Ministry of Industry
REPUBLIC OF INDONESIA

BSKJI Badan Standardisasi dan Kebijakan Jasa Industri

INDUSTRI HIJAU

Indonesia's Decarbonisation and Energy Transition Opportunity in Industrial Sectors

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Center for Green Industry

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Agency for Industrial Standardisation and Service Policy
Ministry of Industry

Indonesia's Decarbonization Commitment and Emission Profile

Indonesia's Commitment and Target on Climate Change

2015
Paris Agreement

2020
Low Carbon and Climate Resillience Development

2030
Enhanced - Nationally Determined Contributions Target

2045
Indonesia Emas

2050
Net Zero Emission Industrial Sector

2060
Net Zero Emission Indonesia

Nationally Determined Contribution Target in 2030

National support **(CM1)**	International Support **(CM2)**
29%	41%

Enhanced NDC

National Support **(CM1)**	International Support **(CM2)**
31,89%	43,20%

Table 1. Projected BAU and emission reduction from each sector category

Sector	GHG Emission Level 2010* (MTon CO2-eq)	GHG Emission Level 2030 (MTon CO_2-eq)			GHG Emission Reduction (MTon CO_2-eq)		GHG Emission Reduction (% of Total BaU)		Annual Average Growth BAU (2010-2030)	Average Growth 2000-2012
		BaU	CM1	CM2	CM1	CM2	CM1	CM2		
1. Energy*	453.2	1,669	1,311	1,223	358	446	12.5%	15.5%	6.7%	4.50%
2. Waste	88	296	256	253	40	43.5	1.4%	1.5%	6.3%	4.00%
3. IPPU	36	69.6	63	61	7	9	0.2%	0.3%	3.4%	0.10%
4. Agriculture	110.5	119.66	110	108	10	12	0.3%	0.4%	0.4%	1.30%
5. Forestry and Other Land Uses (FOLU)**	647	714	214	-15	500	729	17.4%	25.4%	0.5%	2.70%
TOTAL	**1,334**	**2,869**	**1,953**	**1,632**	**915**	**1,240**	**31.89%**	**43.20%**	**3.9%**	**3.20%**

Notes: **CM1**= Counter Measure 1 (*unconditional mitigation scenario*)
CM2= Counter Measure 2 (*conditional mitigation scenario*)
*) Including fugitive.
**) Including emission from estate and timber plantations.

Industrial GHG Emission Sources

Energy

Scope 1
Scope 2

IPPU

Industrial Processes
Product Utilization

Waste

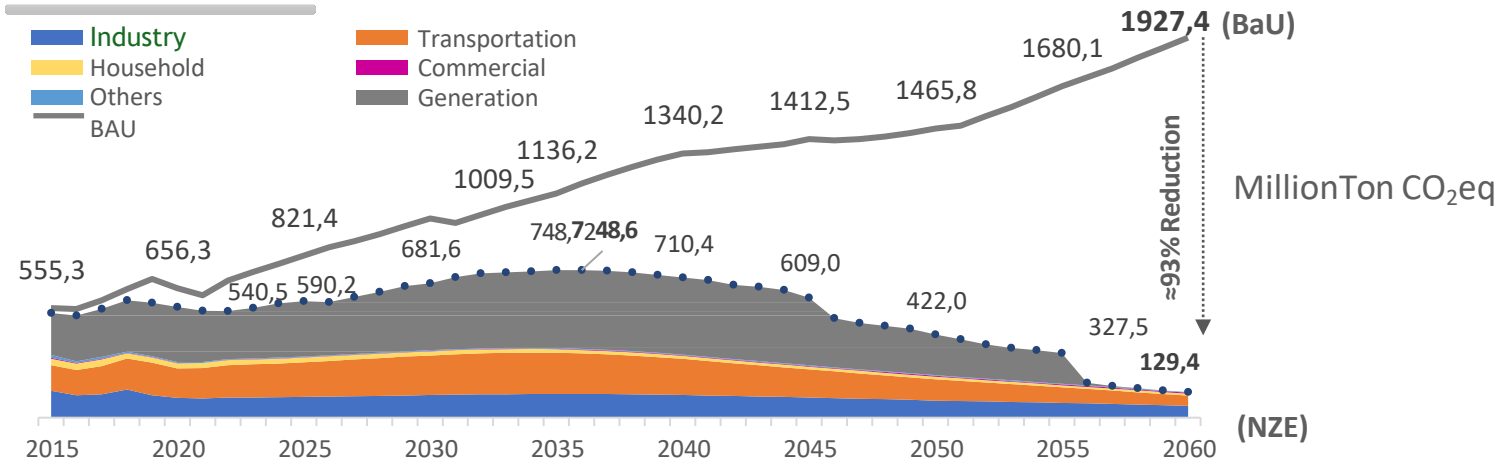
WWTP
Sludge Treatment
Solid Waste
Contaminated Materials

9 Industrial Priority Sectors

Cement Energy: Tier 3 IPPU: Tier 1	**Ammonia** Energy: Tier 1 IPPU: Tier 2	**Iron & Steel** Energy: Tier 1 IPPU: Tier 1
Pulp & Paper Energy: Tier 1 IPPU: Tier 1	**Textile** Energy: Tier 1 IPPU: Tier 1	**Chemical** Energy: Tier 1 IPPU: Tier 1
Ceramic & Glass Energy: Tier 1 IPPU: Tier 1	**Food & Beverages** Energy: Tier 1 IPPU: Tier 1	**Tansportation Vehicle** Energy: Tier 1

