

Carbon Neutrality in Korea

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Tae Yong Jung
Graduate School of International Studies
Yonsei University, Korea

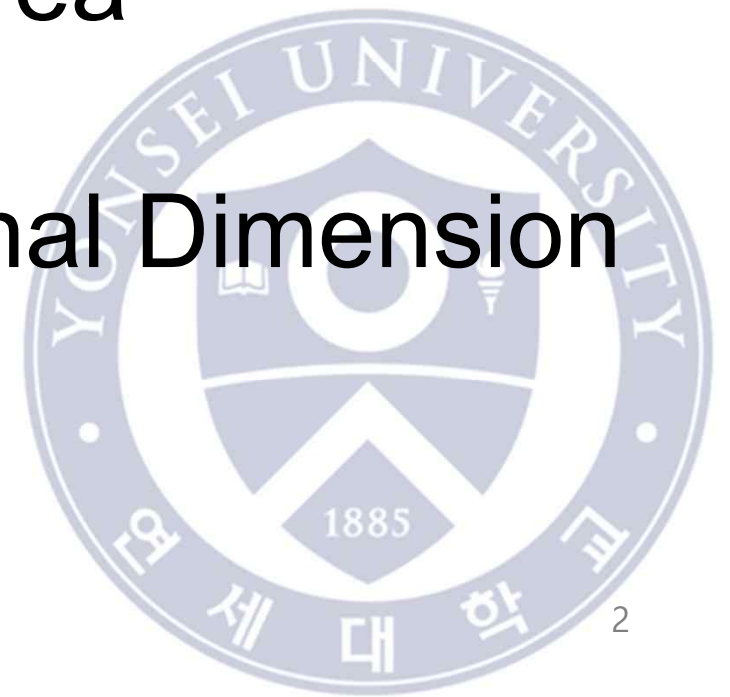


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3. Suggestions: International Dimension



1. 4D Mega-trends in the 21st century

- Digital transformation
- De-carbonization
- De-centralization
- Demographic change



Digital transformation

- Electrification: Rapid Increase of Electricity Demand in every sector;
 - Primary sector/Industrial sector: Robot + Automation, smart system,..
 - Service sector: AI Data Center, Big Data Analysis..,
 - End-user sector: personal digital devices
 - Transport sector: electric car, hybrid car,..
- Energy Storage (Electricity) System
- Too fast technology development and application → difficulty in human adaptation (digital illiteracy)
- Electricity Demand >> Supply → Huge investment requirement → How to provide electricity?

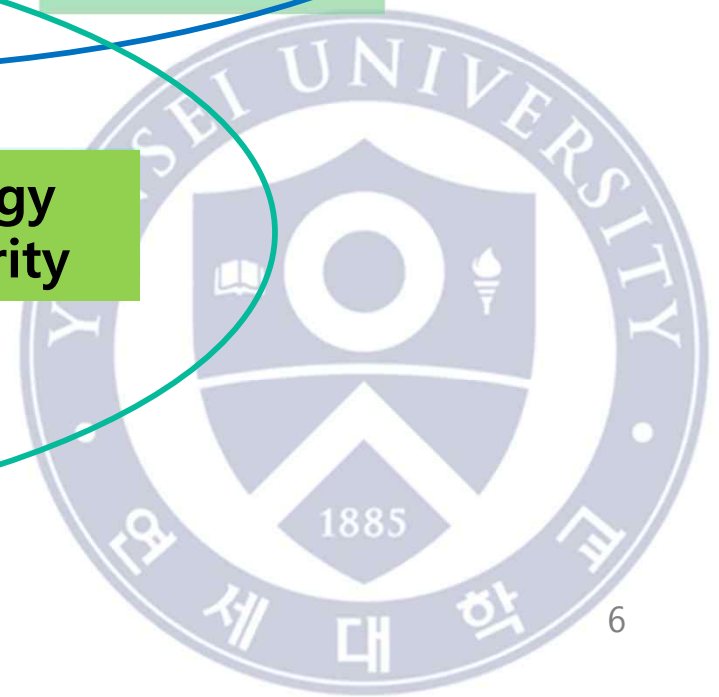
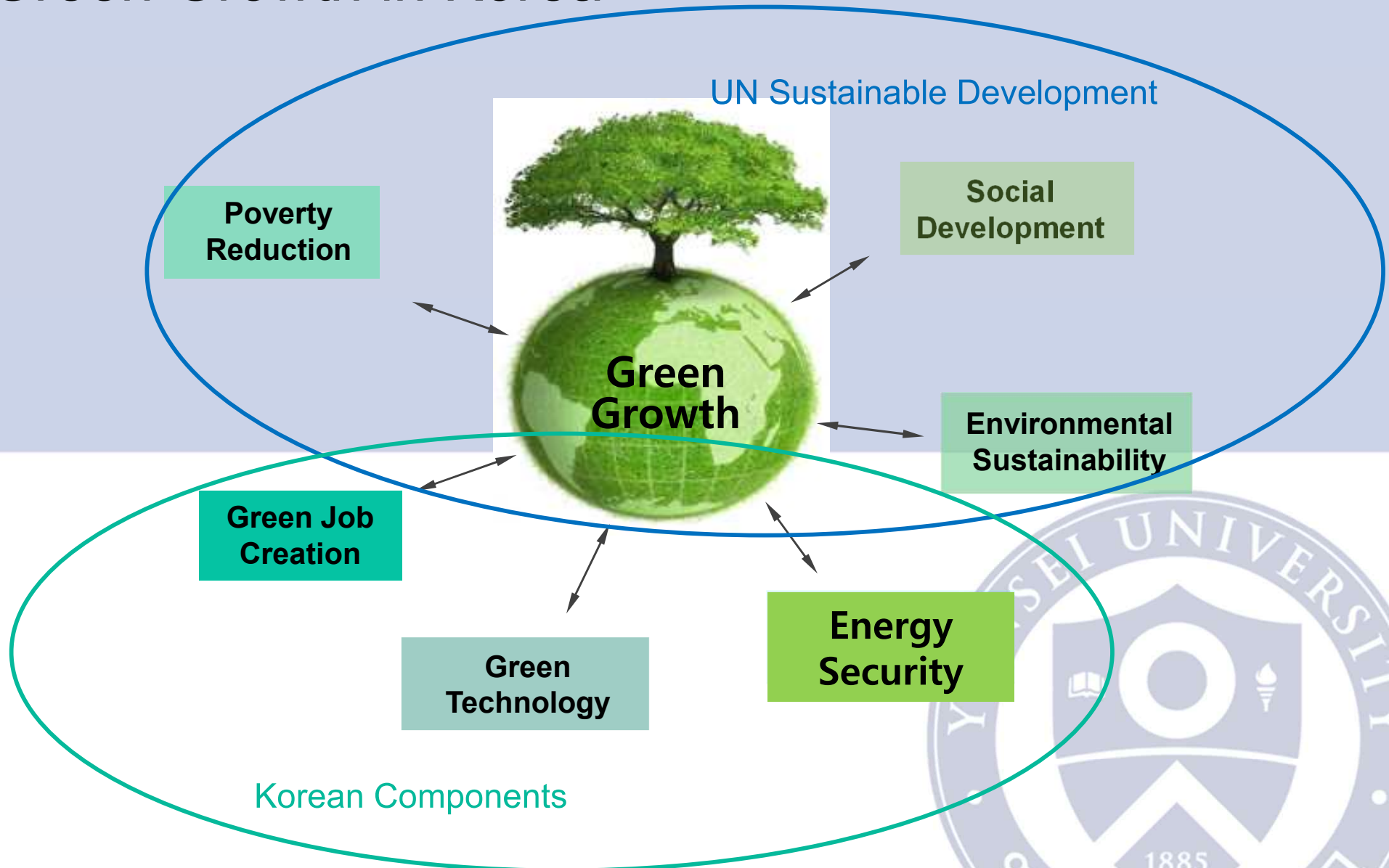


De-carbonization

- Climate change (crisis)
 - Cost and Damage of climate disaster is getting larger → Beyond control?; Flooding in Pakistan (2022), Wildfire in LA (2025), ...
 - Global GHG emissions keep increasing → over 1.5 degree target
- Unstable international orders; Wars in Europe, Middle East, US-China tension,.... → Every Country's concern: Energy Security (Domestic energy sources and non-fossil fuel technology)
- Need for Flexible Energy System
- Decoupling Economic Growth and Environmental Burden → Green Growth (Green Economy)

