ISUS Urban Infra Forum

YONSEI UNIVERSITY
Graduate school of International Studies

Sustainable Development and Carbon Neutrality

2024. 5. 8

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

Tae Yong Jung

Current Position

- Professor and Associate Dean, Graduate School of International Studies, Yonsei University, Republic of Korea
- Director, Sustainable Development Program, Ban Ki-moon Foundation
- Member, Presidential Council on Carbon Neutrality and Green Growth
- Board Member, World Wild Fund, Korea
- Member, UNESCO Korea
- Coordinator, Water Advisory Group, Asian Development Bank

Work Experience

- Professor, KDI School of Public Policy & Management
- Principal Climate Change Specialist, Asian Development Bank
- Deputy Executive Director, Global Green Growth Institute
- Senior Energy Economist, World Bank
- Project Leader, Institute for Global Environmental Strategies, Japan
- Senior Fellow, Korea Energy Economics Institute

Education

- BA, Seoul National University, Republic of Korea
- MA, Ph. D, Rutgers University, USA

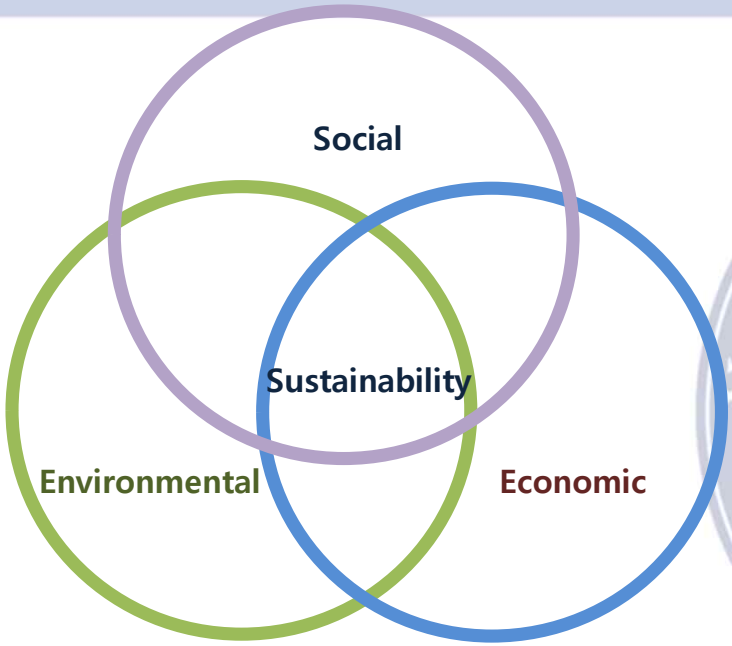
Others

- Member, International Cooperation Committee, National Council on Climate and Air Quality (Presidential Committee), Republic of Korea, Member, Presidential Committee on Green Growth, Republic of Korea
- Chair, Appeal Committee, Green Climate Fund
- Coordinating Lead Author, 6th Assessment Report (WG3), IPCC

Table of Contents

Sustainable Development (SD)

- Economic Sustainability: for poverty reduction (within economic system)
- Environmental Sustainability: environmental protection → investment in natural capital
- Social Sustainability: social protection → investment in human capital for social inclusiveness

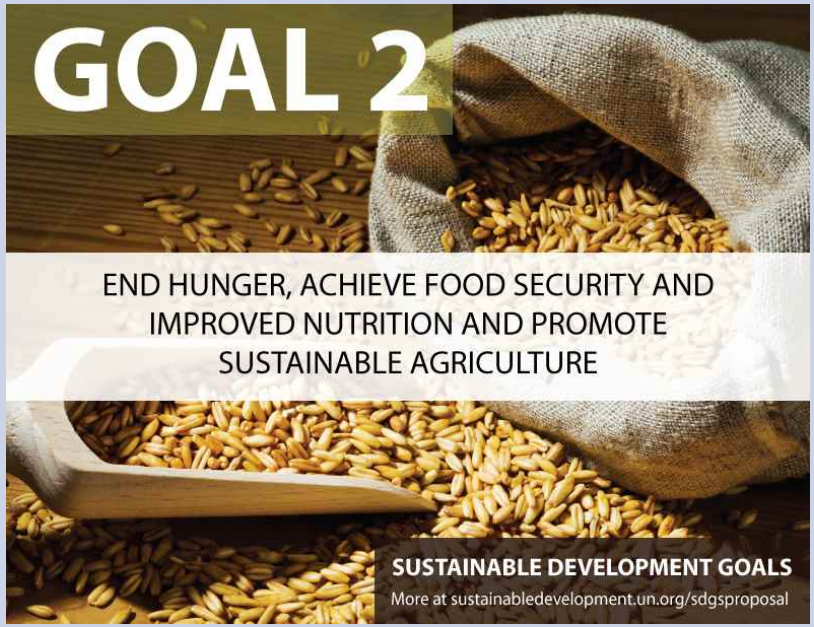


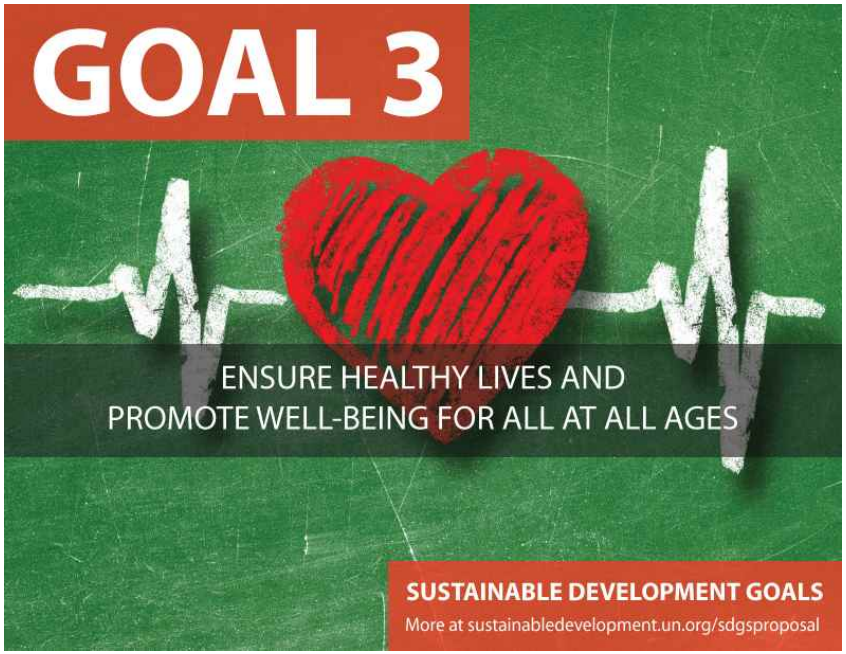
Sustainable Development (SD)

27. Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organization can be both managed and improved to make way for a new era of economic growth. The Commission believes that widespread poverty is no longer inevitable. Poverty is not only an evil in itself, but sustainable development requires meeting the basic needs of all and extending to all the opportunity to fulfil their aspirations for a better life. A world in which poverty is endemic will always be prone to ecological and other catastrophes.

