



BANPU
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40

40 Years And Our Way Forward
to Power the Better Living for All.





01 Economics

- Volatile Commodity Price
- Changing Landscape of Energy Value Chain

03 Social

- Banpu Champions for Change

02 Environment

- Climate Change Risks and Opportunities

04 Governance

- Corporate Governance





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Volatile Commodity Prices

ENERGY PRICES EASING TO PRE-INVASION LEVELS

MONTHLY NEWCASTLE COAL INDEX

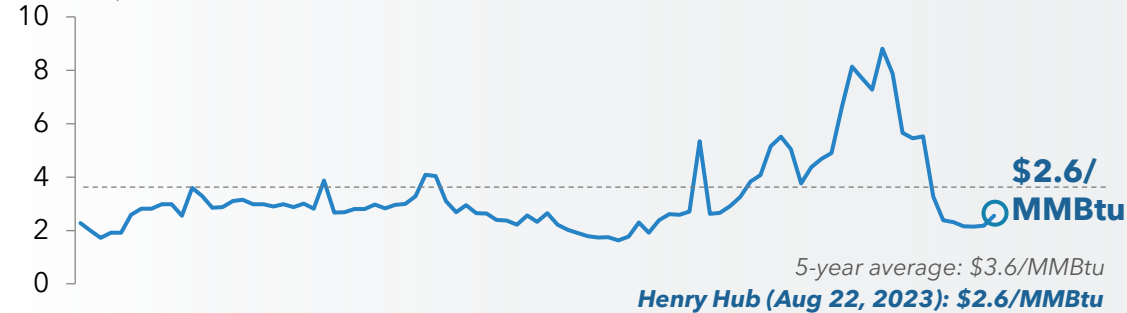
Unit: US\$/t

Monthly prices as of Jul 2023



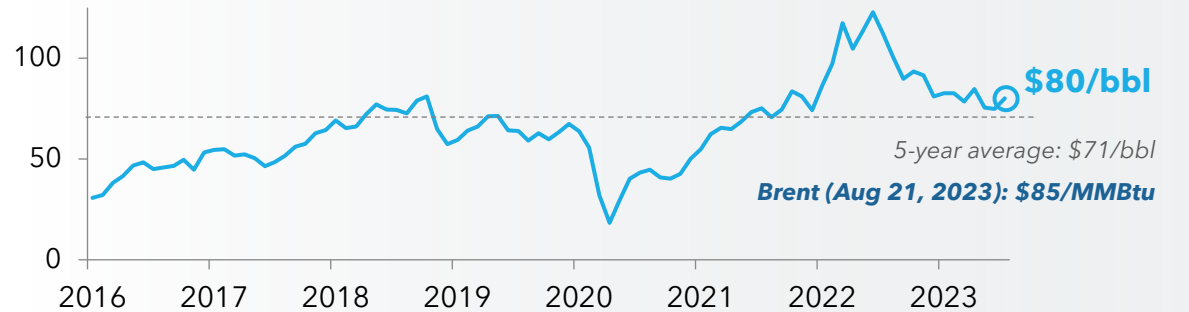
MONTHLY HENRY HUB PRICE

Unit: US\$/MMBtu



MONTHLY BRENT PRICE

Unit: US\$/bbl



Note: *as of 25th August 2023

Source: AWR Lloyd analysis, IEA, Reuters, Federal reserve board, Press

Banpu: initiatives taken to enhance performance amid volatile prices

Short-term initiatives

Long-term strategy



Mining

Operations

Coal blending optimization: to balance coal stock and cover wider coal specifications, potentially increasing the ASP

Cost control effectiveness program: conducted across all business units to ensure expenses are effectively budgeted

Financials

Capital rationalization: 2023 capex reduction at Australia mines by 10%

Operations

Reserve expansion: through organic development at Mandalong, Springvale and GPK, underground operation study at Melak and coal gasification study at Indominco

New business development: expansion of infrastructure business (ports) and development of strategic minerals

Financials

Balanced capital: for required expenditure and investments



Gas

Operations

Continuous optimization: to improve costs and efficiency through automation, monitoring and vendor negotiation

Financials

Cash flow prioritization: maximizing cash flow generation by balancing with moderate production growth (capex reduction)

Hedging positions: c.49% of 2023 gas volume is hedged at US\$3.4/MMBtu while c.18% of 2023 NGL volume is hedged

Operations

Closed-loop operation development: from upstream production to midstream gathering and transportation

CCUS development: through dCarbonVentures' strong project pipeline execution to achieve Net Zero goals by the early 2030s

Financials

Additional hedge requirements: to further protect against downward price movements and reduce revenue volatility



Power

Operations

Sustained strong operations: through investment in advanced tech. and maintenance at international standards

Increased stability: at Temple I plant through implementation of Wet Compression System and real-time monitoring

Financials

Fuel cost optimization: through centralized long-term coal supply contracts at China thermal operations

Operations

US expansion: continued effort to explore power investment opportunities to establish synergy with Temple I and gas production assets in Texas

Decarbonization initiatives: developed at BLCP to assess feasibility of ammonia co-firing and CCS development

Financials

Low gearing ratio: flexible for future growth investment

Banpu: integrated gas strategy in the US

NEW ACQUISITION

TEMPLE II

Combined-Cycle Gas Turbine (CCGT)

ACQUISITION
PRICE

US\$460 M

INSTALLED
CAPACITY

755 MW

DEAL CLOSING
DATE

10 JULY 2023



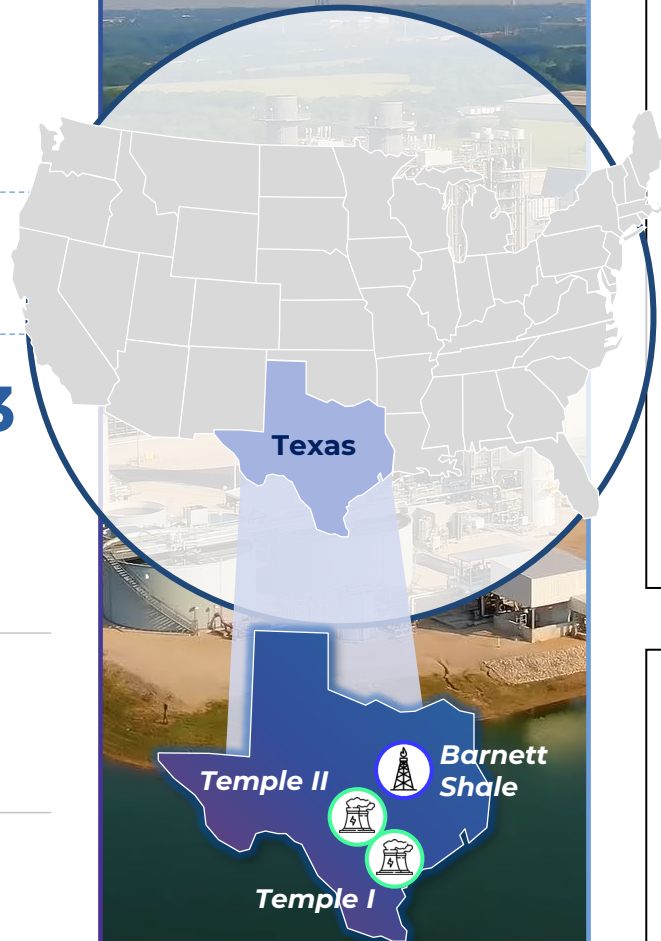
Immediate cashflow contribution with a proven track record of consistent operational performance since COD



