



Enhancing the Enabling Environment and Finance Solutions in ASEAN's Iron and Steel Sector

AJSI Webinar "Achieving Carbon Neutrality in the Steel Sector", 6 February 2024

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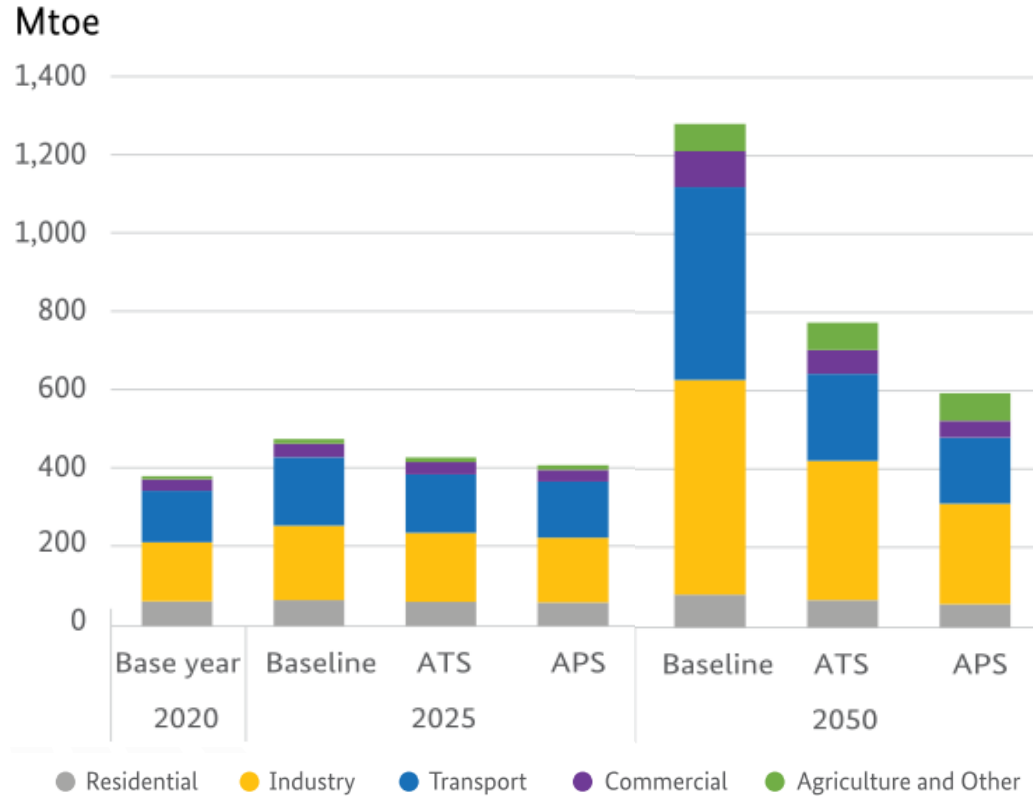
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ASEAN Energy Landscape

