

Role of CCS/CCUS in Energy Transition for Indonesia Achieving Net Zero

Emerging Industry Challenge - White Paper Presentation

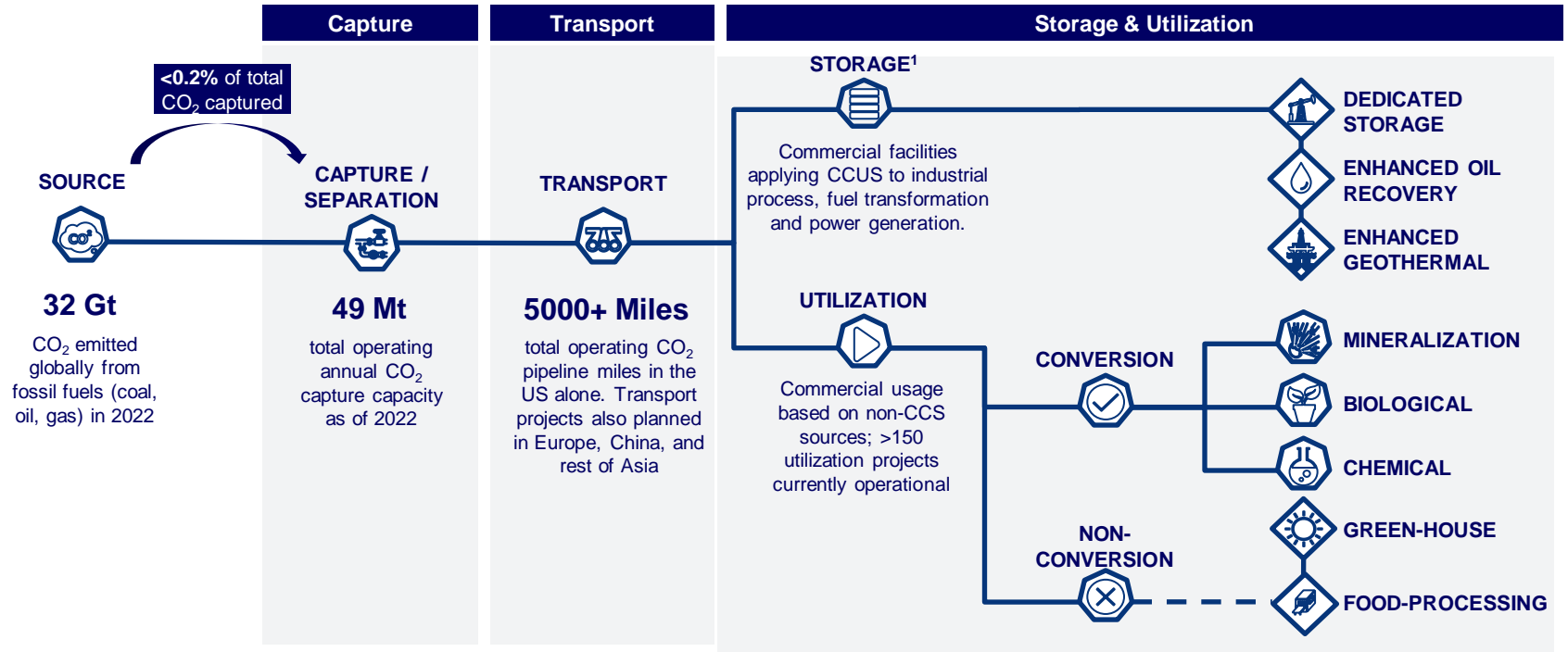
26 July 2023



Wood
Mackenzie

CCS/CCUS involves the capture of carbon emissions which are then transported and utilised or stored