Tier → Level of Accuracy, the higher the better
Tier 1: Default IPCC emission factor
Tier 2: National emission factor
Tier 3: Plant based emission factor

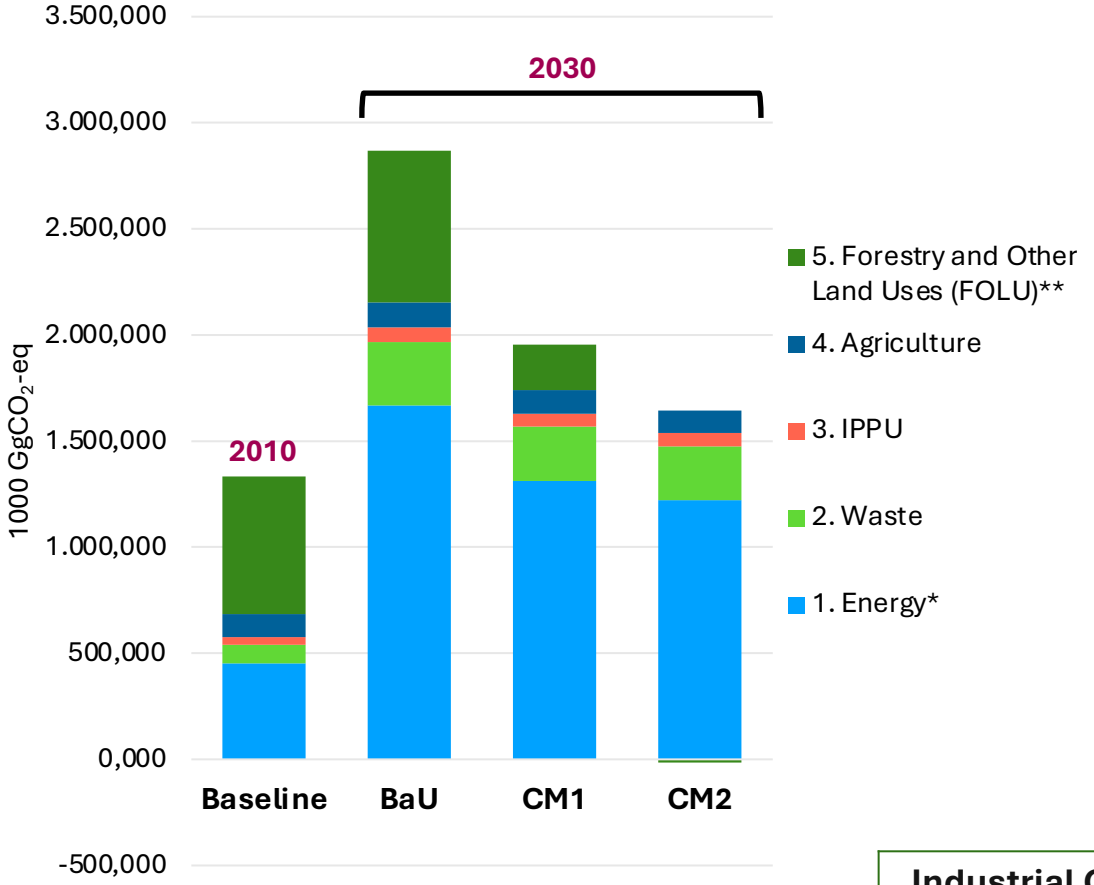
Indonesia's **Net Zero Emission 2060**

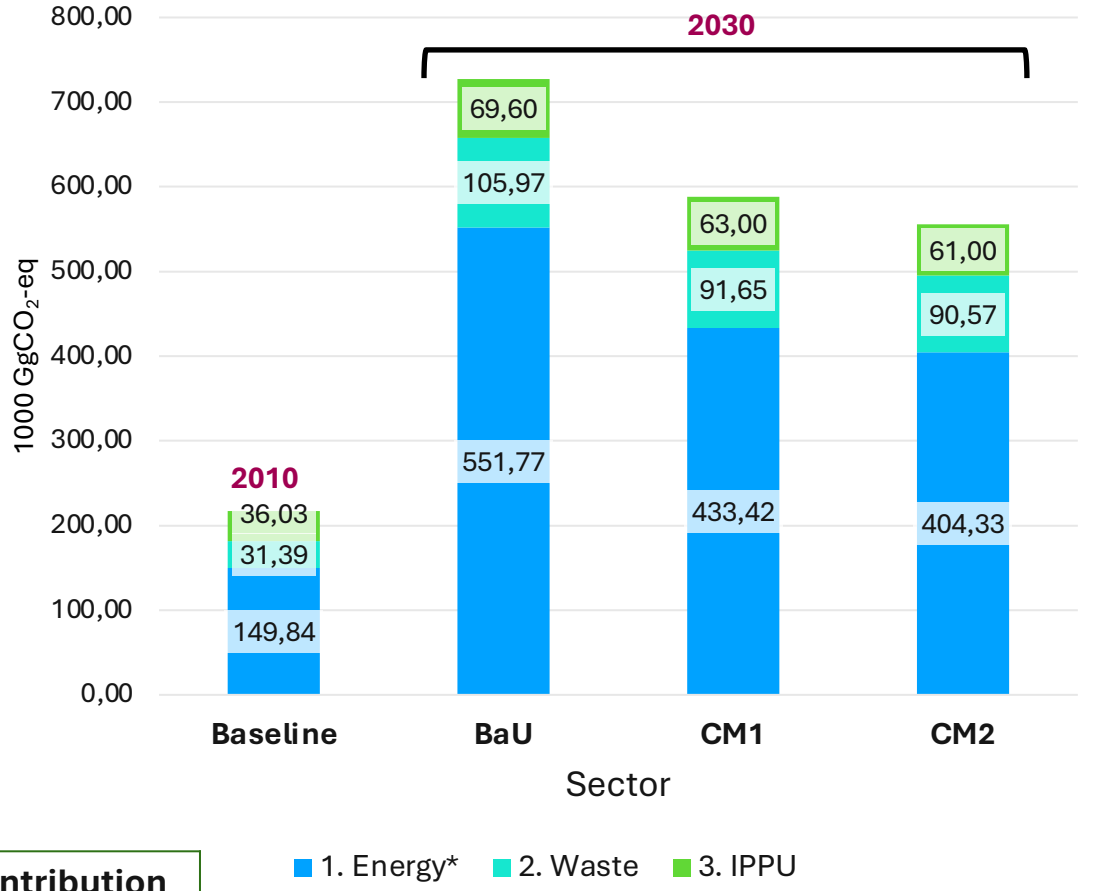


Strategy towards NZE 2060

1. Electrification
2. RE Development
3. Phasing Down and Phasing Out of Coal Power Plant
4. CCS/CCUS
5. Energy Efficiency
6. New Energy Development (Hydrogen and Ammonia)