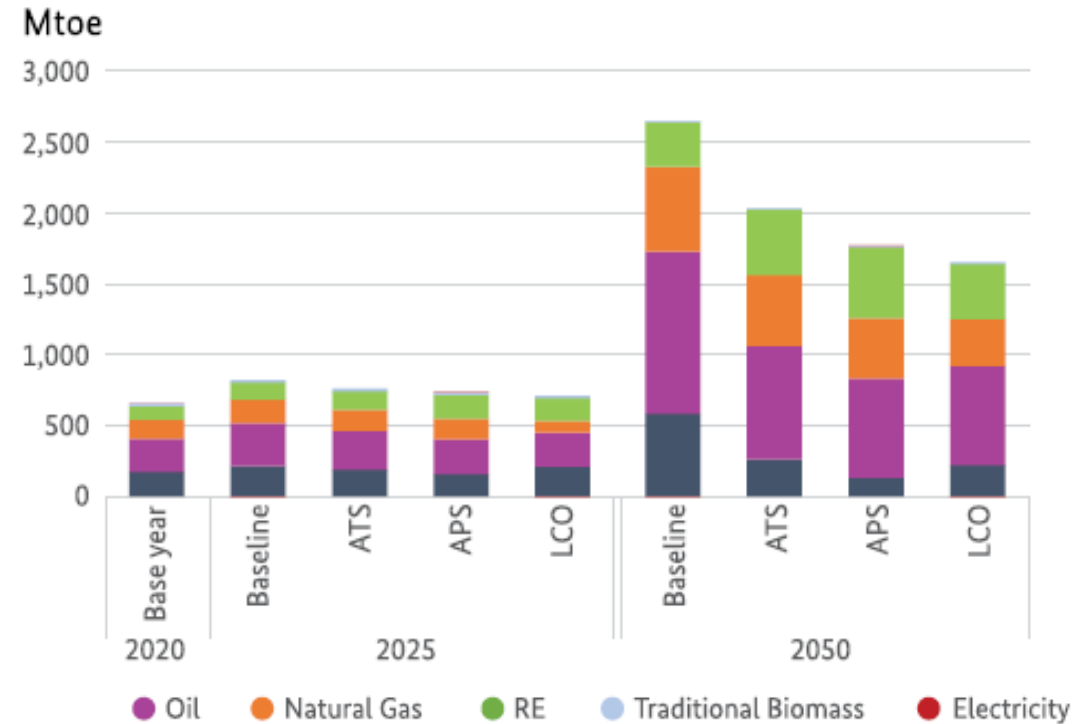


ASEAN Total Final Energy Consumption by Sector



The energy demand is expected to triple by 2050 compared to 2020. Industry and transportation are the largest energy-consuming sectors.

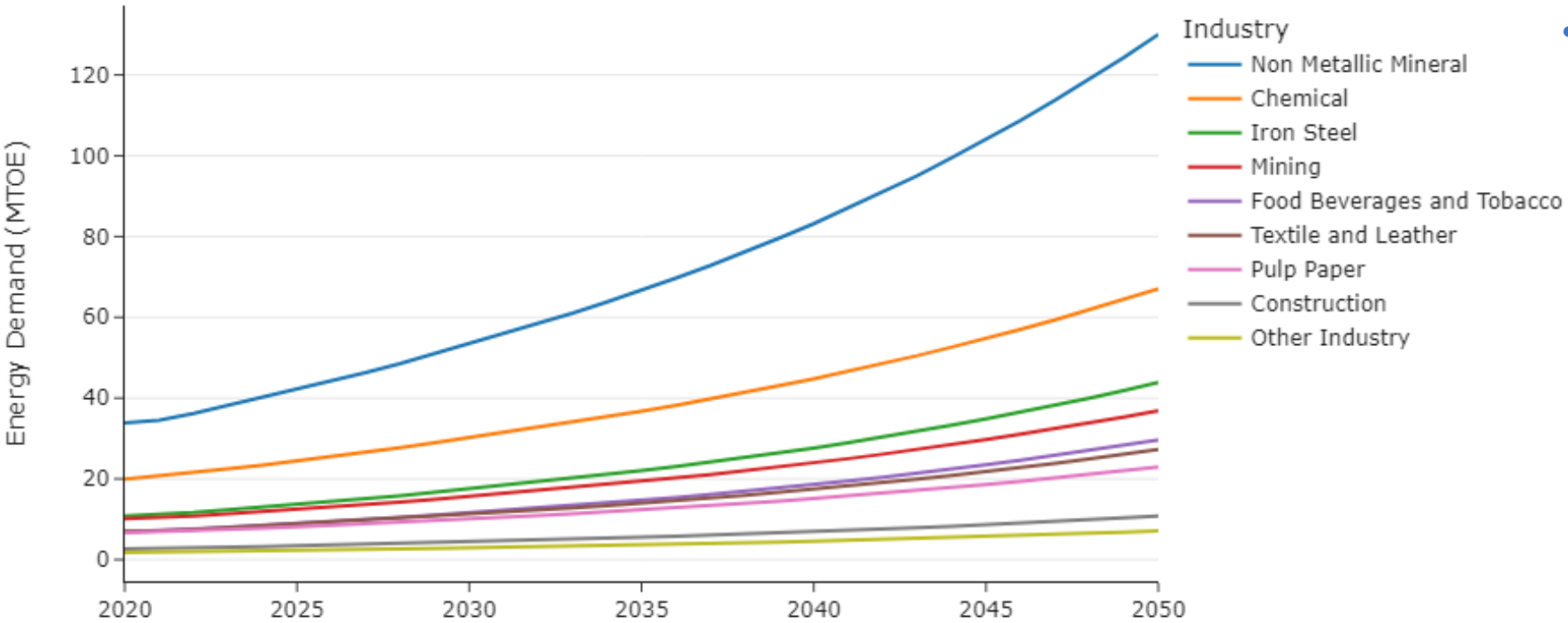
ASEAN Total Primary Energy Supply by Fuel



Source: 7th ASEAN Energy Outlook

ASEAN's TPES remained dominated by fossil fuel, oil (35%), coal (27%), and natural gas (21%), whereas RE share takes up 14.2%, by 2020 respectively.