Overview of the CCS/CCUS value chain

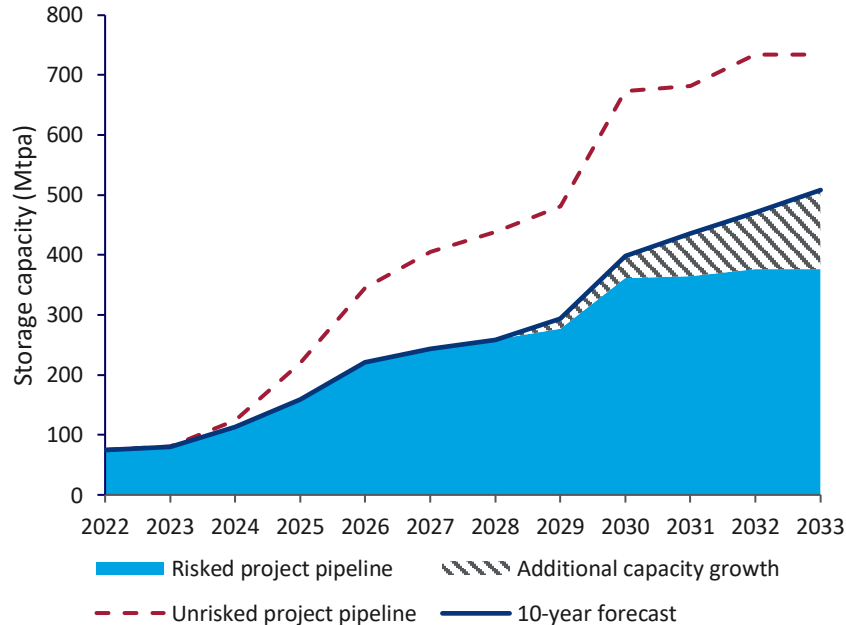


1. Total operating annual CO₂ storage capacity as of 2022 exceeds capture capacity
 Source: Wood Mackenzie Energy Transition Service, IEA, The Global CCUS Institute, Third Way

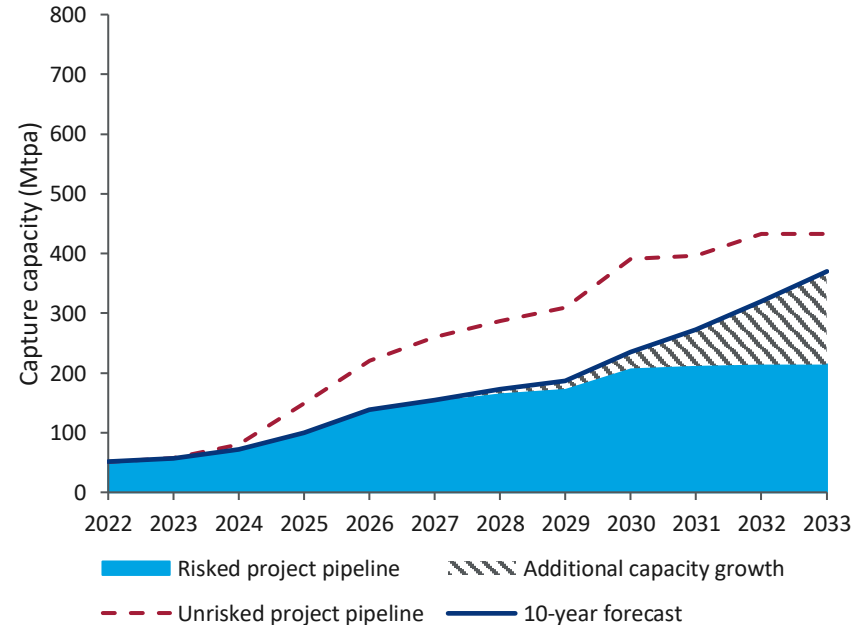
CCS/CCUS capacity have begun growing significantly with an estimated 10x growth over the next decade

