

# Climate Change and the Global Green Transition : Korea and the World

**UNOSD 2024 on SDG 2030 and Climate Action (2024.05.07)**

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Co-Chairperson

Presidential Commission on Carbon Neutrality and Green Growth

Vice President for Sustainability , KAIST

former Senior Secretary to the President of Korea for Green Growth

“ Climate Action is not just one goal of the SDGs. It would serve most of the goals .”  
(Ban Ki-Moon, 8<sup>th</sup> Head of the UN)



# What are the Current Global Risks ? (WEF 2024)

## Risk categories

- Economic
- Environmental
- Geopolitical
- Societal
- Technological

**2023**

2 years

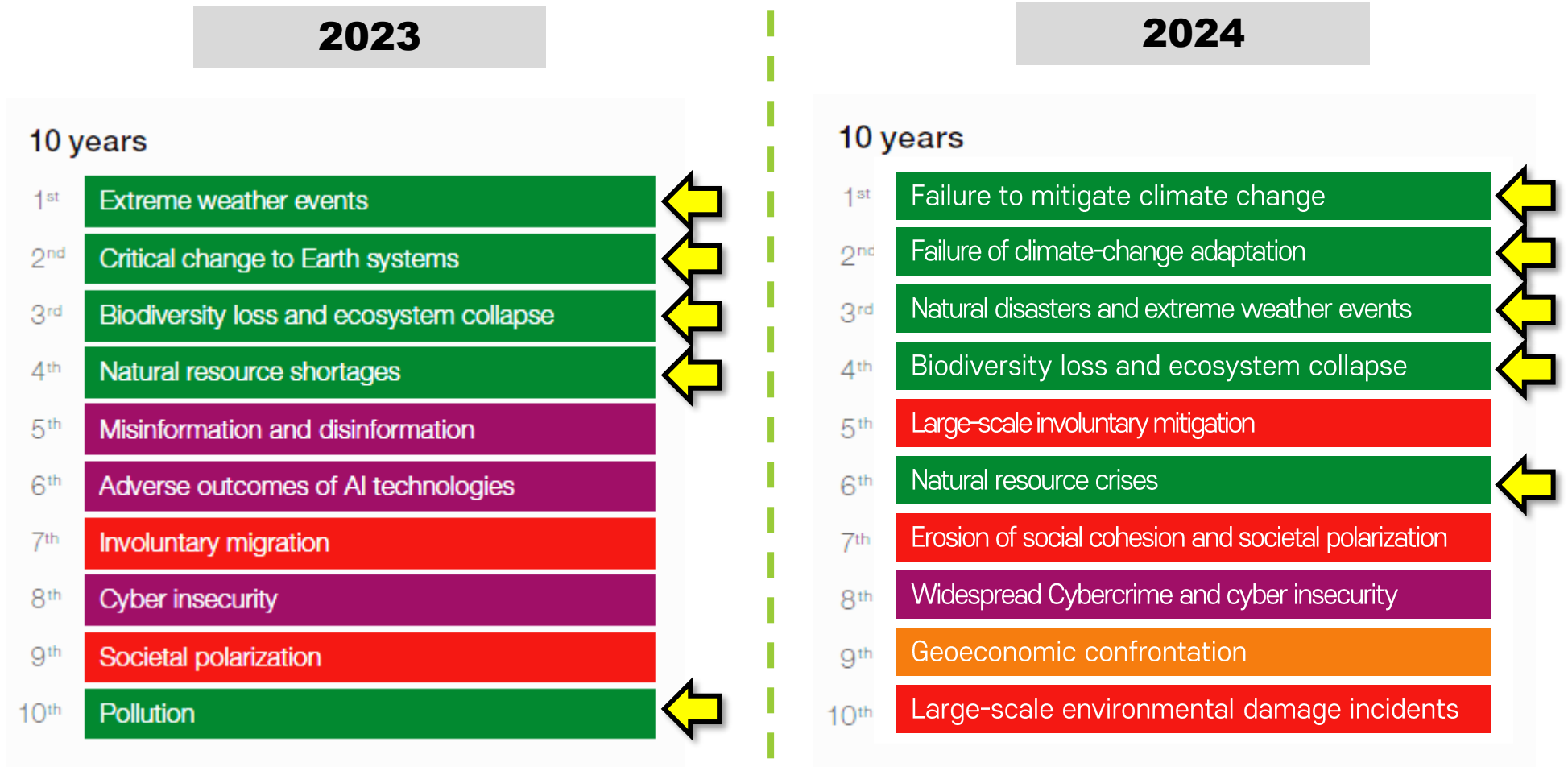


**2024**

2 years



# What is the Biggest On Going Global Risk ? Incomprehensible 'Hyper-object' ?

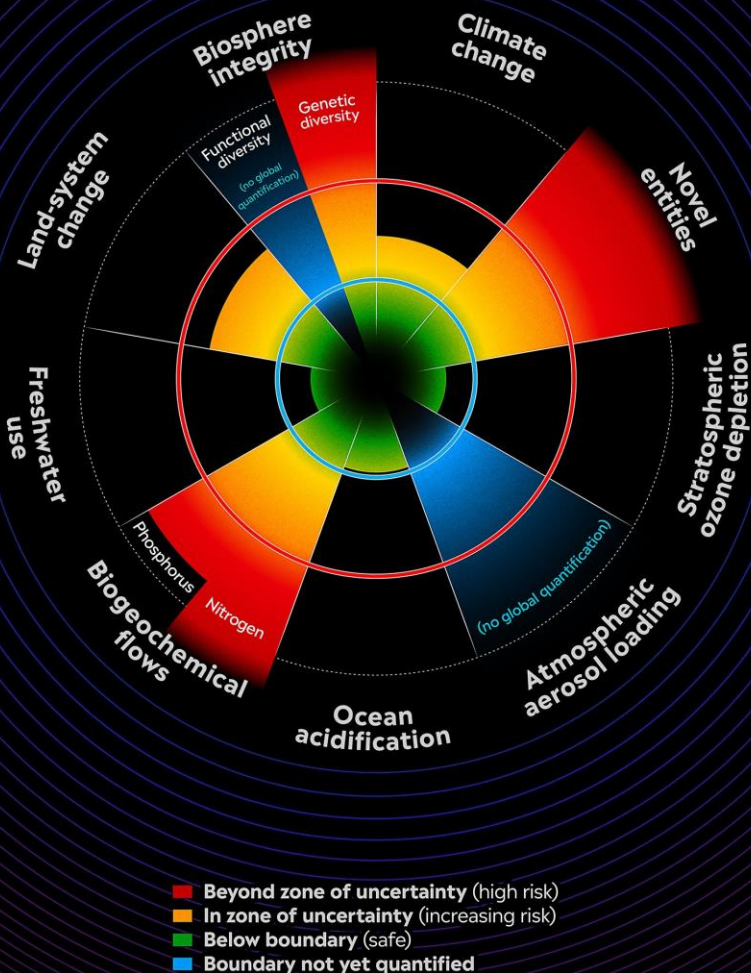


Risk categories

- █ Economic
- █ Environmental
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- █ Technological

# PLANETARY BOUNDARIES

A safe operating space for humanity



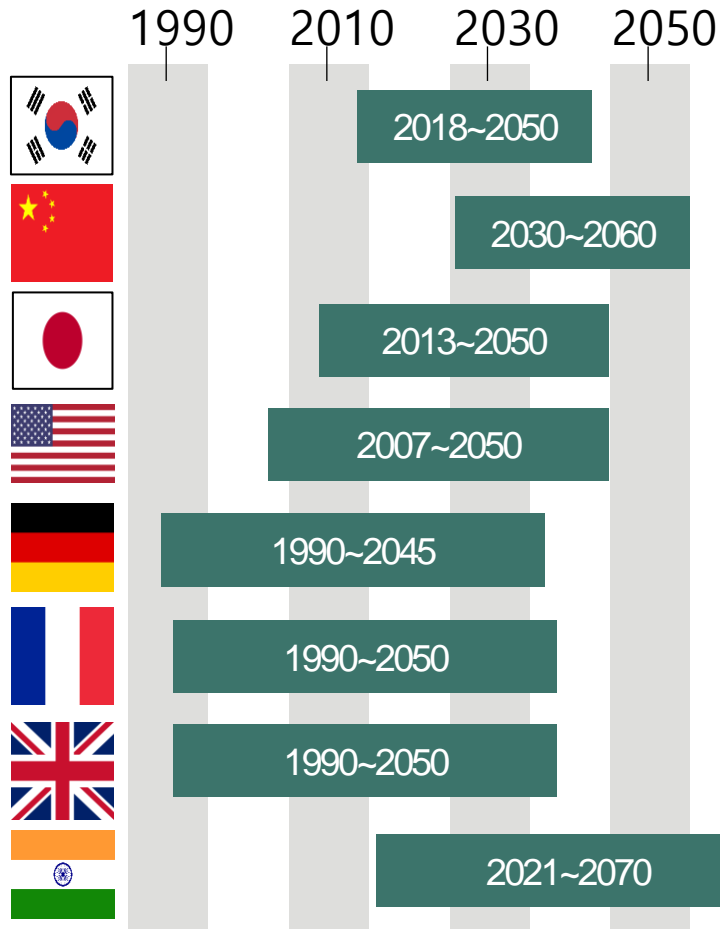