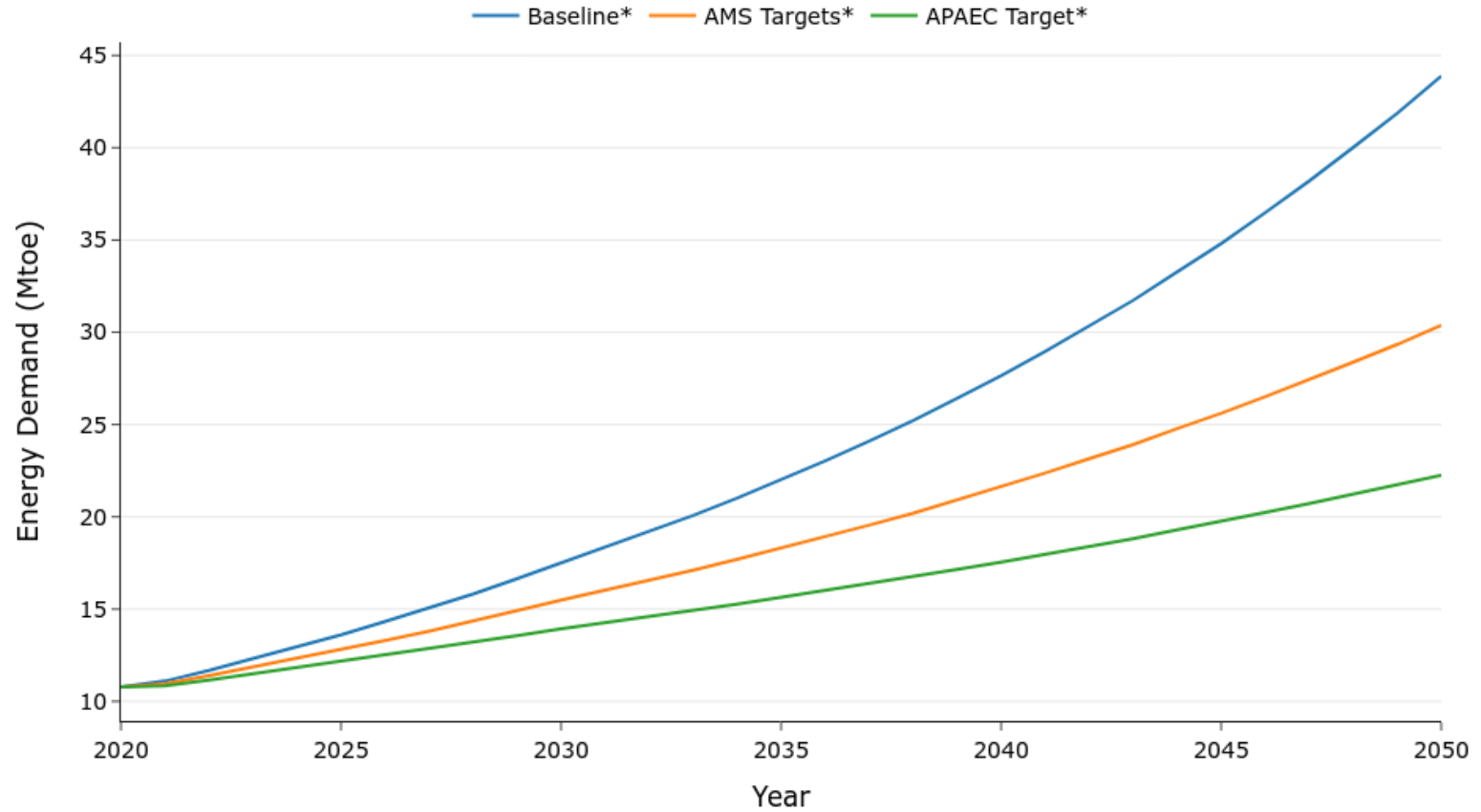
Energy Demand by Industry, Baseline Scenario*



- The iron and steel industry ranks as the third most energy-intensive sector in the ASEAN region, with projections indicating it will maintain this status through 2050.

Source: The 7th ASEAN Energy Outlook
 (*) Baseline Scenario: Business-as-usual trends based on historical data, without new policies.