Unlocking full potential of both Temple I and Temple II through greater flexibility, reliability and efficiency



Enhancing synergies across Banpu's US assets through integrated value chain of upstream and downstream gas



EXISTING ASSETS

Upstream and midstream

BARNETT SHALE

Shale gas assets with strategic location in proximity to Temple I and Temple II power plants allowing potential direct gas supply from the wells



NET
PRODUCTION

728 MMcfed



MIDSTREAM
PIPELINE

778 miles

Downstream

TEMPLE I

The first US power plant acquisition by Banpu located next to Temple II in the ERCOT North Zone



INSTALLED
CAPACITY

768 MW



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The energy world in 2030

DECARBONIZATION

2x Renewables in 2030
>7.7 TW
 from 3.3 TW of global installed capacity in 2021

11x CCUS in 2030
>510 Mtpa
 from 43 Mt of CO₂ captured globally in 2021

16x Electric Vehicles in 2030
>200 M
 from 12.3 M active vehicles globally in 2021

Hydrogen and ammonia in 2030
>30 GW
 of global installed capacity from development stage in 2021

- Nature-based solutions
- Biofuels

DECENTRALIZATION

16x Energy storage system in 2030
>425 GW
 from 27.1 GW of global installed capacity in 2021

- Solar rooftops
- Liberalized energy markets
- Smart power infrastructure

DIGITALIZATION

5x Internet-of-Things in 2030
>US\$1.6 tn
 from US\$322 bn of global industrial IoT market size in 2021

- Energy trading
- Energy management and energy efficiency

ENERGY WORLD IN 2030

Diversified, greener, smarter energy with the deployment of sustainable and transformative energy technologies



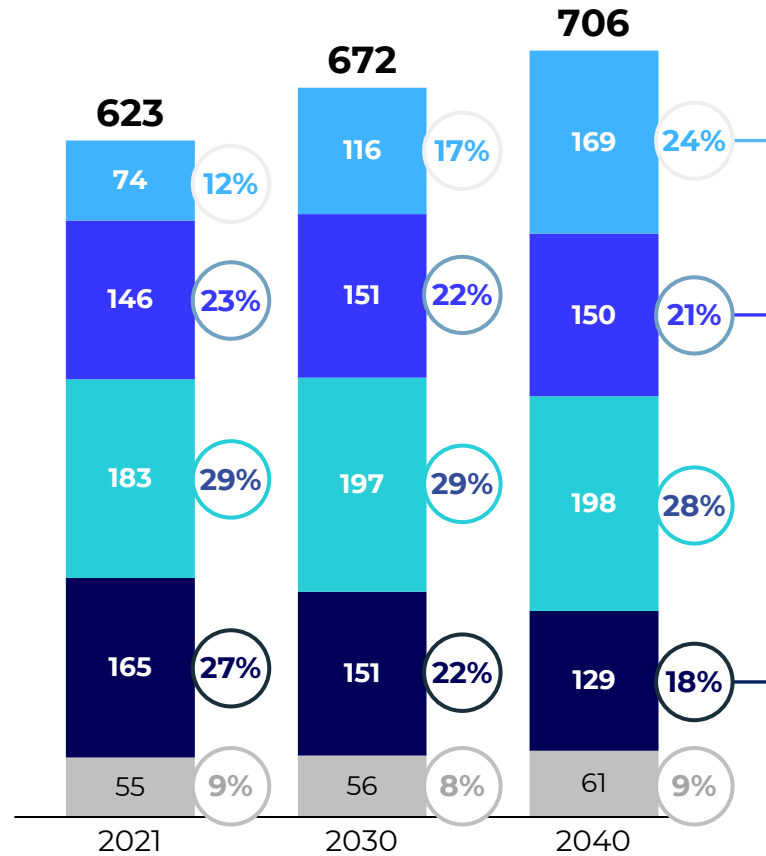
Global energy transition

WORLD PRIMARY ENERGY SUPPLY

Unit: Exajoules

(x%) % share of total supply

Renewables Natural gas Oil Coal Other



Source: IEA WEO 2022 Stated Policies Scenario

ENERGY DEMAND IN BANPU'S FOCUSED GEOGRAPHIES

Unit: TWh

2021

2030

ACCELERATING GROWTH

APAC

3,604

7,334

"The strong business case for renewables, combined with policy support, has sustained an upward trend in their share of the global energy mix."

US

874

2,668



Unit: bcm

2021

2030

CRUCIAL TRANSITION FUEL

APAC

920

1,043

"Natural gas to play a key role due to its flexibility of dispatchable energy, supporting the rapid build-up of renewables... [causing] the increase in natural gas consumption in emerging markets and developing economies."

US

871

864



Unit: Mt

2021

2030

STABILITY AND SECURITY

APAC

4,460

4,444

"Global coal demand plateaus in 2025. However, given the current energy crisis with all its uncertainties, a lurch into growth or contraction is possible."



Banpu 2021-2022



Focus on capitalizing surging energy commodity prices and maintaining strong operations throughout times of disruption from external factors.

Banpu strategy 2023-2025

Financial strategy to meet growth targets.