Source: Our Common Future, UN 1987

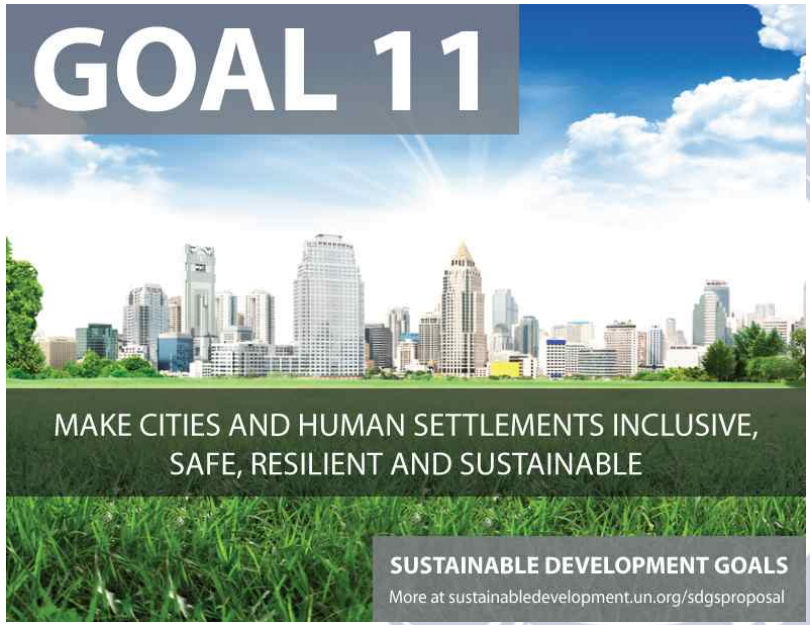
Sustainable Development Goals: SDGs





Sustainable Development Goals: SDGs

Sustainable Development Goals: SDGs



Sustainable Development Goals: SDGs

Sustainable Development Goals: SDGs

Sixth Assessment Report
WORKING GROUP III – MITIGATION OF CLIMATE CHANGE

ipcc
INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

Climate Change 2022

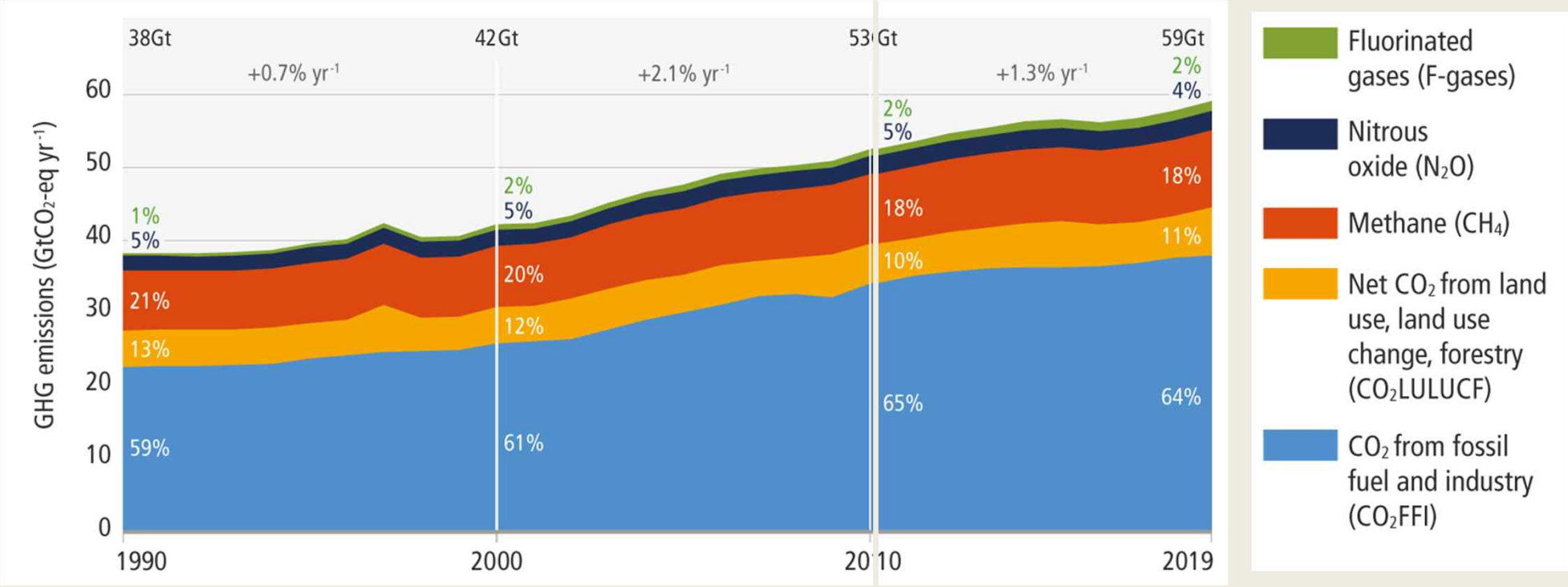
Mitigation of Climate Change

- Summary for Policy Makers -

[Matt Bridgestock, Director and Architect at John Gilbert Architects]

We are not on track to limit warming to 1.5 °C.