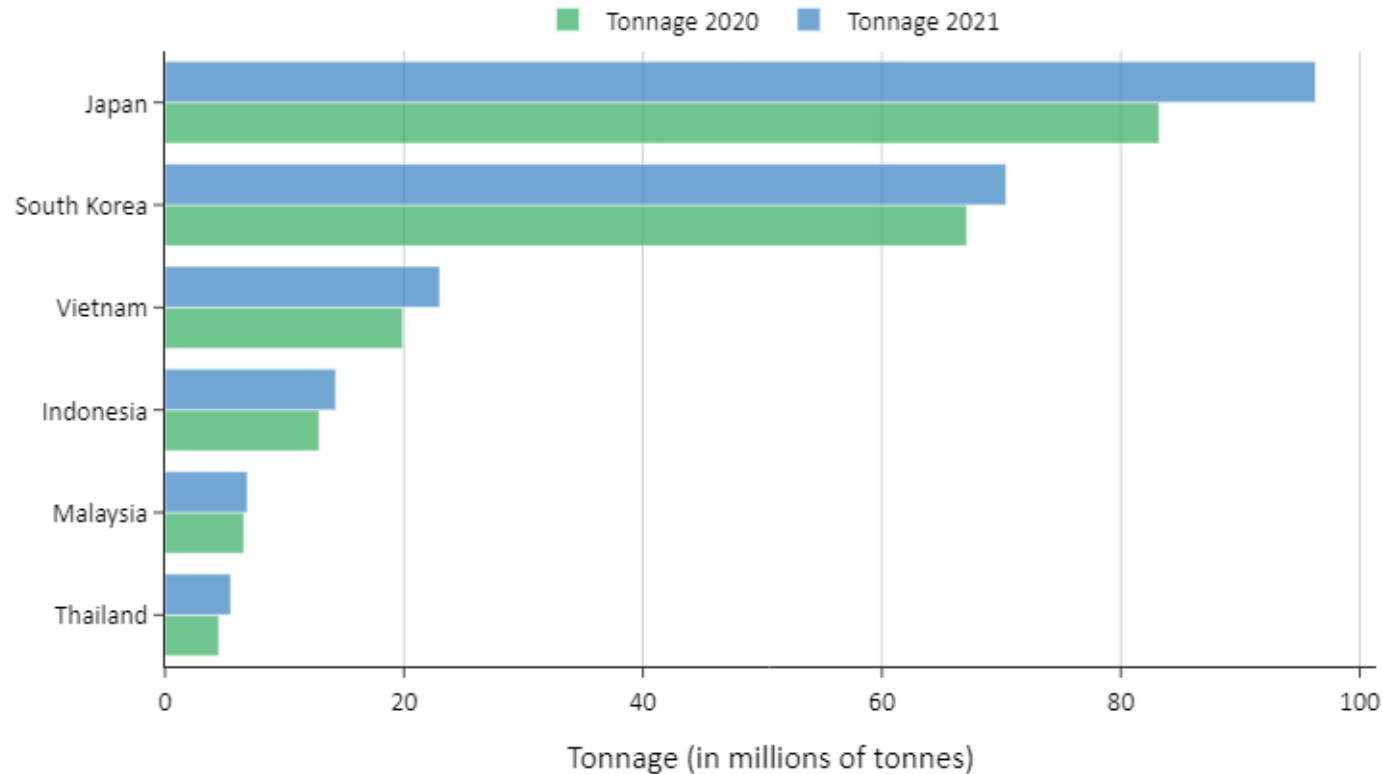
Energy Demand for Iron & Steel Industry



- Across all scenarios, there's a clear trend of growing energy demand in the iron and steel industry from 2020 to 2050.
- In the Baseline Scenario, if continuing current practices without significant policy changes towards sustainability, the industry's energy demand will quadruple by 2050.
- This demand could be halved through interventions aimed at achieving national and ASEAN energy efficiency targets.

Source: The 7th ASEAN Energy Outlook
 (*) Baseline Scenario: Business-as-usual trends based on historical data, without new policies.
 (*) AMS Targets Scenario: Incorporates national policies of ASEAN member states.
 (*) APAEC Targets Scenario: Models policy interventions needed to meet ASEAN targets