Financial strategy

Strong cashflow generation from cash cow commodity businesses

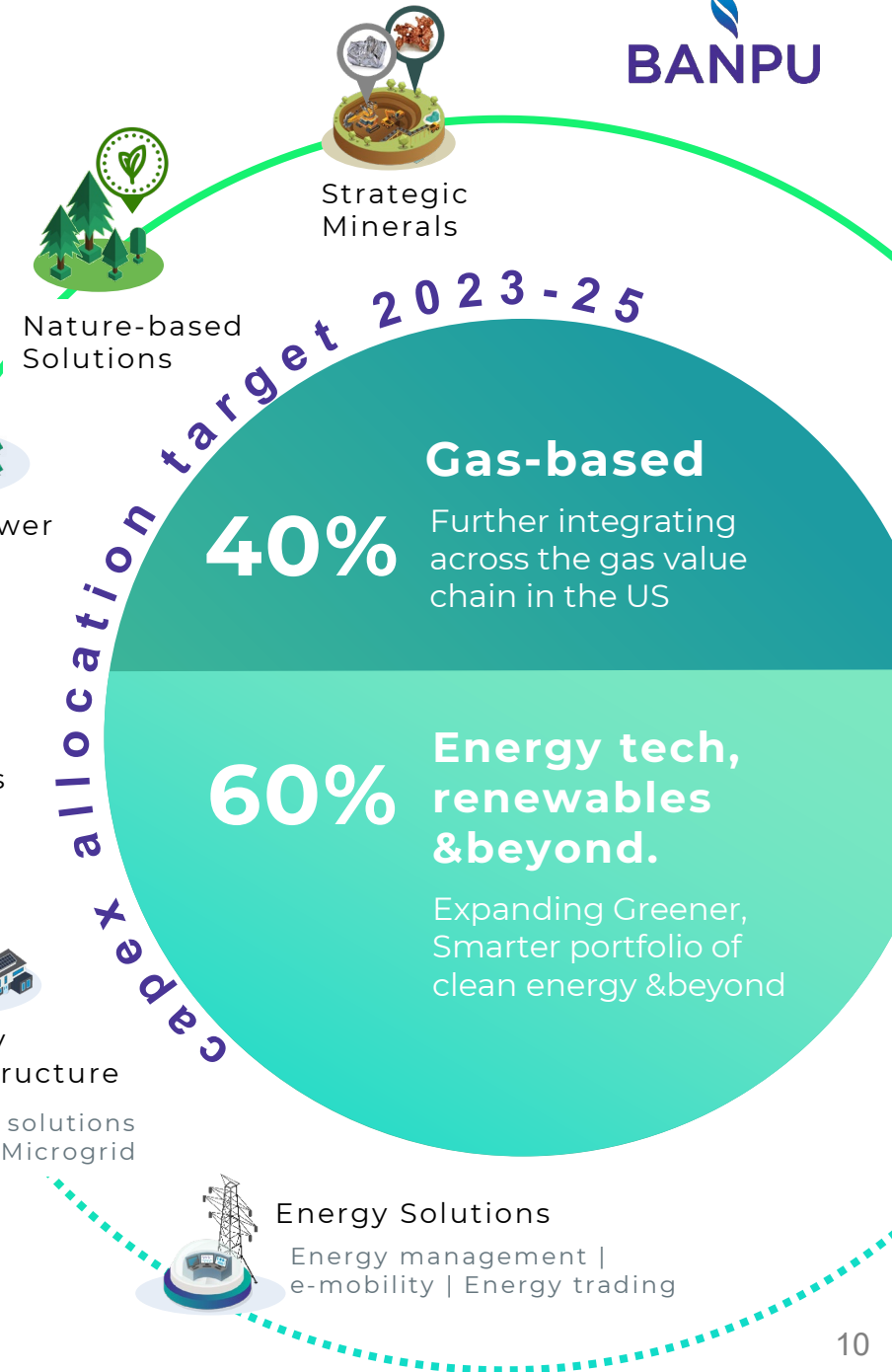
Capitalize on energy commodity prices during volatile market conditions to fuel expansion of sustainable businesses.

Growth capital for Greener, Smarter Strategy

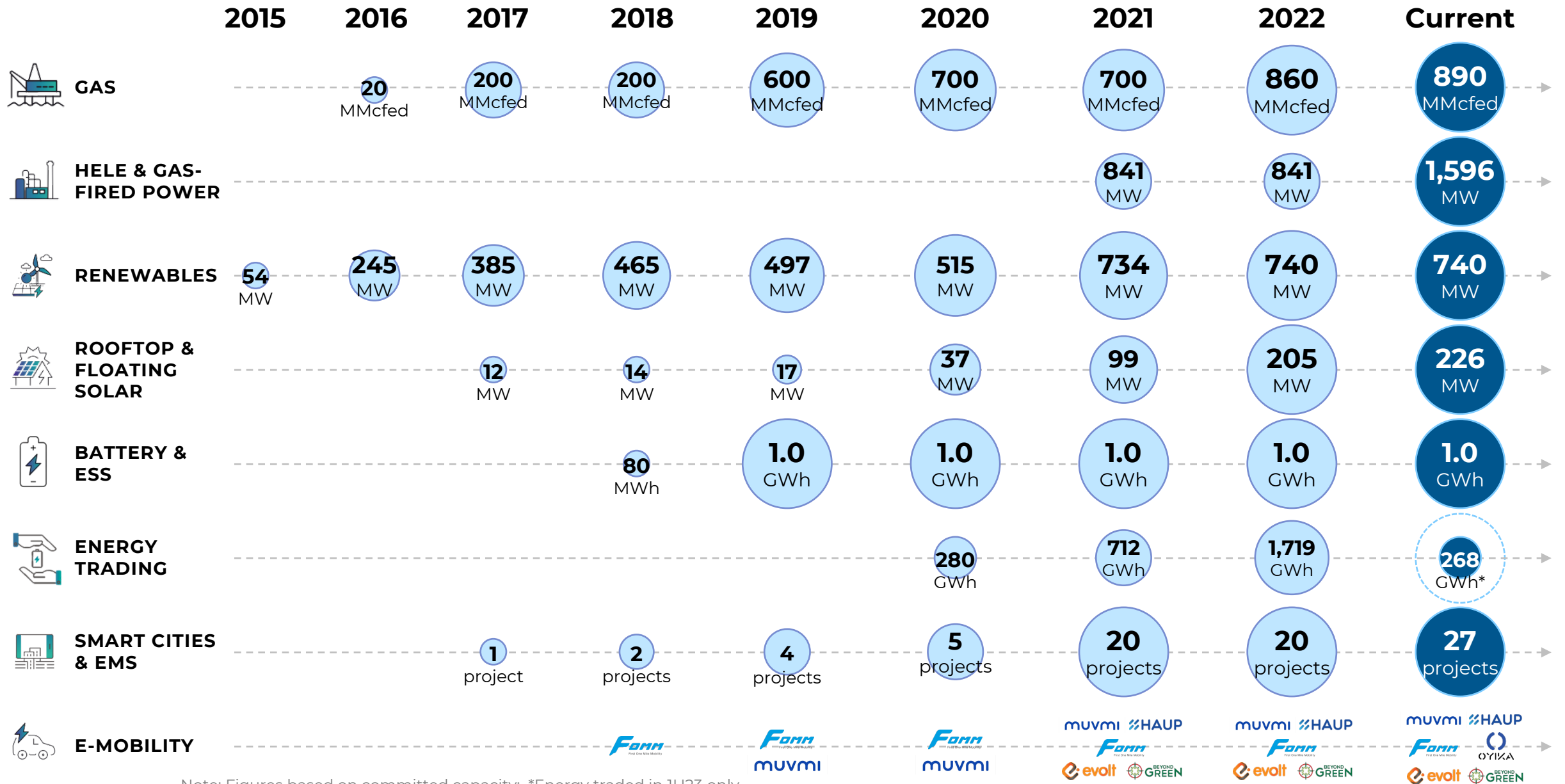
from Banpu Warrant (W4 & W5) to increase financial flexibility to execute strategic projects and investments.

Refinancing to ensure smooth operations

Through issuance of new debenture which received an 'A+' rating from TRIS Rating, to refinance existing debt and fuel working capital.