## Planetary Boundaries in Danger and Climate Collapse

- Among 9 Boundaries, at least 4 are falling into high risk area.
  - Climate change: WMO, 'State of Global Climate' All time Worst / IPCC, 1.5 degree rise within 2040
  - Biosphere integrity
  - Land-system change
  - Freshwater use
  - Biogeochemical flows
  - Ocean acidification (+): Warmest ever
  - Atmospheric aerosol loading
  - Stratospheric ozone depletion
  - Novel entities (+)
- If we hit the 'Tipping Point', then our Planet would lose resilience and become Hothouse Earth → Global Boiling



# Carbon-Neutral Green Growth Policy as Mainstream Trend

Avg. annual investment of 9 trillion USD is required until 2050 (8% of global GDP, estimated by McKinsey & Company)



**Korea:** carbon neutrality by 2050, 40% reduction by 2030 compared to 2018

**Japan:** goals to go carbon neutral by 2050 (announced green growth strategy)

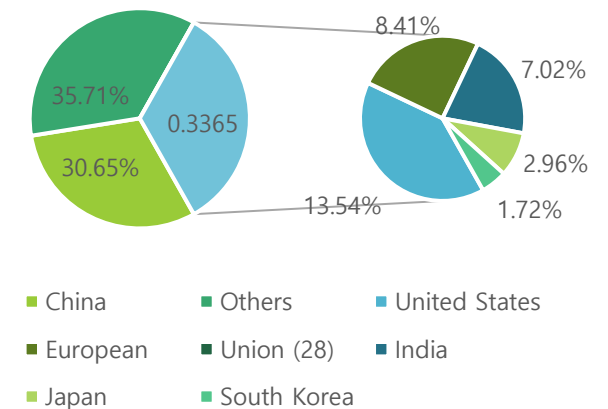
**US:** President Biden legislates IRA, focuses on investment in clean energy and infrastructure **Mainstream Driver**