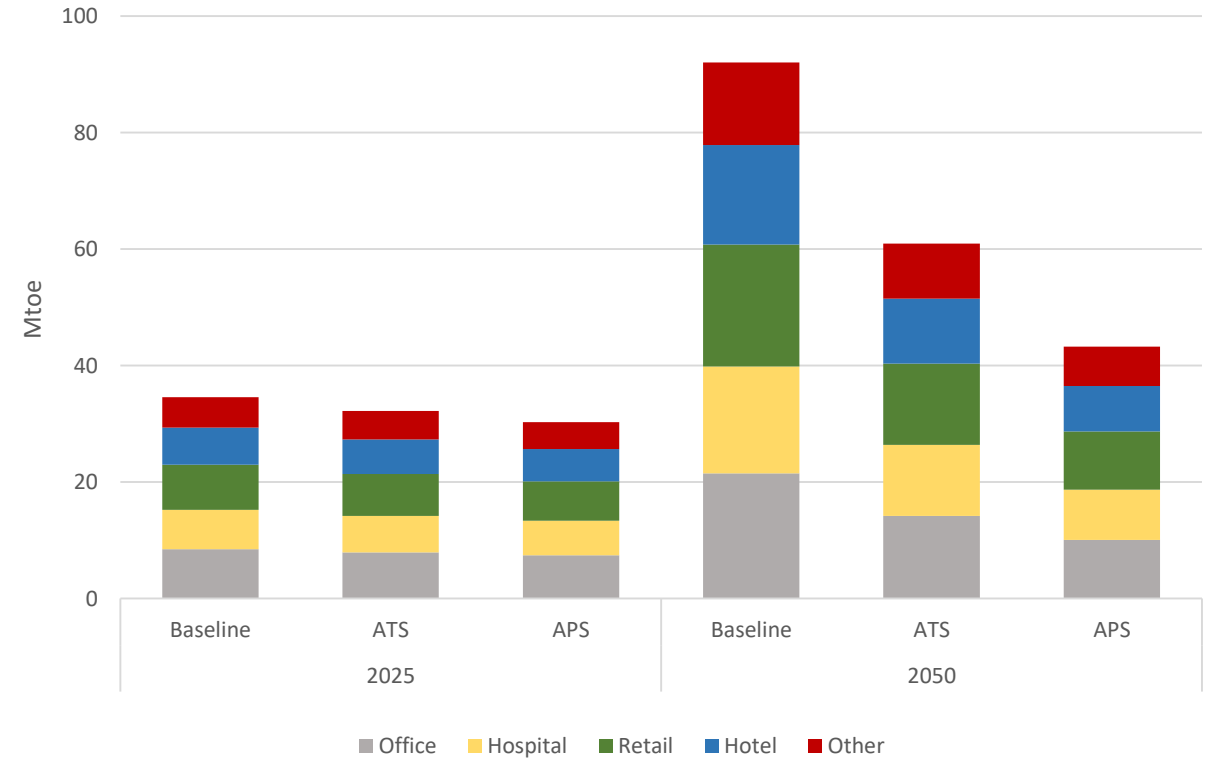
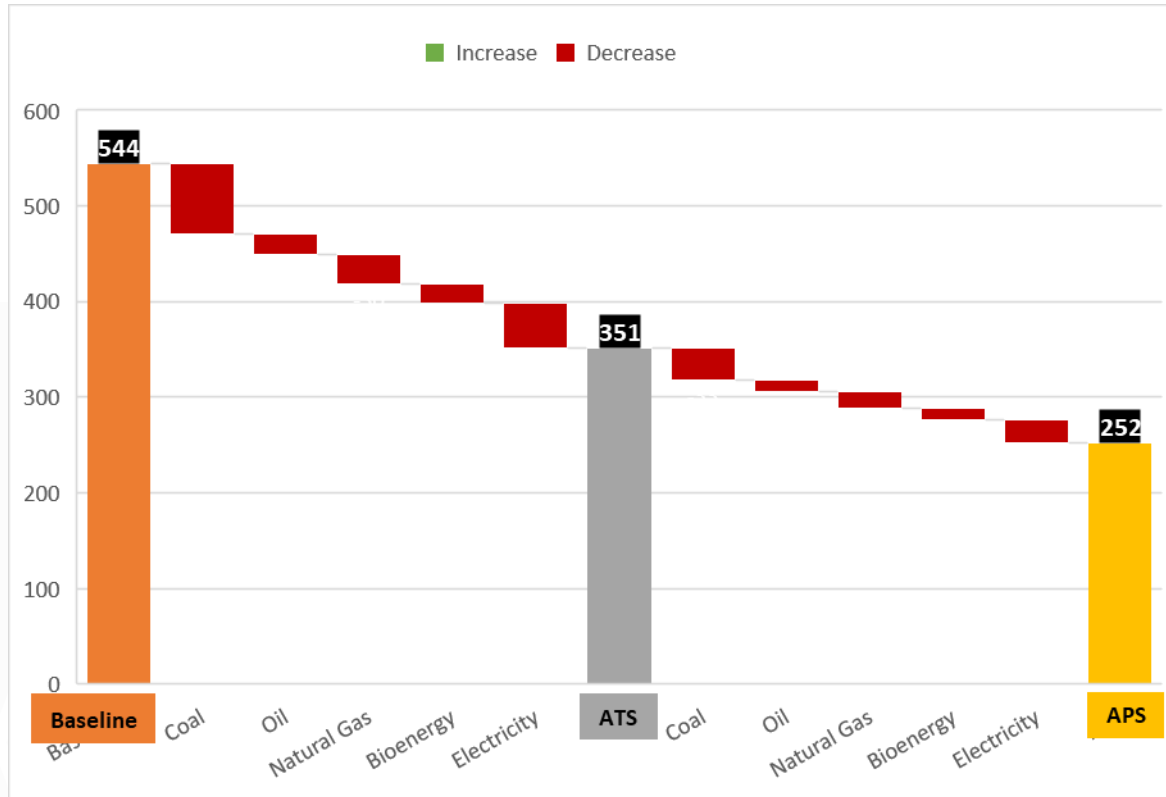
Crude steel production Tonnage for 2020 and 2021



Source: The World Steel Association

- ASEAN member states are noteworthy producers of crude steel, with production volumes on the rise. In 2021, Vietnam, Indonesia, Malaysia, and Thailand were ranked 13th, 16th, 26th, and 30th in the world, respectively, for crude steel production.

