

KGGTF WORLD BANK KGGTF GGID 2023

REENOVATE KOREA ACT WITH NIGT

OCTOBER 17, 2023 | CAIRO, EGYPT



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NATIONAL INSTITUTE OF GREEN TECHNOLOGY



NIGT : NIGHT

GLOBAL TRENDS IN CLIMATE TECHNOLOGY INNOVATION - IPCC AR6

[ADAPTATION OPTIONS]

- Energy reliability (e.g. diversification, access, stability)
 - Resilient power systems
 - Improve water use efficiency
- Efficient livestock systems
 - Water use efficiency and water resource management)
 - Biodiversity management and ecosystem connectivity
 - Sustainable aquaculture and fisheries
- Sustainable urban water management
 - Sustainable land use and urban planning
 - Green infrastructure and ecosystem services
- Enhanced health services
- Risk spreading and sharing
 - Climate services, including early warning systems
 - Disaster risk management
 - Planned relocation and resettlement

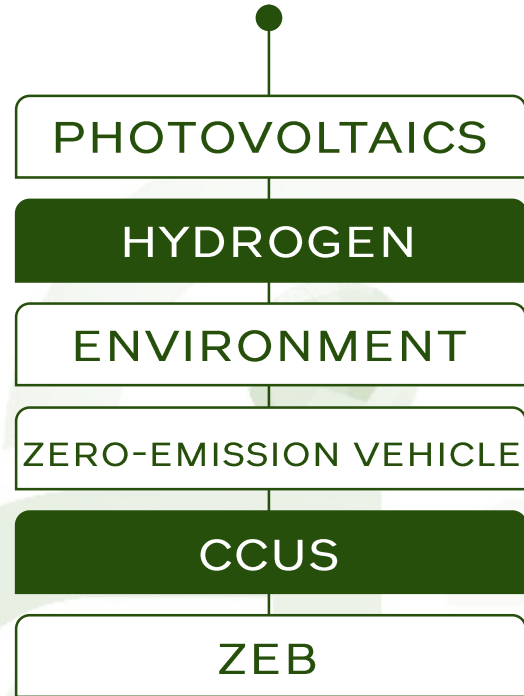


[MITIGATION OPTIONS]

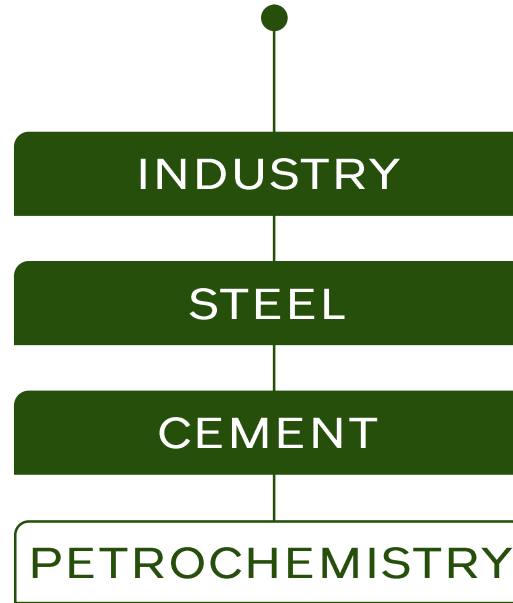
- Solar
 - Wind
 - Reduce methane from coal, oil and gas
 - Bioelectricity (includes BECCS)
 - Geothermal and hydropower
 - Nuclear
 - CCS
- Carbon sequestration in agriculture
 - Ecosystem restoration, afforestation, reforestation
 - Shift to sustainable healthy diets
 - Improved sustainable forest management
 - Reduce methane and N2O in agriculture
- Efficient buildings
 - Fuel efficient vehicles (EV, FCEV, etc.)
 - Biofuels for transport
 - Onsite renewables
- Fuel switching
 - Energy efficiency
 - Material efficiency
 - Reduce methane from waste/wastewater
 - Construction materials substitution
 - Enhanced recycling