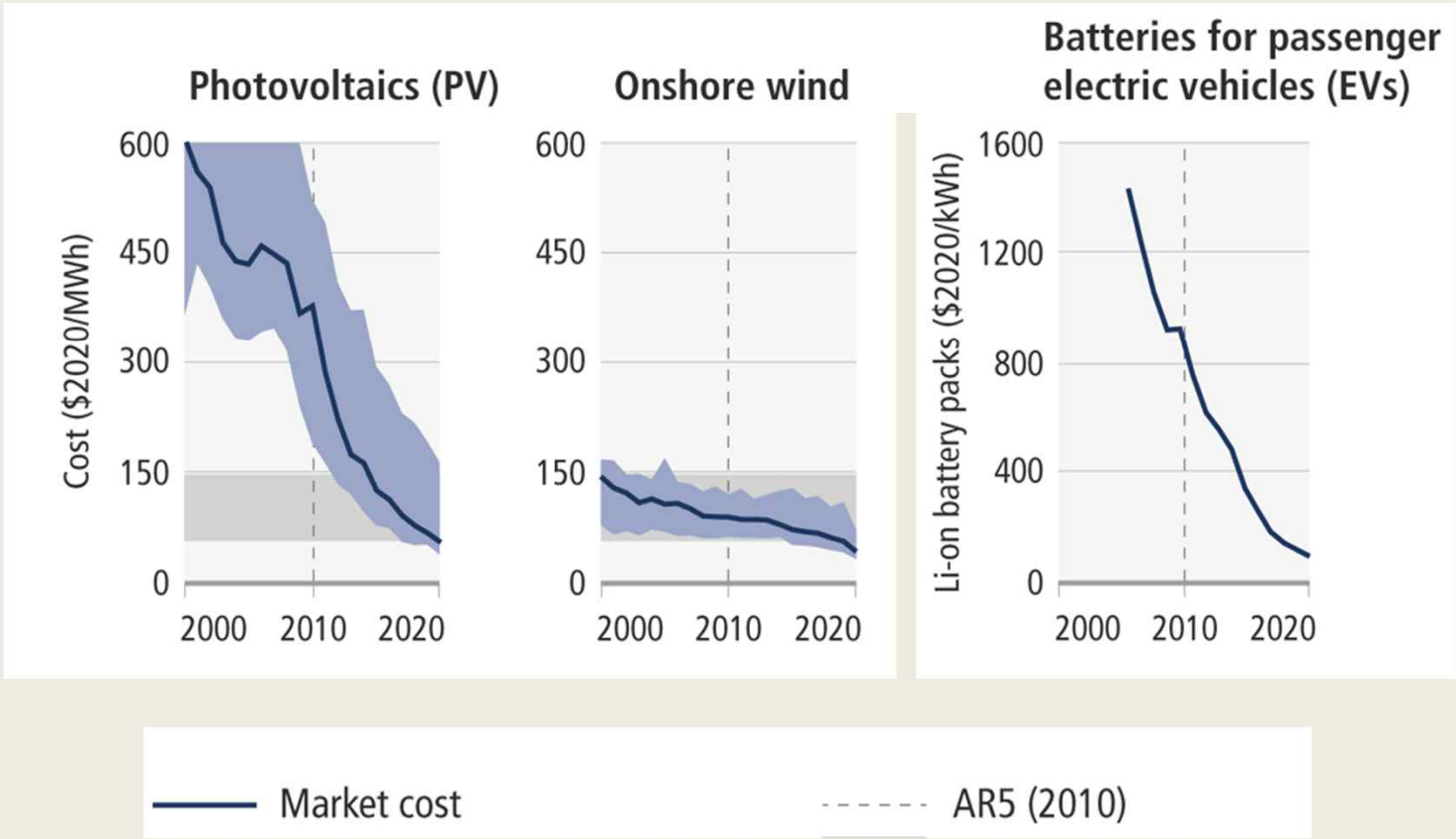
2010-2019: Average annual greenhouse gas emissions at highest levels in human history.



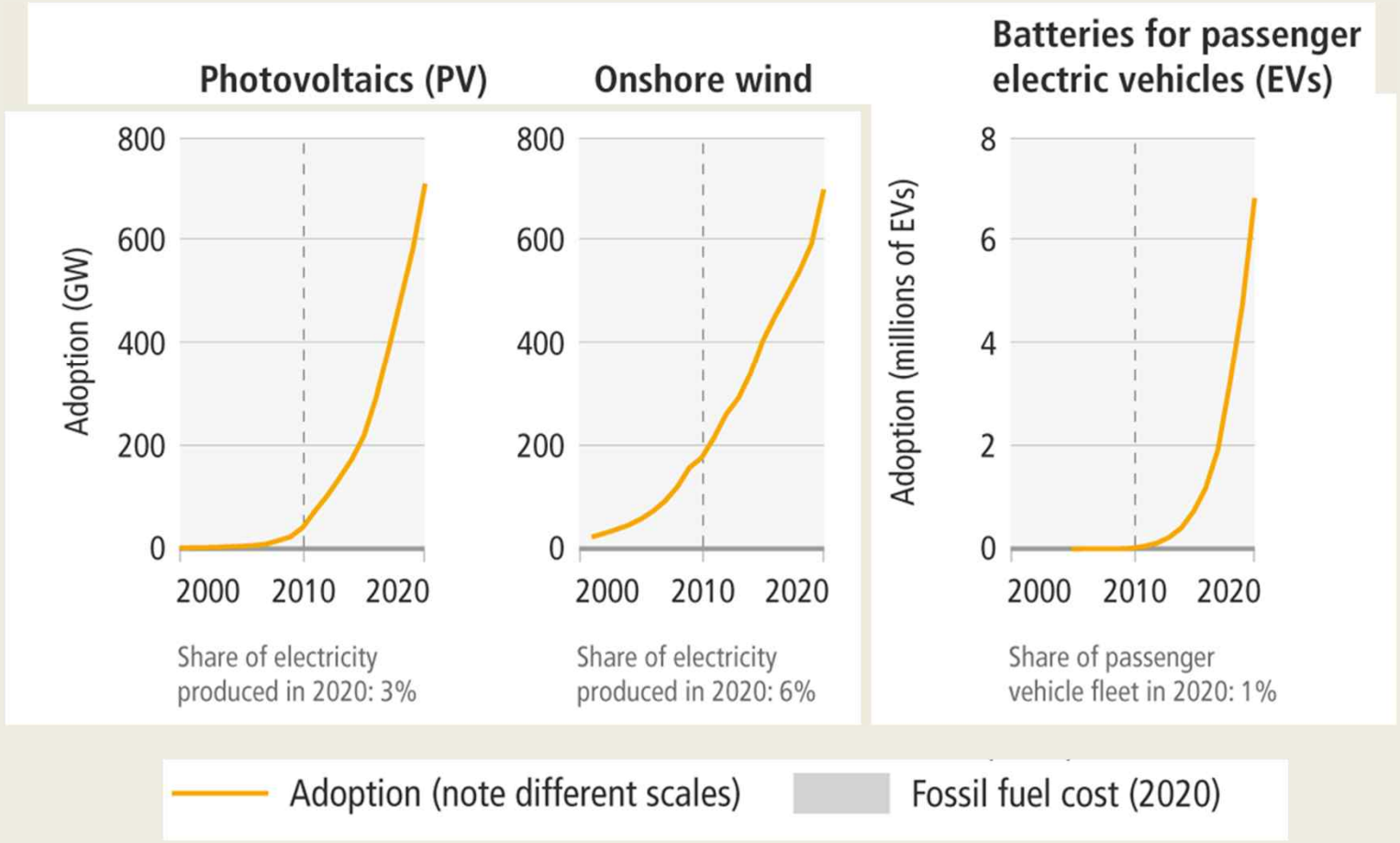
...but there is increased evidence of climate action

Some countries have achieved a **steady decrease** in emissions **consistent** with limiting warming to **2°C.**