Energy Efficiency Potential in Industry

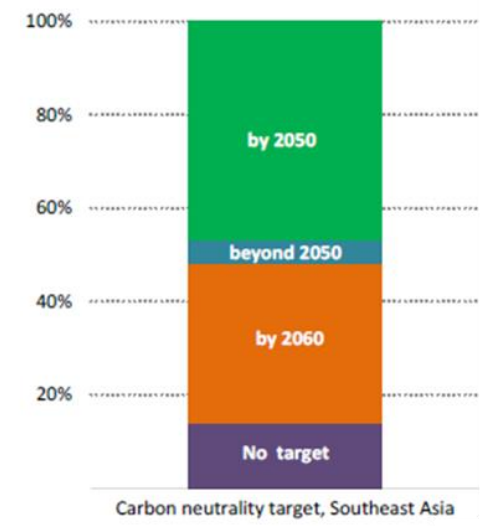


- In industry, all energy types are reduced between scenarios. Showing the importance of energy efficiency.
- In commercial building, energy efficiency can potentially reduce the total energy demand from 92 Mtoe to 43 Mtoe between Baseline and APS

Net Zero Goals Put Pressure on the Steel Industry for Decarbonization



Share of total energy supply covered by carbon neutrality targets in Southeast Asia reductions in the NZE Scenario



Source: IEA (2022), Southeast Asia Energy Outlook 2022

- Most ASEAN Member State (AMS) have announced carbon neutrality targets by 2050 and NZE by 2065
- At COP 27, 4 of the 10 ASEAN member states submitted their enhanced NDCs and 5 out of 10 AMS specified their NCD Energy Sector for emission reduction by scaling up RE and Energy Efficiency.

Policy Package for Energy Efficiency Investment



Regulation

Regulations “push” up energy efficiency across the market, including:

- Minimum energy performance standards for Industry Equipment, e.g. motor
- Mandatory Energy Management
- Mandatory disclosure programs
- Benchmarking

PUSH

Information

Information programmes to ‘lift the market’ by support regulations and incentives and informing consumer choices, including:

- Certification & Labelling
- Energy Audit programmes
- Product registries
- Information campaigns
- Education, training, capacity building
- Smart meter and Digital Technology

LIFT

Incentives

Incentives provide a “pull” to shift the market towards high-efficiency, and include:

- Tax Incentives
- Green procurement programmes
- Manufacturing and innovation grants
- Equity programmes
- Non-financial incentives
- ESCO Accreditation and Guidelines

PULL

Mandatory Energy Management System is a Common Policy for the Application of EE&C Practices in Industry



*Brunei Darussalam is expected to launch energy management policy in 2023

*Thailand threshold:

- Transformer >1,175 kVA & < 3,530 kVA; \geq 3,530 KVA
- Electrical meter >1,000 kW & < 3,000 kW; \geq 3,000 kW

- AMS required the energy intensive establishments to implement EMS in their respective energy efficiency Law, Act, or Decree.
- The threshold value and units are varied among the countries.
- **All of AMS includes industry/factory and commercial building within the scope of coverage. Indonesia, Philippines, Singapore, Vietnam are included transportation sector.**
- Malaysia, Cambodia, Lao PDR, and Myanmar, currently only covers electrical system. With aiming to expand to cover thermal system in the future.

Strategies to Decarbonise ASEAN Steel Industry



Decarbonising ASEAN Steel industry

Sources: ASEAN Energy Outlook 7th

Reducing Material Demand: Emphasizing the importance of reducing material demand through innovative design and recycling to achieve energy resilience in the iron and steel sector. This can be achieved through the optimization of steel consumed in the products at the design stage, the fabrication stage, the use stage, and the end-of-life stage

Energy Efficiency Implementation: The application of energy efficiency measures and technologies reduces fuel and electricity use and their associated CO2 emissions in the iron and steel production process. The technologies and measures are often well-known and cost-effective, providing immediate actions that can be taken in the near term to reduce the overall demand for energy from steel production

Fuel switching and electrification: Switching to lower carbon-intensive fuels can help to significantly reduce CO2 emissions associated with fuel use in ASEAN countries such as: biomass, RNG, green hydrogen for heat.

The technology shift to low-carbon iron and steelmaking, including Hydrogen DRI-EAF, Electrolysis of iron ore and Upgraded smelting reduction.

