Lancang-Mekong Green Development Cooperation

Dr. WANG Ke
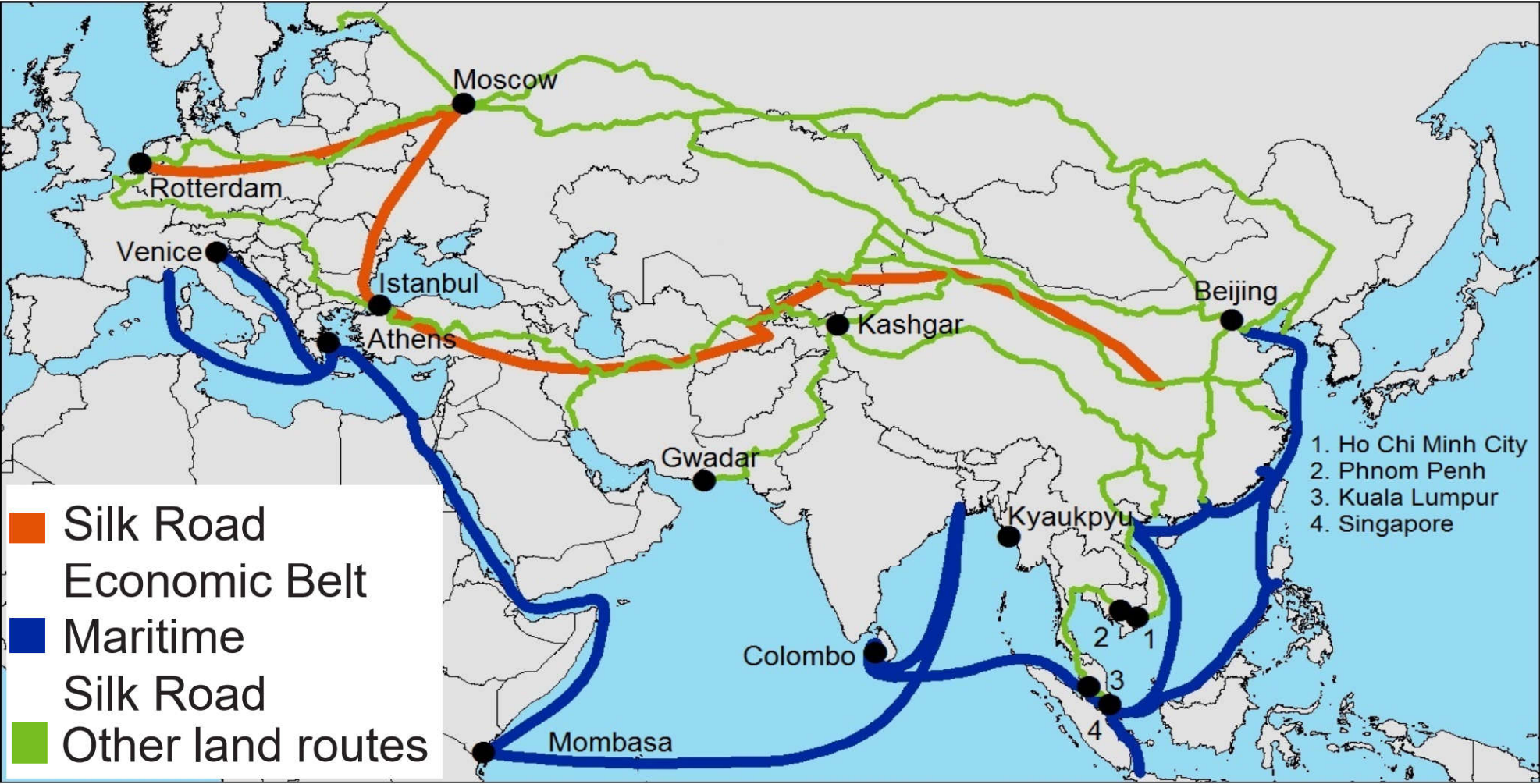
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Background of BRI Green Development

Routes Along the Belt & Road: China has signed more than 200 BRI MOUs with 138 countries and 31 international organizations as of November 2020

Legend:
- Silk Road Economic Belt (orange)
- Maritime Silk Road (blue)
- Other land routes (green)

Cities: Moscow, Rotterdam, Venice, Istanbul, Athens, Kashgar, Beijing, Gwadar, Kyaukpyu, Colombo, Mombasa