GRK Target ENDC

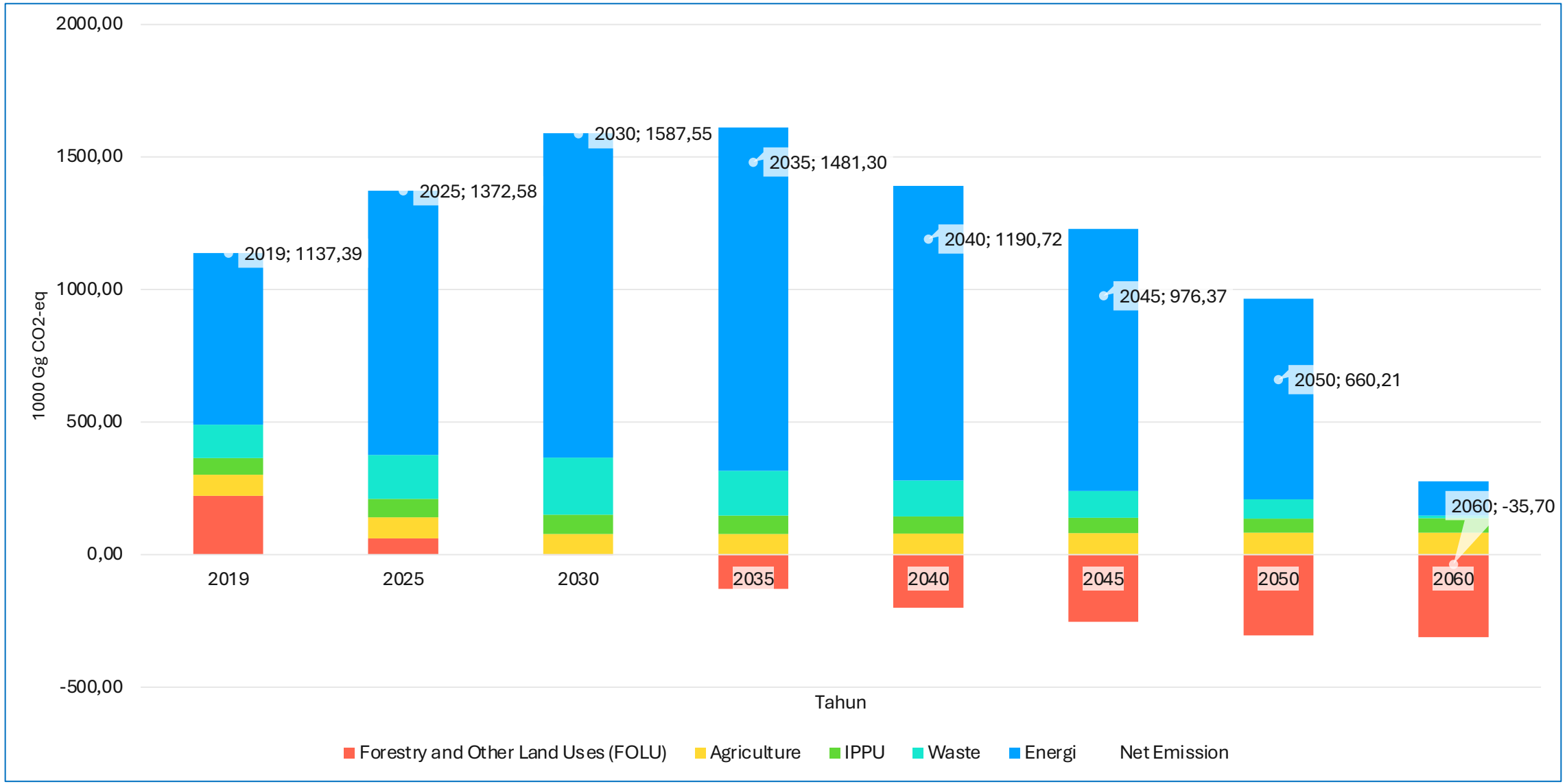




Industrial Contribution	
Energy	33,06%
Waste	35,80%
IPPU	100,00%

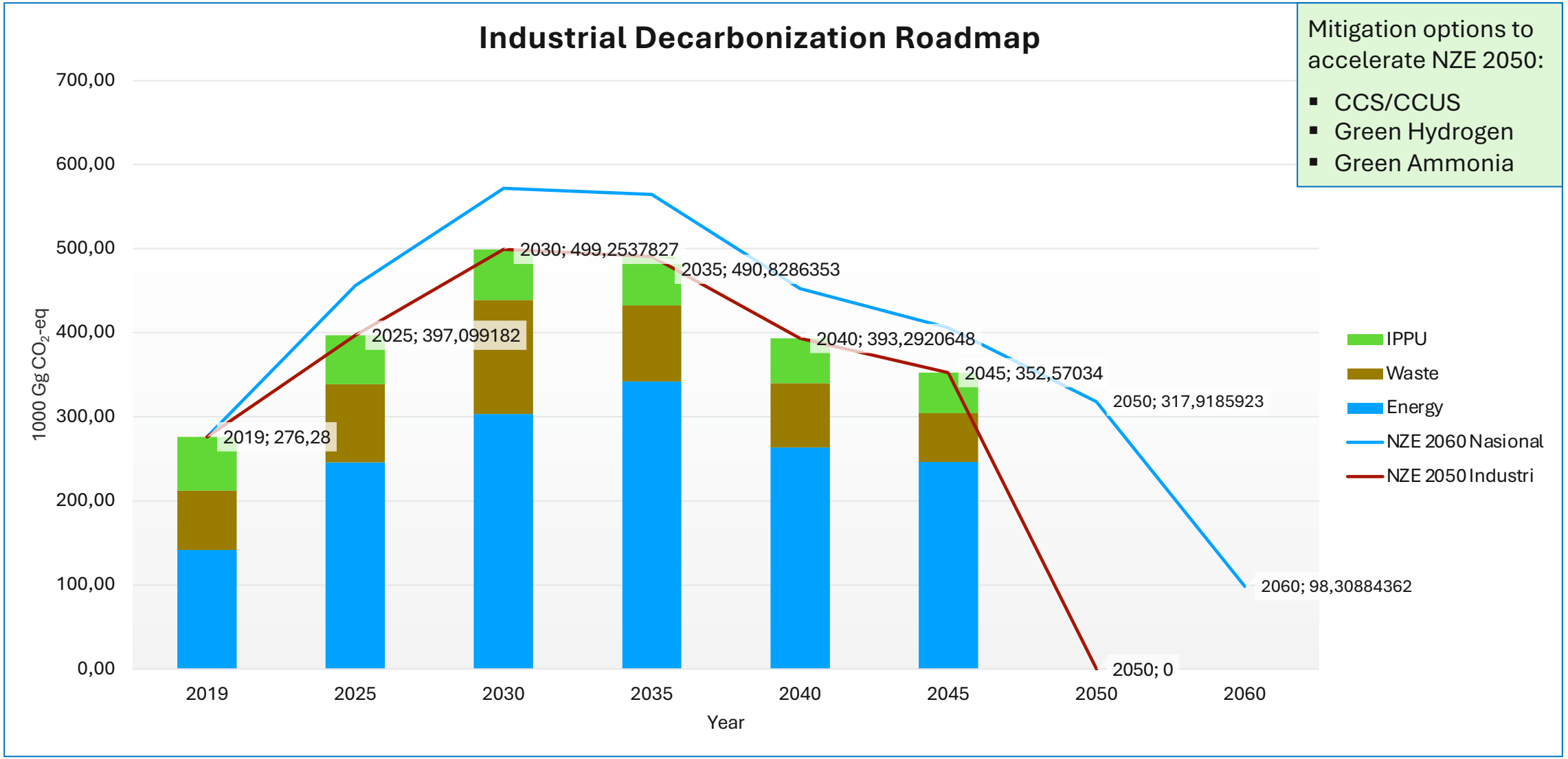
Sources: Ministry of Environment; Center for Green Industry

