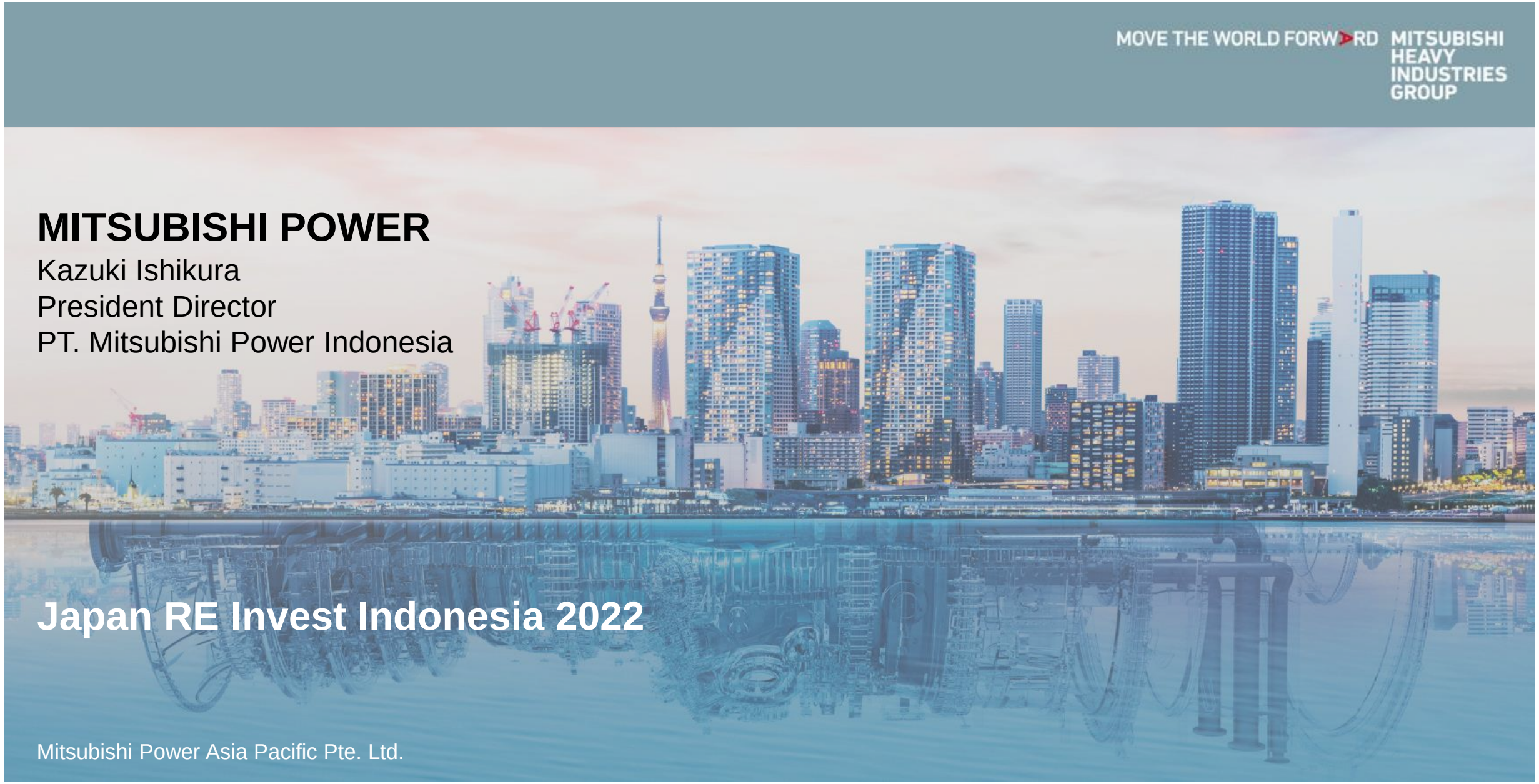


MITSUBISHI POWER

Kazuki Ishikura
President Director
PT. Mitsubishi Power Indonesia

Japan RE Invest Indonesia 2022

Mitsubishi Power Asia Pacific Pte. Ltd.