Current State of Carbon-Neutral Technological Developments in the Steel Sector



	Technology readiness	Years until plateau of productivity	Development costs ¹	CAPEX requirements ²	Operating costs ³	Public acceptance	Possibility to transform brownfield plant
CCUS	Carbon capture, use and/or storage	5-10	High	High	High	Low	High
	Carbon capture, use and/or storage with biomass	5-10	High	High	High	Low	High
Alternative reductant agent	H ₂ -based direct reduced iron – Shaft furnace	0-3	Low	High	High	High	High
	H ₂ -based direct reduced iron – Fluidized bed	5-15	High	High	High	High	High
	Suspension ironmaking technology	17-22	High	High	High	High	High
	Plasma direct steel production	20-25	High	High	High	High	High
	Electrolytic processes	20-30	High	High	High	High	High

¹ Compared to the other presented carbon neutral technologies

² Compared to CAPEX of BF-BOF greenfield plant in 2040-2050

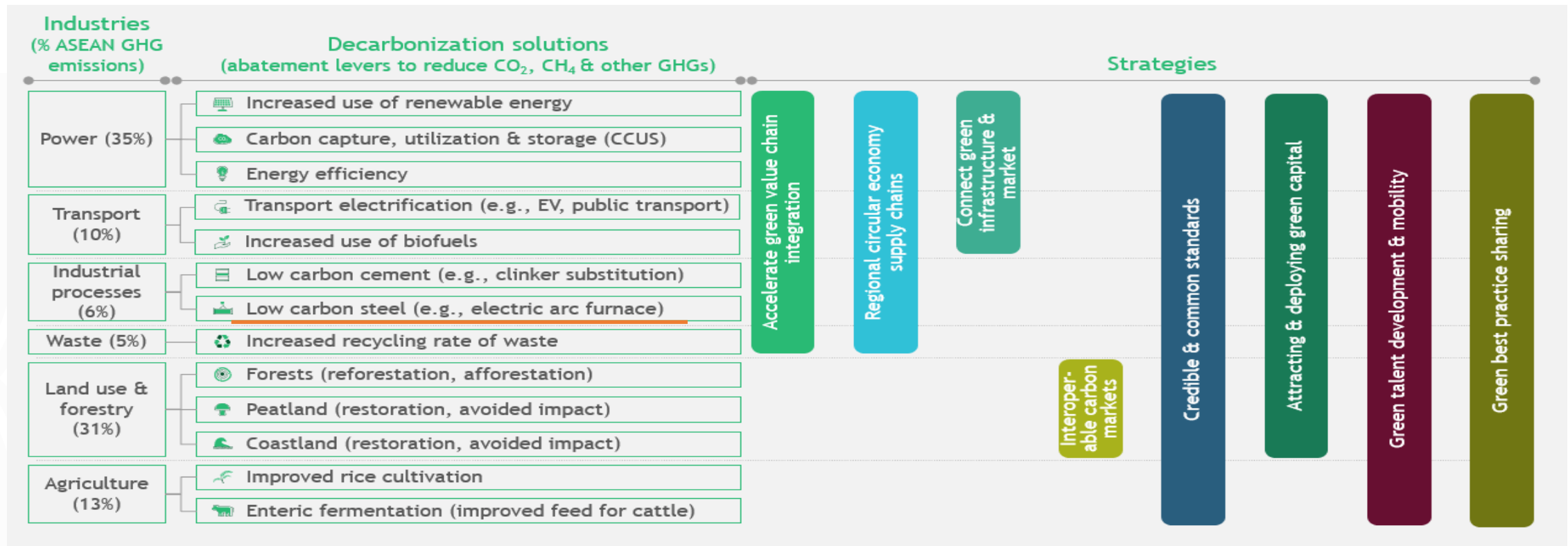
³ Compared to BF-BOF plant in 2040-2050 (incl. carbon tax)