KOREA'S EFFORTS IN CLIMATE TECHNOLOGY INNOVATION

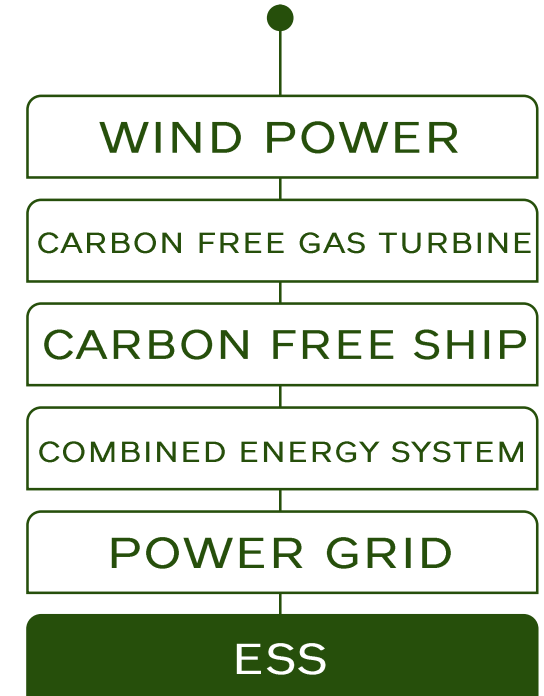
17 MAJOR NET-ZERO TECHNOLOGIES



- MSIT, "Hydrogen Energy Innovation Technology Development Program" (~\$50mn/5yrs)
- Development of large-scale alkaline water electrolysis cells and stack under dynamic operation
 - Core technology development for hydrogen release system based on LOHC
- MSIT, "DACU Technology Development program" (~\$6mn, 2023~)



- MOTIE, "Carbon Neutral Industry Core Technology Development Program" (~\$800mn, 2023~)
- Hydrogen reduction steel, Chemical process furnaces, blended cement, low-temperature process gas



- MSIT, "Climate technology development Program" (~\$900mn/`12~`23)
- Technology for next-generation lithium metal batteries for electric vehicles

NIGT'S MISSION & ROLES

A LEADING THINK TANK FOR INCLUSIVE AND INNOVATIVE GLOBAL GREEN GROWTH

We are a government-funded policy research institute that tackles green growth challenges and climate crisis with green technologies.

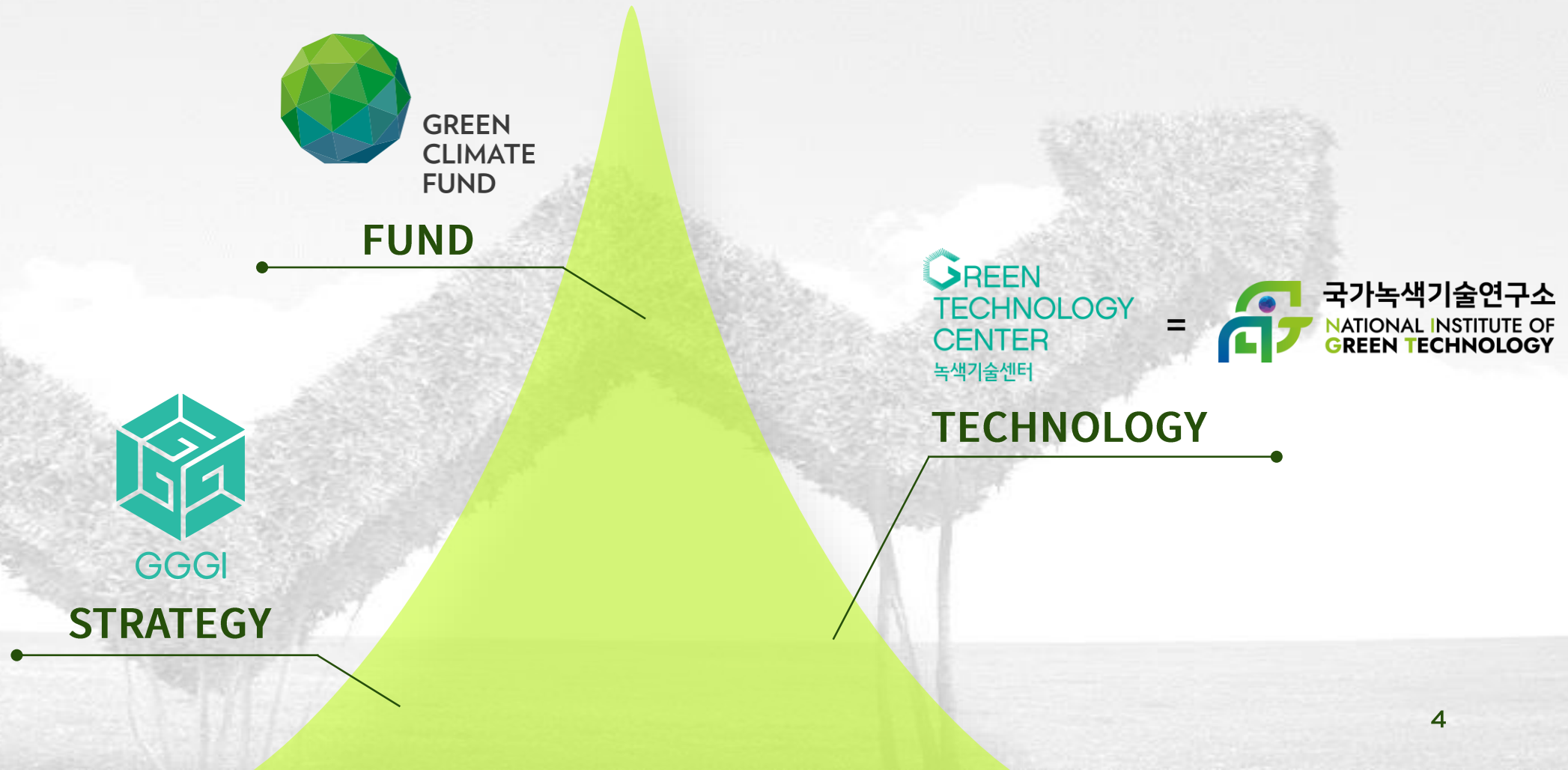
We bridge science, policy and decision-making to develop green solutions and facilitate climate actions.