SNDC Target and Projection for 2035-2060



Sources: Ministry of Environment); Center for Green Industry

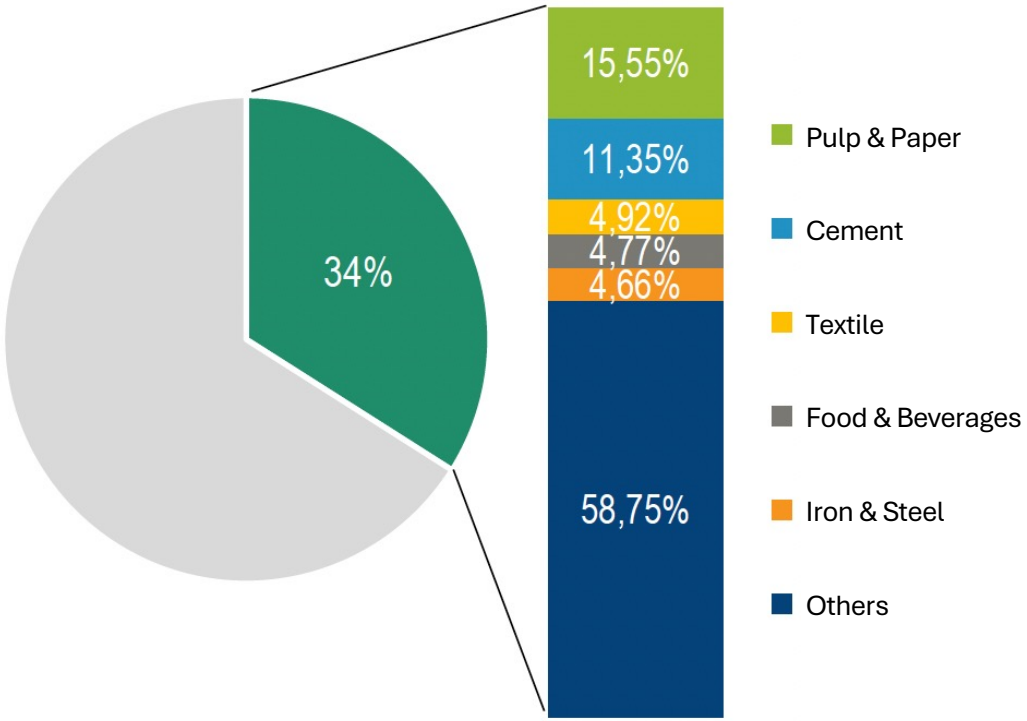
SNDC Target for Industrial Sector and Projection Towards NZE 2050