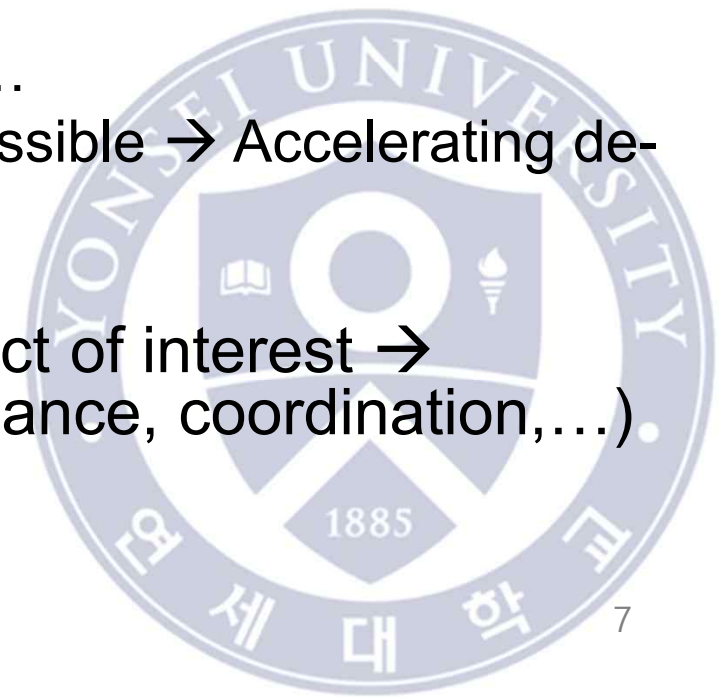


Green Growth in Korea



De-centralization

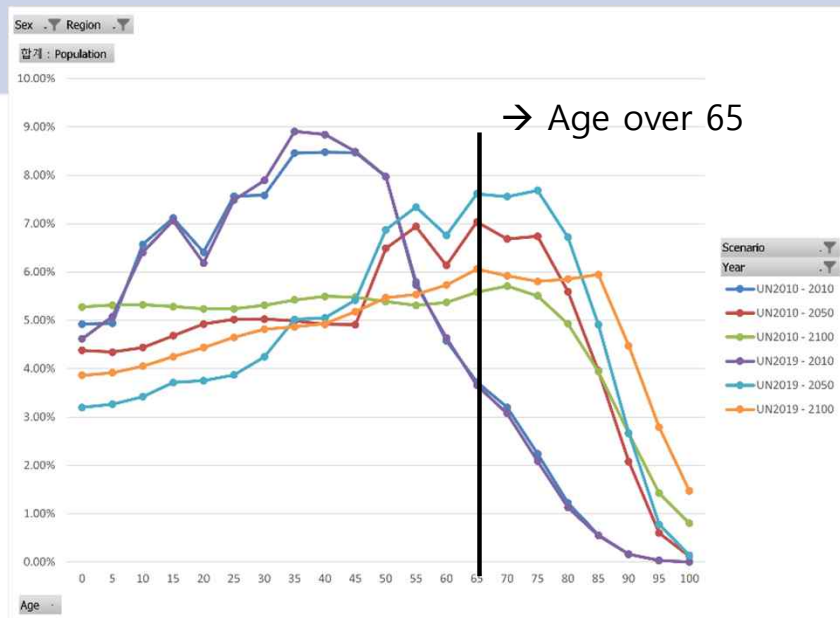
- Governance
 - Public sector: Central government → Local government
 - Top-down → Bottom-up (in decision making process)
 - Public-driven in most countries → Multi-stakeholders
- Communication
 - Supply-driven communication → Demand-driven
 - Unilateral information source/channel → Bilateral communication, multiple sources of information
 - Public/formal channels → Private/SNS,...
 - Monopolizing information is almost impossible → Accelerating de-centralizing trends
- Social systems to meet diversified/conflict of interest → various/multiple systems (check and balance, coordination,...)



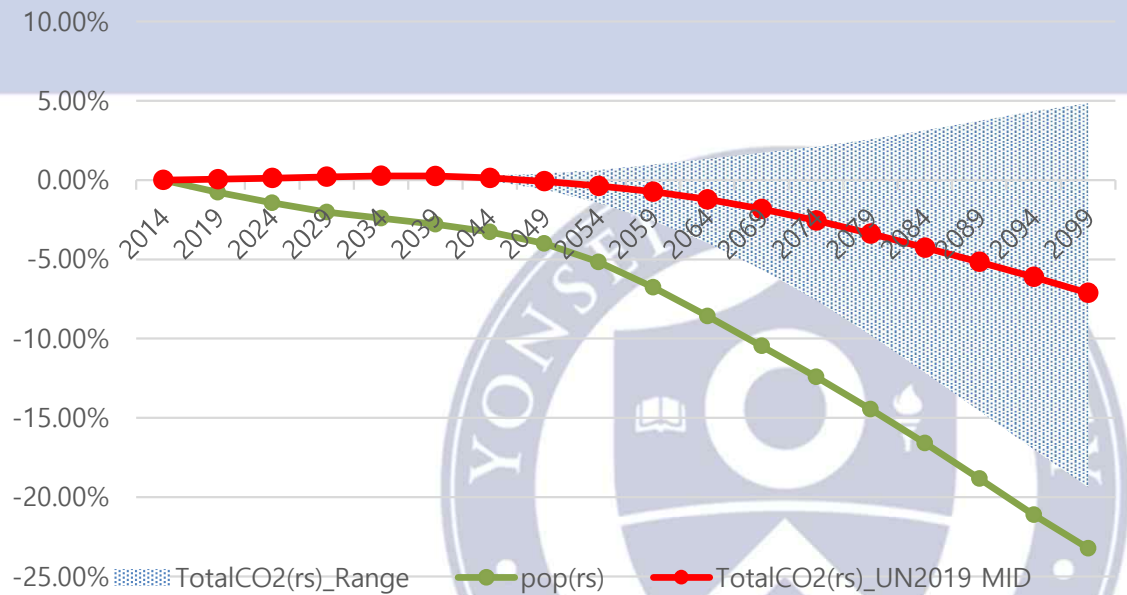
Demographic change

- Aging society with low total fertility rate: Northeast Asian countries (China, Korea, Japan) → Population decrease!
 - Implication to GHG emission: decrease
 - Age group over 65 is increasing → CO2 ?