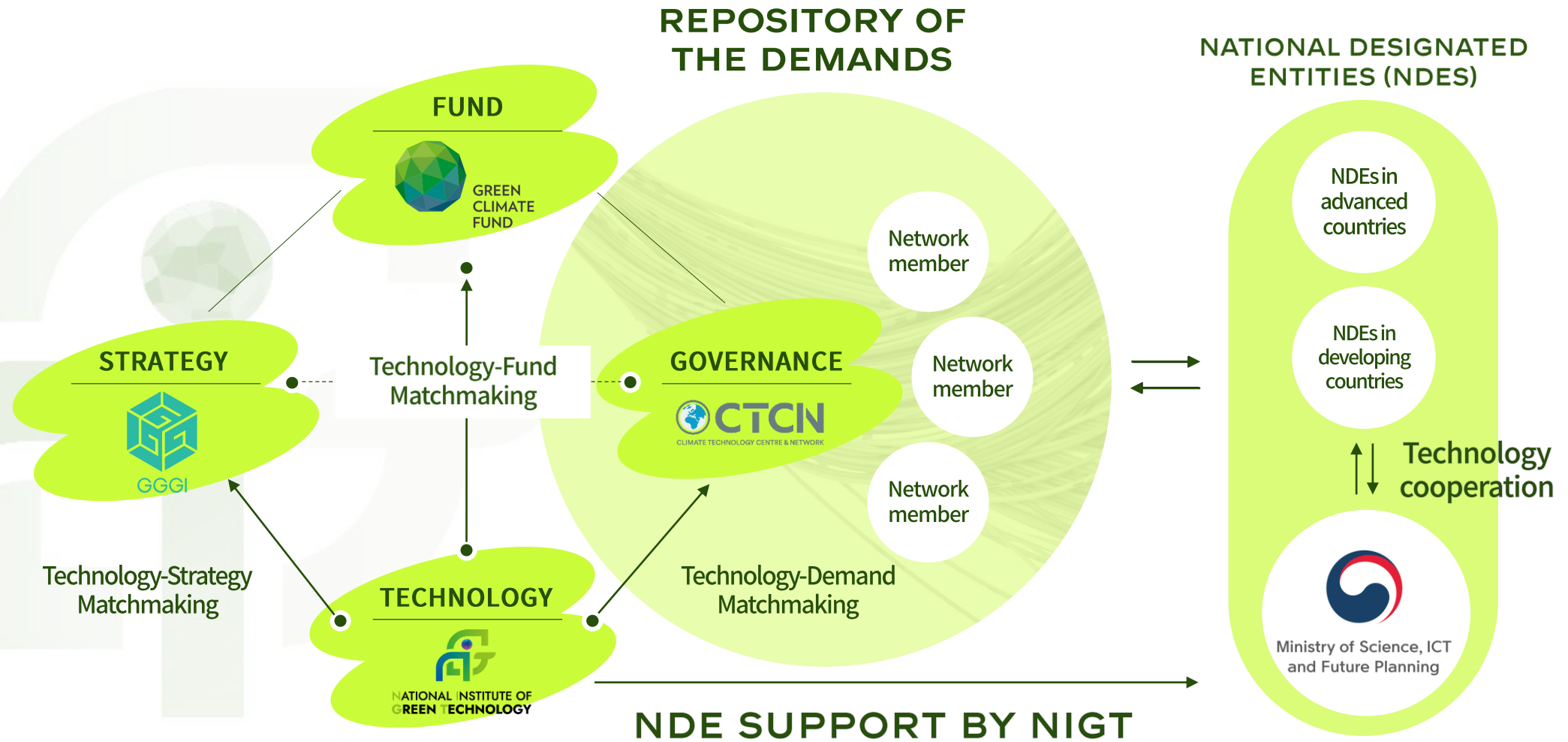
GREEN TRIANGLE PHILOSOPHY

THE 17TH PRESIDENT MYUNG-BAK LEE'S VISION FOR KOREA

THREE ELEMENTS NECESSARY FOR CONTINUING GREEN GROWTH



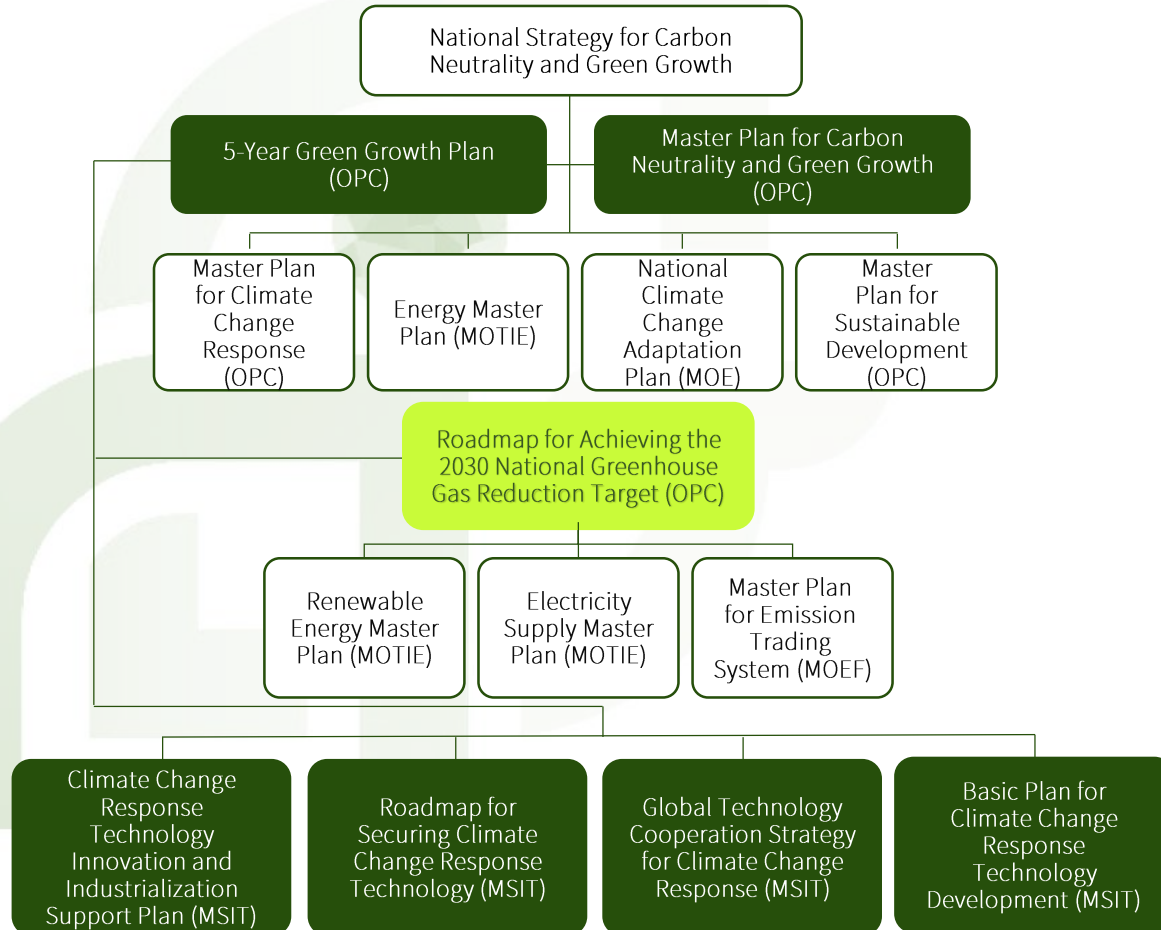
GREEN RECTANGLE PHILOSOPHY



DECADE OF REMARKABLE ACCOMPLISHMENTS BY NIGT (1)

NATIONAL CLIMATE TECHNOLOGY POLICY SUPPORT

National Frameworks for Climate Change Response



Contributed by the NIGT

NDC of the Republic of Korea

CLIMATE TECHNOLOGY DATA MANAGEMENT

Operating CTis(Climate Technology Information System)

Providing information for matching global projects and climate technology DB



Analyzing National Climate Technology R&D and Industry Statistics

Establishment of grounds for international cooperation activities with UNFCCC NDE



CASE: INTERNATIONAL COOPERATION STRATEGY MAP

International Cooperation Strategy Map for Hydrogen Production Technology

Technology Level of Hydrogen Production: 5th in the world (10-year average (2013-2020))

Global Export Ranking of Related Products: 5th in the world ('21)

● Standardized Score of Scholarly Publication (Number of SCI Paper Publications) ● Standardized Score of Patent (Number of Triadic Patents)