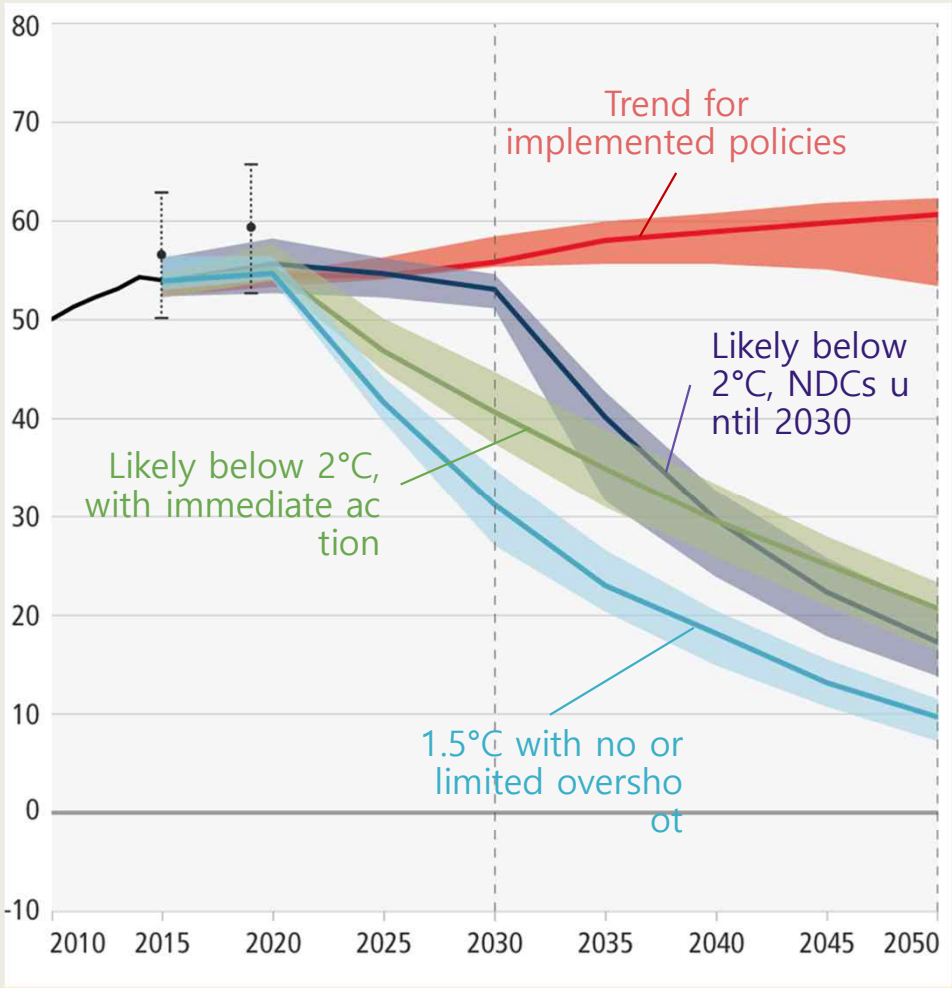
Zero emissions targets have been adopted by at least **826 cities and 103 regions**



In some cases, costs for renewables have fallen below those of fossil fuels.



Electricity systems in some countries and regions are already predominantly powered by renewables.



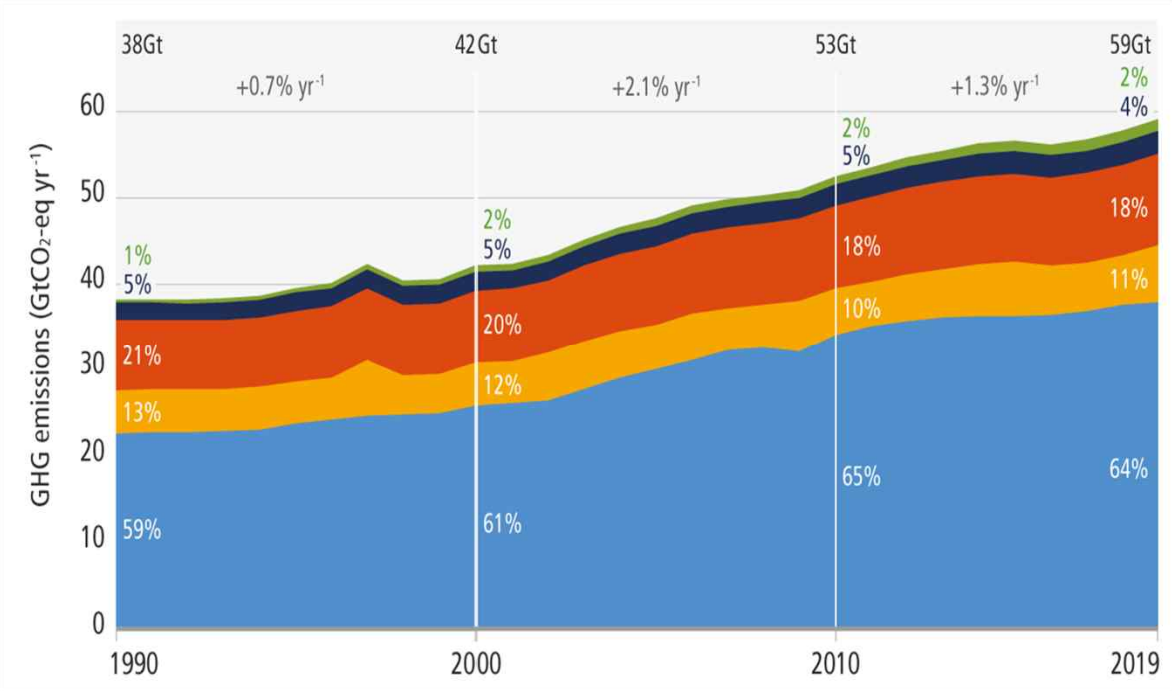
Limiting warming to 1.5 °C

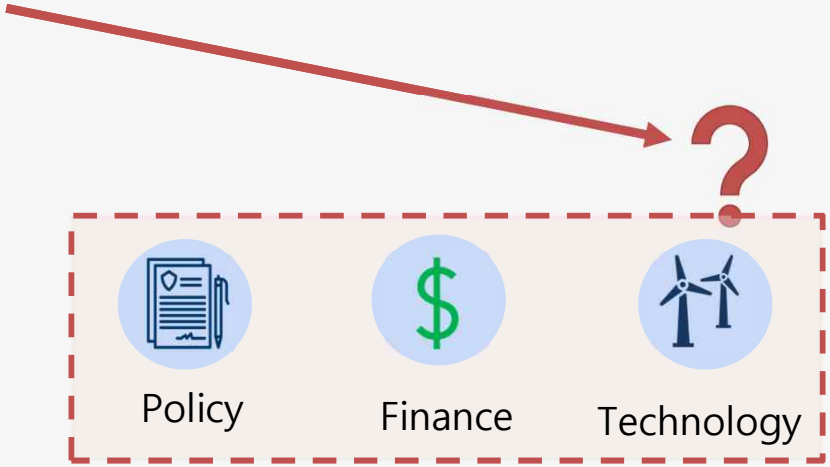
- Global GHG emissions peak before 2025, reduced by **43%** by 2030.
- Methane reduced by 34% by 2030

Limiting warming to around 2°C

- Global GHG emissions peak before 2025, reduced by **27%** by 2030.