Global CCS/CCUS storage and capture capacity forecast

CO2 storage capacity: Unrisked pipeline vs. forecast

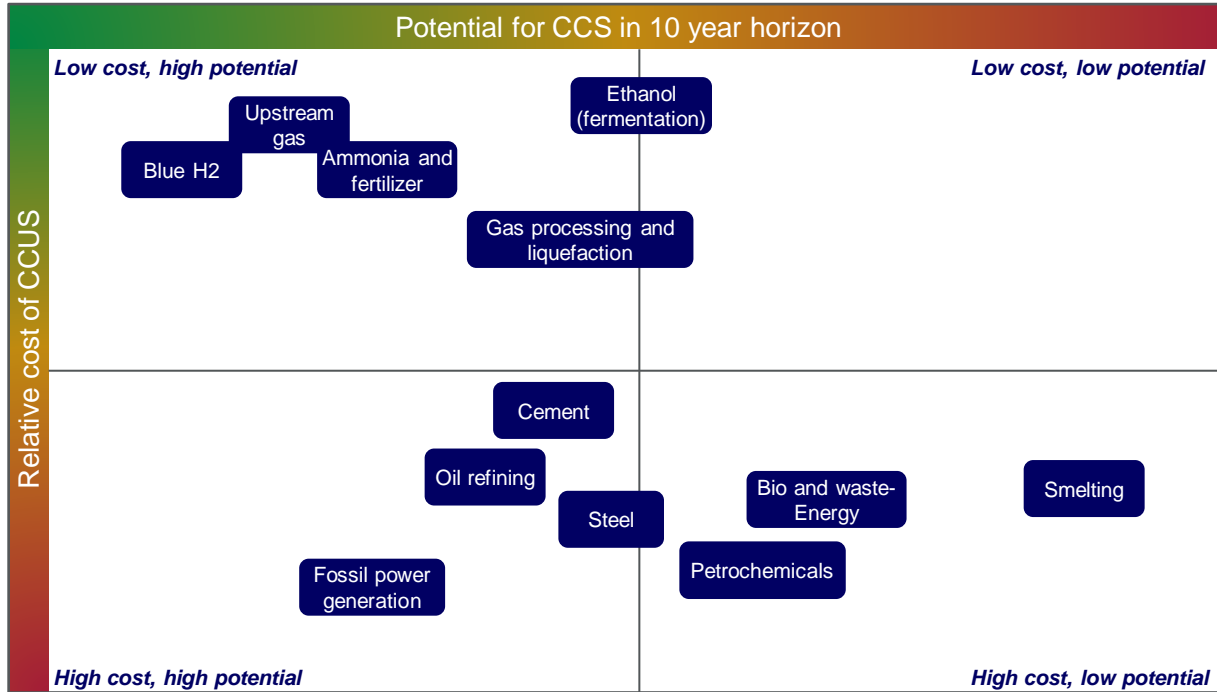


CO2 capture capacity: Unrisked pipeline vs. forecast

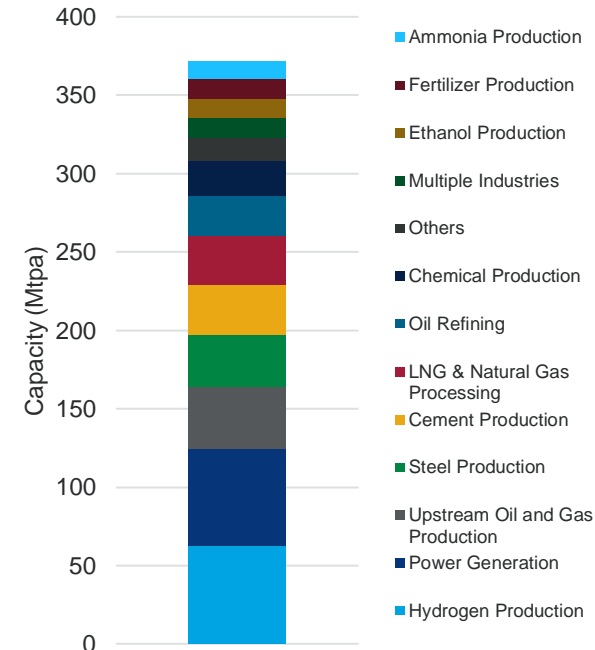


CCS/CCUS can be applied to a wide range of sectors, supporting the decarbonization of hard-to-abate sectors