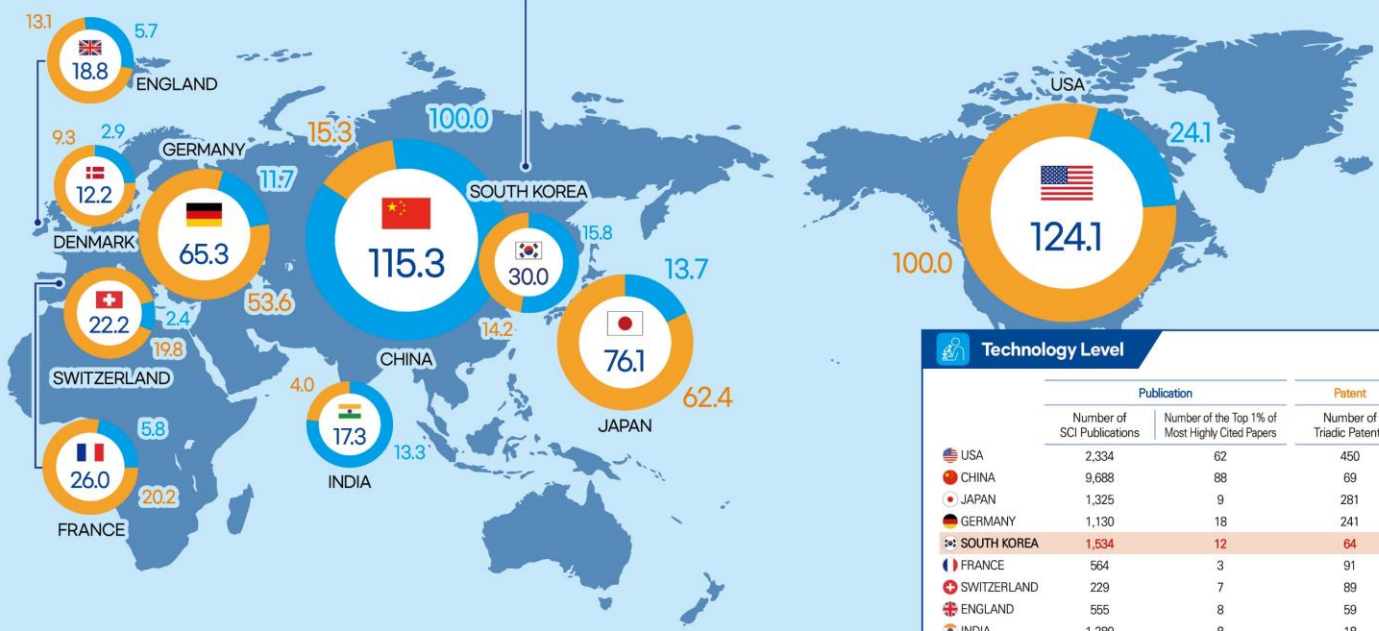
* Standardized Score: Relative score when the top-ranked country in the world is set to 100

Domestic Status of Hydrogen Production Technology

Government R&D Investment	72,856,023 USD	(21)
Value-added Ratio of Relevant Industries	33.60%	
Global Export Ranking of Related Products	5th	
Related Policies	National Strategic Technology Development Plan Carbon-Neutral Green Growth Technology Innovation Strategy.	

Renewable Energy Ratio in Electricity Generation (%)

USA	20.5	FRANCE	22.6
CHINA	28.8	SWITZERLAND	28.7
JAPAN	22.3	ENGLAND	40.7
GERMANY	41.5	INDIA	20.4
SOUTH KOREA	8.6	DENMARK	67.0




Technology Level

	Publication		Patent
	Number of SCI Publications	Number of the Top 1% of Most Highly Cited Papers	Number of Triadic Patents
USA	2,334	62	450
CHINA	9,688	88	69
JAPAN	1,325	9	281
GERMANY	1,130	18	241
SOUTH KOREA	1,534	12	64
FRANCE	564	3	91
SWITZERLAND	229	7	89
ENGLAND	555	8	59
INDIA	1,289	8	18
DENMARK	283	7	42

Representative Research Institutions and Corporations for Hydrogen Production Technology