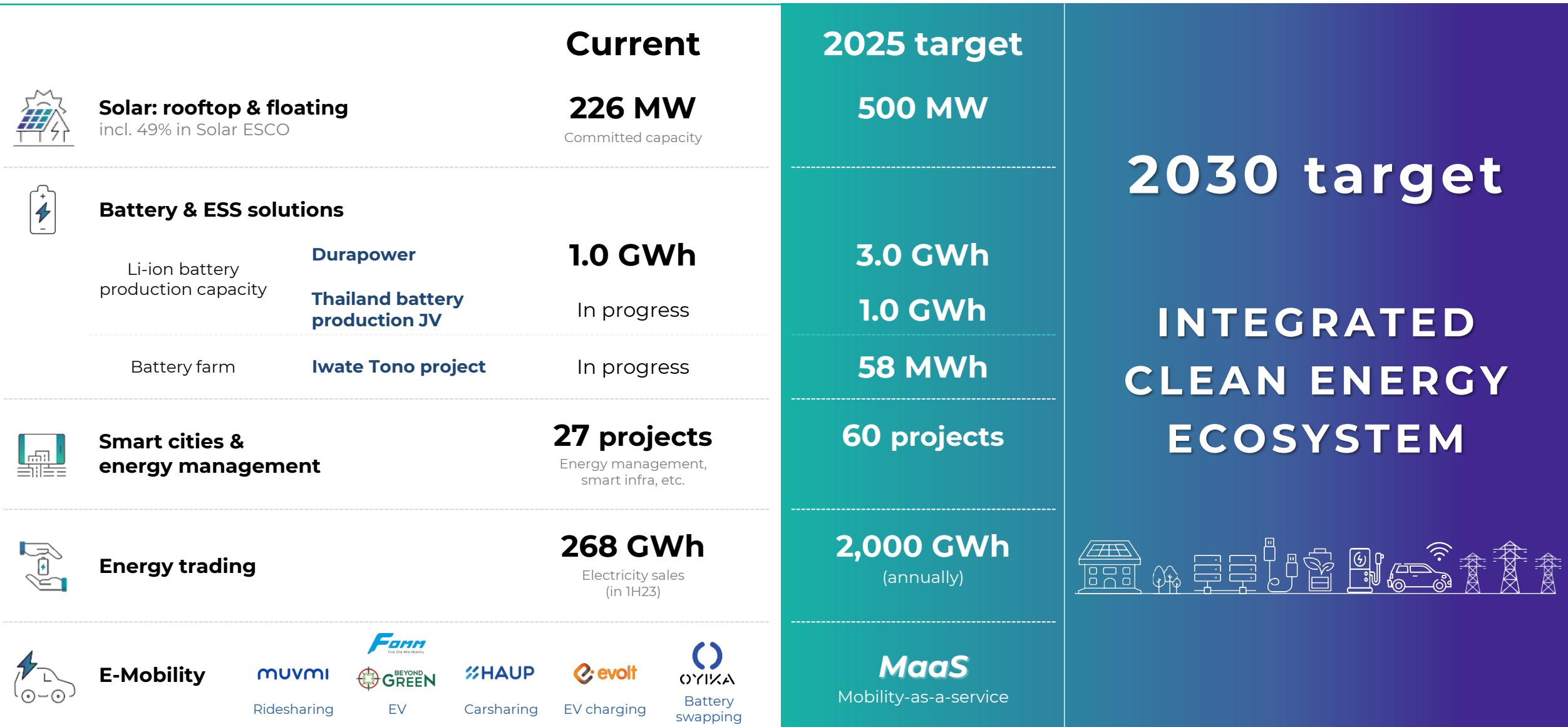


Banpu: transition progress so far



Note: Figures based on committed capacity; *Energy traded in 1H23 only

Energy technology: current position and future targets



Note: Current and target capacity are based on Banpu group's 100% basis



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Global energy transition – country-specific policies

1 Coal still critical baseload energy source

 Coal-fired power projects in the pipeline have been approved to proceed with their developments (Indonesia, China)


2 Co-firing of coal-fired and gas-fired power plants


 **20% and 30%**
ammonia and hydrogen co-firing in coal-fired and gas-fired power plants respectively by 2030 (Japan)


 **100%**
ammonia and biomass co-firing in coal-fired power plants by 2050. Hydrogen co-firing in gas-fired power plants to start in 2035 (Vietnam)

 **CCUS***
technology adoption in gas-fired power to support decarbonization of the power industry (US, China, Japan)

3 Accelerating developments in renewables and clean tech

 **59 GW**
additional renewable capacity installed by 2030, focusing on solar, wind and energy storage (Australia)

 **69% share**
of BEVs and PHEVs by 2035, with THB 24 bn in subsidies to support domestic EV battery cell manufacturing (Thailand)

 **30% tax credit**
available to lower cost of installing rooftop solar, wind, geothermal and energy storage (US)

Note: *Carbon capture, utilization and sequestration

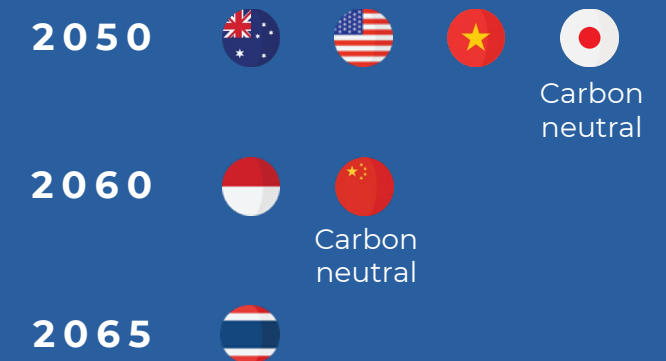
Source: IEA, Press

Climate ambitions

GHG emissions reductions by 2030

Through renewable energy expansion, energy efficiency, clean transportation, afforestation and reforestation, carbon pricing, etc. across geographies to limit global warming to 1.5°C