**EU :** Green Deal , CBAM

**China:** reaches the peak in 2030 (possibly by 2026~27), carbon neutrality by 2060

**India:** joins carbon neutrality goals by 2070

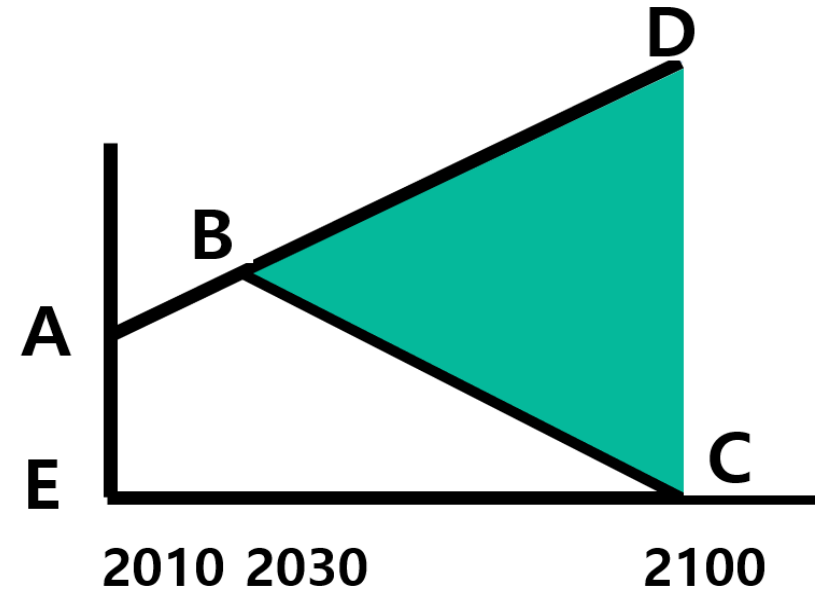
Country/Region	Emissions (MtCO2eq)	Share
China	10,668	30.65%
US	4,713	13.54%
EU	2,928	8.41%
India	2,442	7.02%
Japan	1,031	2.96%
Korea	598	1.72%
Others	12,428	35.71%
<b>World total</b>	<b>34,807</b>	<b>100%</b>



# Korea's Green Growth as New National Paradigm (2008~2013)

from BAU(Business As Usual) to BAW(Business As Wanted)

Basic Act for Low Carbon Green Growth ,  
Introduction of Emission Trading Scheme,  
Expansion of Green Tech R&D, Setting-up  
GGGI and GCF ... aiming for huge Green  
Opportunities (BCD Triangle)



Source: Lee, Hoesung, & Kim, Sang Hyup

# Some Achievements of Korea's Green Growth (2008-2013)

## Creation of 760,000+ jobs

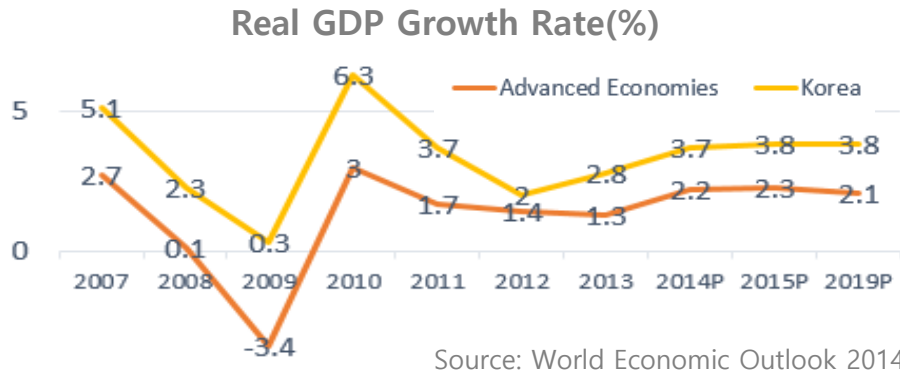
Comparison of job inducement effects in green vs non-green sector (KDI, KLI)

2009~2011	Investing in non-green	Investing in green sector
Employment inducement	518,094	764,008

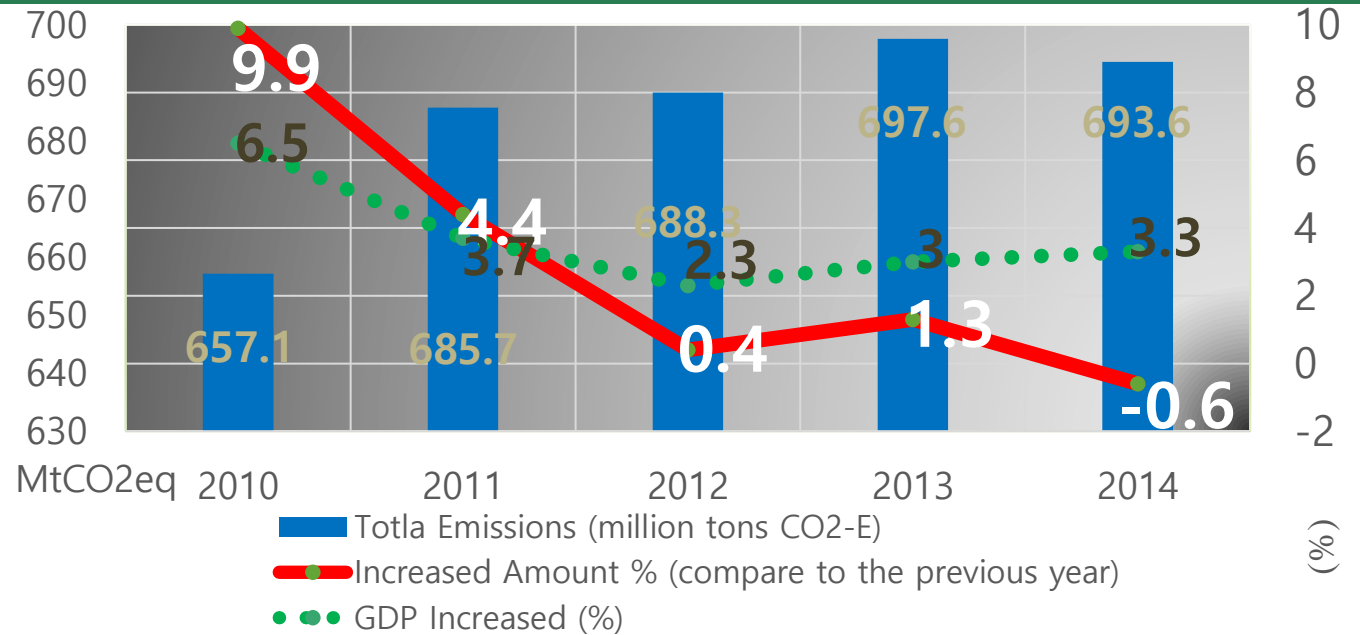
Job inducement effect according to 「5-year Plan」 (KDI)