(based on IPCC-assessed scenarios)





2030

Energy | Land use | Demand and services | Industry | Urban | Buildings | Transport

Energy

- **major transitions** are required to limit global warming
- reduction in fossil fuel use and use of carbon capture and storage
- low- or **no-carbon** energy systems
- widespread **electrification** and improved energy **efficiency**
- **alternative fuels**: e.g. hydrogen and sustainable biofuels

[Portland General Electric CC BY-ND 2.0, Harry Cunningham/Unsplash, Ste´phane Bellerose/UNDP in Mauritius and Seychelles CC BY-NC 2.0, IMF Photo/Lisa Marie David, Tamara Merino CC BY-NC-ND 2.0]

Land use

- can provide large-scale emissions reductions **and** remove and store CO_2 at scale
- protecting and restoring **natural ecosystems** to remove carbon: forests, peatlands, coastal wetlands, savannas and grasslands
- competing demands have to be **carefully managed**
- **cannot compensate** for **delayed** emission **reductions** in other sectors

[Mokhamad Edliadi, Nanang Sujana/CIFOR CC BY-NC-ND 2.0]

Demand and services

- potential to **bring down** global **emissions** by **40-70%** by 2050
- walking and cycling, electrified transport, reducing air travel, and adapting houses make large contributions
- **lifestyle changes** require **systemic changes** across all of society
- **some** people require additional **housing**, **energy** and **resources** for human wellbeing

[Bosch, Unsplash/Yoav Aziz, Adam Bartoszewicz, Victor Hernandez]

Industry

- using materials more **efficiently**, **reusing**, **recycling**, **minimising waste**; currently **under-used** in policies and practice
- **basic materials**: low- to zero-greenhouse gas production processes at **pilot** to **near-commercial** stage
- achieving **net zero** is challenging

[Ahsanization/Unsplash, IMF Focus | Industry and Manufacturing CC BY-NC-ND 2.0, Rwanda Green Fund CC BY-ND 2.0, ILO/M. Fossat CC BY-NC-ND 2.0, Stephen Cornwell Pxhere.com]

Cities and urban areas

- better urban planning, as well as:
- sustainable production and consumption of goods and services,
- **electrification** (low-emission energy),
- enhancing **carbon uptake and storage** (e.g. green spaces, ponds, trees)

There are options for existing, rapidly growing *and* new cities.

[Pelargoniums for Europe/Unsplash, City of St Pete CC B Y-ND 2.0, Victor/Unsplash, EThekwini Municipality, Arne Mu¨seler/arne-mueseler.com, CC BY-SA 3.0 de]

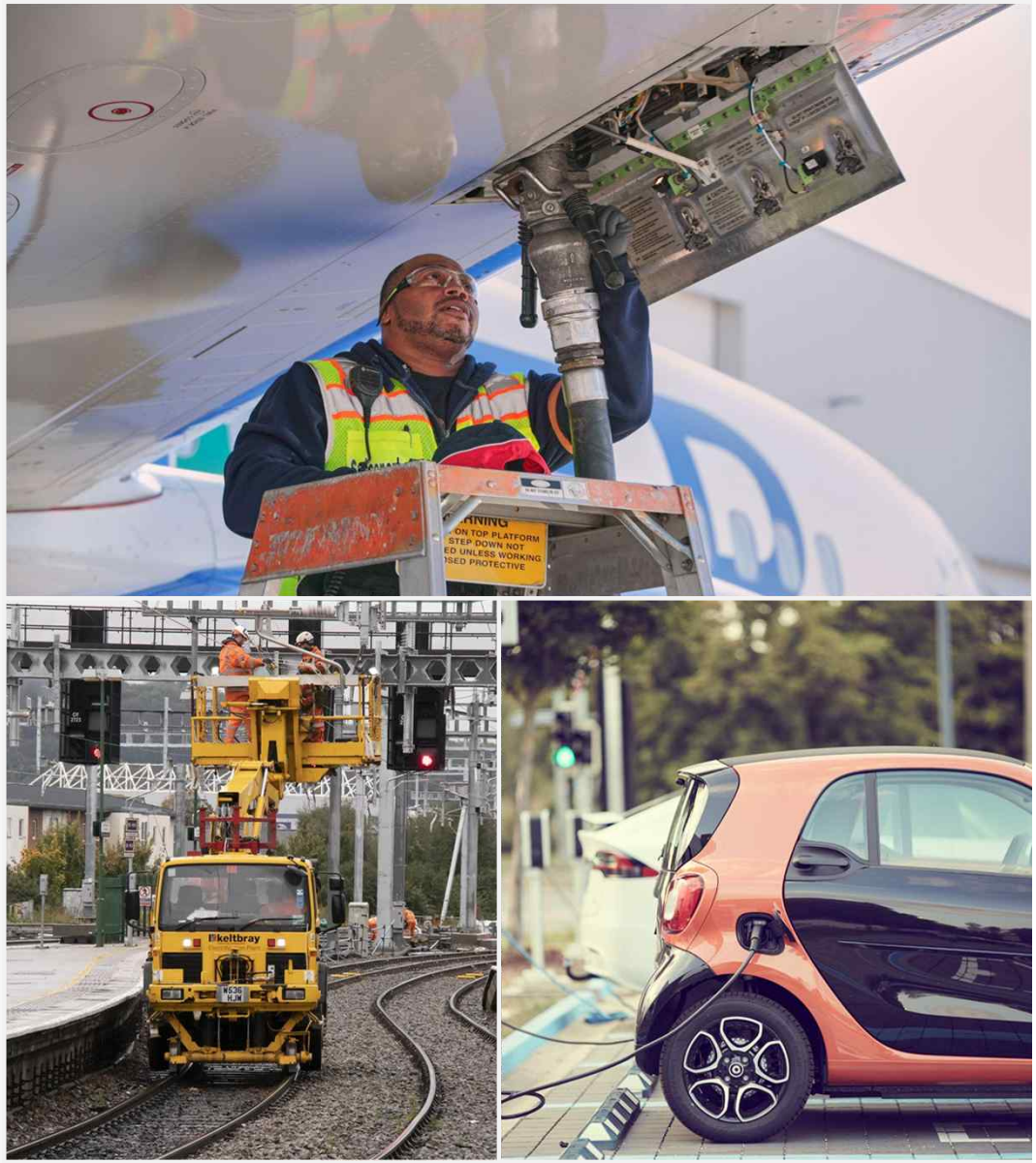
Buildings

- buildings: possible to reach net zero emissions in 2050
- action in this decade is critical to fully capture this potential
- involves retrofitting existing buildings and effective mitigation techniques in new buildings
- requires ambitious policy packages
- zero energy and **zero-carbon** buildin gs exist in new builds **and retrofits**

[Pelargoniums for Europe/Unsplash, City of St Pete CC BY-ND 2.0, Victor/Unsplash, EThekwini Municipality, Arne Mu¨seler/arne-mueseler.com, CC BY-SA 3.0 de]

Transport

- **reducing demand** and **low-carbon** technologies are key to reducing emi ssions
- **electric vehicles**: greatest potential
- **battery technology**: advances could assist electric rail, trucks
- **aviation** and **shipping**: alternative fuels (low-emission **hydrogen** and **biofuels**) needed
- Overall, substantial potential but depe nds on **decarbonising the power sector**.