Sources: Ministry of Environment); Center for Green Industry

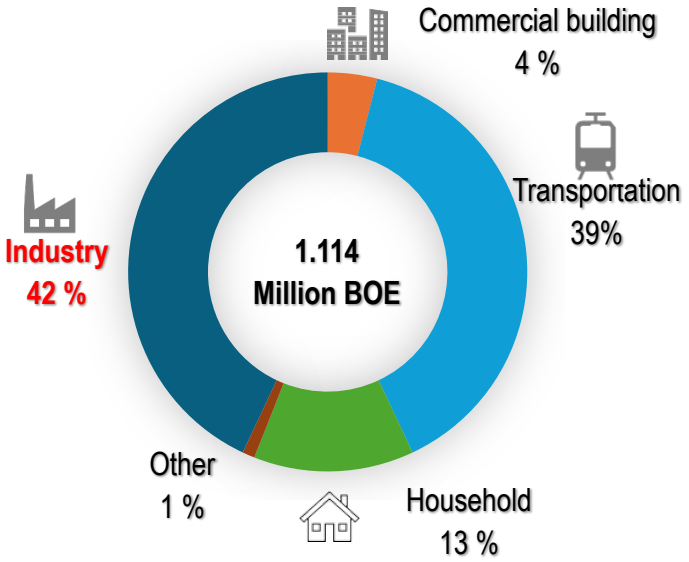
Emission Profile in Industry and Energy Profile in Indonesia

GHG Emission Profile

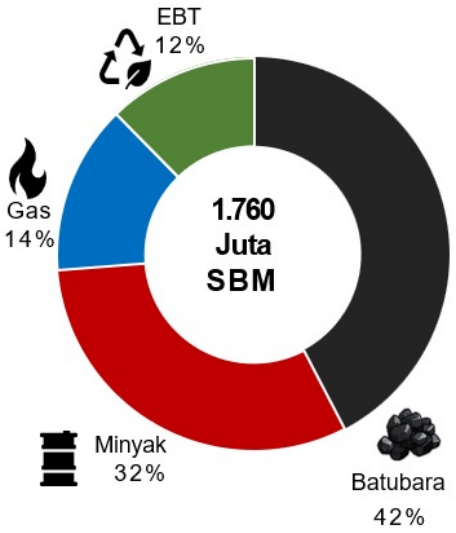


FINAL ENERGY CONSUMPTION AND PRIMARY ENERGY (EXCLUDING BIOMASS) IN 2022

FINAL ENERGY



ENERGI PRIMER



Source: World Resources Institute

Source: Ditjen EBTKE MEMR 2023

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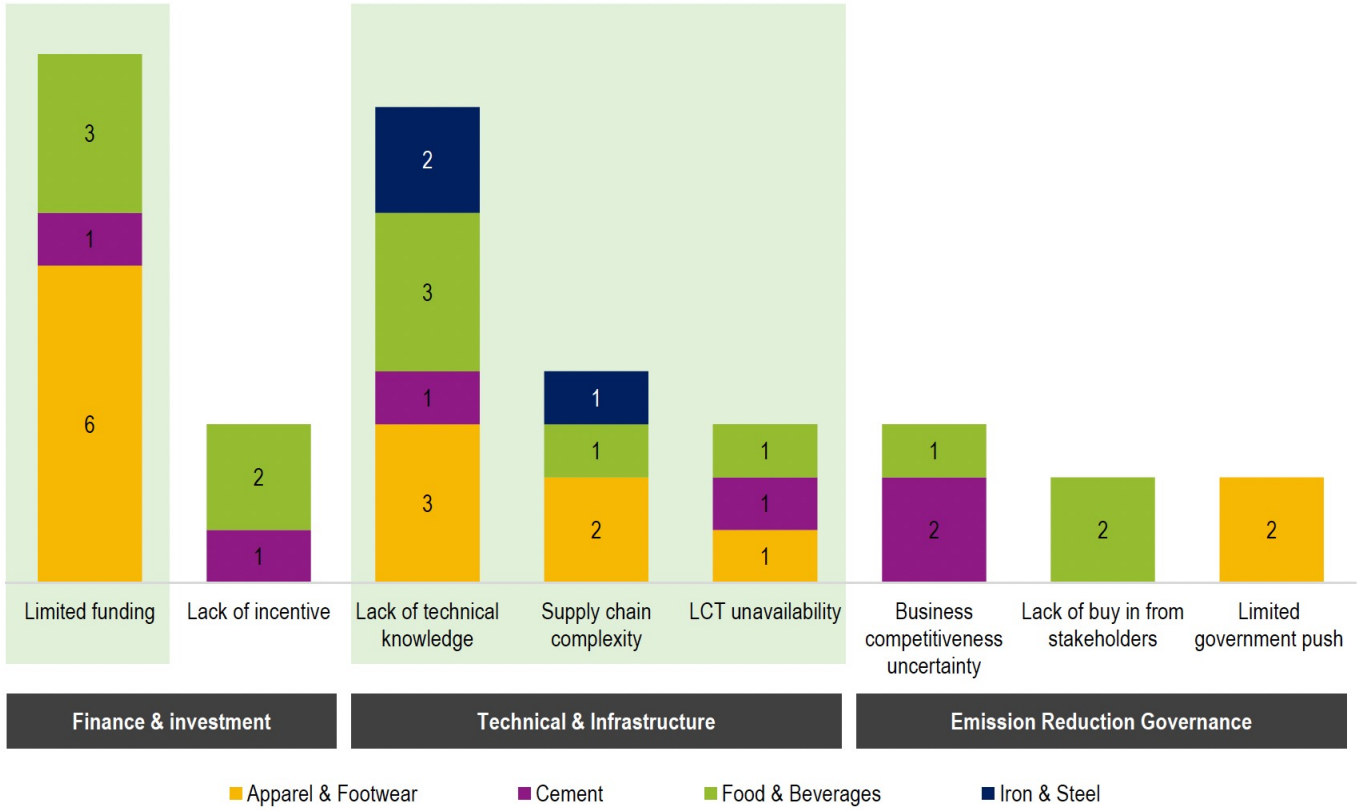
Indonesia's Challenges on Energy Transition and Decarbonization