Korea

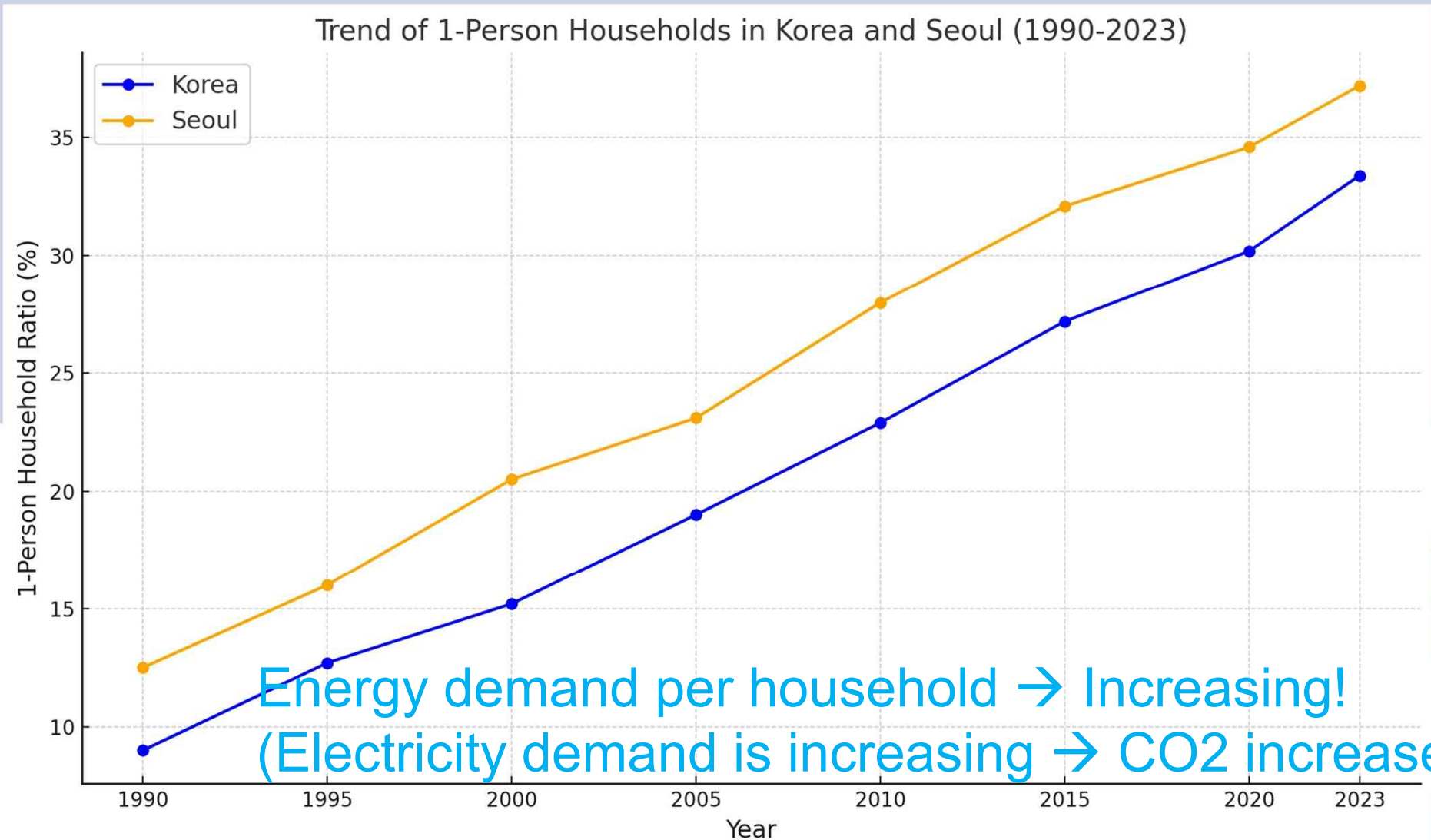


Source: World Population Prospect 2019, UN

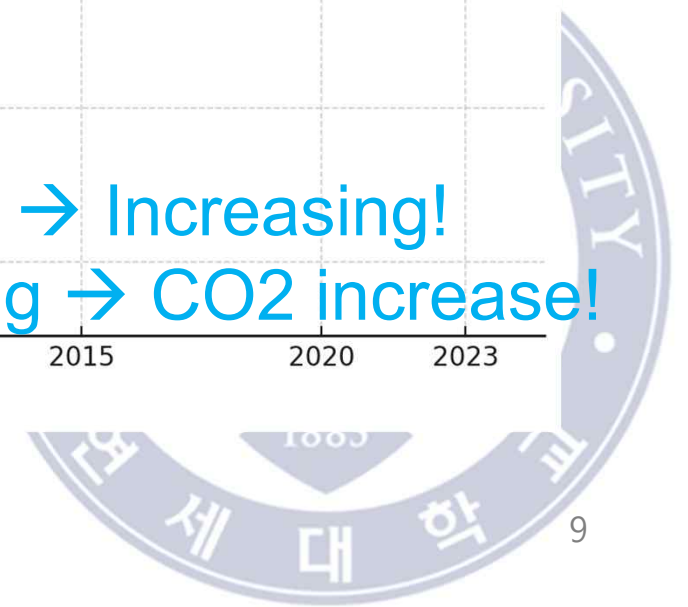


Source: The Impact of Demographic Changes on CO₂ Emission Profiles: Cases of East Asian Countries, Jung, TY, Kim YG and Moon JW, Sustainability, 2021

Trends of 1-Person Households in Korea and Seoul



Source: KOSTAT. 2023 numbers: Estimates



2. Carbon Neutrality in Korea



Trends of Korea's
Greenhouse Gas
Emissions



Korea's 2030 NDC
Target



Carbon Neutrality:
National Basic Plan for
Carbon Neutrality and
Green Growth



Key Issues 1:
Preparation of 2035
NDC



Key Issues 2:
Constitutional Court's
Decision on National
GHG Reduction Target





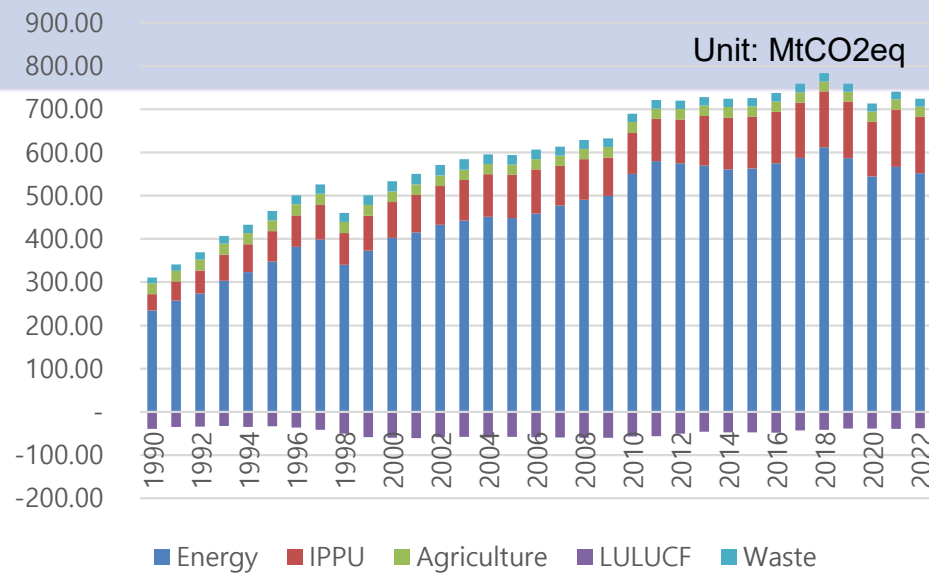
Trends of Korea's Greenhouse Gas Emissions



Trends of Korea's Greenhouse Gas Emissions

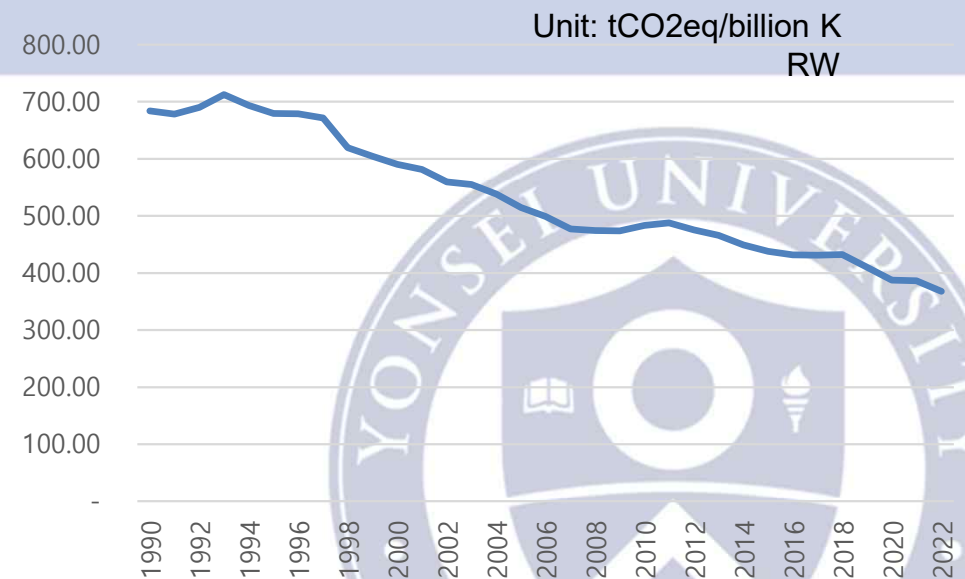
- National GHG emissions reached a peak in 2018 and continued to decline afterward
- GHG intensity (GHG emissions / Real GDP) continues to decrease