	Research Institution*	Corporation**
USA	Univ. of California Berkeley (65), Georgia Institute of Technology (57)	Bristol-Myers Squibb Co[14], Dow Global Technologies Inc.[14]
CHINA	Univ of Chinese Academy of Sciences (306), Tsinghua Univ (220)	Sunshine Lake Pharma Co., Ltd[6], China Petroleum & Chemical Corporation[2]
JAPAN	Kyushu Univ (140), Univ of Tokyo (95)	Toray Industries, Inc[16], JFE Steel Corporation[8]
GERMANY	Max Planck Society (77), Research Center Jülich (70)	BASF SE[42], Wacker Chemie AG[15]
SOUTH KOREA	Ulsan National Institute of Science & Technology (81), Yonsei Univ (68)	LG Chem Ltd [16], Lotte Chemical Corporation[3]
FRANCE	Centre National de la Recherche Scientifique (50), CEA (36)	Commissariat à l'Énergie Atomique et Aux Énergies Alternatives[27], IFP Énergies Nouvelles[6]
SWITZERLAND	Ecole Polytechnique Fédérale de Lausanne (103), ETH Zurich (43)	Novartis AG [24], SIG Technology AG [5]
ENGLAND	Imperial College London (99), University of Cambridge (52)	Intelligent Energy Limited [9], H2GO Power Ltd[3]
INDIA	Indian Institute of Technology (46), Siksha 'O' Anusandhan Univ (41)	Indian Oil Corporation Limited[2], Deepak Pahwa[1]
DENMARK	Technical Univ of Denmark (201), Aalborg Univ (24)	Haldor Topsoe a/s[11], Novozymes a/s[5]



Representative Hydrogen Production Technology and Its Performance

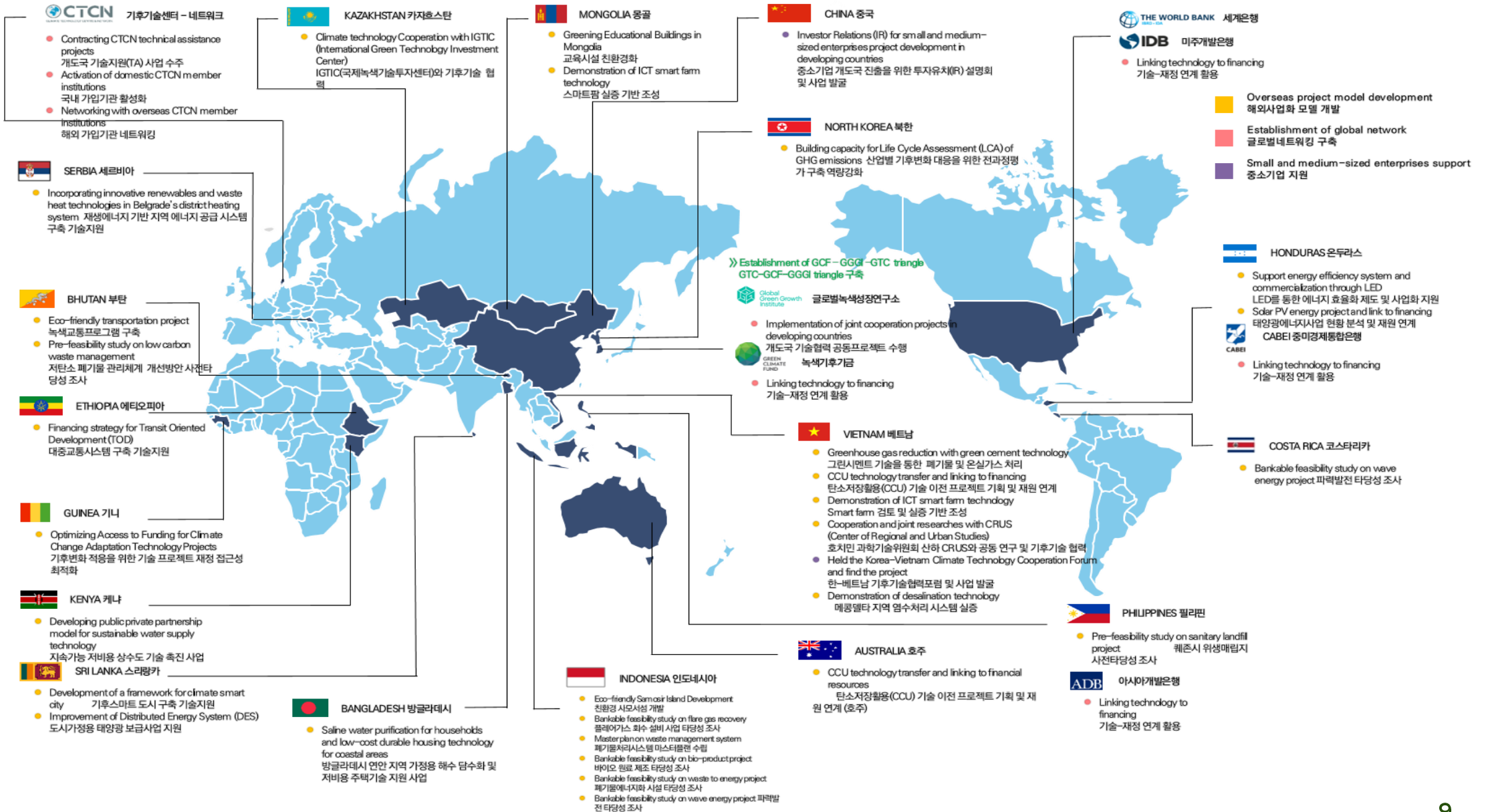
	Corporation	Technology	Technological Performance
USA	Dioxide Materials	AEM	Possessing technology of an anion exchange membrane that drastically reduces resistance (Sustainox37 membrane has a resistance capability of 0.045Ω·cm ² at 60°C, 1M KOH conditions).
	JAPAN	Asahi Kasei	AEC
Toshiba		SOEC	Successfully conducted experiments on hydrogen production and storage using SOEC (Solid Oxide Electrolysis Cell) technology, where hydrogen produced through electrolysis is stored in high-efficiency hydrogen storage tanks and used for power generation through fuel cells.
AIST		AEM	Possess technology for producing catalyst-coated membranes using the deal transfer method (The deal transfer method has the advantage of producing membrane-electrode assemblies with the same performance, and mass production is possible.)
GERMANY	Sunfire	SOEC	Successful verification of 150 kW-class bidirectional high-temperature water electrolysis/fuel cell technology (90% efficiency (HHV) and 1% degradation rate per 1,000 hours). Successful development of the Reversible Solid Oxide Cell (RSOC) system, a reversible solid oxide fuel cell-water electrolysis system (with 45% reversible operation efficiency), and joint verification operation with BOEING are underway.
	Enapter	AEM	Possess technology of anion exchange membrane (AEM) based water electrolysis (stack: 2.2 kW commercial, 200-300 kW lab scale)
SOUTH KOREA	Susoenenergy	AEC	Development of key components, securing large-scale technology, and development and verification of 1 MW-class (110 cm) systems in progress
	Elchemtech	PEMEC	Development of the only domestic PEM electrolysis system (Development and testing of a single stack of 1 MW-scale PEM electrolysis system is underway)
	SK ecoplant	SOEC	Proving experimental verification to produce 2.6 kg of hydrogen per hour at 125 kW level.
	YEST	AEM	Planned installation of a 2MW system in collaboration with German company Enapter