Center for Green Industry

Industries' Biggest Challenges on Decarbonization

Industries Biggest Challenge towards Decarbonization



Biggest challenges for industries in general:

45%

Limited funding

Low funds to invest towards net zero transformation

41%

Lack of technical knowledge

Limited skilled human resources and ever-evolving climate policies

18%

Supply chain complexity

High dependency on the suppliers; resulting in significant Scope 3 emissions

Source: Surveyed from 22 out of 50 KADIN NZH (Net Zero Hub) & CEIA (Clean Energy Investment Accelerator) members in four sectors who have at least signaled their intention to decarbonize.

Clean Energy Supply

Green Electricity Supply

Green electricity supply

- 64% — Self-generation (e.g. RtS)
- 9% — Unbundled Renewable Energy Certificate (REC)
- Direct contract with power plant (PPA)
- Contract with power utility (e.g. green tariff)

Current state of green electricity procurement

27,3% of industries **have not procured green electricity**

Current issues:
- Limitation of self-generation capacity
- Sustainability issues around unbundled REC

Available supply Unavailable supply

Clean Heat Supply

Clean heat supply

- 6% — Electrified heat from clean source
- 50% — Fuel switching (biomass, natural gas, co-firing biomass with fossil fuel)
- 0% — RE direct use for heating (renewable gas, green hydrogen)

Current state of clean heat procurement

55,6% of industries **have not procured clean heat**

Current issues:
- Limited availability, price uncertainty (biomass)
- Grid is not yet green for electrification

Source: Surveyed from 22 out of 50 KADIN NZH (Net Zero Hub) & CEIA (Clean Energy Investment Accelerator) members in four sectors who have at least signaled their intention to decarbonize.