Employment inducement in 2009~2013E **1,212,721**

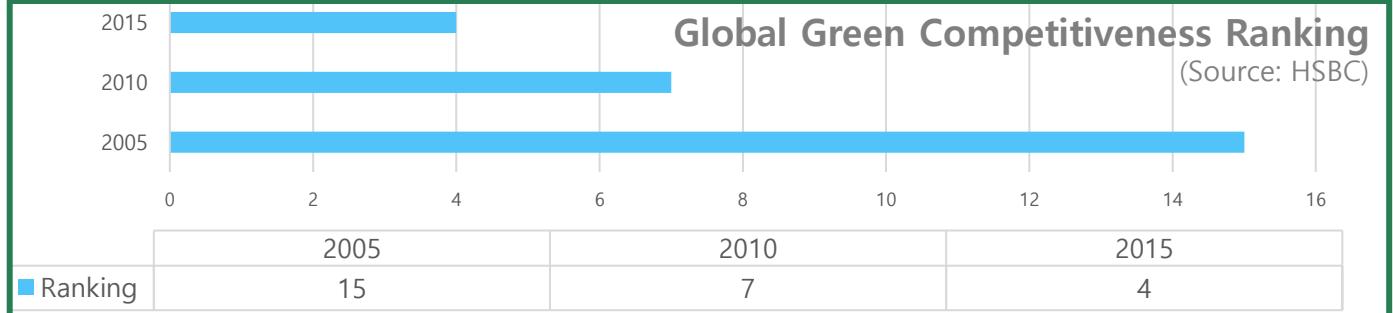
## Demonstration of Green & Economic Growth



## % change (per person) of GHG emissions



## Strengthened Global Green Competitiveness





# Establishment of new international organizations in Korea: GGGI & GCF



GREEN  
CLIMATE  
FUND

**Total pledges**  
for GCF-2 replenishment\*

**USD 12.8 billion**

31 countries pledged

**#InspireMoreClimateAction**

\*As of 8 December 2023

## Politics and Policy Disruption? Super Election Year of 2024, Globally...

**Do we have reliable Political Systems to deal with Climate Change?**





# Relaunching Green Growth with Carbon Neutrality (2022~ )

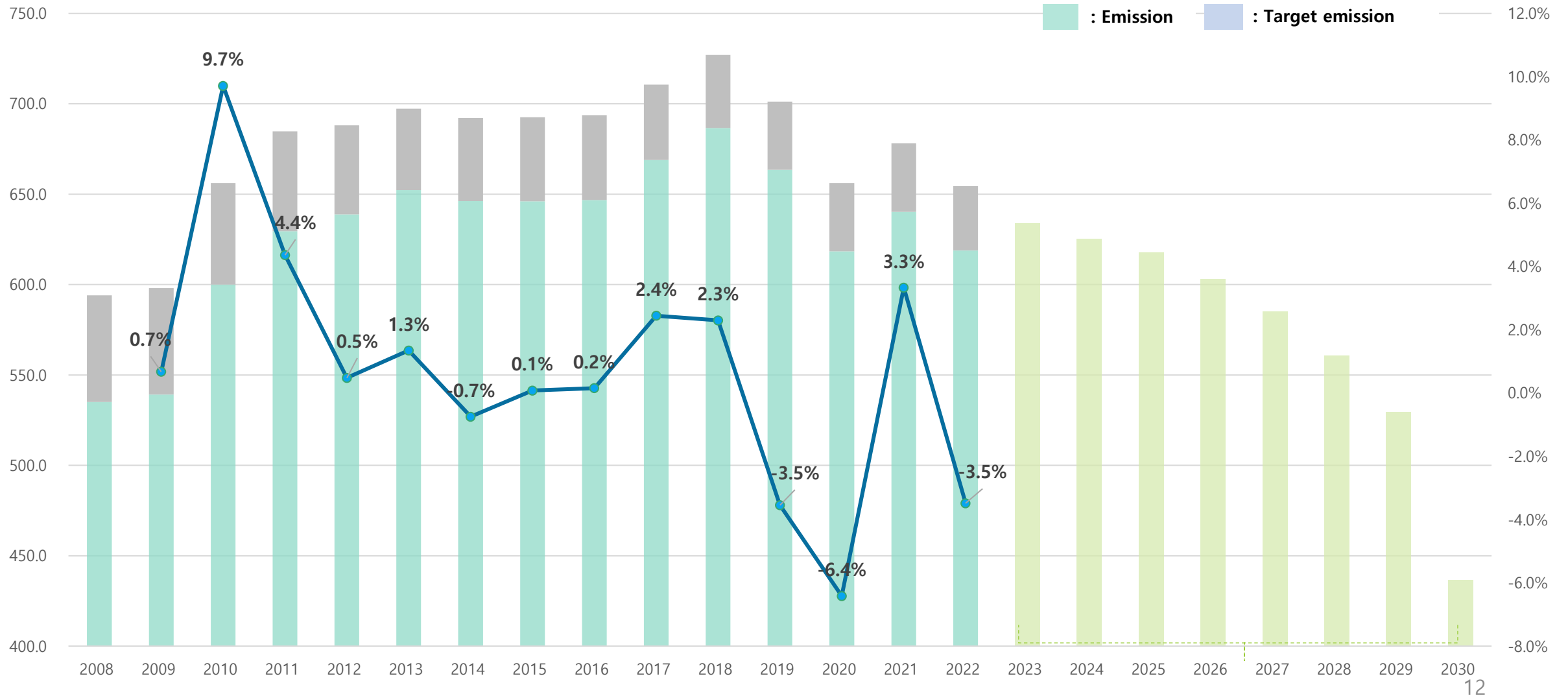
Reconstituted the Commission on Carbon Neutrality and Green Growth as a Statutory Body under the President of the Republic of Korea