DECADE OF REMARKABLE ACCOMPLISHMENTS BY NIGT (2)

CREATING CLIMATE TECHNOLOGY COOPERATION MODELS LINKING DIVERSE FUNDING PROGRAMMES



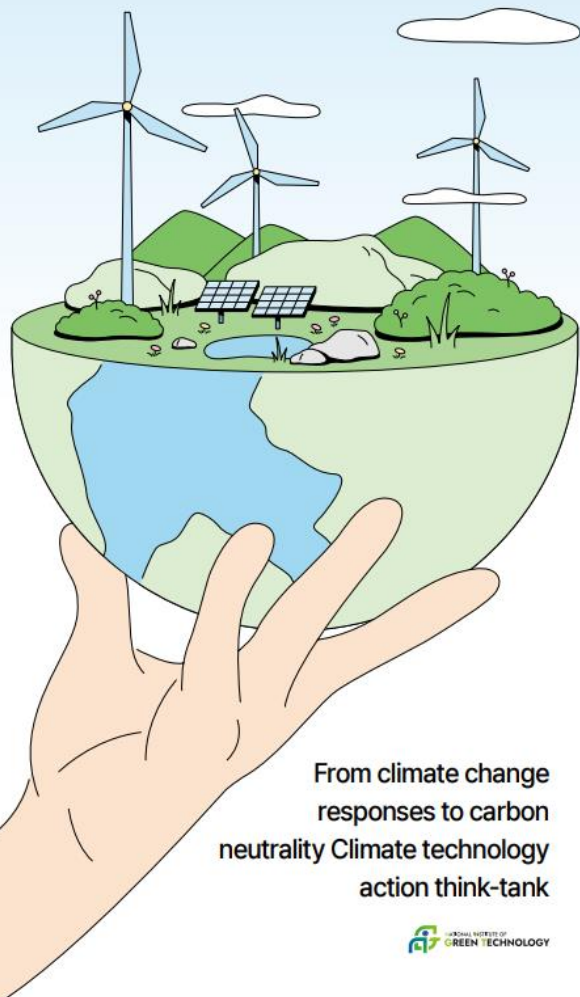
NIGT'S GLOBAL TECHNOLOGY COOPERATION STATUS