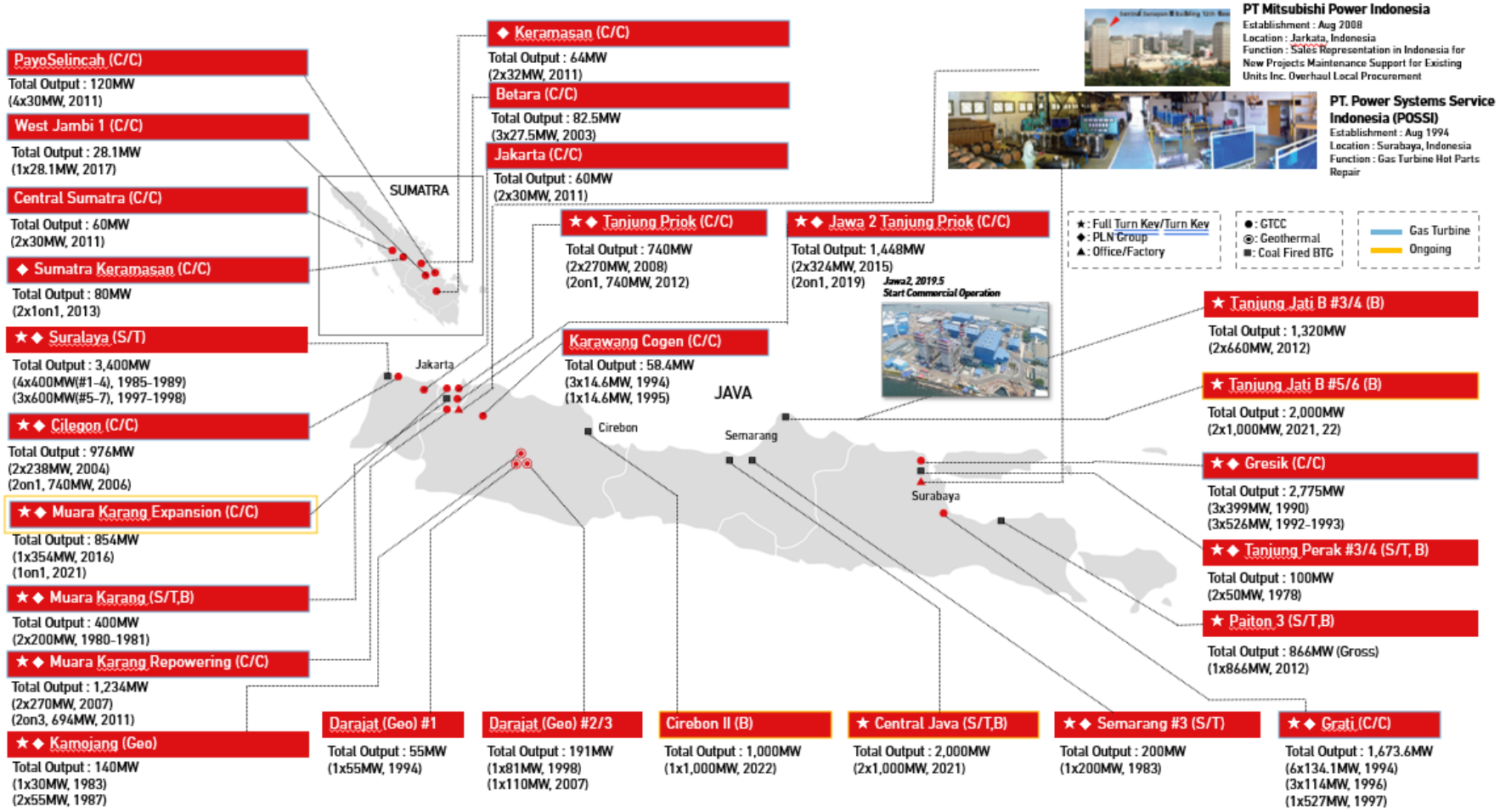
MITSUBISHI POWER

ABOUT MITSUBISHI POWER ASIA PACIFIC

We are creating a **future that works for people and the planet**, by developing innovative power generation technology and solutions to enable the decarbonization of energy and deliver reliable power everywhere.