Greenhouse Gas Emissions



Source: GIR (2025), Greenhouse Gas Inventory

GHG Intensity



Source: GIR (2025), Greenhouse Gas Inventory



Korea's 2030 NDC Target

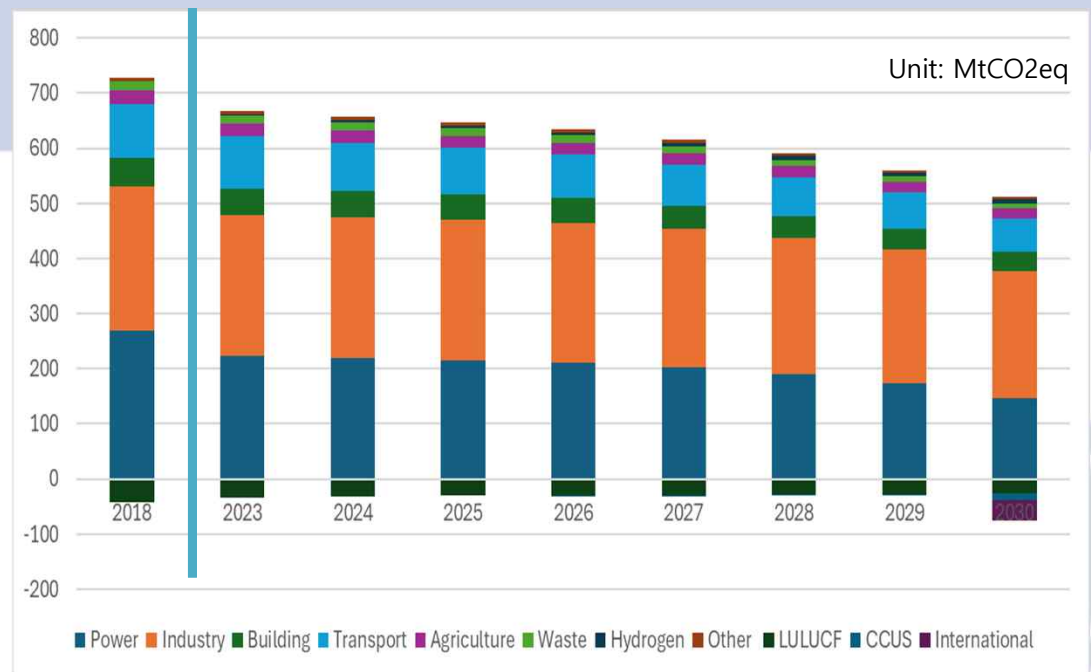


Korea's 2030 NDC Target

- Larger contribution from the Power sector, but less contribution from the Industry sector
 - Additional reduction of 4 MtCO₂eq by further deployment of clean energy sources (solar, hydrogen, etc.)
 - Hydrogen supply, domestic CCS potential, and international reduction

	2018	NDC(2021)		UPDATED NDC(2023)	
	MTCO ₂ EQ	MTCO ₂ EQ	%	MTCO ₂ EQ	%
Emissions	727.6	436.6	-40.0%	436.6	-40.0%
Power	269.6	149.9	-44.4%	145.9	-45.9%
Industry	260.5	222.6	-14.5%	230.7	-11.4%
Building	52.1	35	-32.8%	35	-32.8%
Transport	98.1	61	-37.8%	61	-37.8%
Agriculture	24.7	18	-27.1%	18	-27.1%
Waste	17.1	9.1	-46.8%	9.1	-46.8%
Hydrogen	0	7.6		8.4	
Other	5.6	3.9		3.9	
LULUCF	-41.3	-26.7		-26.7	
CCUS	0	-10.3		-11.2	
International	0	-33.5		-37.5	

National GHG emission targets by year and sector



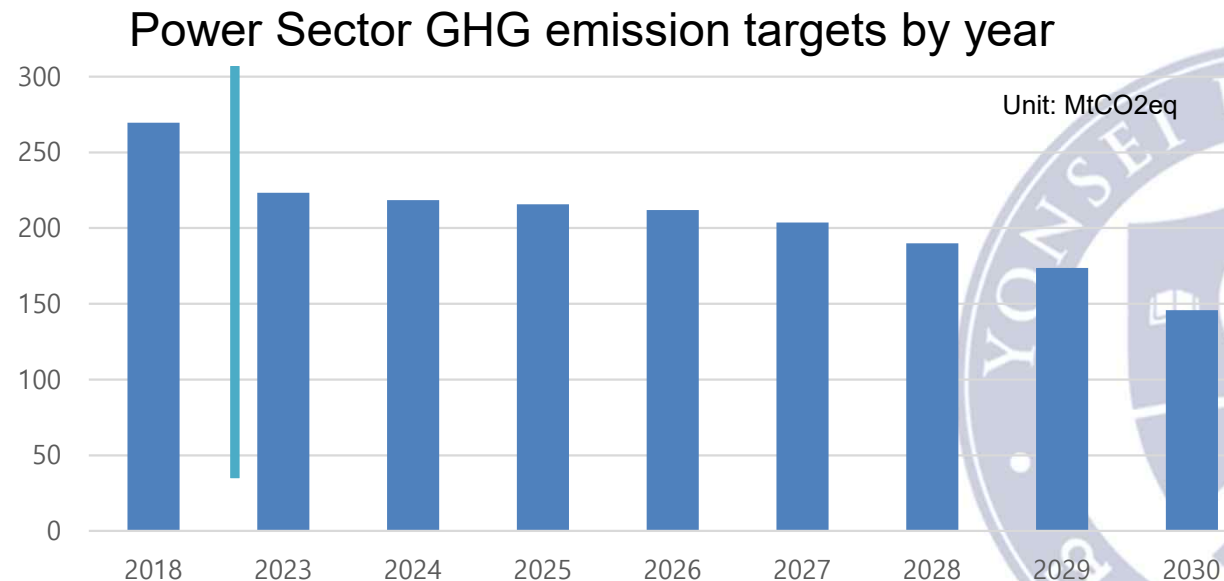
Source: Korean Government (2023), The Basic Plan for Carbon Neutrality and Green Growth



Korea's 2030 NDC Target by Sector

Power Sector

- **Reducing coal power generation** and expanding **nuclear and renewable energy** (32.4% of power generation from nuclear and over 21.6% of power generation from renewable energy by 2030)
 - Shut down aged power plants and shift towards LNG (Liquefied Natural Gas)
 - Uptake of solar and wind power
 - Support R&D of energy efficiency improvement of renewable energy facilities and improve power grids

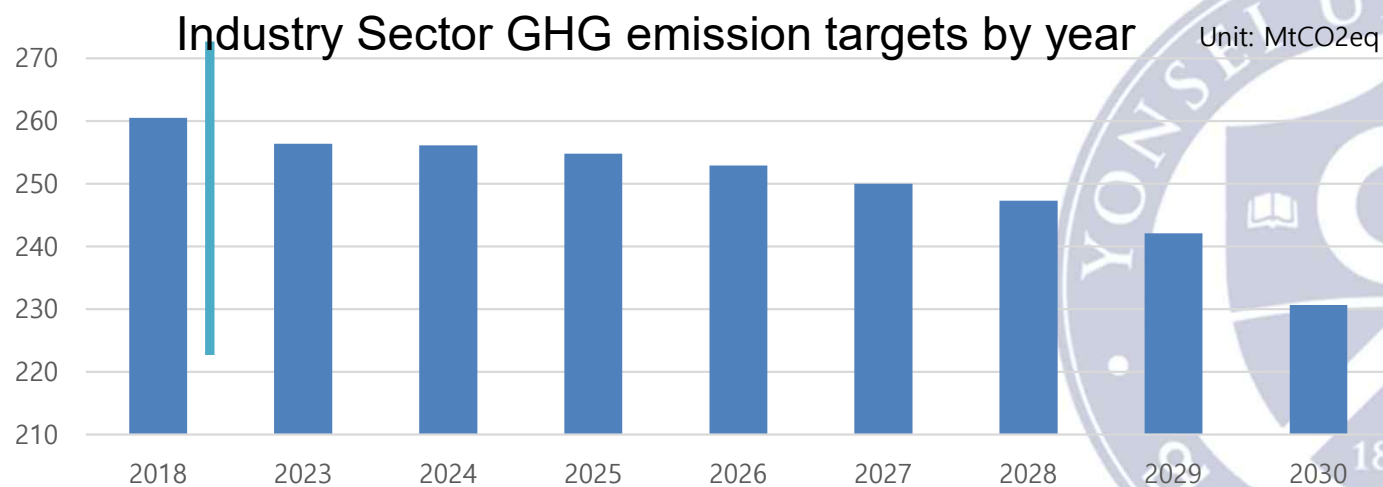


Source: Korean Government (2023), The Basic Plan for Carbon Neutrality and Green Growth