- Responsible Implementation
- Orderly Transition
- Innovative Progress

# In pursuit of the ambitious 40% reduction target by 2030

## How to achieve this target in less than 8 years?



Source: Greenhouse Gas Inventory and Research Center

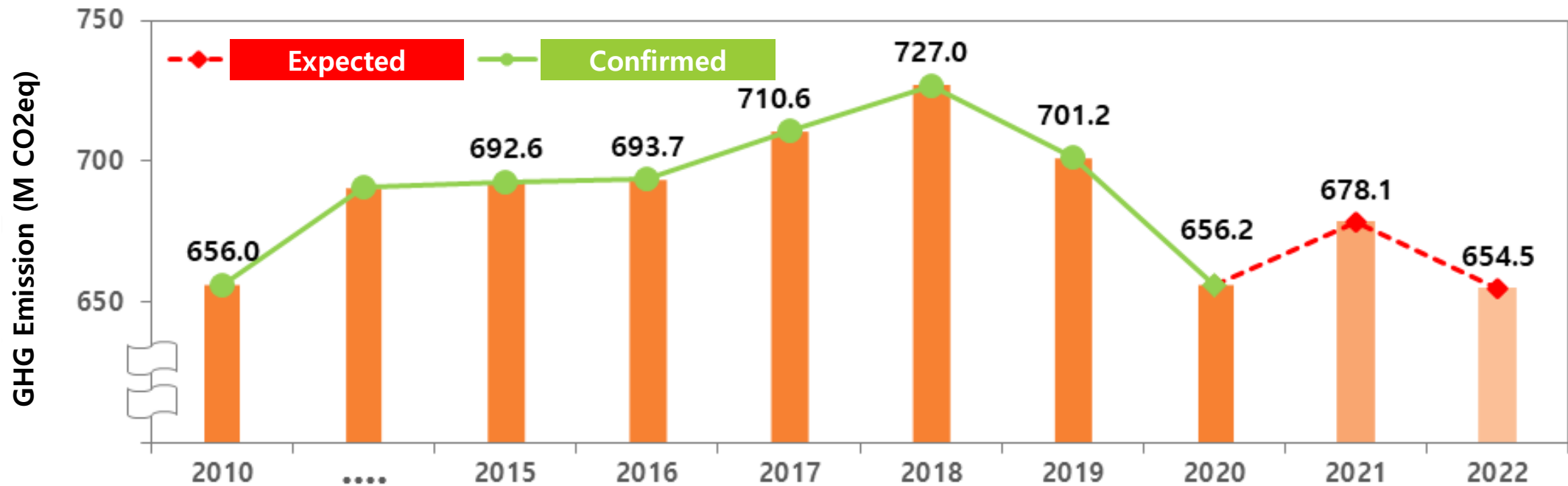
# Carbon Emission (2022) : - 3.5 % / Power Sector Emission (2023): -4.8% (est) More should be done... Tech & Money + @

**Lowest** since 2010 (-10% compared to the level of 2018) while GDP increases by 2.6% → Decoupling?

⇒ Power Sector -4.3% (Renewable 23.4% ↑, Nuclear 11.4% ↑ vs Coal ↓, LNG 3.5↓),

⇒ Industry -6.2% (Steel↓, Petro Chemical ↓)

\* global average (0.9%↑), US 0.8%↑, EU 2.5%↓, China 0.2%↓ (IEA)