OUR FOOTPRINT IN INDONESIA

In the power generation industry, we have a total supply capacity of **18GW by 2022 – approximately 30% of total installed capacity**. We have been supporting Indonesia's development for the past **50 years**.



ROADMAP FOR DECARBONIZATION

Mitsubishi Power has established the following three recommend approaches to achieving **decarbonized and reliable power** in the region.

Improve flexibility of existing coal and gas plants

Existing plants can **increase start-up and ramp-up rates** and **lower minimum operational load** to accommodate intermittencies as more renewables enter the grid.

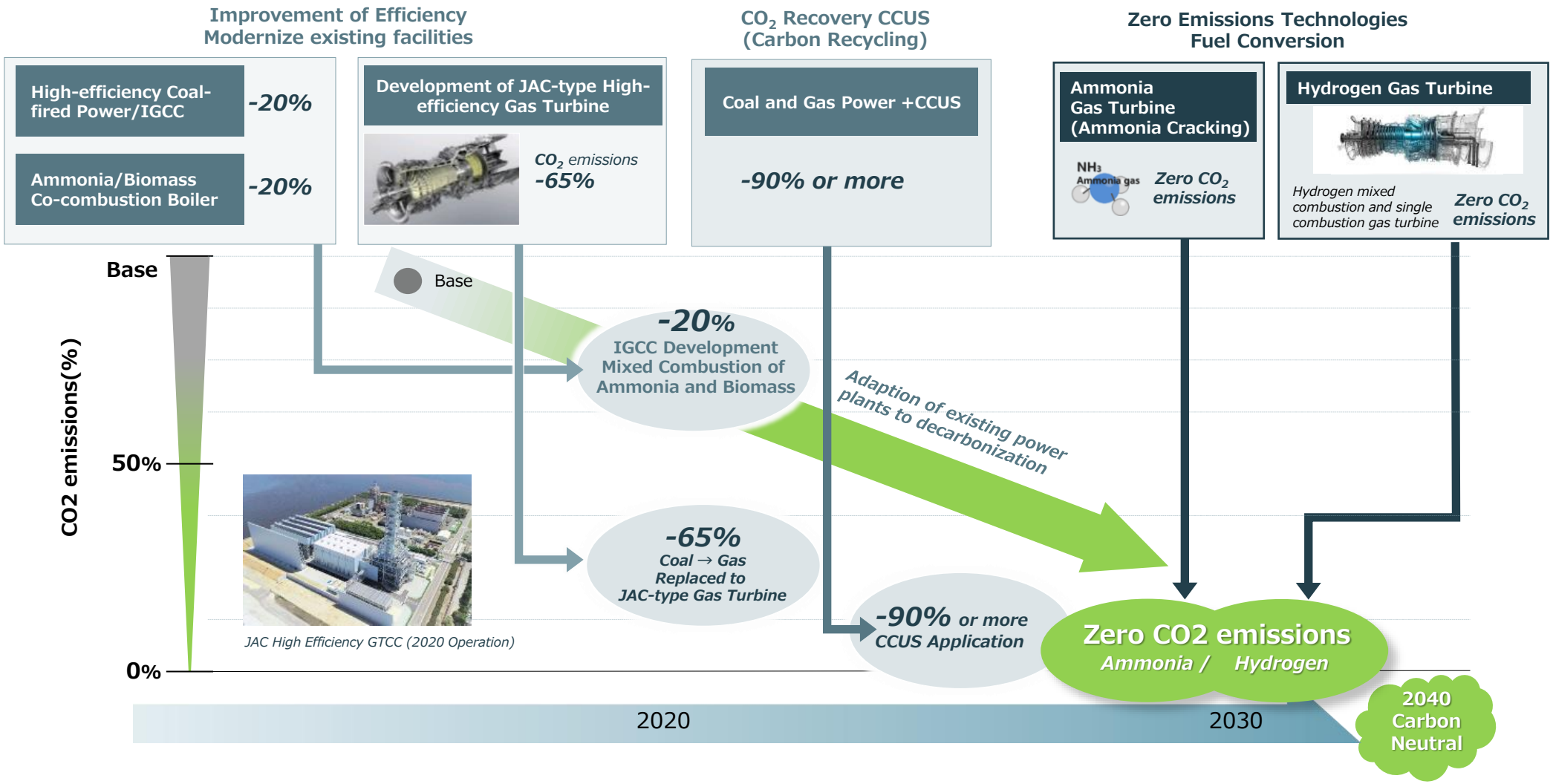
Decarbonize existing power generation systems