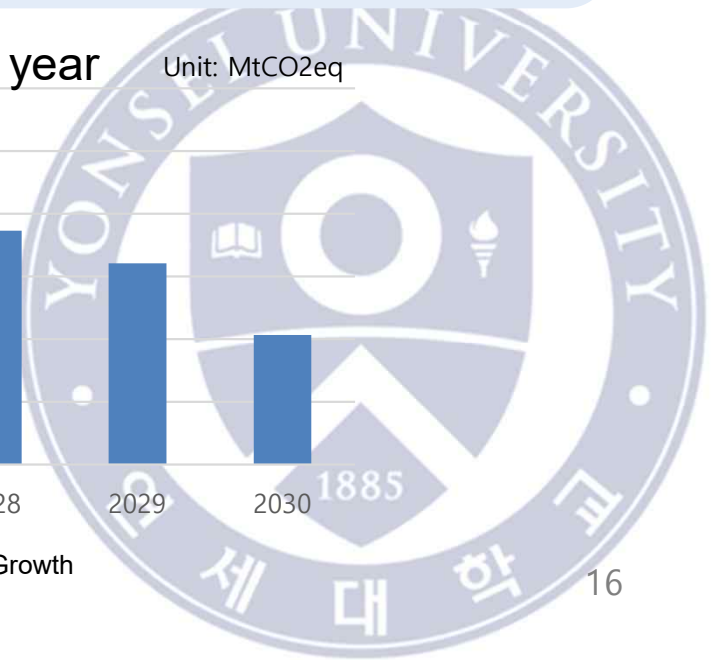
Korea's 2030 NDC Target by Sector

Industry Sector

- Focusing on a **low-carbon transition in emission-intensive sectors**
 - Utilization of electric arc furnace(EAF) in the steel sector
 - Potential use of bionaptha as a feedstock instead of naphtha in the petrochemical sector
 - Improve energy saving rate and potential use of waste synthetic resin in the cement sector
 - Further reduction in fluorinated GHG emissions in semiconductor and display sectors
- **Enhancing Korean ETS** with stricter benchmarks and expanded coverage
- Support **innovation and technology** for carbon reductions
 - Support private investment through grants, loans, and funds



Source: Korean Government (2023), The Basic Plan for Carbon Neutrality and Green Growth



Korea's 2030 NDC Target by Sector

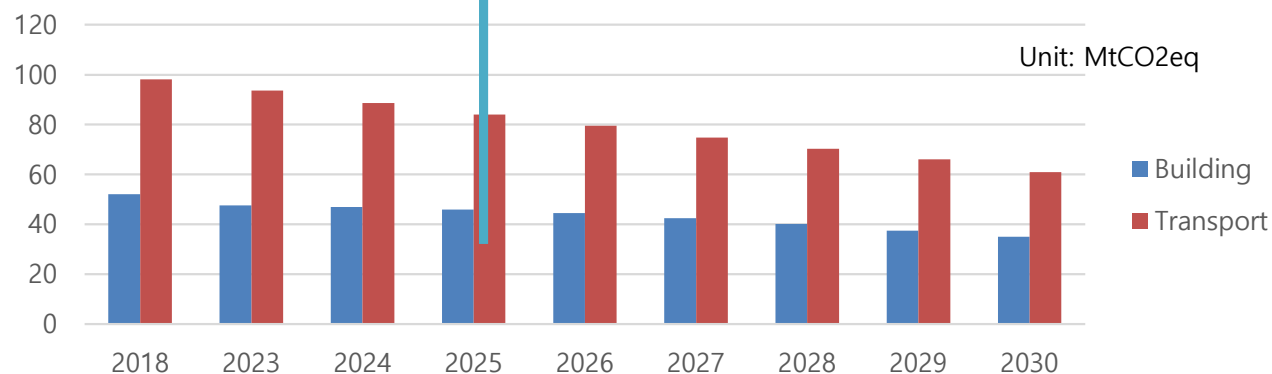
Building Sector

- Promote **zero-energy building solutions** for new buildings and further implementation of **green remodeling** on existing buildings
- Improve **energy efficiency** (e.g., energy-efficient lighting systems and appliances)
- Deployment of **renewable energy** sources

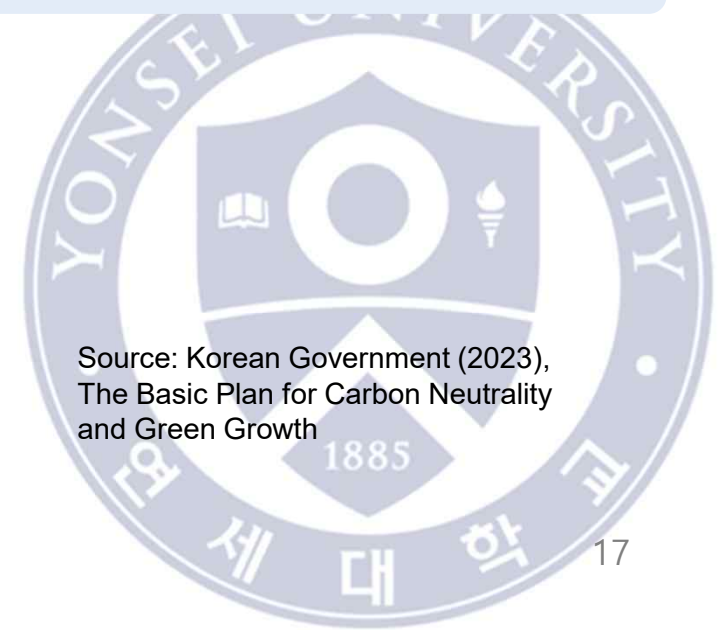
Transport Sector

- Increase target on the deployment of **zero-emission vehicles** (electricity and hydrogen)
- Reduce trips by car, including through the improvement of **public transportation**
- Enhancing efforts in distributing **eco-friendly ships** and improving the **operational efficiency of aircraft**

Building and Transport Sector GHG emission targets by year



Source: Korean Government (2023),
The Basic Plan for Carbon Neutrality
and Green Growth



Korea's 2030 NDC Target by Sector

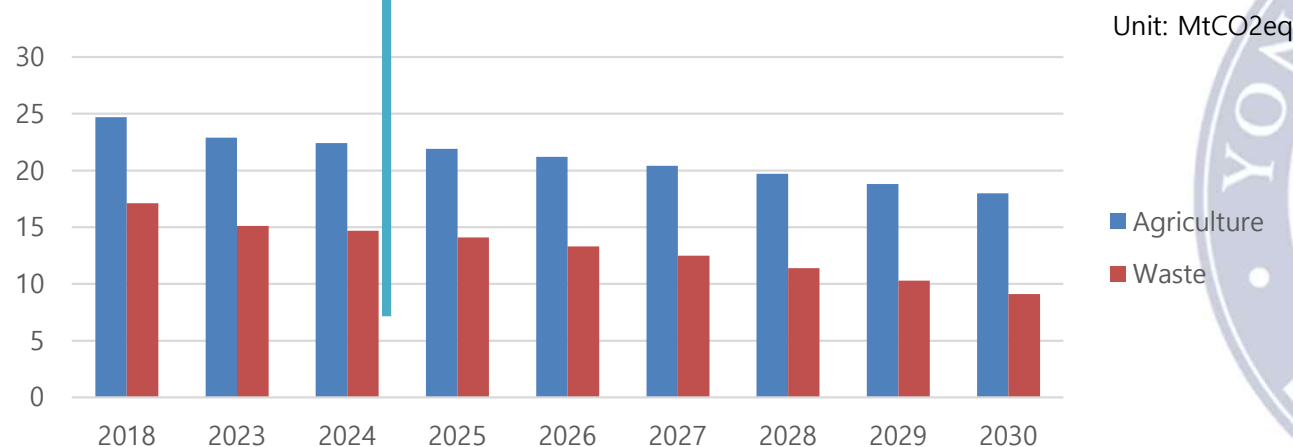
Agriculture, Livestock Farming and Fisheries

- Accelerate **low-carbon farming** (e.g., improvement in irrigation techniques in rice paddies)
- Better treatment of livestock excreta
- Adopt **highly-efficient** facilities

Waste

- **Reduce waste generation** and increase **recycling**
- Replace petroleum-based plastics with bioplastics
- Utilize methane gases from landfills as energy

Agriculture and Waste Sector GHG emission targets by year



Source: Korean Government (2023),
The Basic Plan for Carbon Neutrality
and Green Growth

2030 NDC Target: Legal and Governance

Legislative Framework: Carbon Neutrality Act (2021)

- Strengthening mitigation and adaptation measures
- Defining 2050 carbon neutrality as a national vision and setting NDC target for 2030
- Include climate impact assessment, climate-responsive budgeting, K-ETS, etc.