Carbon neutrality & net zero emissions

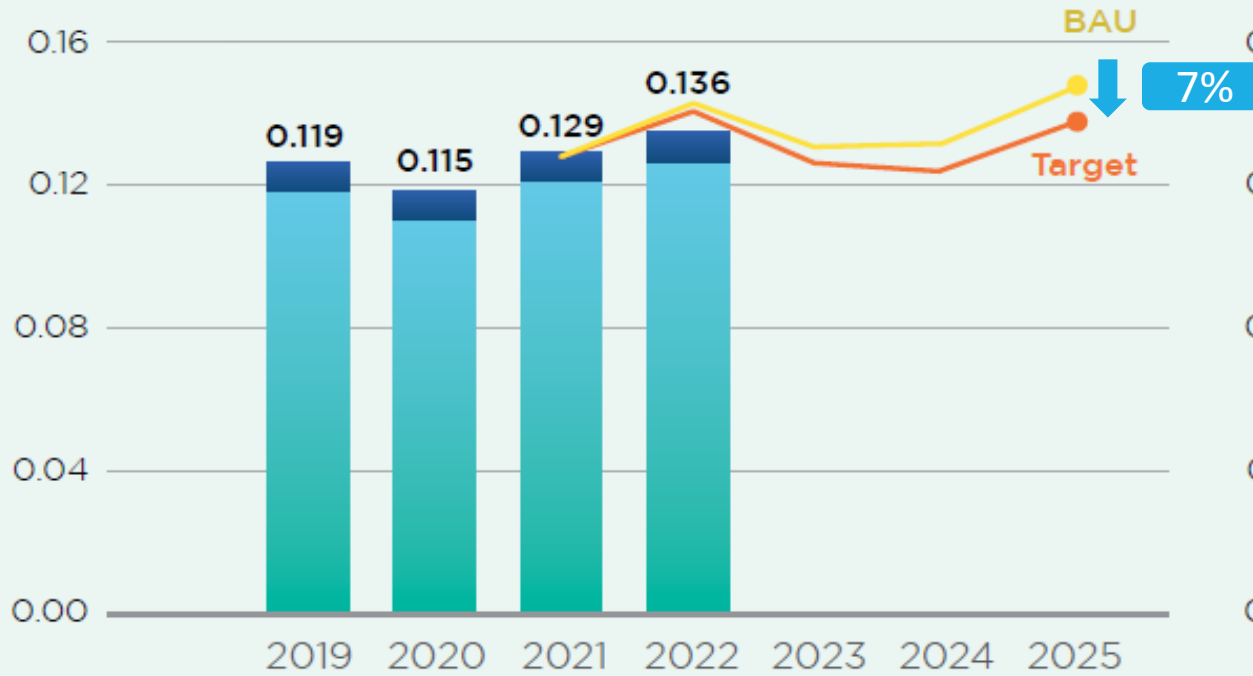


Decarbonization Strategies to Address Climate-related Risks

Climate-related risks		Potential Impacts	Decarbonization Strategy
Transition	Political and Legal	<ul style="list-style-type: none"> Increased pricing of greenhouse gas emissions due to regulations e.g. carbon taxes Increased compliance costs and potential disruption related to new mandates and regulations 	<p>Mitigate GHG emissions</p> <ul style="list-style-type: none"> - Ensure compliance with related laws - Seek to reduce GHGs emission - Integrate carbon pricing in investing decision <p>Be Adaptive</p> <ul style="list-style-type: none"> - Monitor risks, opportunities, and implications of climate change - Planning for business continuity regarding climate change <p>Be a part in low carbon society</p> <ul style="list-style-type: none"> - Invest in renewable energy business - Research and development of low GHGs emission technologies - Engage with stakeholders to reduce GHGs emission <p>Participate in a climate community</p> <ul style="list-style-type: none"> - Share the performances and GHGs management practices - Be a member of the climate change community, committee, or taskforce
	Technology	<ul style="list-style-type: none"> Increased capital expenditure / operating cost and potential disruption due to technology improvement or innovation that support the transition to lower carbon emission and energy efficiency 	
	Market	<ul style="list-style-type: none"> Decreased in net operating revenue from coal due to reduction in demand for thermal coal from energy transition and substitution of fossil fuel by renewable energy 	
	Reputation	<ul style="list-style-type: none"> Increased financial cost as banks and other financial institution discontinue working with fossil fuel related companies 	
Physical	Increased Severity of Extreme Weather	<ul style="list-style-type: none"> Increased operating cost and decreased revenue due to extreme weather events such as cyclones, floods, bush fire, etc. Increased insurance premium due to severity and frequency of natural disaster from climate change 	
	Change of Precipitation Pattern	<ul style="list-style-type: none"> Increased operating cost and decreased of coal production due to abnormal rain pattern 	

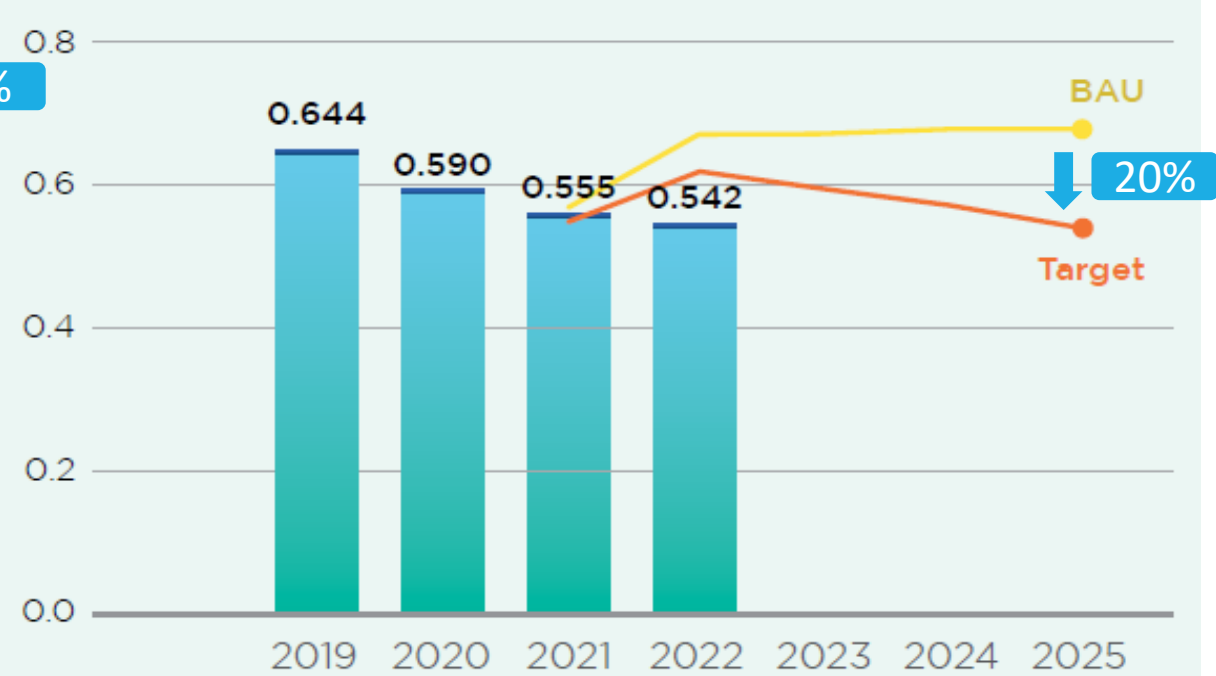
GHG Emissions Target 2025

GHG emissions intensity - mining business (tonnes CO₂e/tonne coal)