Source: Greenhouse Gas Inventory and Research Center

# 100 Key Technologies for Green Korea (to be selected for global top)

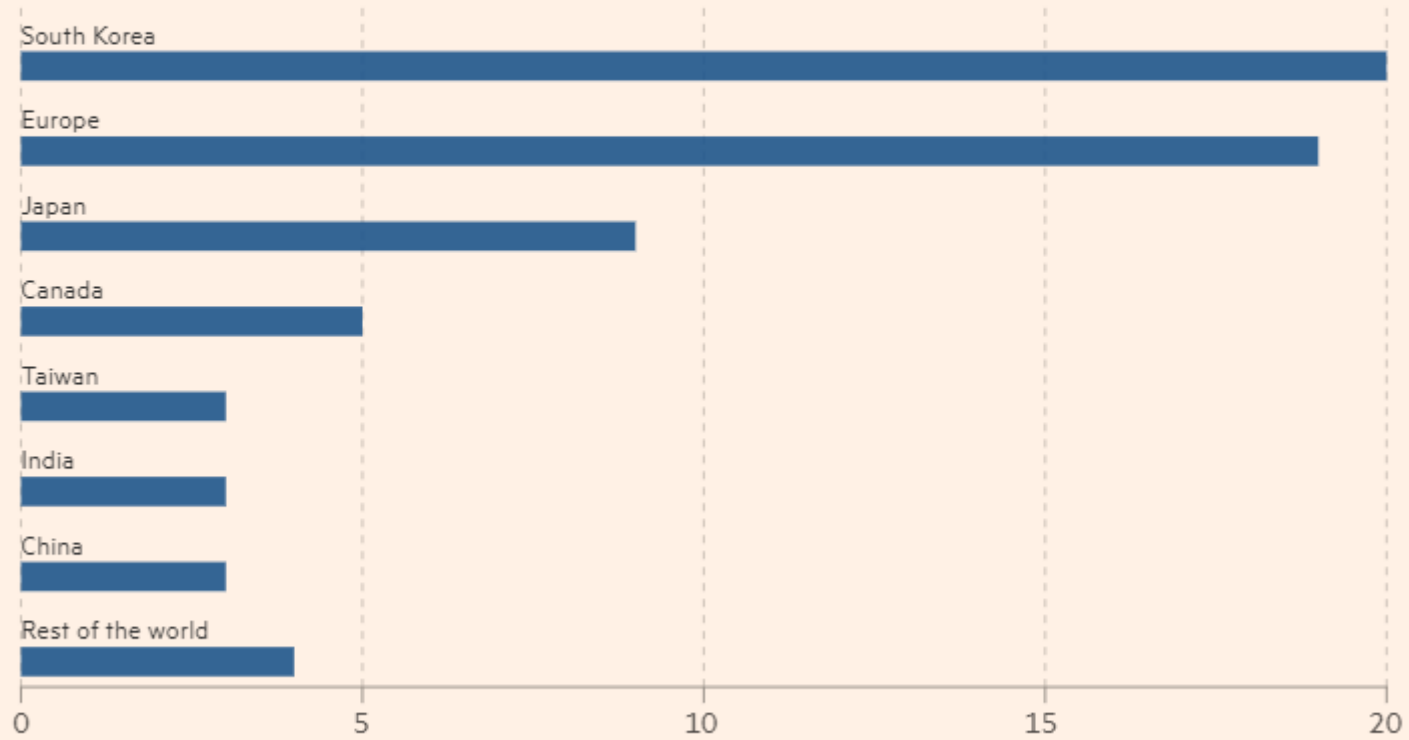
Solar energy	Ultra-high-efficiency solar-cell	Zero energy building	Super-insulation covering material and facility	Steel	Carbon reduction furnace	Industry general	Electrification replacing fossil fuels (boilers)
	Diversified uses of solar power		Green remodeling		Pure oxygen furnace		to use hydrogen and ammonia bio mass fuel
	wasted solar power recycle		Building refrigeration and air-conditioning efficiency		High-speed electric furnace processing		High GWP (Global Warming Potential) processing gas replacement
Wind power	Supersized wind turbines		Building energy system efficiency		Low-carbon new thermal raw materials usage		Biomass-originated fiber production
	Offshore wind power floater		ESS convergence using renewable energy		hydrogen-reduced steel production		to expand cullet within glass manufacturing process
	to operate and manage offshore wind power plants		Fuel cell-based convergence system		hydrogen-reduced steel-based new electric furnace		Motor and power converter efficiency
Hydrogen supply	Vertical axis type floater wind power		Unused energy usage	Steel by-product high value upcycling	Eco-friendly emission processing		
	to produce water electrolysis hydrogen		Building energy data integration system	Steel by-product CCUS	Environment friendly automobiles		
	to store and transport hydrogen		Building energy smart linking control	Electric heating furnace system			Next generation second cell
to store and transport hydrogen overseas	CCUS		to convert by-product gas (methane) into high-value	Driving motor performance enhancement			
Carbon-free energy		Hydrogen to gas turbine gas power	for piling up after combustion	Bio olefin production application		Power converter advancement (SiC strategic semiconductor)	
		Hydrogen combustion gas power	Industry processing piling up	Bio PEF production and application	Wired charging time reduction		
		Dust coal boiler ammonia mixed fuel	for piling up during combustion	Bio polyol production and application	to advance fuel cell system durability		
		Floater boiler ammonia mixed fuel	Direct air piling up	Wood fuel usage and application	Environment		
		Ultra high efficiency fuel cell compound development	Land and sea storage exploration and evaluation	Biol acryl production and application		to substitute material for waste reduction	
High-efficiency fuel cell cogeneration system	Carbon-free vessels	Mixed plastic classification and pre-processing	Land soil's carbon storage promotion				
Power Storage		Short-term energy storage system	Waste plastic pyrolysis	Land restoration , including new carbon sinks			
		Long-term energy storage system	waste plastic gasification	to recover metal resource from wasted resources			
	After-use battery ESS system	Waste plastic depolymerization	Blue carbon (marine algae, salt marsh) promotion				
Power Grid	Intelligent power transmission system	Storage facilities design and establishment	Fuel oil's basic chemical fuel conversation	Nuclear power			
	Real-time electric power transaction platform	Storage CO2 injection and operation	Low-energy chemical reaction processing		Small modular reactor (SMR)		
	to combine and operate distributed resources and flexible resources	Monitoring including storage leakage detection	Low-energy separating material processing		Advanced nuclear power system		
Energy integration system	Heat pump	Chemical conversion	Low-energy processing smart platform	Nuclear power waste management			
	Solar heat	Biological conversion	Petrochemistry processing smart platform				
	Power-thermal-hydrogen hybrid system	Mineral carbonation	Noncarbonate fuel preprocessing				
	Thermal energy network system	Internal combustion engine using carbon-free fuels	Noncarbonate fuel plastic				
		Vessel fuel cell and battery system	Noncarbonate processing and quality control				
		Electric motor powered system	Noncarbonate fuel usage rate maximization				
		of post-processing of carbon-free fuels and increasing efficiency	Low-temperature plastic fuel replacement				
			to increase mixed material content within OPC				
			New admixture and cement				



# Korean companies are the biggest investors following American IRA

South Korean and European companies have committed the most projects among foreign investors

Number of announced US cleantech and semiconductor projects of at least \$100mn



Source: FT analysis of company and state press releases and data from fDi Markets, Rystad Energy.

# 145 Trillion KRW (109 billion USD) Domestic Investment for Climate Tech and Green Industry (June, 2023 at the 4<sup>th</sup> Commission Meeting)

- ✓ Delivering **massive green finance** by 2030
- ✓ **New R&D** and **New Policy** Funds
- ✓ **Green finance** by Major Financial Groups  
→ **135 trillion KRW** (101 billion USD) from 5 major financial groups