Governance Structure

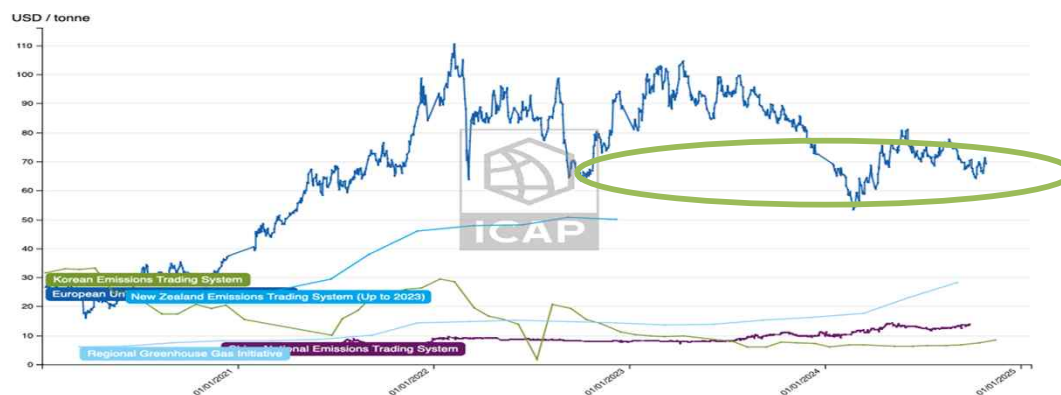
- **Presidential Commission on Carbon Neutrality and Green Growth** (former “2050 Carbon Neutrality Commission”) to deliberate major policies and plans to achieve carbon neutrality (Presidential Commission on Carbon Neutrality and Green Growth homepage)
 - Define foundational policy directions to encourage the transition towards a carbon-neutral society and foster green growth
 - Evaluate the national strategy, national mid- and long-term reduction targets, and national framework plans, while reviewing the implementation progress
 - Develop, update and oversee national adaptation measures to address the climate crisis
 - Enhance public awareness about carbon neutrality, strengthen public outreach efforts, and advance international cooperation

How to Achieve Korea's 2030 NDC Target

Korean ETS (Emission Trading System)

- **The fourth Basic Plan for the K-ETS (2026-2030)**
 - **Expand auctioning** (particularly in the power sector) but differentiated by sector and industry
 - **Improve allocation criteria** to reflect the characteristics of the industry better and reduce the uncertainty (free allocation vs. auctioning) due to price fluctuations
 - **Expand BM(Benchmark) allocation** to provide incentives to efficient companies
 - Relaxation of carryover restrictions of emission allowances and expanding the market participants
 - **Enhance MRV efficiency** to reduce cost burdens by satisfying international standards and simplifying the certification process

Carbon Price (2020-2024)



Korea's Carbon Price (2020-2024)



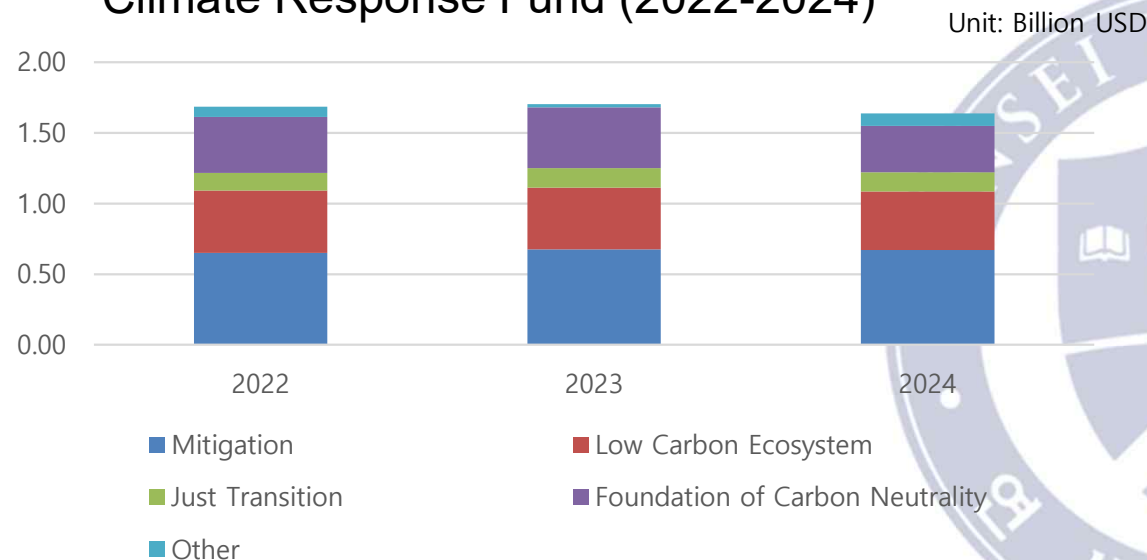
Source: ICAP Homepage (2025.1.19), ICAP Allowance Price Explorer

How to Achieve Korea's 2030 NDC Target

Financial Support to the transition towards carbon neutrality

- **Climate Response Fund** was established in 2022 to secure financial resources to effectively respond to the climate crisis and promote the transition towards a carbon-neutral society and green growth
 - Financial Resources: Revenues from the auction of emission allowances and 7% of the revenues from transportation, energy, and environmental taxes (and additional accounting and fund transfers, etc.)
 - Four sectors: (1) Support GHG mitigation; (2) Establish a low-carbon ecosystem; (3) Building a foundation of carbon-neutrality; (4) Just Transition

Climate Response Fund (2022-2024)





Carbon Neutrality: National Basic Plan for Carbon Neutrality and Green Growth



The National Basic Plan for Carbon Neutrality and Green Growth (2023)

Responsible Carbon Neutrality

1. Maximizing Use of Carbon-free Energy Sources (nuclear and renewable energy)
2. Transition toward a Low Carbon Industry and Circular Economy
3. Transition toward Carbon Neutral Society through Decarbonization of Territory

Innovative Carbon Neutrality and Green Growth

4. Accelerating Carbon Neutrality through Technological Innovation and Regulatory Improvement
5. Leading the Global Market and Creating New Markets through the Development of Key Industries
6. Building and Expanding Carbon-neutral Financial Programs, and Enhancing Investment

Carbon Neutrality Together

7. Reducing Energy Consumption and Practicing Carbon Neutrality for People
8. Carbon-neutral Green Growth Led by Local Governments
9. Supporting Industrial and Job Transition for Employee Job Security, Corporate Innovation and Growth

Active Carbon Neutrality

10. Building a Foundation for Climate Crisis Adaptation in which All Adaptive Entities Cooperate Together
11. Leading the Implementation of Carbon Neutrality in the International Community
12. Establishing a Continuous Implementation Management and Feedback System for all Tasks

The National Basic Plan for Carbon Neutrality and Green Growth

Responsible Carbon Neutrality

Maximizing Use of Carbon-free Energy Sources (nuclear and renewable energy)

- Reduction of fossil fuels, expansion of nuclear power, and harmony with renewable energy
- Introduction of carbon-free power sources utilizing existing power generation and grid facilities
- The improvement of the power grid and ESS

Transition toward a Low Carbon Industry and Circular Economy

- Acceleration of innovation across the industry to achieve carbon neutrality throughout the entire life cycle
- Government support to reduce the burden of corporate carbon neutrality
- Strengthening resource utilization efficiency through lifecycle management of key resources