[United Airlines, Jeremy Segrott CC BY 2.0, Andreas160578/Pixabay]

Carbon Dioxide Removal

- required to **counterbalance hard-to-eliminate** emissions
- through **biological** methods: reforestation, and soil carbon sequestration
- **new technologies** require more **research**, up-front **investment**, and proof of concept at **larger scales**
- **essential** to **achieve net zero**
- **agreed methods** for measuring, reporting and verification required

[Forest Service Northern Region CC BY 2.0, Fiston Wasanga/CIFOR CC BY-NC-ND 2.0, Climeworks]



Technology and Innovation

- investment and policies **push forward low emissions** technological **innovation**
- **effective decision making** requires assessing potential benefits, barriers and risks
- **some options** are technically **viable**, rapidly becoming **cost-effective**, and have relatively **high public support**. Other options face barriers

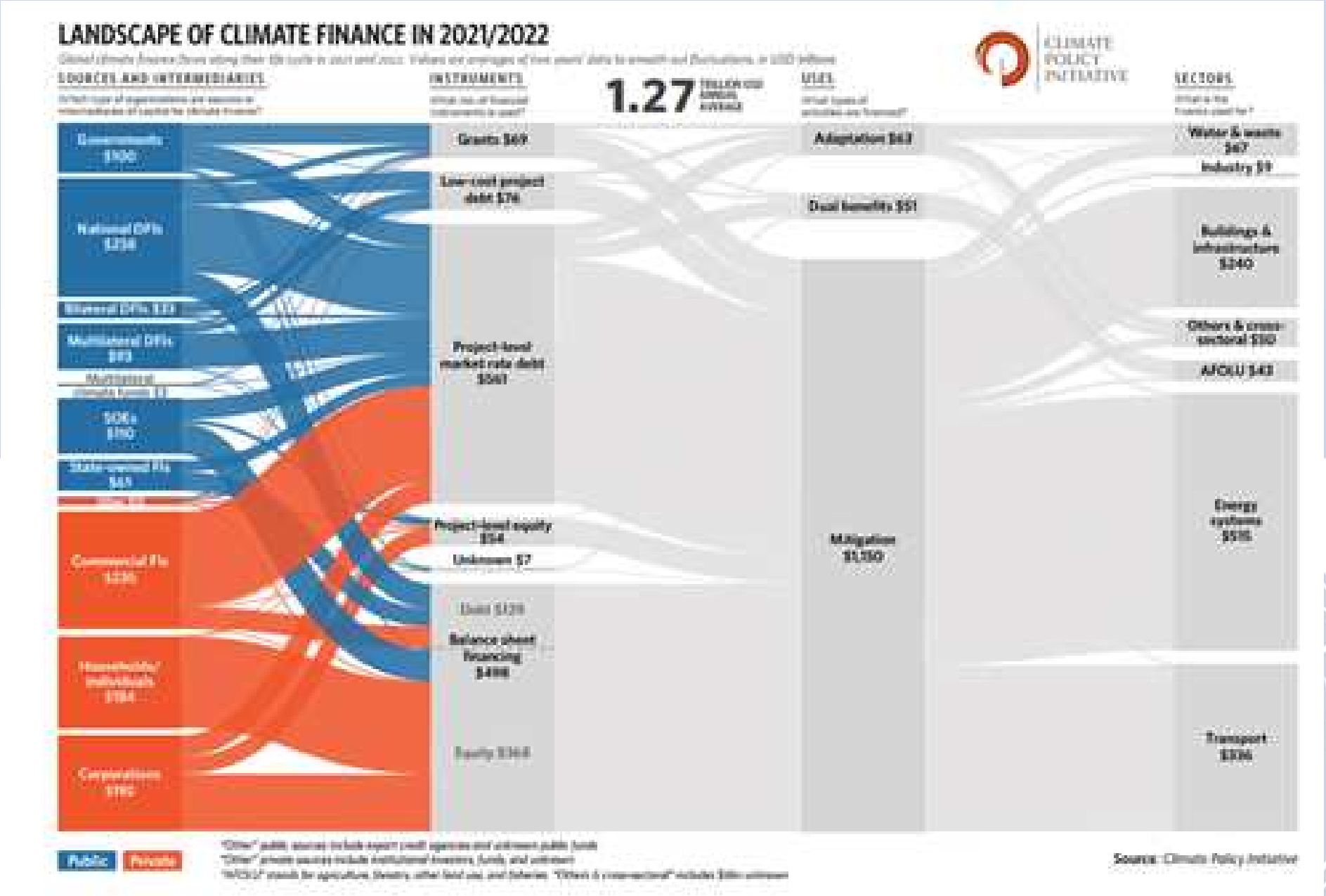
Adoption of low-emission technologies is slower in most developing countries, particularly the least developed ones.

Closing investment gaps

- financial flows: **3-6x lower** than levels needed **by 2030** to limit warming to below 1.5°C or 2°C
- there is **sufficient global capital** and liquidity to close investment gaps
- challenge of closing gaps is widest for developing countries