● High ○ Low

Source: Roland Berger

Investment for ASEAN Carbon Neutrality Target

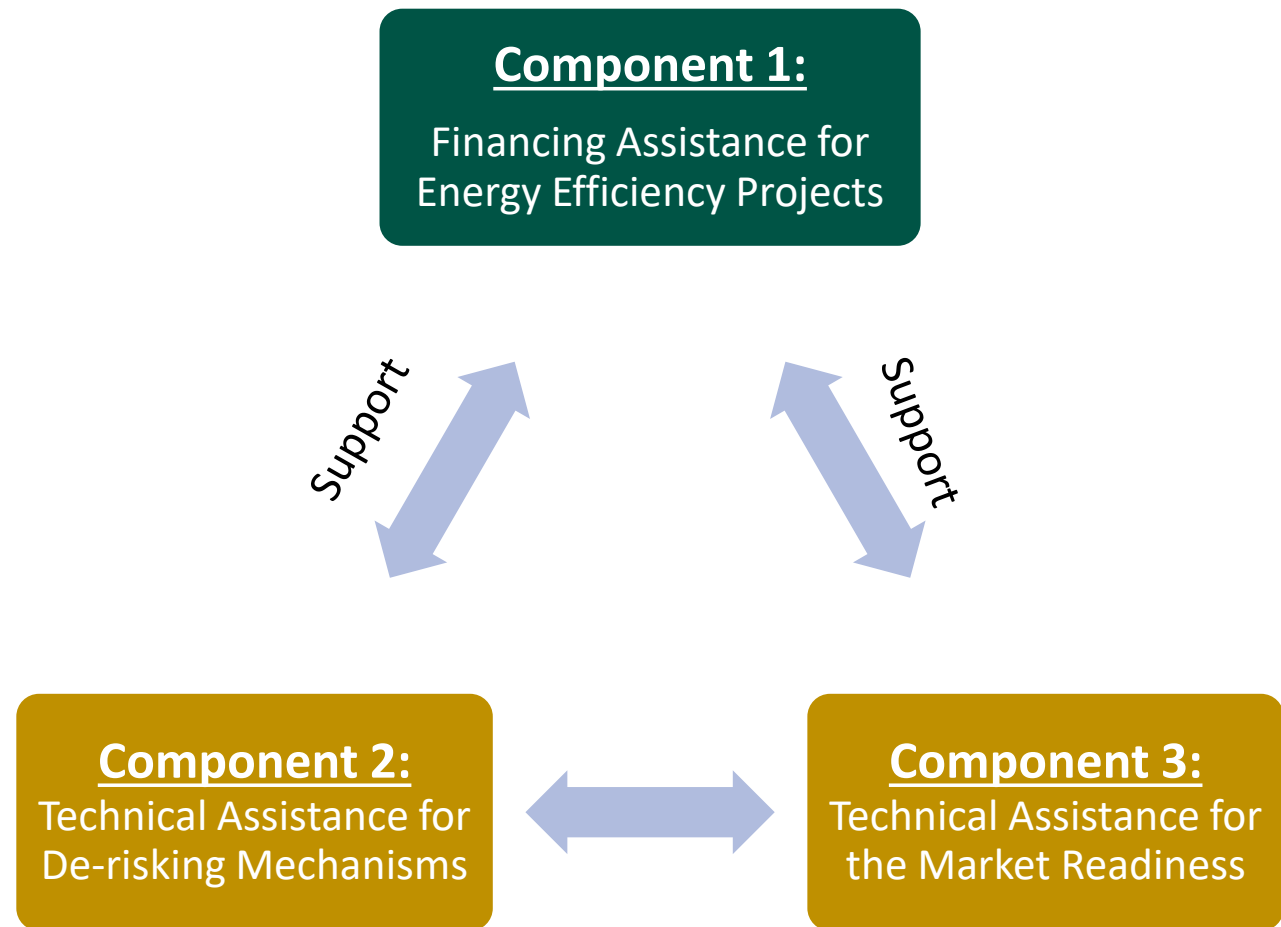
- Total investment required for meeting the ASEAN carbon neutrality target is USD 0.8- 1.1 Trillion by 2030 and USD 3.7- 6.7 Trillion by 2050.



Source: ASEAN Strategy for Carbon Neutrality

ACE-GCF Programme to Enable Private Investment in Industry Sector

- The Programme consists of **three components** designed as an integrated package **that aims to address financial, regulatory, and demand-side barriers**, accelerating the facilitation of genuine paradigm shifting outcomes.
- The TA components (Component 2 and 3) are designed to support a successful implementation of Component 1, which would lead to a genuine paradigm shift in the industrial EE sector of Indonesia, as well as those of neighbouring states beyond a single country.



Conclusion



- The iron and steel industry in ASEAN is projected to experience a significant increase in energy demand, with the industry ranking as the third most energy-intensive sector in the region. This demand is expected to triple by 2050 compared to 2020, and the industry's energy demand could be halved through interventions aimed at achieving national and ASEAN energy efficiency targets.
- The industry is facing the challenge of balancing rising steel demand with the need to decrease associated carbon emissions. ASEAN member states are significant producers of crude steel, with production volumes on the rise, and the industry is under pressure to decarbonize and shift to producing "green steel."
- To address the rising energy demand and the need for decarbonization, the iron and steel sector in ASEAN will require substantial investment, with the total investment required for meeting the ASEAN carbon neutrality target estimated to be USD 0.8-1.1 trillion by 2030 and USD 3.7-6.7 trillion by 2050. Additionally, the industry will benefit from financing assistance, technical assistance, and investment programs to enable the transition to a more sustainable and energy-efficient future.
- The ACE-GCF program is designed to enable private investment in the industrial sector by providing financing assistance for energy efficiency projects, technical assistance for de-risking mechanisms, and technical assistance for the market readiness component, including **steel industry**.



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