Transition toward Carbon Neutral Society through Decarbonization of Territory

- Promoting carbon neutrality in cities (building energy efficiency) and increasing the energy self-sufficiency rate
- Accelerating the adoption of clean vehicles and promoting eco-friendliness in all aspects of mobility
- Environmentally friendly agriculture, livestock, and fisheries industry and expanding renewable energy facilities
- Rediscovering the value of forests, oceans, and wetlands as carbon sinks

The National Basic Plan for Carbon Neutrality and Green Growth

Innovative Carbon Neutrality and Green Growth

- Selection of key technologies and establishment of technology roadmaps
- Regulatory improvement and management of the entire process from R&D plans to commercialization
- Training of specialized personnel and promoting the future technologies

Leading the Global Market and Creating New Markets through the Development of Key Industries

- Restoration of nuclear industry ecosystem and strengthening of the renewable energy industry ecosystem
- Fostering hydrogen industry and eco-friendly mobility
- Promotion of CCUS

Building and Expanding Carbon-neutral Financial Programs, and Enhancing Investment

- Financial support to reduce carbon emissions and Policy financing support for the green sector
- Encouraging private financing and advancing the Korean emission trading system
- Fostering innovative venture companies and building sustainable infrastructure
- Improving energy efficiency investment

The National Basic Plan for Carbon Neutrality and Green Growth

Carbon Neutrality Together

Reducing Energy Consumption and Practicing Carbon Neutrality for People

- Promoting demand efficiency improvement in industry, household/building, and transport
- Advancing the system based on ICT-based demand management
- Strengthening energy conservation and improving national awareness
- Expanding communication for disseminating carbon-neutral practices and policies

Carbon-neutral Green Growth Led by Local Governments

- Municipality-tailored carbon neutrality and green growth strategy
- Spatial implementation
- Establishment of an implementation system and enhancement of central-local government communication

Supporting Industrial and Job Transition for Employee Job Security, Corporate Innovation and Growth

- Discovering industries and companies in crisis
- Support for workers, companies, and regions



The National Basic Plan for Carbon Neutrality and Green Growth

Active Carbon Neutrality

Building a Foundation for Climate Crisis Adaptation in which All Adaptive Entities Cooperate Together

- Strengthening cooperation in climate adaptation among entities
- Strengthening climate risk predictions and expanding infrastructure for disaster response
- Developing climate-adaptive technologies

Leading the Implementation of Carbon Neutrality in the International Community

- Strengthening international cooperation in climate response
- Expanding Green ODA
- Establishing the foundation of International reductions and supporting the overseas expansion of carbon neutrality

Establishing a Continuous Implementation Management and Feedback System for all Tasks

- Performance-based implementation review
- Establishment of a regular management system
- Establishment of a cross-ministerial support system



Key Issues 1: Preparation of 2035 NDC



Preparation of 2035 NDC

To establish the 2035 NDC, Korea considers...

Paris Agreement Article 4.3

- Progression beyond the current NDC
- Highest Possible Ambition

- Consideration of GHG mitigation of 45% (2030), 60% (2035) compared to 2019

COP28

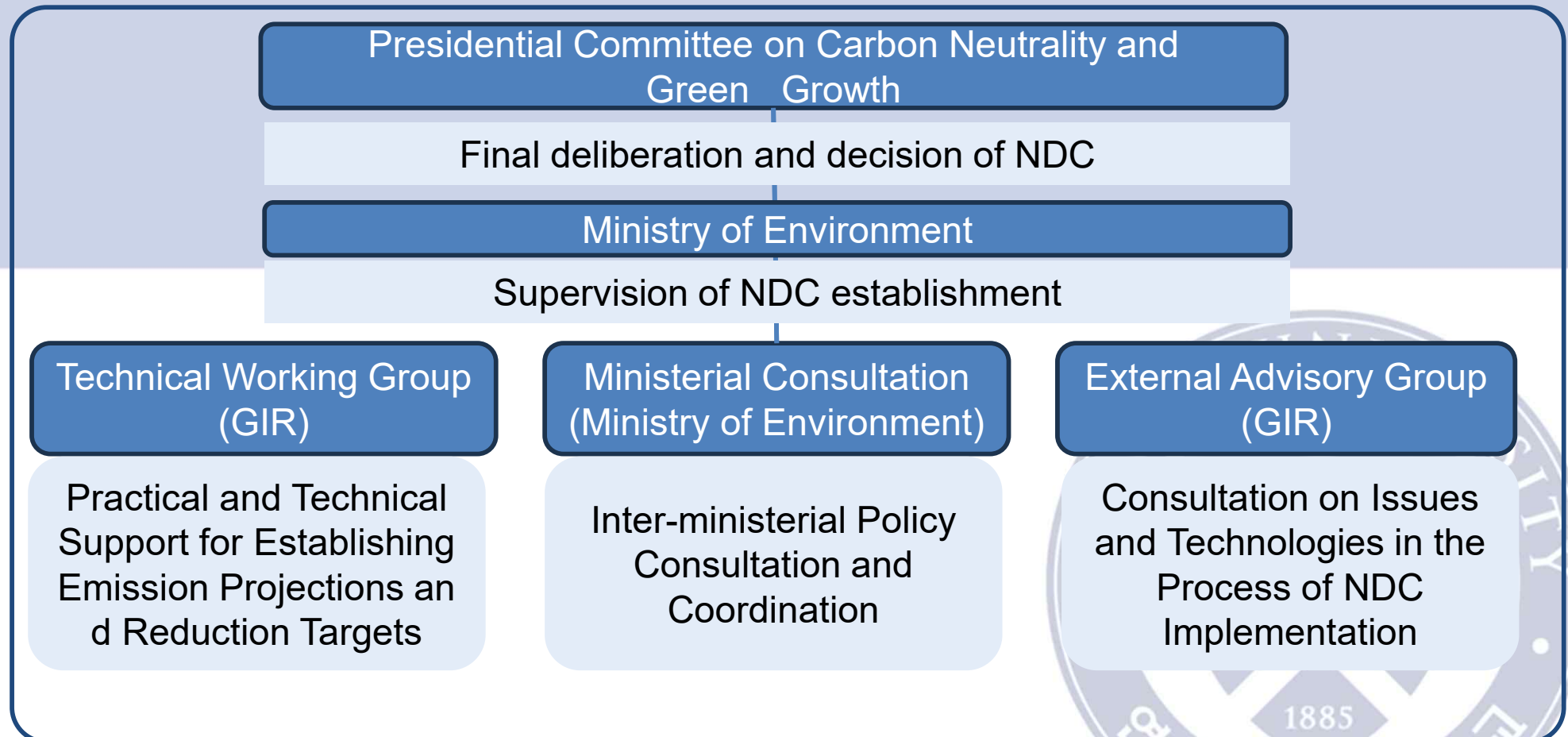
- Transition away from fossil fuels
- Tripling renewable capacity and doubling energy efficiency
- Utilization of carbon-free technologies (nuclear, hydrogen, CCUS, etc.)