Facility upgrades and installing new equipment such as **CCUS and AQCS** solutions can help lower emissions and support decarbonization goals.

Expanding capacity for **low- and zero-carbon energy solutions**

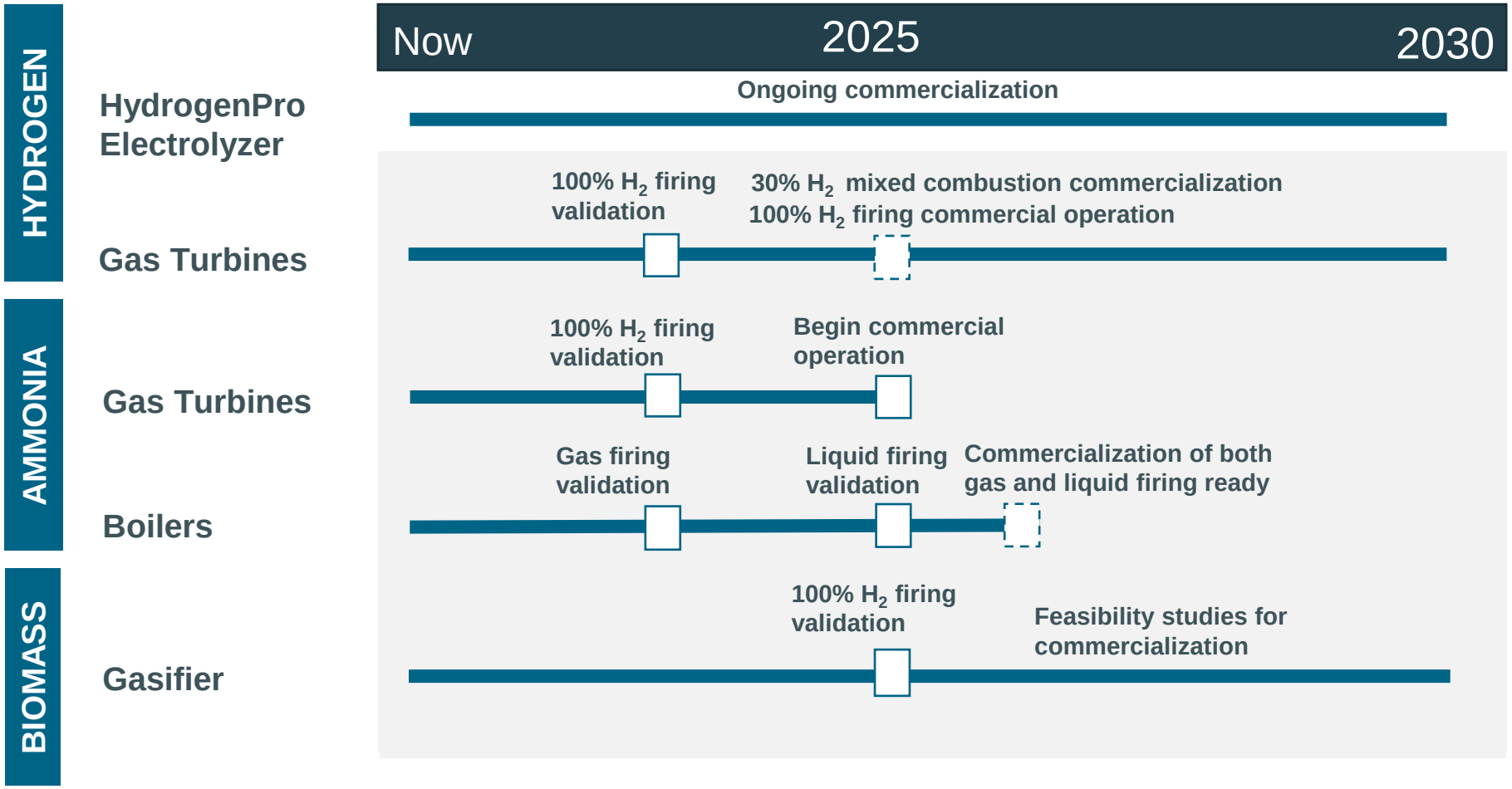
Technologies can support low-carbon and carbon-free power generation using **hydrogen and ammonia**, along with the use of **biomass and geothermal power**.