Potential for CCS/CCUS in various industrial sectors



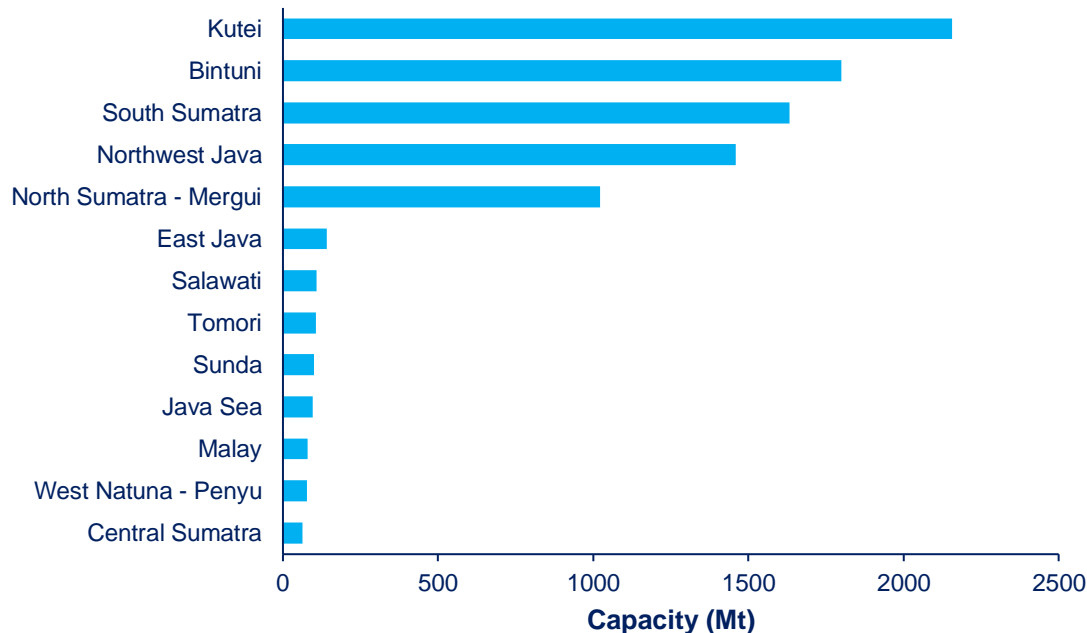
Forecast of global capture capacity by emission industry source by 2033



Indonesia has a significant competitive advantage for the development of CCS/CCUS

Key competitive advantages for CCS/CCUS development in Indonesia

WM Estimate of CO₂ Storage Capacity by Basin (O&G Reservoir Only)¹



- Indonesia meets **many of the requirements for effective CCS development:**
 - ✓ Depleted reservoir storage capacities across regions
 - ✓ Presence of capable E&P players with CCS capabilities
 - ✓ Extensive E&P infrastructure
 - ✓ Large static emission sources
- Other **factors contributing to CCS deployment** in Indonesia include:
 - ✓ Ability to retrofit existing infra
 - ✓ Limited need for new value chains
 - ✓ Minimal disruption of existing energy systems