**Not Enough ! Huge Financial Gap**



## 제4차 전체회의의 주요 안건 심의·의결

- 「기후테크 산업 육성전략」
- 「제3차 국가 기후위기 적응 강화대책」
- 「국가 기본계획 '23년 이행점검 계획」

# Mobilizing 450 Trillion KRW (330 billion USD)+ @ Blended Green Finance by 2030

<Financial Services Commission with major financial groups `24.3.19)>

기후위기 대응을 위한  
정책금융기관의 역할을 강화  
'30년까지 총420조원 정책금융  
공급

은행권 출자를 통해  
총 9조원 규모의  
「미래에너지펀드」 신규 조성

미래 먹거리 개발을 위해  
기후기술 분야에  
약 9조원 규모 투자

기후위기 대응을 위한  
민간금융 지원 제도 정비  
병행



Tangible Deliveries are the Key for Small Medium and Start Ups



# World : Sluggish Negotiation on Fossil Fuel, Massive Money for Green Opportunities



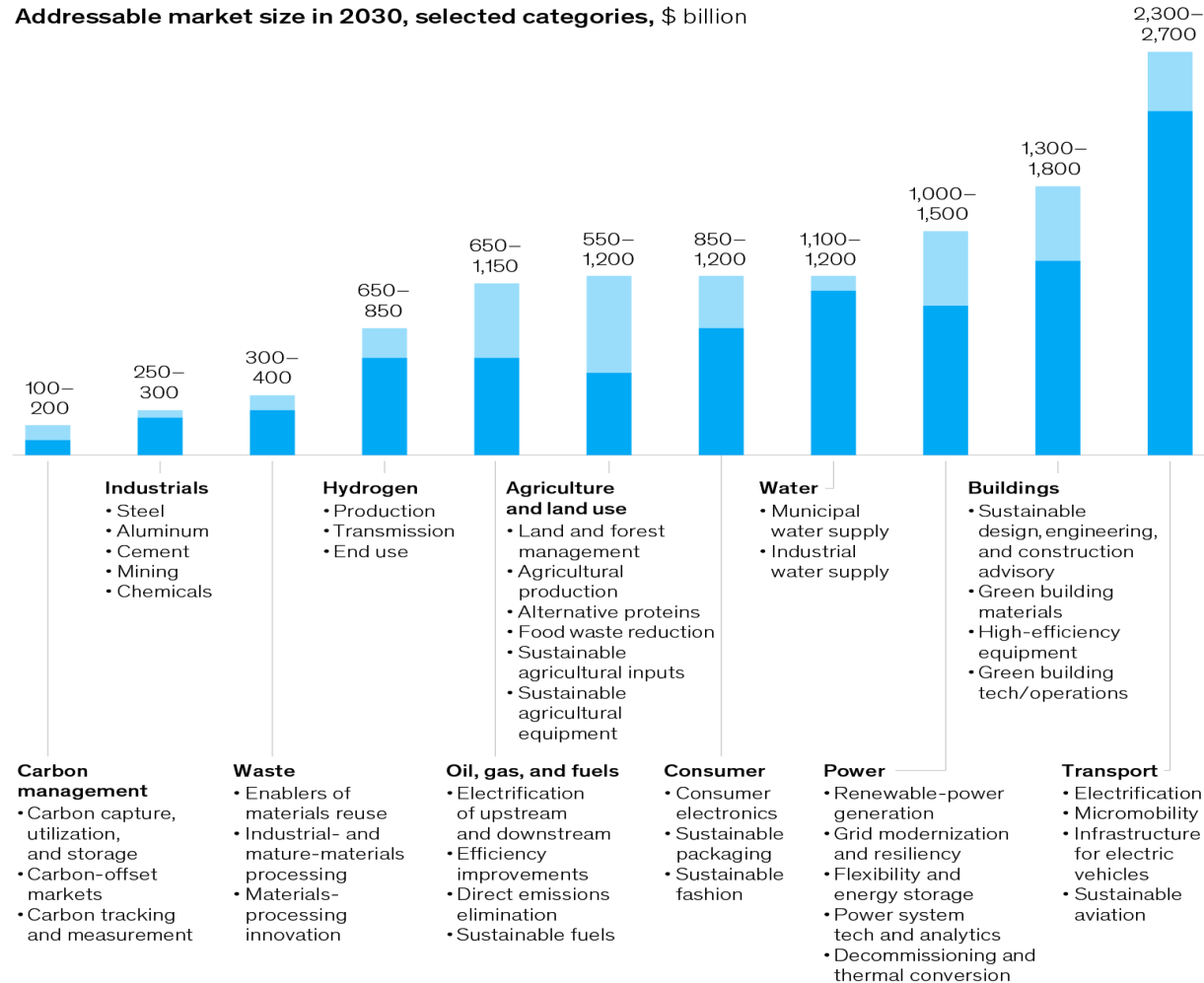
- Orderly **Phase Out** of Unabated Fossil Fuel → **Transition Away** from Fossil Fuel
  - 85 billion USD at the end of Dubai COP28
- Not Enough ! Huge Financial Gap:** at least 7 times gap between what is needed and what could be mobilized by 2030 (CPI 2023)



# Eleven high-potential Green Markets up to \$ 12 Trillion by 2030 (McKinsey & Company)

“ 1000 Green Unicorns would be created. Much bigger than the Internet Boom around 2000 ”

Addressable market size in 2030, selected categories, \$ billion



Note: Preliminary, not exhaustive.