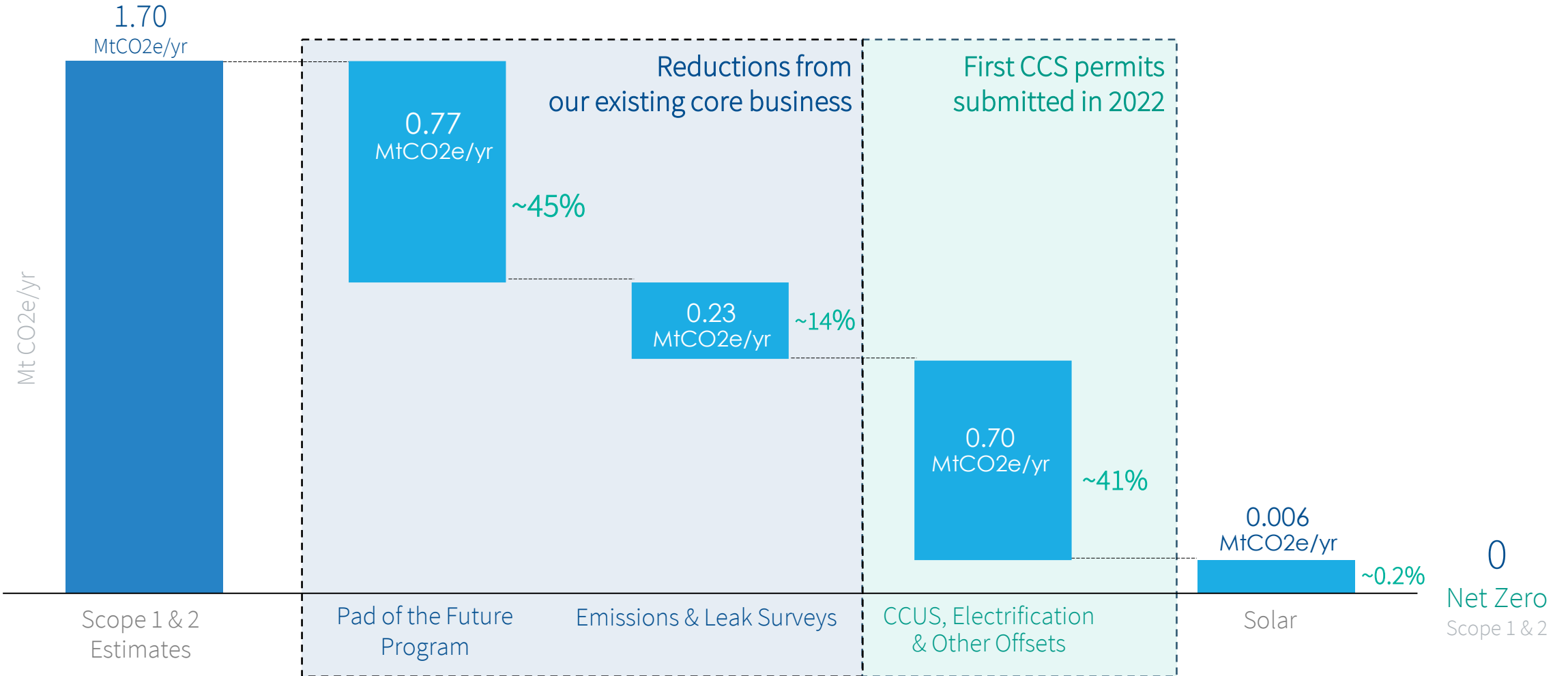


■ Scope 1
■ Scope 2

GHG emissions intensity - power business (tonnes CO₂e/MWh)



BKV Path To Net Zero (Scope 1 & 2)



Emissions and Leak Surveys

4 Tier, Leak Monitoring Ecosystem

Satellite Monitoring
(2x Monthly)



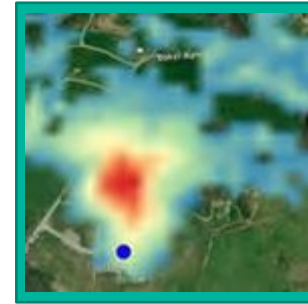
Fixed-Wing Flyover
(1-4x Annually)



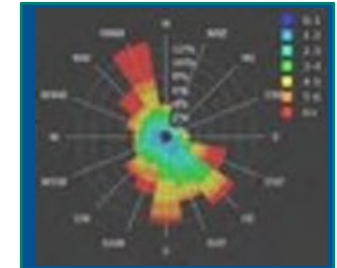
Continuous Monitoring
(Real Time)



Leak Detection and Repair – LDAR
(Occasionally by Infrared Camera)



Data
Analysis &
Reporting



BKV CCUS– GHG Reduction Program

- An effort to inject CO₂ into underground
- Barnett Zero
 - 1st injection in December 2023
 - Injection rate up to 210,000 ton-CO₂ per year
 - Investment 29 - 34 MUSD
- Cotton Cove
 - Commencement of CO₂ injection activities by end of 2024
 - Injection rate up to 80,000 ton-CO₂ per year
 - Investment 14 - 24 MUSD





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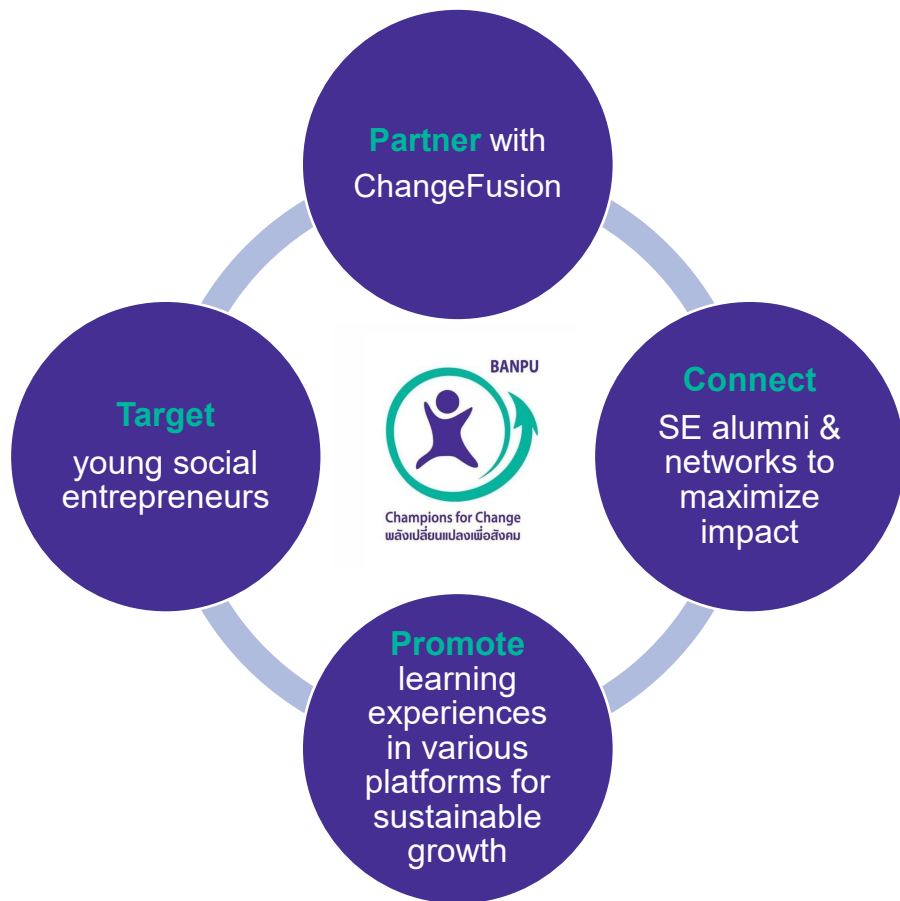
- Corporate Governance



Banpu Champions for Change (BC4C)

12 years of continuous support to Thai social enterprises (SE) to create a positive impact on communities

STRATEGY



TARGETS

Near-future goal

Develop the potential of the young SE entrepreneurs to excel in their businesses, both in the early and scaling-up stages, while expanding the SE network for a greater positive impact.

Long-term goal

Quality SEs to drive Thailand's grassroots economy and wellbeing of the people.