Development of CCS/CCUS will deliver significant value for Indonesia

Value gained from CCS/CCUS development in Indonesia

International emissions capture



Generate revenue from int'l emitters



Enhance geopolitical standing



Contribute to global climate action



Mitigate impact of global warming

Domestic emissions capture



Contribute to Indonesia's NDCs



Improve investment attractiveness



Produce low-carbon goods & services



Avoid carbon taxation of exports

New economic sector



Promote GDP growth



Improve balance of trade & payments



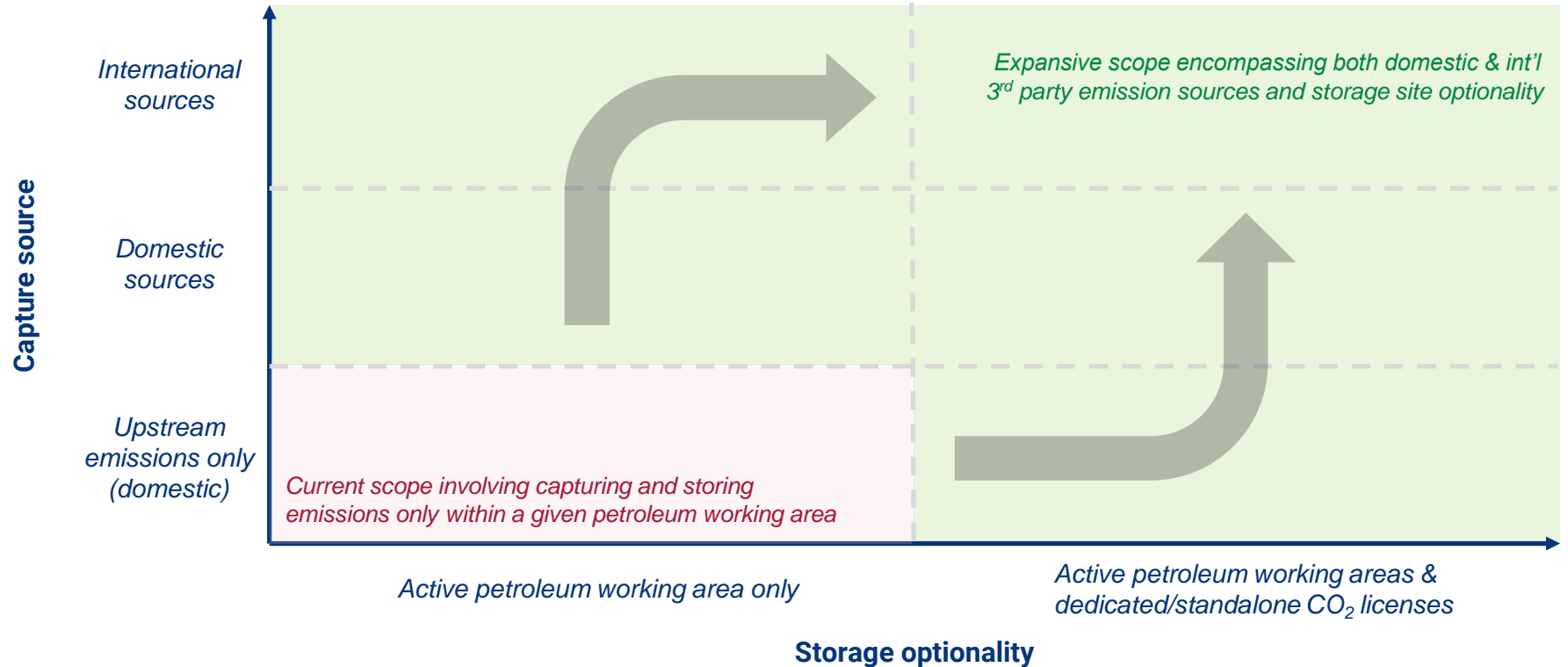
Develop capabilities & expertise



Enhance employment

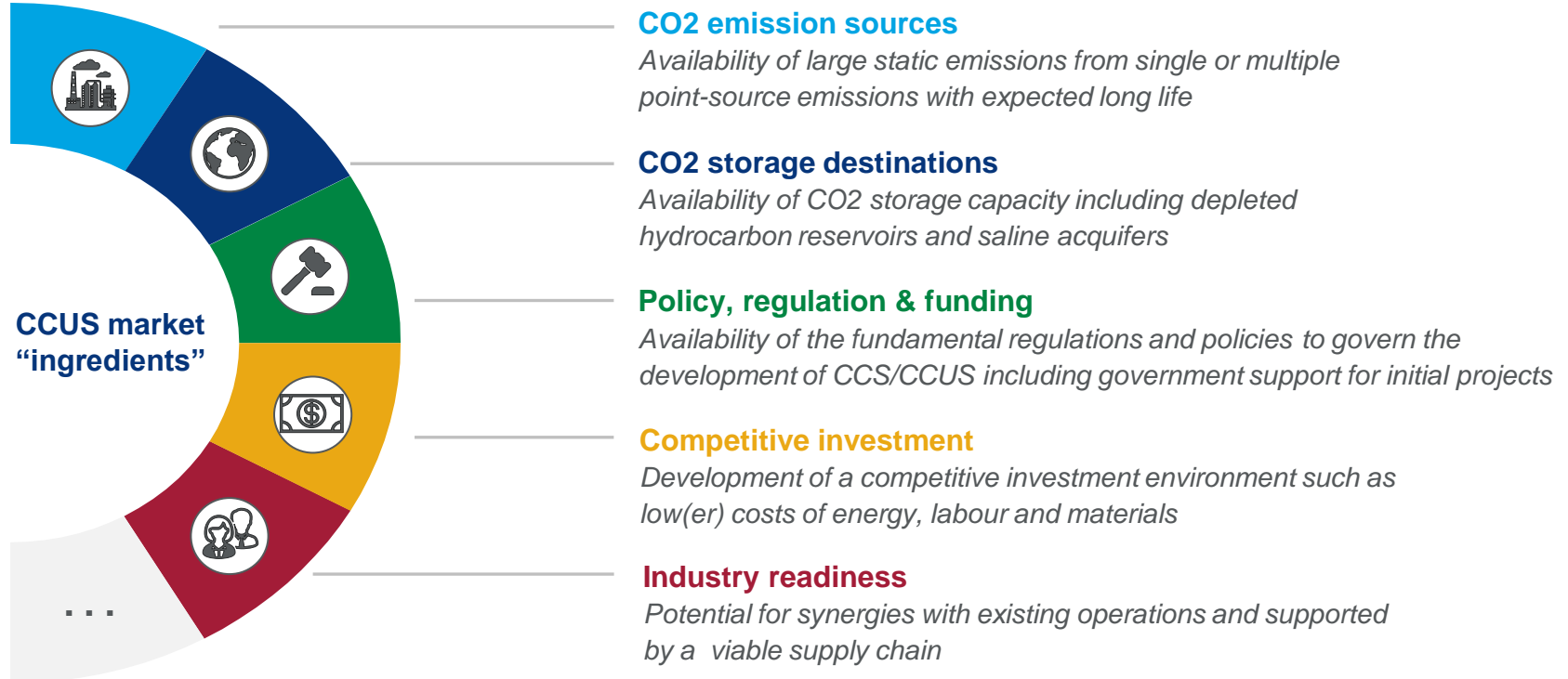
To realise the full range of upsides and maximise gains, Indonesia must adopt an expansive vision for the country's CCS/CCUS sector