NIGT USER GUIDE

National Institute of Green Technology

NIGT USER GUIDE

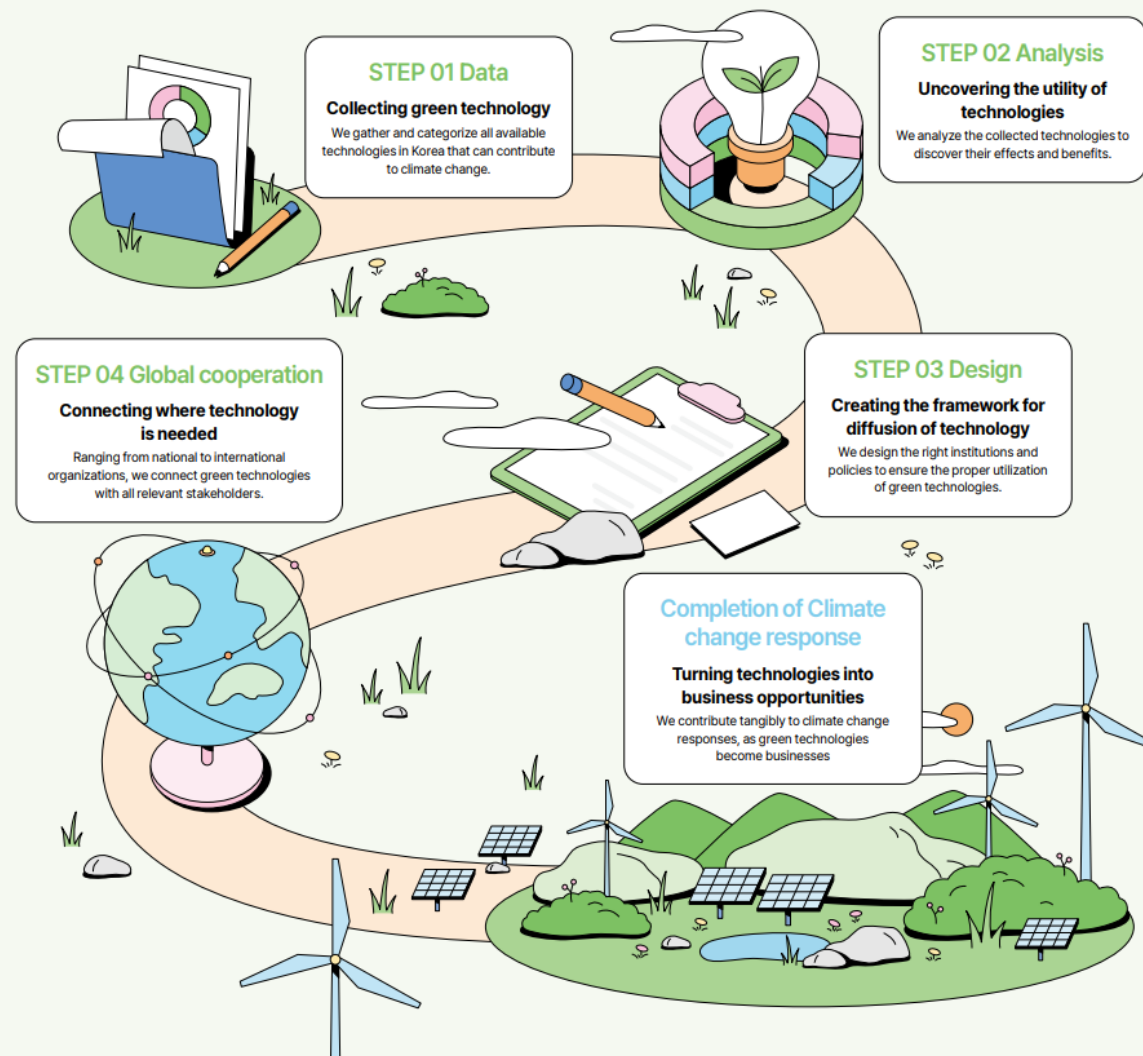


From climate change
responses to carbon
neutrality Climate technology
action think-tank



NIGT's Key Functions

A research institute that effectively contributes
to global climate change responses
by bringing added value to green technologies



NIGT's Benefits and What We Offer



Climate technologies at a glance

We create customized green technology
information based on policy customer demands.

- Establishment of a specialized information
platform on climate technology cooperation
- Development of a climate technology
classification system



Policies which reduce greenhouse gases are designed

We discover and suggest proactive
climate change response policies
at the national level.

- Formulation of the 3rd Five-Year Plan for
Green Growth
- Development of the package-type R&D
investment model for tackling fine dust



Korea's green technology spreads to the world

We build a cooperative process that ranges
from identifying technology demands to project
implementation.

- Approval of Korea's first-ever GCF Project
Preparation Facility (PPF)
- Promotion of public and private overseas joint
technology cooperation projects



Creating a global green technology platform

We research methods to facilitate technology
cooperation and prepare strategies for domestic and
international technology cooperation.

- Taking the lead in energizing climate technology
cooperation in linkage with the UNFCCC CTCN
- Establishment of the Korea-Indonesia Green
Technology Cooperation Hub Center



NIGHT WILL BE A KNIGHT

FOR CLIMATE CHANGE RESPONSE
IN A GREEN GROWTH ERA

KGGTF WORLD BANK KGGTF KGGID 2023

LOOKING FORWARD TO
OUR PARTNERSHIP

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