WORKING PLAN

1. SE School and BC4C Facebook for SE learning

2. Developing 7 SEs in early stage and 6 SEs in scaling up stage through various activities

Incubation Program

- Workshops
- Mentor matching
- Business pitching
- Initial funding
- Market testing
- Promote products through Impact Day

Acceleration Program *

- Business profile development
- Connect SE with investors
- Pitching business to investors

* Program started in 2021

3. Impact Network for maximizing impact through SE alumni network



Banpu Champions for Change

SUCCESS STORIES

Incubation Program – **The Next Forest**



- Successfully pitching for 15 Rais of forest rehabilitation project and 40 Rais of forest inspection and evaluation services.
- Income increase to 1.5 million baht in initial phase.

Acceleration Program – **a-chieve**

Change its business model to cover online service, resulted in:

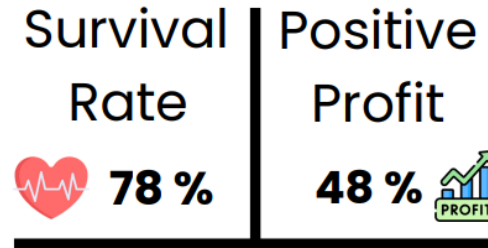
- Reach more than 600 teachers/year from around 100 teachers/year.
- Impact increase from 2,000 people/year to 20,000 people/year.



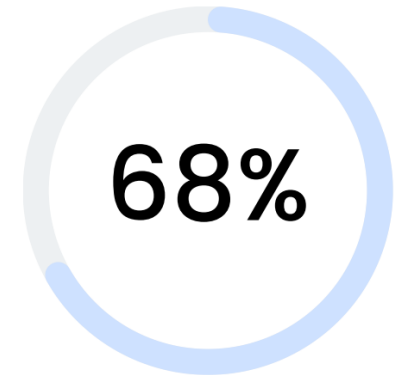
QUALITY AND QUANTITY RESULTS SINCE PROJECT INCEPTION TO 2022



11 Batches
99 Champions

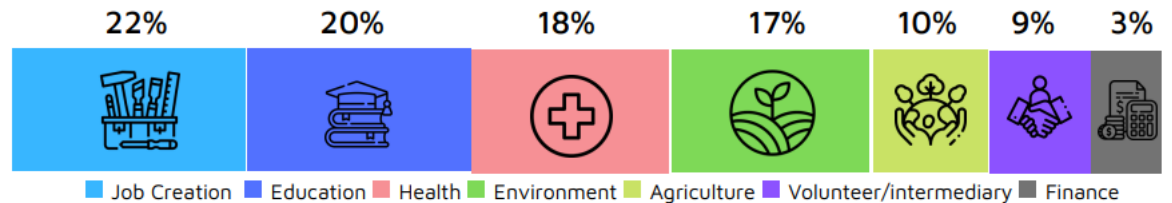


78% of 99 champions remained in operation for at least 3 years
48% of champions surveyed reported positive net profits for 2 consecutive years



As of Jan 2023, 68% of the alumni (67 out of 99) are still operating either under the original mission or as a new SE.

Distribution of impact categories of champions



Champions had impacted a total of more than **1.4 million lives** during the program.



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- **Corporate Governance**



Board of Directors

The Board of Directors set up four sub-committees.



Corporate Governance and Nomination Committee



1 Independent director



3 Non-executive directors

- Review and update the Corporate Governance Policy
- Monitor compliance through whistleblower channel
- Review the Board's composition and skills matrix
- Nominate directors, CEO and senior executives



Compensation Committee



3 Independent director



1 Non-executive directors

- Review remuneration, compensation, and benefits of the Board of Directors, sub-committees, and the CEO
- Review compensation structure and employee remuneration



Audit Committee



3 Independent director

- Review the financial reports, the sufficiency of internal control, internal audit, and risk management system, and regulatory compliance
- Review the connected transactions or transactions that may lead to conflicts of interests



Environmental Social and Governance Committee



3 Independent director

- Oversee the Company's policies and practices, as well as targets and performance with respect to ESG matters
- Review and monitor stakeholder engagement and materiality assessment process
- Review and monitor management practice of major ESG risks

Board Skill Matrix





Financial Reporting and External Auditing

- Examines Banpu's quarterly financial information and financial statements
- Considers and recommends the selection, nomination, and termination of the auditor for the Company
- Evaluates external auditor nominations



Internal Control and Internal Auditing

- Reviews Internal Control Adequacy Assessment according to the SEC's regulation which follows the COSO 2013 framework.
- Reviews the Company's internal control system and internal audit system



Risk Management

- Reviews and monitors the Company's risks
- Established a framework that is in line with the ESG direction
- Reviews the audit cases informed by the Company's external auditor
- established the Corporate Fraud Management Policy and whistleblower channels



Governance and Compliance

- Reviews ethical business conduct, effectiveness, and efficiency of good corporate governance
- Reports its activities and results to the Board of Directors.
- Reviews compliance with laws and regulations



Additional Information

Banpu: our purpose, vision and mission



With a wide variety of ethnicities, languages and cultures, Banpu people are united to achieve the company's vision and mission guided by the principles of Banpu Heart

■ PURPOSE ■

To deliver sustainable energy

■ VISION ■

Asian energy company at the heart of **innovation, technology, and sustainability**

■ MISSION ■

Build sustainable value for all our stakeholders as a trusted partner, with emphasis on care for the earth and society

Promote innovation, synergy, sustainability, and integration across the energy supply chain, between thermal and new energy technologies

Foster our corporate values, operational excellence, and uphold Banpu's reputation for integrity, professionalism and best practices



Passionate



Innovative

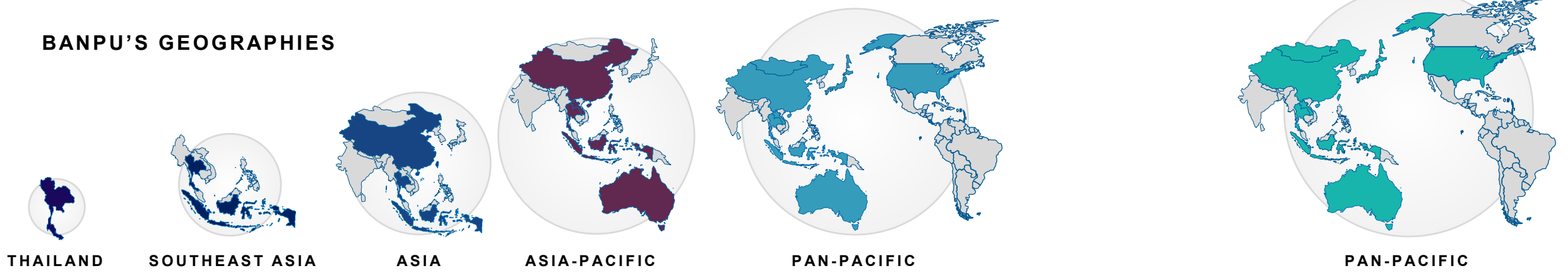


Committed

Banpu: 40 years journey



BANPU'S GEOGRAPHIES



MINING
Established to focus on coal mining in Thailand

ENERGY RESOURCES

ENERGY GENERATION

THERMAL POWER
Established thermal power business in Thailand

GAS
Commenced natural gas operations in the US

RENEWABLES
Entered renewable power business with first investment in Japan solar

ENERGY TECHNOLOGY

BANPU NEXT ENERGY TECHNOLOGY
Ventured into energy technology with investment in solar rooftop business, followed by battery production, smart cities, e-mobility and energy trading