Possible ambitions for CCS/CCUS in Indonesia



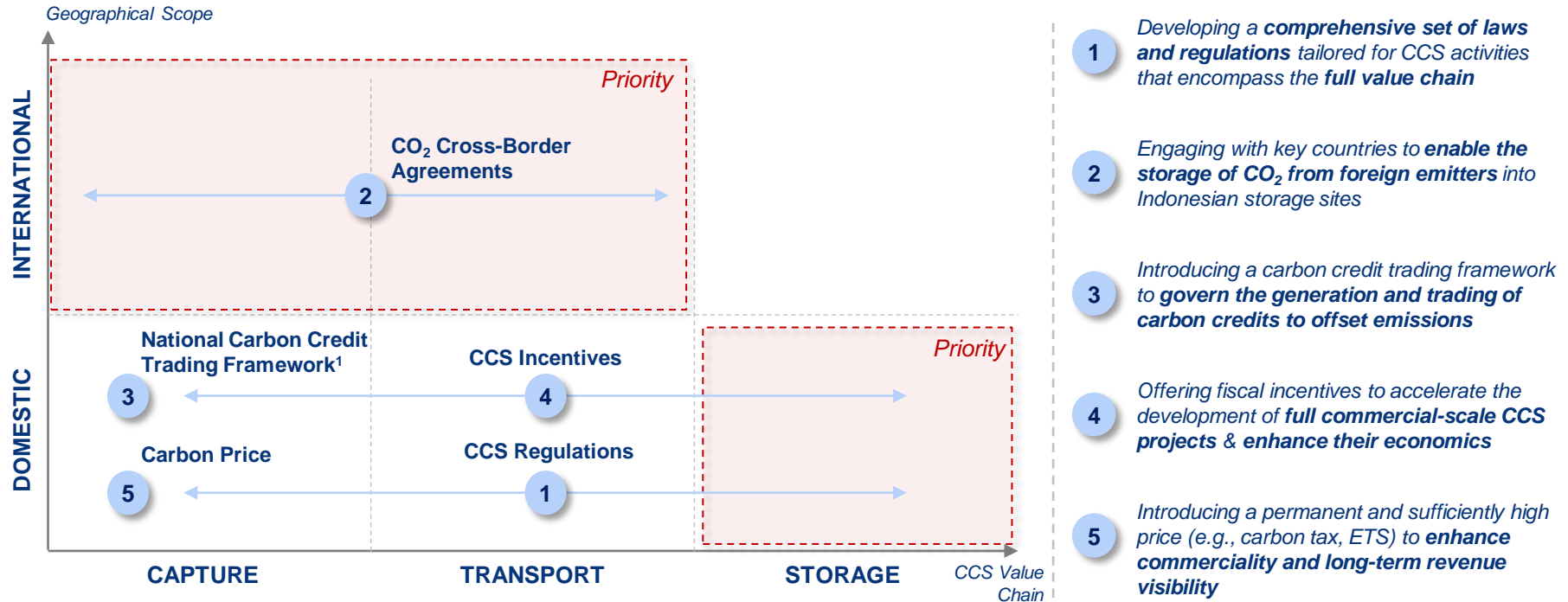
At the same time, Indonesia needs to develop the right eco-system for the development of the CCS/CCUS industry

Requirements for the development of a CCS/CCUS industry



We have identified 5 fundamental building blocks that Indonesia needs to attract investment and enable a fully-fledged CCS/CCUS ecosystem