DECARBONIZATION SOLUTIONS

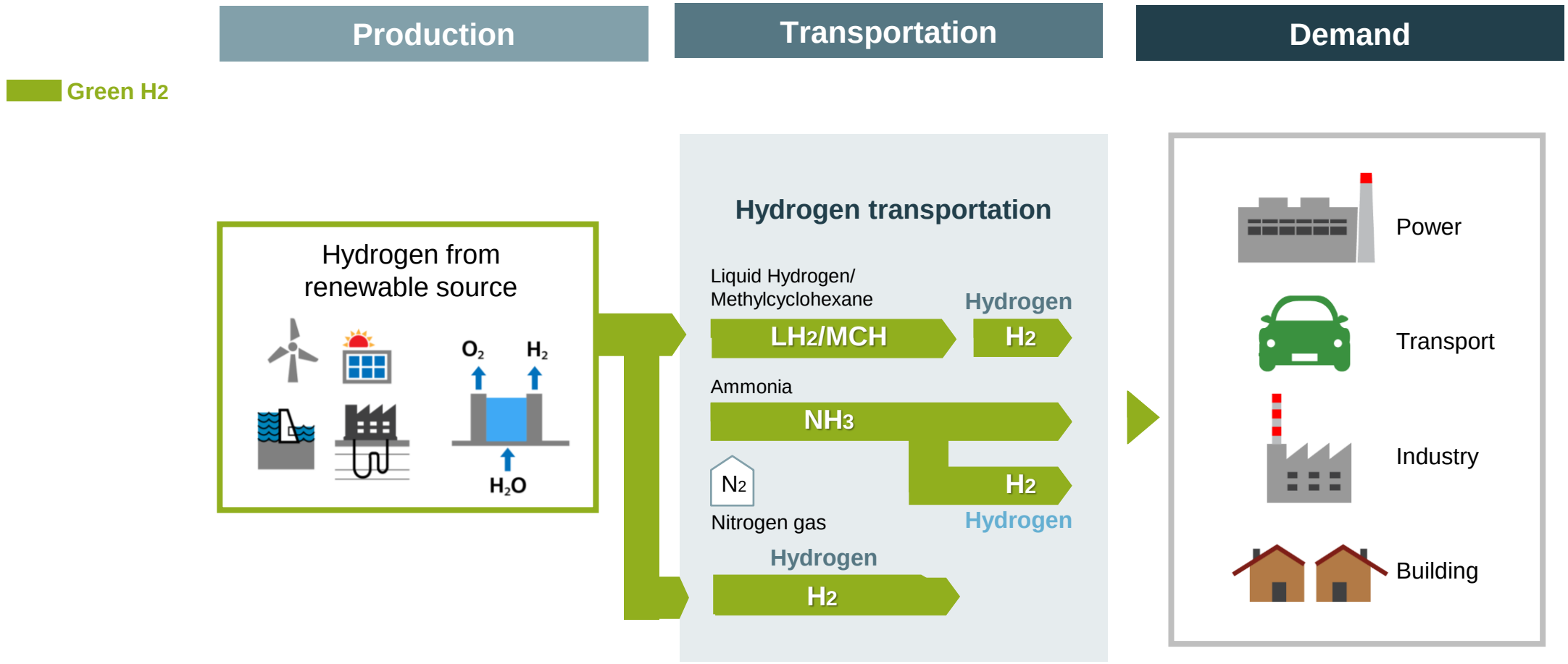


TIMELY DEVELOPMENT OF TECHNOLOGIES

We develop technologies for low carbon and carbon-free power generation, with the goal of **commercialization within the decade**.



GREEN HYDROGEN SUPPLY CHAIN



GREEN HYDROGEN PRODUCTION

HydrogenPro designs and supplies **alkaline electrolyzer technology plants and solutions**.

Hydrogen pro

Renewable Energy

Water

Hydrogen Pro

Large-scale Hydrogen Production Plant

1
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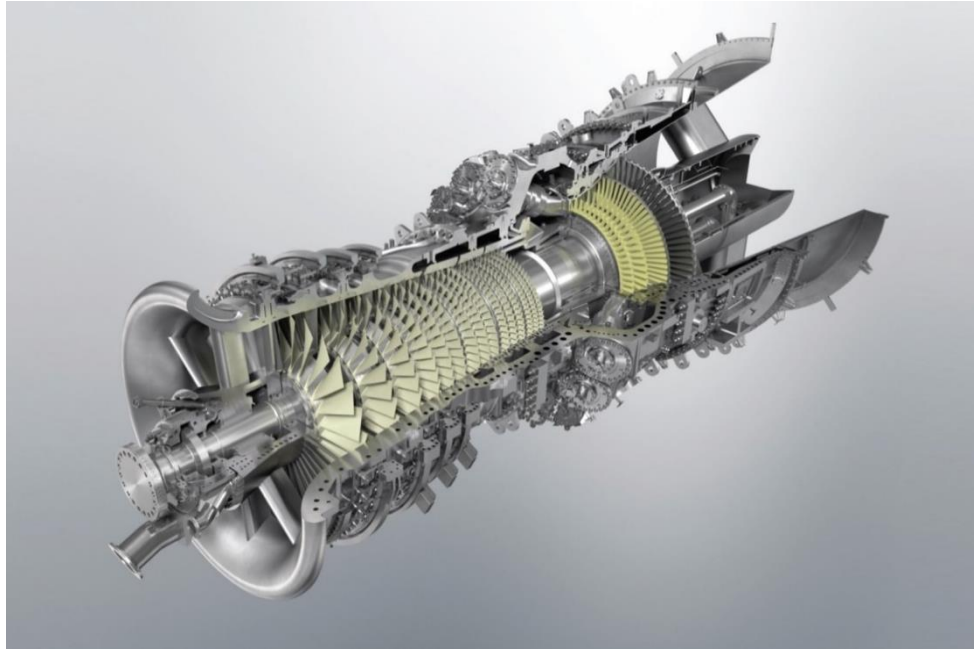
Hydrogen1.008

GREEN HYDROGEN FIRING

To support **hydrogen co-firing**, our world class **gas turbines** are being developed to run on **100% hydrogen, by or around 2025.**



- Our **advanced-class gas turbines** can already run with up to 30% hydrogen, a carbon-free fuel
- In combined cycle, our JAC gas turbines have achieved **>64% efficiency** and can **lower carbon emissions at 65%** compared to conventional coal-fired power plants
- Our global fleet of J-Series gas turbines has accumulated more than **1.6 million operating hours** and has achieved **99.5% reliability**.