# Advent of AI as Climate Solution



**Climate Trace Project (AI Gore)**

**Graph Cast (Google Deep Mind)**

**AI Driven Zero Emission Vehicle  
(Tesla & Hyundai)**

**→ BCG to invest 1 billion USD in  
Climate and AI**



**“ UNFCCC: “AI 4ClimateAction Initiative”**



# A Different World... What's the Use of Bailout to Climate-Hit Countries?

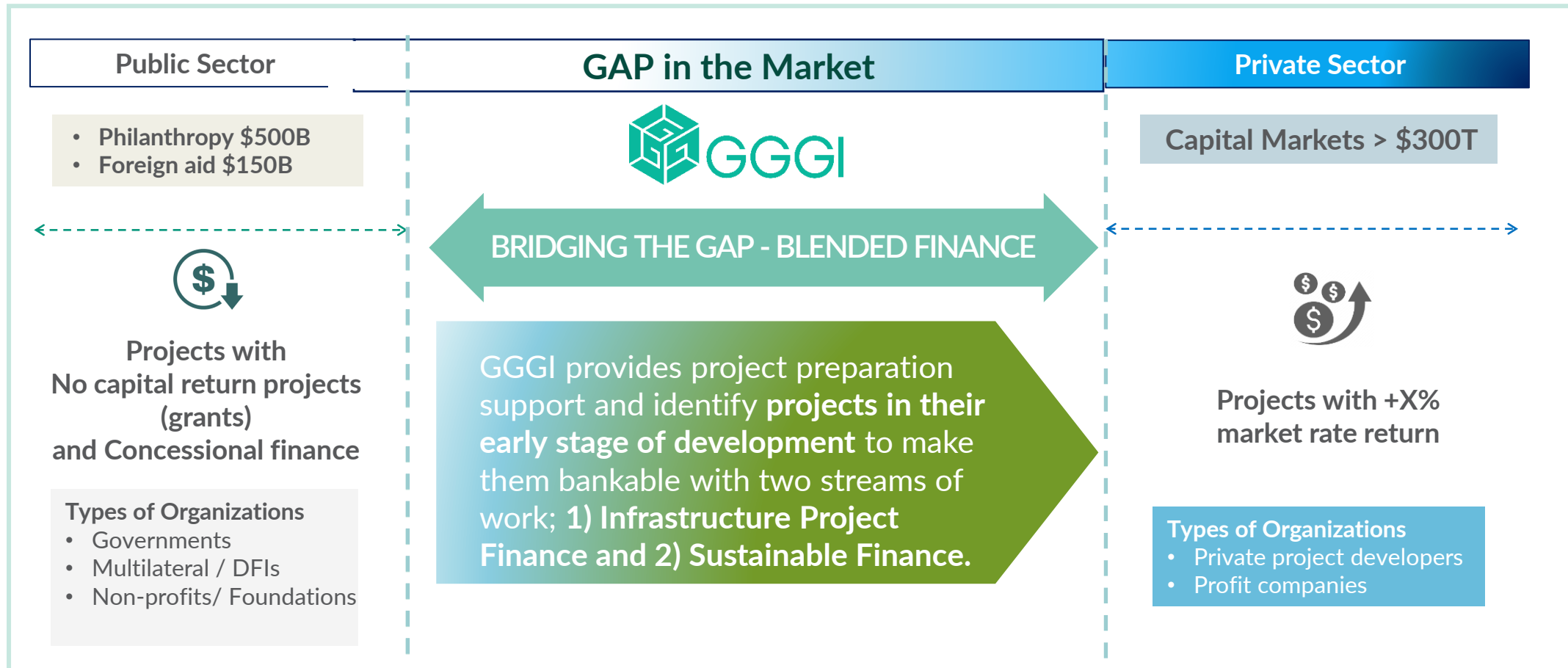
- Is the **Bretton Woods System** working for Developing and Underdeveloped Countries in the Era of Climate Crisis?
- How can they pursue green transformation **without adequate money, technology and capacity**?
- Do we have **effective global governance** including the UN?

< IMF 'Climate Finance Seminar with Central Bank Governors of Asia' in Bangkok >



Source: IMF (Dec, 12, 2023)

# BRIDGING THE GREEN FINANCE GAP: CASE OF GGGI



# GGGI'S THEMATIC BOND HIGHLIGHTS



GGGI has assisted the issuance of Selected Green, Social, Sustainability, and Sustainability-Linked Bond exceeding US\$ 5 billion

## Selected Green, Social, Sustainability, and Sustainability-Linked Bonds experience

Nov 2021 US\$3.2bn  Sustainable Bond Sustainability Structuring Agent	Nov 2021 US\$1bn  Social Bond Sustainability Structuring Agent	Oct 2021 US\$385mn  nacional financiera Banca de Desarrollo Sustainability Bond Sustainability Structuring Agent	Nov 2022 US\$150mn  Green Bond Sustainability Structuring Agent	Mar 2023 US\$200mn  FIRA FIDEICOMISOS INSTITUIDOS EN RELACION CON LA AGRICULTURA Resilience Bond Sustainability Structuring Agent	Jul 2022 US\$75mn  EVN FINANCE Green Bond Sustainability Structuring Agent	Feb 2022 US\$300mn  North American Development Bank Green Bond Sustainability Structuring Agent
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### Peru



GGGI delivered technical assistance to the Government of Peru to develop the capacity and systems to issue the country's [first sovereign Sustainable Bond](#), leading to multiple issuances for USD 3.2bn and EUR 1bn.

### Mexico



GGGI's technical assistance to Nacional Financiera (NAFIN) led to the bank's [first Sustainable Bond issuance for approx. US\\$ 370 million](#), first ESG bond with digital focus in Mexico.

### Vietnam



GGGI is implementing the [Viet Nam Green Bond Readiness Program](#) funded by the Government of Luxembourg to support development of the Green Bond Market.

### Africa



GGGI is in early talks with Member countries in Africa, particularly [Rwanda](#), [Senegal](#), [Côte d'Ivoire](#) and [Uganda](#) who have shown keen interest for support in Green and Sustainability Bonds.

### Donors & Funding Partners





# “It is people all that matter in the end.”

More than 800 million workers (25% of all) would be affected by climate risks globally and 300 million new jobs would be created in the course of transition.

**No one should be left behind.**

**Education and Training has never been important than now. People-Centered Clean Energy Transition is in need.**

**(with Fatih Birol, Executive Director, at the IEA Global Summit in Paris, April 2024)**



# Empowering Future Generation and Connecting Civil Actors and Innovators

Much depends on the power of education for young leaders (i.e. KAIST Graduate School of Green Growth and Sustainable Development) and social impacts by innovative NGOs across the Globe (i.e. Coalition for Our Common Future, the ISF Global Summit )

< SNU-KAIST Joint Forum on Training Human Resources for Innovative Carbon Neutrality Technologies >



Source: Presidential Commission on Carbon Neutrality and Green Growth

< Green Big Bang Prelude 2023 >



Source: Coalition for Our Common Future



# Speed-up, Scale-up for Green Big Bang (Learn As You Do)

**Integrate Top-Down and Bottom-Up Governance As Strong As Possible.**

**The world is looking for best cases and stories to be engaged.**

**‘Green Ladder Korea’ will be a part of it. 4.3 billion ODA budget (2024). Additional 300 million USD contribution to the GCF. Main contributor among the 48 member countries of the GGGI. Ambition for ITMO of Paris Agreement and **Coalition for Our Common Future !****



**John Kerry**

*Special Presidential Envoy for Climate*

Source: Coalition for Our Common Future (Nov. 7, 2023)





**Are we afforded the luxury of waiting for perfect answers  
in this imperfect uncharted world?  
New Thinking, New System, New Actors...Right Now!**