Actions to establish the fundamental building blocks for CCS development

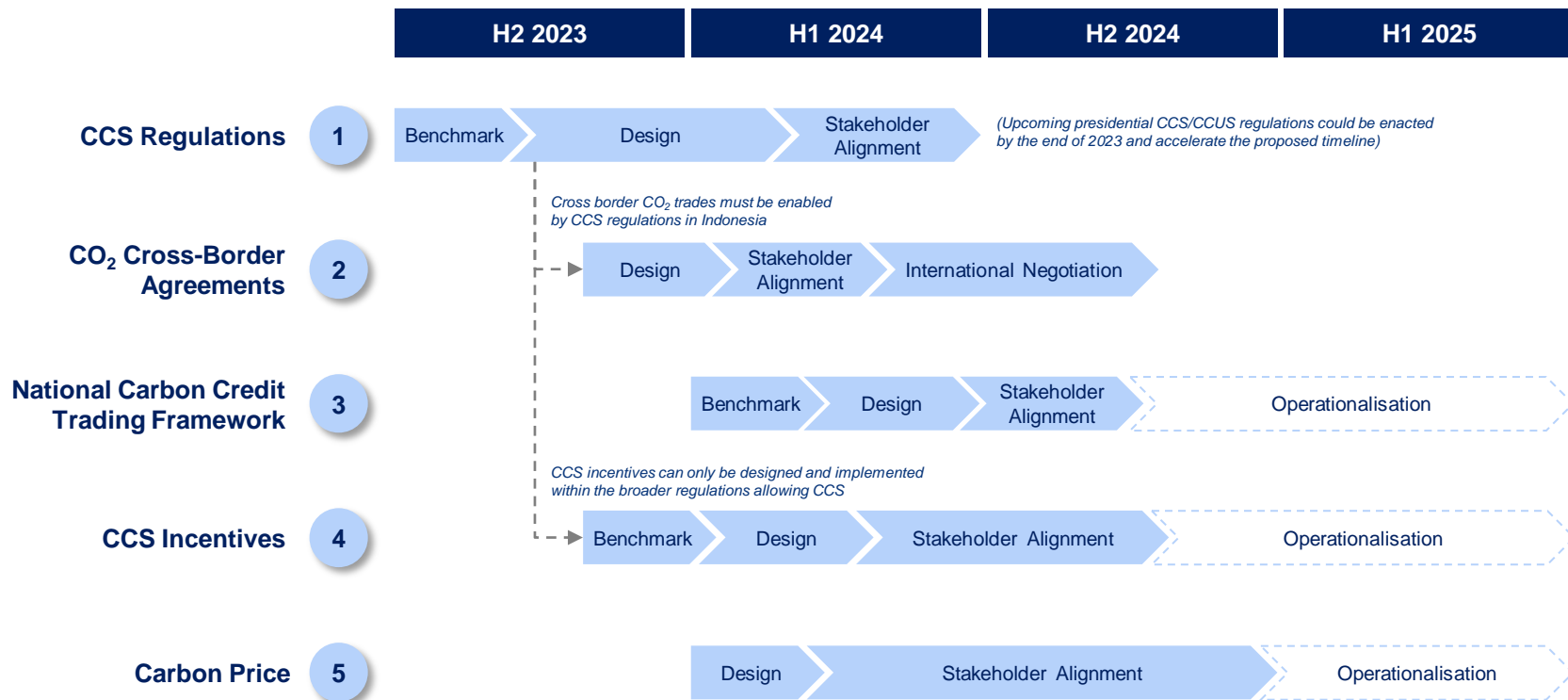


- 1 Developing a **comprehensive set of laws and regulations** tailored for CCS activities that encompass the **full value chain**
- 2 Engaging with key countries to **enable the storage of CO₂ from foreign emitters** into Indonesian storage sites
- 3 Introducing a carbon credit trading framework to **govern the generation and trading of carbon credits** to offset emissions
- 4 Offering fiscal incentives to accelerate the development of **full commercial-scale CCS projects & enhance their economics**
- 5 Introducing a permanent and sufficiently high price (e.g., carbon tax, ETS) to **enhance commerciality and long-term revenue visibility**

Note: 1) The national carbon credit framework must cover carbon avoidance/removal projects in Indonesia to incentivize domestic financing but could also allow the listing of international carbon projects
 Source: Wood Mackenzie

Policymakers must act promptly to ensure that Indonesia can achieve first-mover advantage and become a regional leader

Illustrative timeline for establishing the foundations for CCS



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