BANPU International versatile energy provider offering integrated energy solutions across the Pan-Pacific

Banpu: 'Our Way in Energy'



Celebrating 40 years of excellence, growth, and innovation in delivering affordable, reliable and eco-friendly energy that has powered the development of the **Pan-Pacific Region**



Well-structured and balanced portfolio for strong cash flow generation and upside potential

Extensive track-record in asset management across different countries in the Pan-Pacific region



Effective capital allocation supported by financial stability and robust funding

Continuous people and organizational development inspiring innovation and excellence

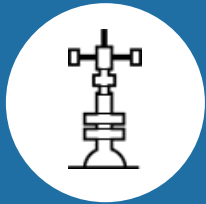


Value-oriented strategic and financial investments focusing on both short-term cash flow generation and long-term growth

Banpu: 'integrated energy solutions' 2023

ENERGY RESOURCES

Shale Gas



890 MMcfed*
Net production

ENERGY GENERATION

Renewable Power



740 MW
Committed capacity

ENERGY TECHNOLOGY

Rooftop & Floating Solar



226 MW
Committed capacity

Mining



37.5 Mt
Coal sales

Thermal Power



4,008 MW
Committed capacity

Clean Energy Tech



1.0 GWh (100% basis)
Li-ion batteries



E-mobility services
E-mobility solutions

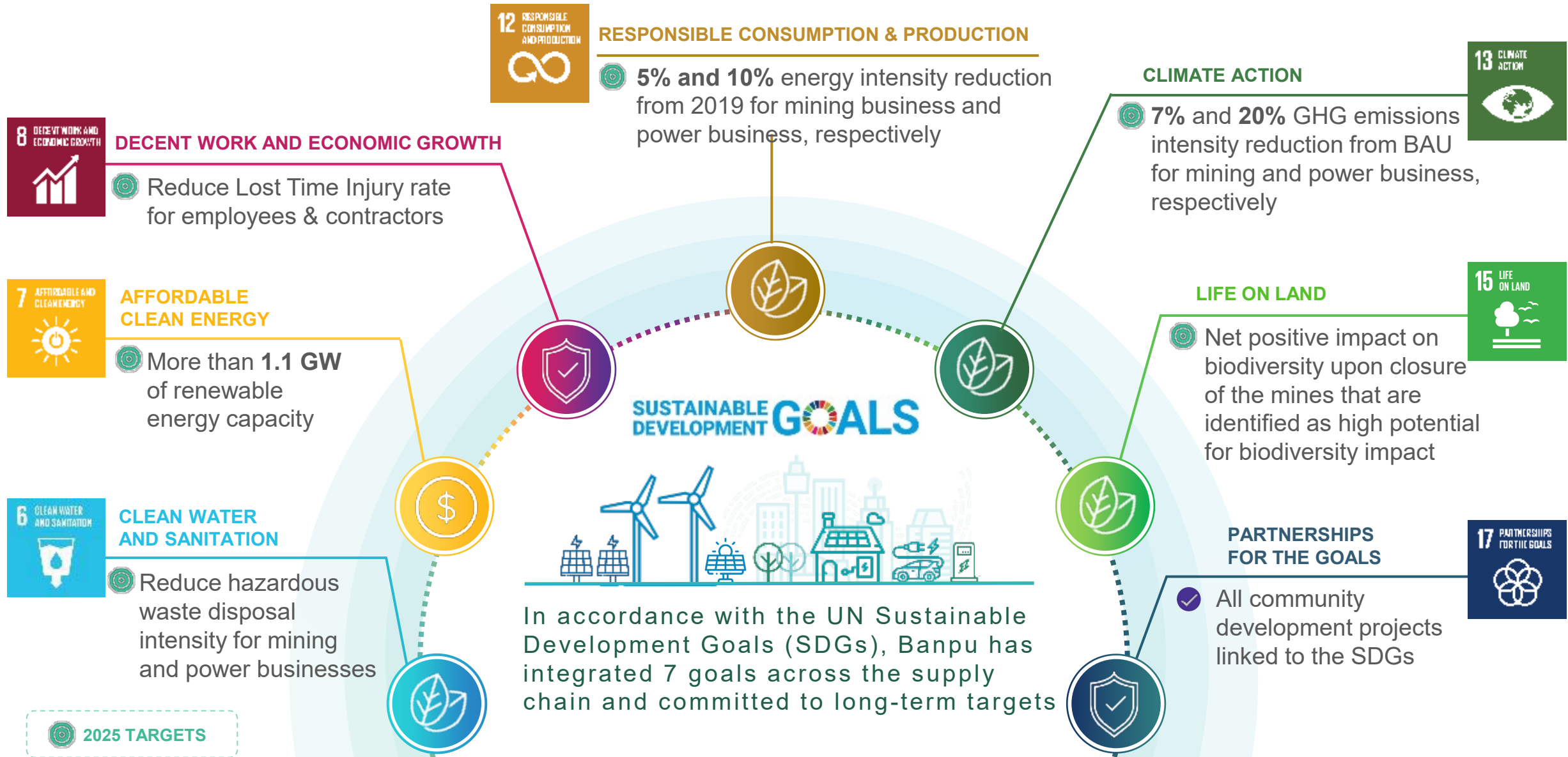


Smart Cities &
Energy Management



268 GWh
Electricity trading

• Note: *As of 30th June 2023



CORPORATE VENTURE CAPITAL (CVC)



Diversify Banpu's portfolio and explore new S-curve businesses by leveraging venture-driven approach to gain access to emerging technologies, innovative business models and untapped market opportunities

ENERGY-RELATED

BEYOND ENERGY



DIRECT & INDIRECT INVESTMENT

Focusing on early-to-late growth stage, Banpu CVC aims to directly acquire companies or invest through funds with concentrated and diversified portfolios to gain exposure to high growth S-curve industries

SYNERGY AND GROWTH STRATEGY OF CVC:

INTEGRATE WITH EXISTING BUSINESSES

Investments with high growth potential and synergistic value with existing businesses will be integrated accordingly to enhance their value creation

SPIN OFF TO NEW BUSINESS PILLAR

Investments with strategic alignment with the Banpu group and potential to become a new core cash flow generator will be spun off to become a new business pillar

FINANCIAL RETURNS

Focus on generating additional returns to Banpu group with prioritization of investments with mid-to-long term financial returns through cash flow generation and value-growth

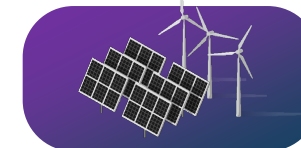
INVESTMENT SUPPORT FOR EXISTING BUSINESS PILLARS

Banpu CVC will support existing business pillars in identification of investment targets with high synergistic potential and execution of investment process

ENERGY RESOURCES



ENERGY GENERATION



ENERGY TECHNOLOGY