GEOTHERMAL ENERGY IN INDONESIA

Geothermal energy is a **stable, zero emissions power generation solution**. We support **power plants that leverage Indonesia's massive geothermal potential** – the country is estimated to have 29GW of geothermal energy resources, which is the **largest in the world.**

DARAJAT GEOTHERMAL POWER PLANTS

- Two geothermal power plants in West Java
- Two units commenced commercial operations in 1994 and another in 2008

KAMOJANG GEOTHERMAL POWER PLANT

- Three units in PT. Indonesia Power UPJP Kamojang power plant in Bandung
- Total capacity of 140MW

ADOPTION OF BIOMASS

Biomass is **organic matter** that can be used to generate energy. We **collaborate with government stakeholders** in Indonesia and customers around the world to promote this fuel in the global energy mix.

BIOMASS POLICY PROPOSAL TO THE GOVERNMENT

Policy proposal to promote **adoption of biomass co-firing** presented in 2022

- Partnered with **PLN Group** and **ITB**
- Explored biomass in thermal power plants – a viable short-term option in the road to net zero

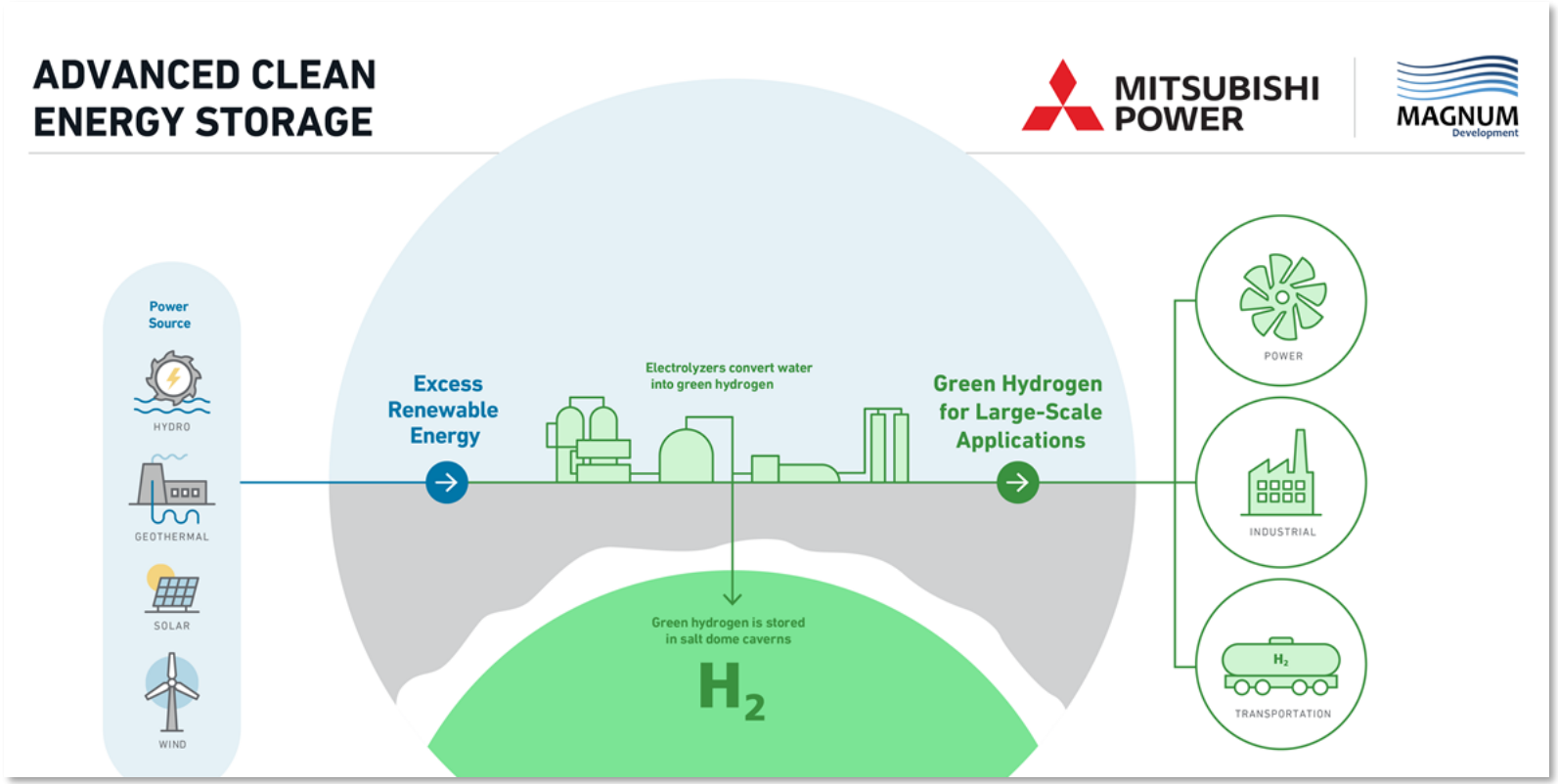
DRAX POWER STATION

Largest decarbonization project in Europe

- Converted to use **100% sustainable biomass** in Mitsubishi Power's coal-fired boiler, reducing emissions >85%
- Biomass experience with **11 units and >3,500MW worldwide**

EXTERNAL FUNDING ON ENERGY TRANSITION PROJECTS

