PERTAMINA
GEOTHERMAL ENERGY

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The Journey Toward
A Global Green Energy Enterprise

JUNE 2021

www.pge.pertamina.com

Pertamina's Power, New and Renewable Energy Sub-Holding

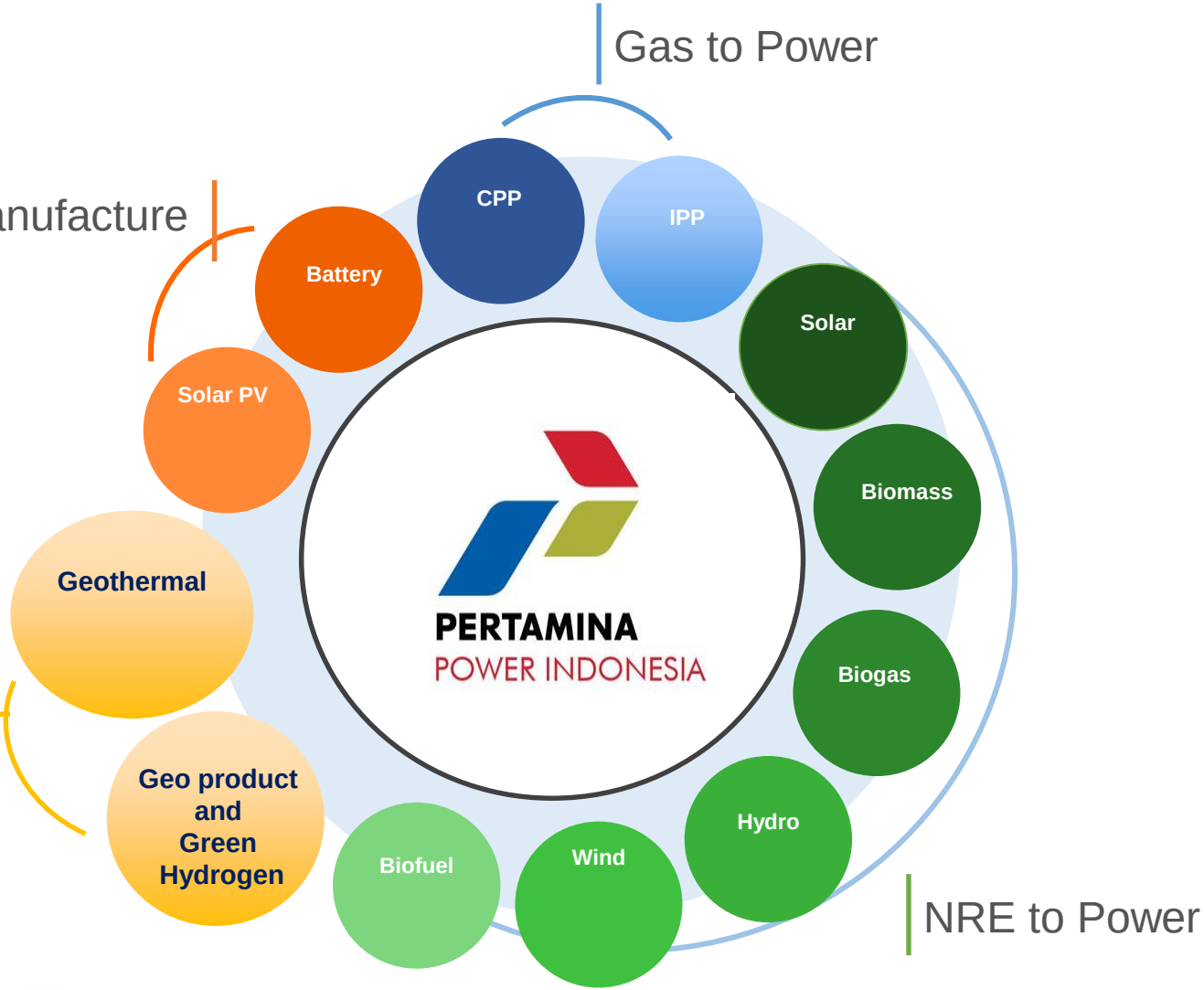
PERTAMINA GEOTHERMAL ENERGY

To Collaboratively Lead Indonesia's Energy Transition Through Innovative Clean Energy