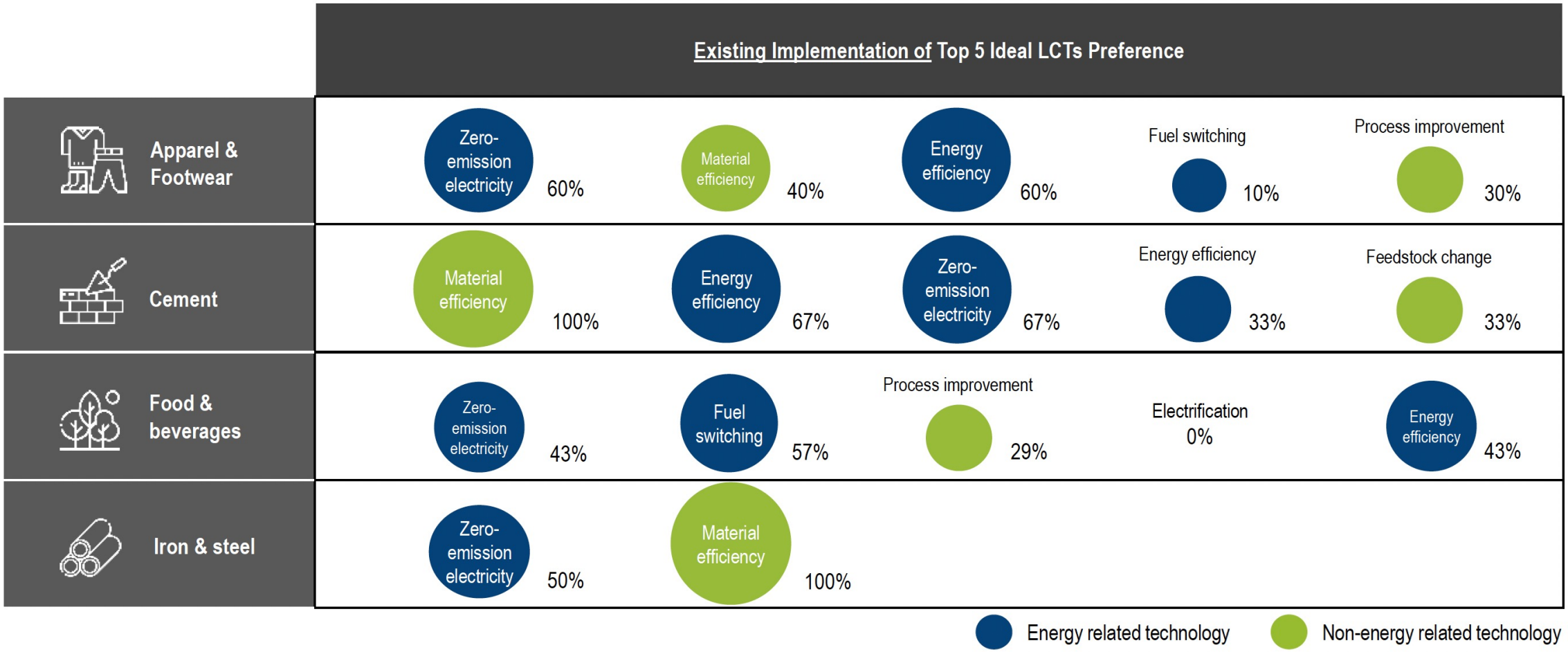
Technological Issues

	Top 5 Ideal LCTs Preference				
Apparel & Footwear	1. Zero-emission electricity	2. Resource efficiency	3. Energy efficiency	4. Fuel switching	5. Process improvement
Cement	1. Resource efficiency	2. Fuel switching	3. Zero-emission electricity	4. Energy efficiency	5. Feedstock change
Food & beverages	1. Zero-emission electricity	2. Fuel switching	3. Process improvement	4. Electrification	5. Energy efficiency
Iron & steel	1. Zero-emission electricity	2. Resource efficiency			

Energy related technology
Non-energy related technology

Source: Surveyed from 22 out of 50 KADIN NZH (Net Zero Hub) & CEIA (Clean Energy Investment Accelerator) members in four sectors who have at least signaled their intention to decarbonize.

Gap of LCTs Solutions & Implementation



Source: Surveyed from 22 out of 50 KADIN NZH (Net Zero Hub) & CEIA (Clean Energy Investment Accelerator) members in four sectors who have at least signaled their intention to decarbonize.

Green Industry Building Block

Technology & Infrastructure

Green electricity
Increase quality, diversify, & make options accessible

Clean heat
Increase adoption, create incentive for new technology development, & unlock cross-sectoral deep decarbonization

Other LCTs
Push for options, develop ecosystem, & mainstream new technologies

Finance & Investment

State-based instruments
Allocate national budget & prepare institutional settings to incentivize decarbonization

Market-based instruments
Establish a fully functioning & high-quality carbon pricing mechanism & instruments, as well as mature market for climate responsive financial product & blended finance

Emission Reduction Governance

Decarbonization roadmap
Establish emission reduction pathways for industries, promote adoption in a phased-based manner

Secured market demand
Harmonize product standard, build demand in domestic market, & prepare for international market

MRV
Establish integrated platform & mechanism, promote adoption in a phased-based manner

Opportunity on Energy Transition and Decarbonization

Industrial Decarbonization Strategy

- Industrial Decarbonization Roadmap
- Industrial Carbon Pricing Mechanism
- Green Industry Standard
- Industrial Symbioses, Resource Reuse, and Circular Economy
- Carbon Capture and Utilization
- Industrial Emission Threshold and Emission Exchange Mechanism

9 Industrial Priority Sectors

Cement	**Ammonia**	**Iron & Steel**
Pulp & Paper	**Textile**	**Chemical**
Ceramic & Glass	**Food & Beverages**	**Tansportation Vehicle**

Green Industry Ecosystem

Problem: Awareness is high, but lack of CAPEX capability

Institutional

It is a business unit that has official legal status in Indonesia, and has an appropriate business scope