USA: INTERMOUNTAIN POWER PLANT



840MW **Intermountain Power Project** (IPP)

- Retire coal plant to transition to a natural gas and hydrogen blend with **two M501JAC gas turbines**

Advanced **Clean Energy Storage project**

- Received **US$504 million loan approval** from U.S. Department of Energy
- World's largest industrial **green hydrogen production and storage facility** with two salt caverns each capable of storing 150GWh of clean energy

EXTERNAL FUNDING ON ENERGY TRANSITION PROJECTS

INDONESIA: FEASIBILITY STUDIES ON AMMONIA


Source: PLTU Suralaya Power Station

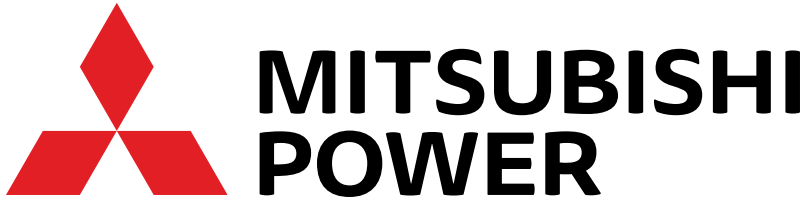
Research to Establish an **Ammonia Value Chain**

- Research funded by **Japan's Ministry of Economy, Trade and Industry (METI)**, part of **Asia Energy Transition Initiative (AETI)**
- Study ammonia as a **feasible energy source**, across production, transport, consumption, and CO2 storage
- For long-term power generation using ammonia at the **PLTU Suralaya Power Station** and an existing **natural gas-fired power plant**
- PLN/IP/PJB, ITB and MHI also making policy recommendations for the use of **biomass** at PLTU Suralaya Power Station, for short/medium-term

COMMITMENT TO THE FUTURE

JAPAN: WORLD'S FIRST FOR VALIDATION OF HYDROGEN-RELATED TECHNOLOGIES

TOWARD ZERO EMISSION PARTNERSHIPS


MITSUBISHI
POWER

MOVE THE WORLD FORWARD

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INDUSTRIES
GROUP