PERTAMINA
GEOTHERMAL ENERGY

To support PPI in :

- carrying out Pertamina's mission in developing gas-based, new and renewable energy businesses
- being the pioneer in the Future Energy business



PERTAMINA
GEOTHERMAL ENERGY

TODAY | The Leading Geothermal Enterprise In Indonesia

- Geothermal Power
- Program Based Conservation

672 MW
Own Operation

1.205 MW
Joint Operation

9,7 M tCO2/year
approx. potential emission reduction

Environment

Social

Governance

Green Investment and Development Strategy

2030 | The Global Integrated Green Energy Enterprise

- Geothermal Power
- Carbon Abatement Business
- Sustainable Integrated Conservation
- Global Operation
- Strategic Partnership
- Green Hydrogen
- Beyond Energy
- Green Consulting Services

1.300 MW
Own Operation

1.205+ MW
Joint Operation

Approx.
13 M tCO2/year
potential emission reduction

The Way Forward

PERTAMINA GEOTHERMAL ENERGY

2021 Leading Geothermal Enterprise in Indonesia

672 MW

1.205 MW

9,7 M tCO2/y emission reduction

* Including JOC Production

Invest to Grow

+165 MW

+200 MW

Immediate Growth

- Efficient Exploration
- Multi-Tracks Development
- Fit-for-Purpose Engineering
- Strategic Partnership
- World Class Capability Development
- Digital Enabler

2030 World Class Integrated Green Energy Enterprise

1.3 GW

- Top 3 geothermal producer in the world
- Organic and Inorganic growth of geothermal business
- Commercial production of Green Hydrogen, minerals and other gas extraction
- Global presence
- Contributing to at least 13 MT CO_2e/y emission reduction from own operation

Environmental Impact

- Direct contribution to carbon abatement
- Generation of green electricity from geothermal resources
- Production of future energy, such as green hydrogen
- Integrated biodiversity, conservation and sustainability management

Social Impact

- Economic multiplier through local content commitment
- Sustainable community economic empowerment
- Promoting diversity and equal opportunity employment
- Health, Safety and Wellbeing of our employees, families and business partners

Governance Impact

- Implementing ethics and compliance standards
- Geothermal Integrated Management System, inclusive of Quality and Innovation
- Strategic Partnership for impact creation
- Sustainability accountability and reporting

Beyond Energy | Optimalisation of Geothermal Energy

Geothermal Direct-use, Mineral Extraction and Product Diversification

PERTAMINA GEOTHERMAL ENERGY

1 Brines to Power

- 200 MW in various area
- Incremental development
- Capex efficient

2 Green Hydrogen

- Green hydrogen production through water electrolysis (H_2O)
- Plan to be marketed to refineries/ chemical plants or as raw material for making green methanol

3 H_2S Removal & CO_2 Liquefaction

- Reducing H_2S & CO_2 emission
- Dry Ice production

4 CO_2 - Methanol

- Reducing CO_2 emission
- As a fuel mixture (Pertamina's A20 program) or for export markets

5 Agrobusiness

- Commercialization of agro resources (cloves, coffee, flowers, mushrooms, vegetables, livestock and essential oil production)
- Optimization of low temp energy (steam/brine) and CO_2, as well as economic empowerment of the surrounding community

6 Geothermal Tourism

- Utilization of high tourism potential in the Lahendong field
- Development of tourist objects with the concept of geothermal parks (hot springs, manifestation tours, and geothermal education)

7 Silica Extraction

- Production of high quality silica from an extraction plant with a capacity of 7,000 tons/year in Hululais field

Geothermal Development Challenges

Obstacles in Utilizing Geothermal Energy in Indonesia

Challenges in INDONESIA

Commonly Faced By The Developer

Resource Location

Most of geothermal potential in Indonesia is in forest areas, some of them even spread in National Park.

Electricity Demand

Geothermal power plant development is constrained by the local electricity demand (limited).

Upfront Investment

Geothermal development requires massive investment with the highest risk in exploration phase.

Exploration Phase Funding

Currently, Lenders are still reluctant to fund geothermal exploration phase project.

Specific Challenges

Geothermal Viability

Current tariff policy does not reflect the benefits (externality) and rate of return of the geothermal business.

Permit & Social Issues

There are resistance, both from the local community and the local government, in some of the Projects

THANK YOU