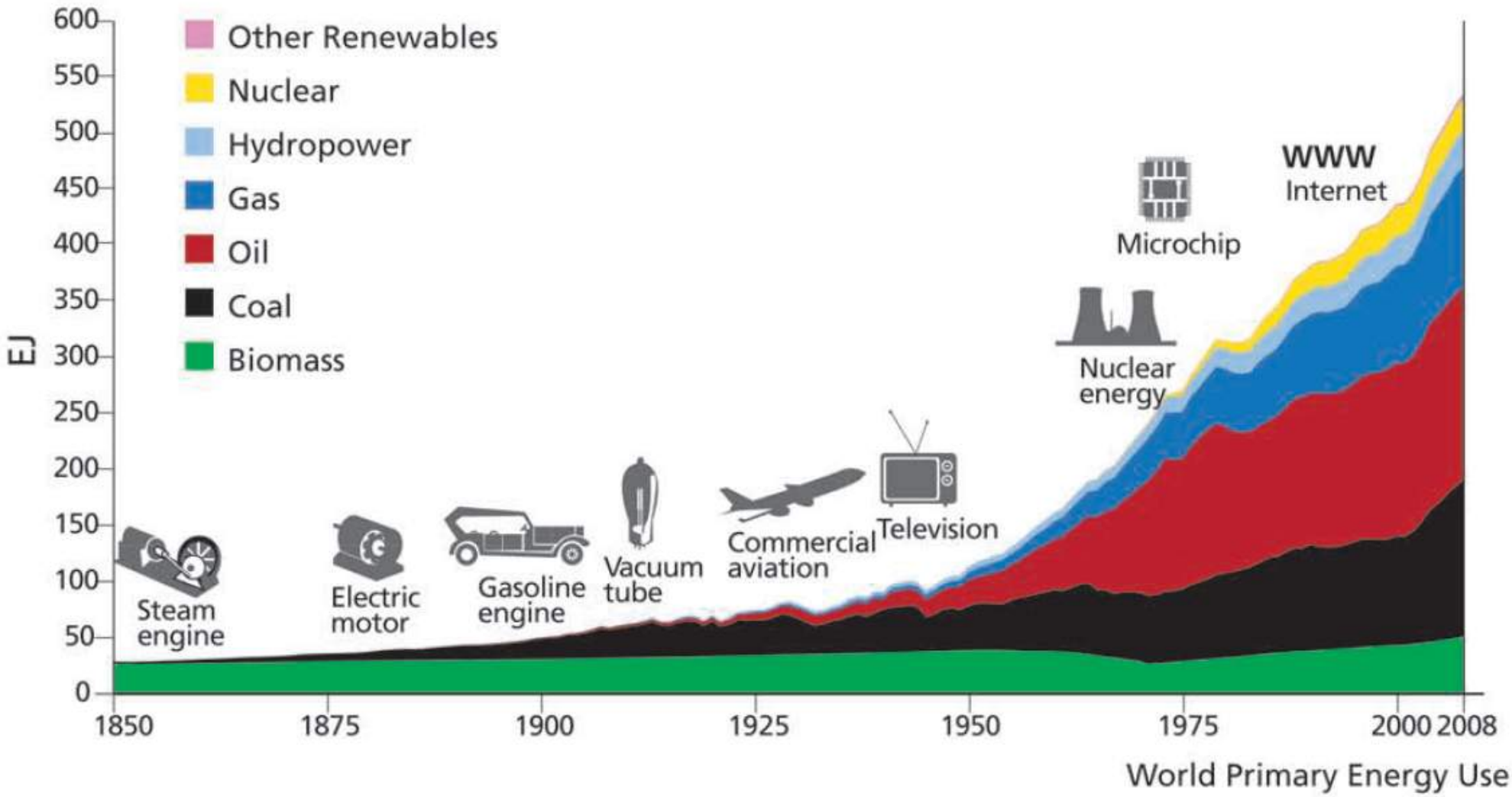
[Tobias/Unsplash, Rwanda Green Fund /CC BY-SA 2.0]

Landscape of Climate Finance (2021/2022)



Source: The Global Landscape of Climate Finance, Climate Policy Initiative, 2023

Global Energy History

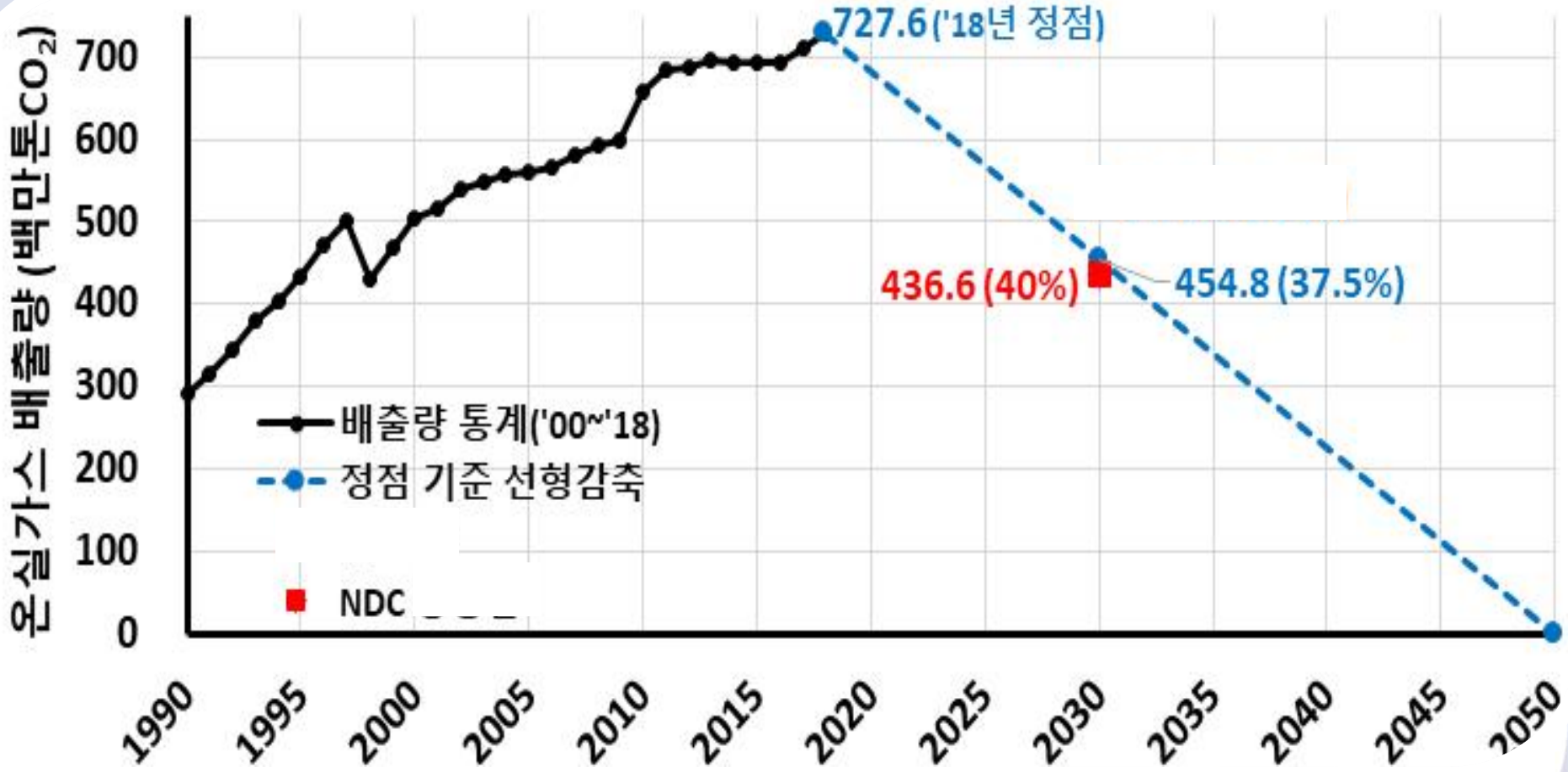


Source: Global Energy Assessment, GEA, IIASA, 2012

4D Mega-trends in the 21st century

1. Digital transformation
2. De-carbonization
3. De-centralization
4. Demographic change

Korea's NDC by 2030



NDC Target by Sectors

(mill. Ton, %)