Targeted Industries

Sustainable

Making efforts to continuously improve human resource and institutional capacity

Competence

Have certified HR and organizational competencies according to needs

Green Financing Provider

Strategic Alliance

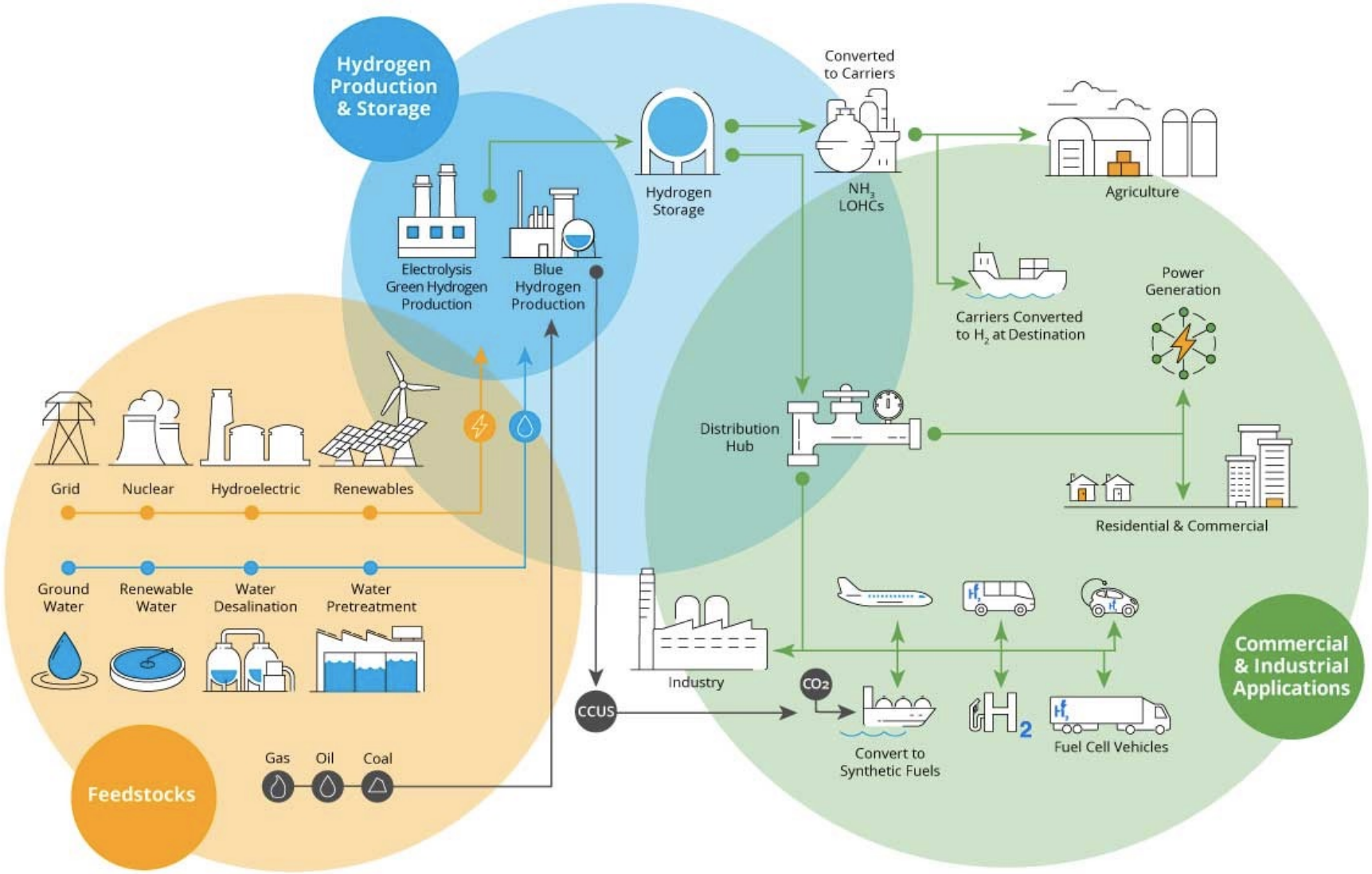
Have and build strategic alliances with Green Financing Providers and environmentally friendly technology providers

- Investment grade audit
- Demand driven green financing
- Cost recovery through Cost efficiency

Turn Key Project

- Cost of Transformation
- Potential Emission Reduction
- Potential Energy Efficiency
- Potential Cost Efficiency

New Opportunities



Low Carbon Technology (LCT)

No.	Sub-sectors	Strategic Technology and Process		
		Process with biggest emission	Decarbonization Strategy	Crucial Technology
1	Cement	Clinker calcination and cement mill	• Reduction of clinker ratio • Use of alternative fuels (biomass, natural gas, hydrogen) • Use of renewable energy	• Reduction of clinker to cement ratio • Clinker material replacement • Biomass for rotary kiln • Solar PV and REC
2	Fertilizer	Steam methane reforming	• Fuel change and process improvement (integrasi and control) • Retrofit turbin gas and steam • Increased energy efficiency and energy recovery	• Hydrogen-based ammonia synthesis • CCS and biomass gasification • Heat pump, heat exchanger • Retrofit technology
3	Iron and Steel	Primary steel making	• Fuel change and process improvement (integration and control) • Retrofit of gas and steam turbines • Improvement of energy efficiency and energy recovery	• Direct Reduced Iron Furnace • Electric blast furnace and Electrowinning • Solar PV and REC
4	Pulp and Paper	Steam for pulping and paper making	• Electrification of thermal equipment • Use of alternative fuels (biomass, natural gas, hydrogen) • Increased energy efficiency and energy recovery	• Electric boiler/biomass boiler • Heat pump, heat exchanger • Pyrolysis process for oil recovery
5	Chemical	Steam reforming/cracking, MTO, and gasification	• Energy efficiency and energy recovery improvements • Fuel change and process improvement	• High-efficiency manufacturing technology • Heat pump, heat exchanger • Hydrogen-based methanol synthesis • Biomass gasification
6	Food and Beverages	Steam & food processing: heating, drying, cooling, mixing, and cold storage	• Electrification and use of green electricity • Increased energy efficiency and energy recovery	• Electric boiler/biomass boiler • Solar PV and REC • High efficiency chiller
7	Textile	Fabric processing: texturizing, dyeing, drying, finishing for fabric production.	• Electrification and use of green electricity • Use of alternative fuels (biomass, natural gas, hydrogen) • Increasing energy efficiency in production equipment	• Electric boiler/biomass boiler • Electrochemical dyeing • Solar PV and REC • High-efficiency manufacturing technology
8	Automotive	Manufacturing and assembly	• Increasing energy efficiency and energy recovery • Electrification and the use of green electricity	• High-efficiency technology (assembly line) • Heat exchanger • Solar PV and REC
9	Glass and Ceramic	Melting process, coloring and drying	• Energy efficiency and energy recovery • Electrification and renewable energy use • Process improvement for dyeing and raw materials	• Electric furnace • Heat pump, heat recovery • Pendesainan kiln and dryer • High-efficiency manufacturing technology

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THANK YOU

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