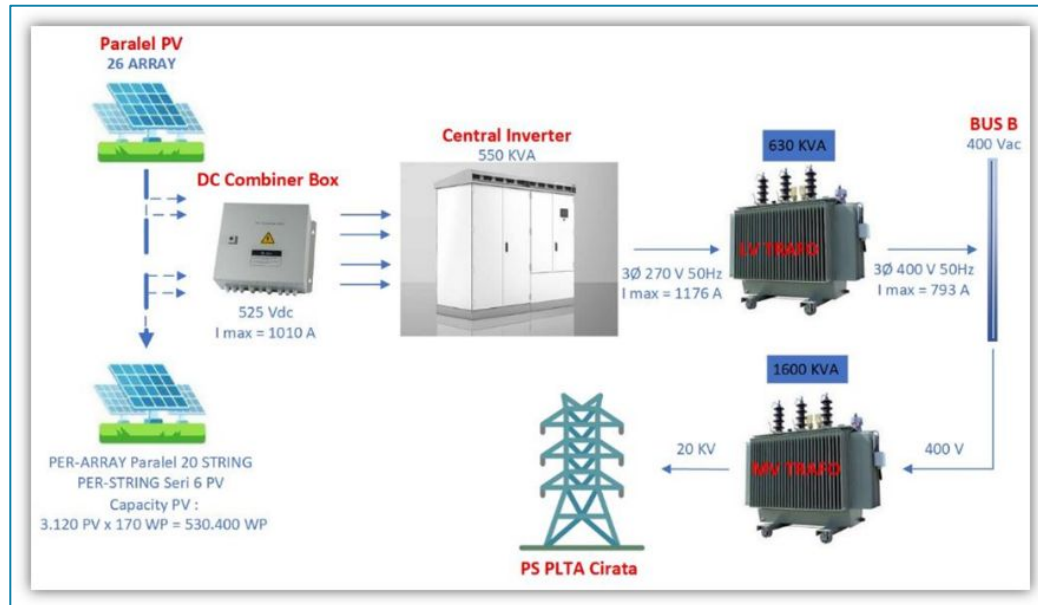
# 3. Research and Technology Development

## CENTRAL INVERTER

Solar energy research

We installed 3 type Inverter

- ★ String Inverter,
- ★ Central Inverter
- ★ Bidirectional Inverter and Battery Storage



# 3. Research and Technology Development

## Bidirectional Converter And Battery Storage

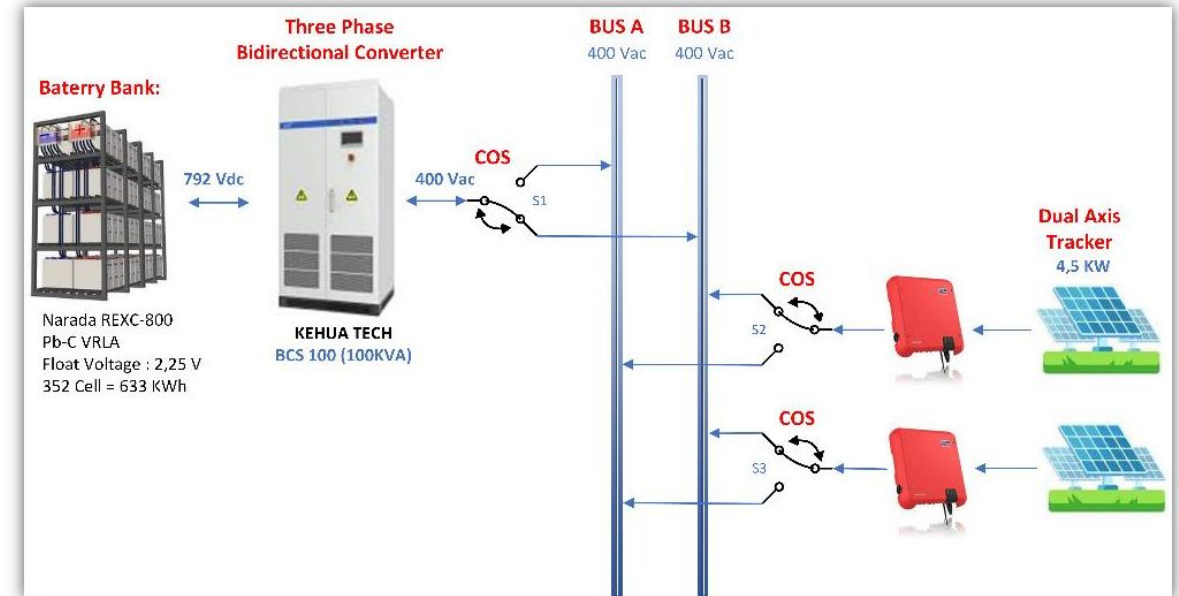
### Bidirectional Converter, Battery Storage



### Single Line Diagram

Battery Charge (Input power Bidirectional inverter from bus and input power bus from inverter string or central in the same connection)

Battery Discharge (Output Bidirectional inverter to bus)





## 4. Renewable Energy Support

Cirata Solar Power Plant provides energy to biomass machines that convert energy forest products into co-firing raw materials at a rate of 10.5 tons per day. After undergoing production processes, 26 tons of end product in the form of sawdust have been supplied to PLTU Indramayu. As a result of sustainability aspects, there is a potential for CO<sub>2</sub> absorption from calliandra and gamal energy plantation forest cover. Carbon absorption has reached 19,233.75 tons of CO<sub>2</sub> until 2023

Cirata Solar Power Plant provides energy to biomass machines



Raw Material → Biomass machines → Sawdust



Not to mention, a total of 50 local people are involved in managing energy plantation forests through land clearing, plantation, fertilization, harvesting, and saw dust processing

# 5. Community Development and Empowerment

During 2021 - 2023 a total of 236 people benefited from the training (first-ring vocational and college students)



The Cirata 1 MW Solar Power Plant is positioned as a knowledge Operation and Maintenance Center for the beneficiaries which are local residents. A total of 100 highly experienced resources are expected to be born from the beneficiaries by attending Sertifikat Kompetensi Pembangkit (Generator Competence Certificate, Level 1) by 2024





# CGE (Achievement)



At the 2021-2022 Subroto Award  
K2 Keselamatan Ketenagalistrikan  
*Electricity Safety*  
Hydro Power Plant Cirata

“PLTA Grid Code Jawa, Madura dan Bali  
Skala Besar” From Ministry of Energy and  
Mineral Resources Republic of Indonesian



At the 2022-2023  
corporate social responsibility  
From Ministry of Village, Development of  
Disadvantaged Regions And Transmigration

Source :

- ★ <https://www.plnnusantarapower.co.id/pln-nusantara-power-raih-21-penghargaan-subroto-award/>
- ★ <https://www.plnnusantarapower.co.id/pln-nusantara-power-raih-2-penghargaan-csr-pdb-award-2023-upaya-pelestarian-lin-gkungan-dan-pemberdayaan/>