	Sector	2018	2030 Target	
			NDC ('21.10)	Revised NDC ('23.3)
Total		**727.6**	**436.6(40.0%)**	**436.6(40.0%)**
Emission	**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	35.0(32.8%)	35.0(32.8%)
	Transport	98.1	61.0(37.8%)	61.0(37.8%)
	AG	24.7	18.0(27.1%)	18.0(27.1%)
	Waste	17.1	9.1(46.8%)	9.1(46.8%)
	Hydrogen	(-)	7.6	**8.4**
	Leaking	5.6	3.9	3.9
Sink · Removal	**Sink**	(-41.3)	-26.7	-26.7
	CCUS	(-)	-10.3	**-11.2**
	Article 6	(-)	-33.5	**-37.5**

Source: Council on Carbon Neutrality and Green Growth

International development cooperation arrangement - Climate change projects by Korean partners -

Recipient Countries	• Strengthen capacity to cope with climate change • Prevention of infectious diseases and improvement of overall living conditions • Reducing GHG emissions and contributing to stable and sustainable economic growth
Rep. of Korea	• Developing business opportunities for Korean private sectors (especially with SMEs)
International Community	• Cooperation in international efforts to achieve SDGs to respond to climate change in APEC developing member economy

Risk factors for project financing in developing countries

General political riks

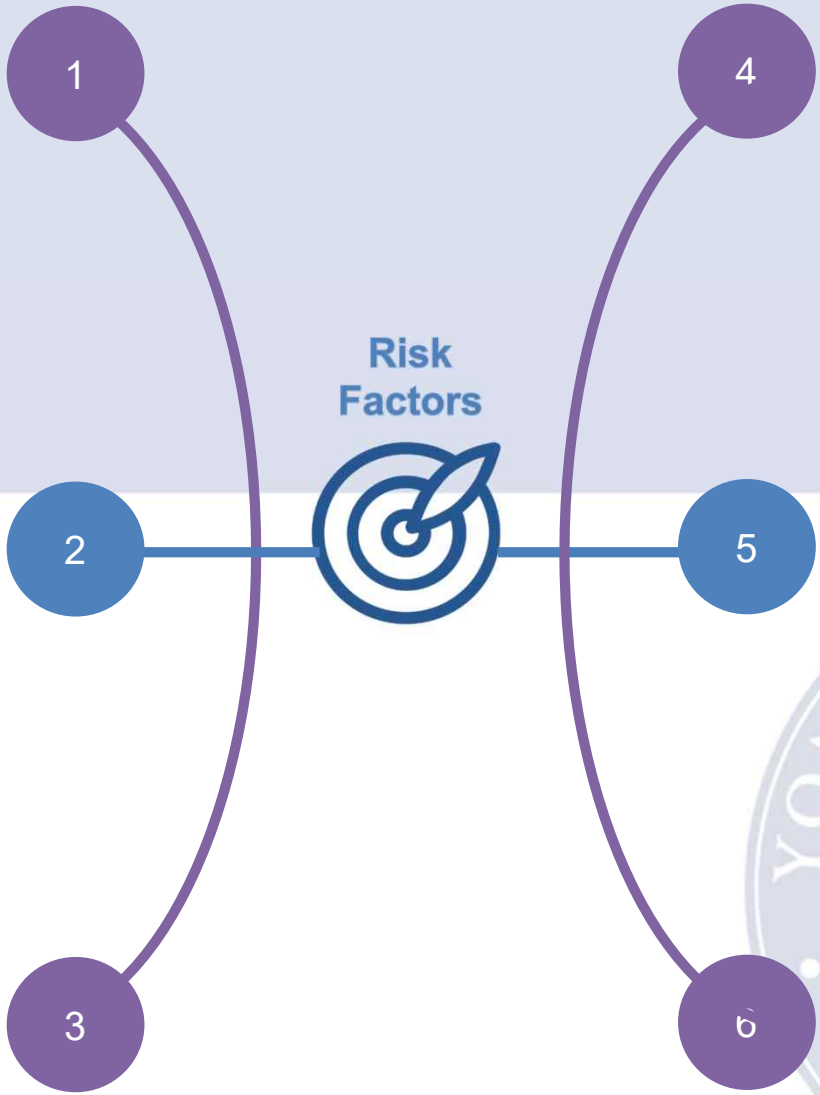
reflecting concern about political stability and the security of property rights in the country; along with the generally higher cost of working within unfamiliar legal systems

Currency risk

reflecting concern about the loss of value of local currencies (and their lower utility to an overseas investor)

Regulatory and policy risk

reflecting concern about the stability and certainty of the regulatory and policy environment, including the longevity of incentives available for low carbon investment and the reliability of power purchase agreements



Execution risk

reflecting concern that the local project developer/firm may lack the capacity and/or experience to execute the project efficiently; along with the general difficulty of operating in a distant and unfamiliar country

Technology risk

reflecting concern that a new and relatively untried technology or system may not work as expected

Unfamiliarity risk

reflecting the amount of time and effort it takes to understand a project of a kind that has not been undertaken by the investor before.

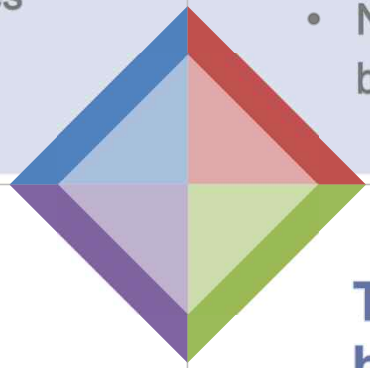
Suggestions for project development

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

Suggestions for global financing

Combine Energy Transformation + Digital Transformation

- Upgrading Energy Infrastructures → Green + Digital
- Financing + Green Technologies
- Green Stimulus Packages (GCF: Green Resilient Recovery)

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 (too much weight on loan)
- Private sectors actively participate and play pivotal roles → PPP
- SMEs focused business areas, jointly with multi-partners in APEC developing member economy

Suggestions for Korean partners

Design detailed mechanism for the private sector participation

- How to participate into the digital new deal + green new deal packages
- R&D for green technologies
- PPP, SME participation

Participatory Process & Impact Assessment

- Multi-stakeholders' participatory process & mechanisms are required
- Transparency & impact assessment process are needed
- Private sector engagement plan is necessary

Linkage with Korean ODA & EDCF programs

- Develop green opportunities abroad
  - Public-driven: developing countries
  - Private-driven: developed markets
- Partnership with bilateral & multilateral agencies
  - MDBs, GCF, UN agencies, bilateral donor agencies…
- Knowledge & Experience Sharing Programs
  - Upgrading existing programs (KSP, DEEP, …)

THANK YOU