- 2030 NDC: 40% mitigation compared to 2018
- Achieve Carbon Neutrality by 2050



Preparation of 2035 NDC

Governance Structure





Key Issues 2: Constitutional Court's Decision on National GHG Reduction Target



Constitutional Court's Decision on National GHG Reduction Targets

Overview

- The Constitutional Court ruled that certain provisions of **the Framework Act on Carbon Neutrality do not align with the Constitution** and that it fails to protect the rights of the future generation
- The National Assembly needs to amend the law by **February 2026**

Key Points

- **Lack of long-term targets:** Lacking legally binding targets beyond 2030
→ Necessary to establish quantitative **targets for the period 2031 ~ 2049** (Carbon Neutrality by 2050)
- Necessary to **avoid excessive future burden:** Necessary to ensure gradual and continuous GHG reductions that should not impose undue burden on future generations

Progress

- Establishment of the “**Future Climate Forum**” led by the Ministry of Environment to bring experts and stakeholders together to prepare multiple reduction pathways and prepare legislative alternatives reflecting the sectoral mitigation measures and social and economic impacts

3. Suggestions: International Dimension - green/climate project development -

To fill the gaps between climate change community and financing community

- Priority, criteria and decision-making rules and practices are different
- Mutual understanding and joint activities should be considered

To fill the gaps between donors and recipients

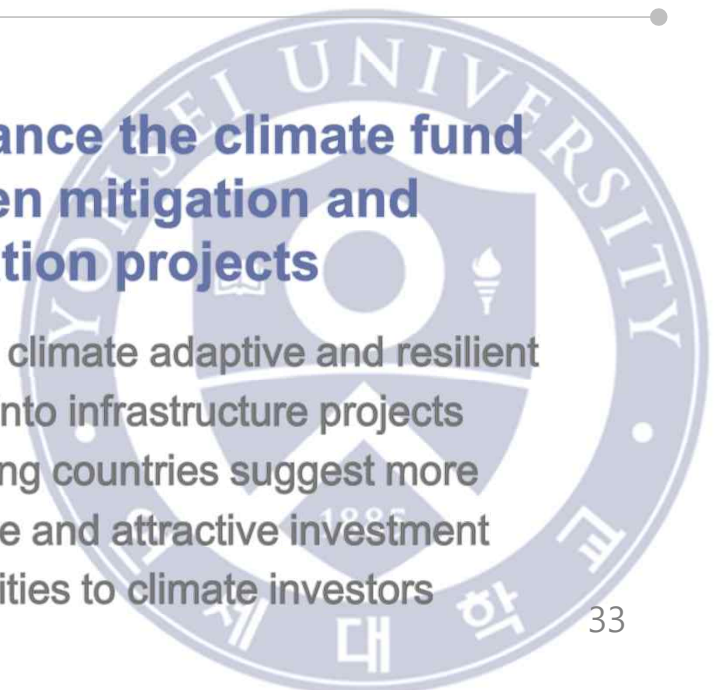
- Donor groups are more interest in GHG mitigation projects, while recipients are keen in climate resilient (adaptation) projects
- New designing of infrastructure projects should be considered.

To develop innovative financing schemes

- To merge different motivations for investing climate projects between public and private sectors
- Joint project risk management & strategies should be considered.

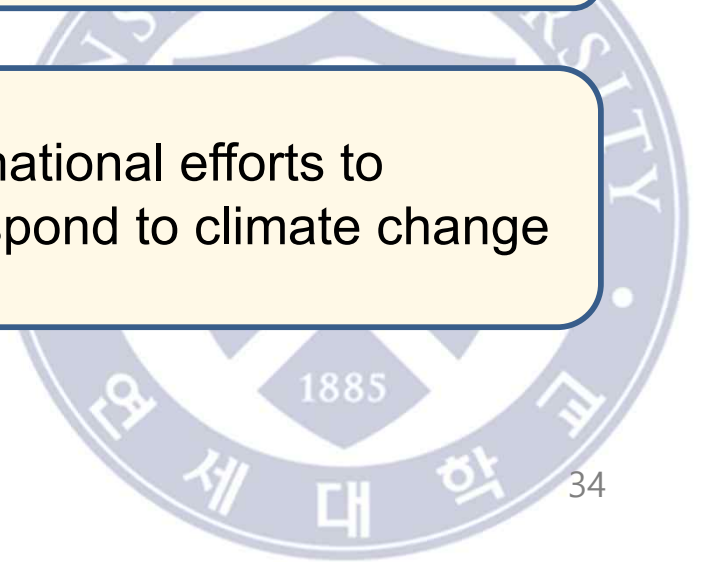
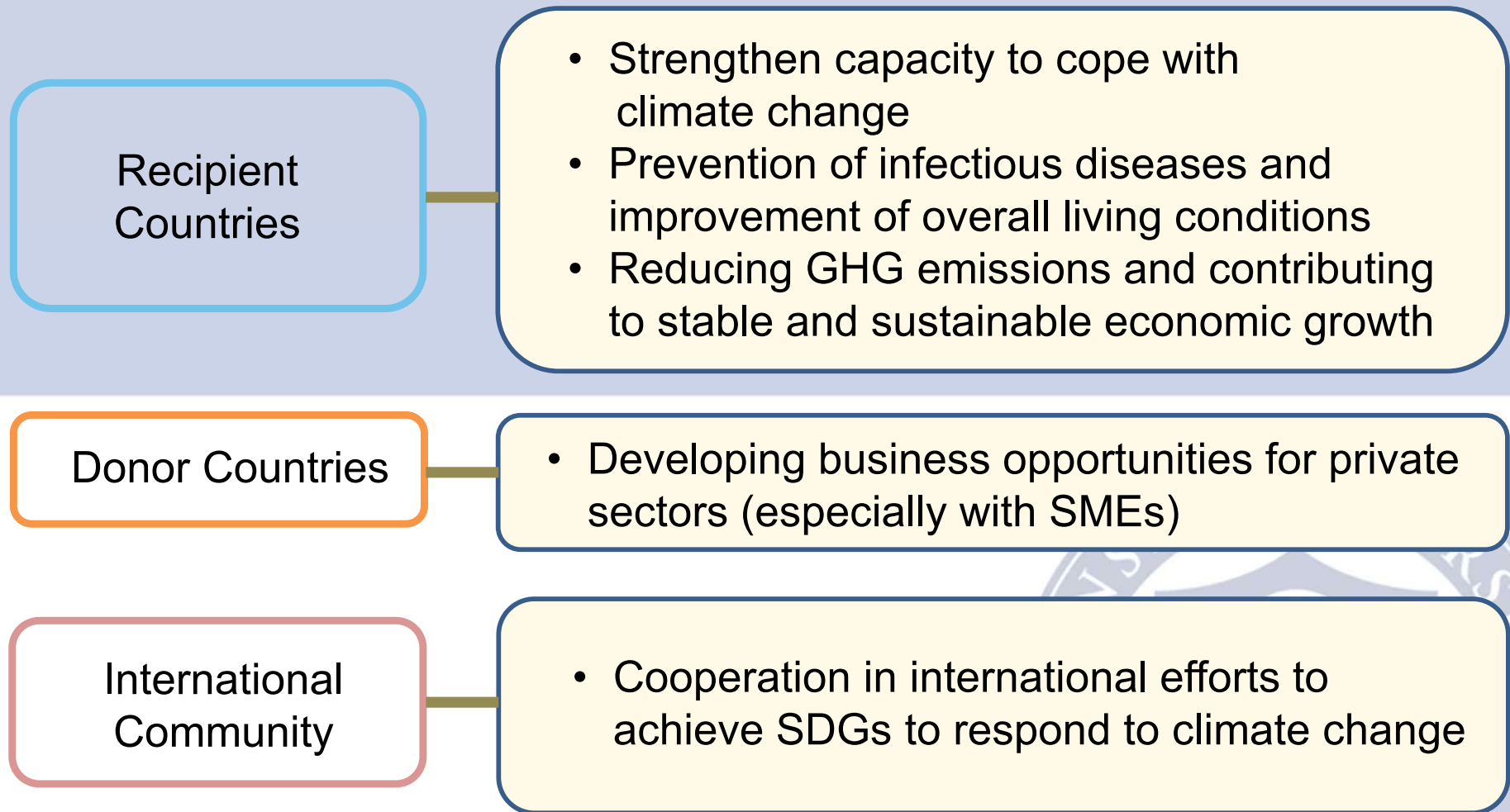
To balance the climate fund between mitigation and adaptation projects

- Integrate climate adaptive and resilient projects into infrastructure projects
- Developing countries suggest more innovative and attractive investment opportunities to climate investors



3. Suggestions: International Dimension

- International development cooperation arrangement -



3. Suggestions: International Dimension

- global climate financing -

Combine Energy Transformation + Digital Transformation

- Upgrading Energy Infrastructures → Digital + Green (D+G Strategy)
- Financing + Green Technologies
- Climate Resilient Green Development

Finance in Climate Adaptation Projection from Public Sectors

- Multilateral/Bilateral/Domestic Public Financial Institutes focus more on climate adaptation finance (Private sector: mitigation projects)
- Innovative financing scheme is necessary for private sector to join in climate adaptation projects.

Synergy between Public & Private Sectors

- Public sectors focus more on **guarantee** option (too much weight on loan)
- Private sectors actively participate and play pivotal roles → Private Public Partnership (PPP)
- SMEs focused business areas, jointly with multi-partners



THANK YOU