1. Ho Chi Minh City
2. Phnom Penh
3. Kuala Lumpur
4. Singapore

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"The Belt and Road Initiative—Six Years On" from Moody's Analytics

Table 1: Average Annual Real GDP Growth: 2018 to 2038

	No BRI	US$2 tril	US$5 tril	US$8 tril
Cambodia	5.3%	6.1%	6.2%	6.3%
Indonesia	4.6%	5.8%	5.9%	6.0%
Laos	5.4%	6.2%	6.4%	6.7%
Malaysia	3.4%	3.9%	3.9%	4.0%
Myanmar	4.4%	5.3%	5.4%	5.6%
Philippines	6.1%	7.0%	7.2%	7.5%
Thailand	2.2%	2.3%	2.5%	2.6%
Vietnam	5.3%	5.9%	6.0%	6.2%
Avg	4.6%	5.3%	5.4%	5.6%

Source: Moody's Analytics

BRI will increase all countries' real potential productivity growth

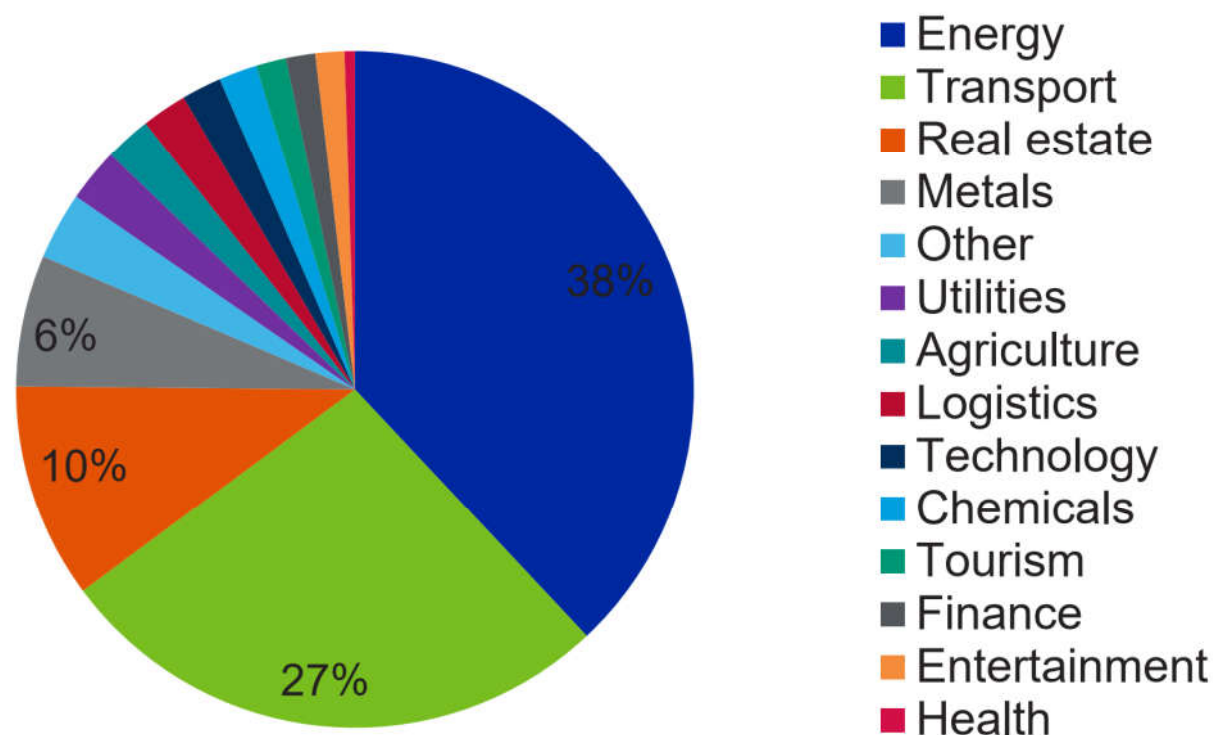## Table 2: Average Annual Real Potential Productivity Growth: 2018 to 2038

	No BRI	US$2 tril	US$5 tril	US$8 tril
Cambodia	4.1%	5.0%	5.0%	5.1%
Indonesia	3.5%	4.5%	4.6%	4.7%
Laos	3.9%	4.5%	4.8%	5.1%
Malaysia	2.3%	2.9%	3.3%	3.9%
Myanmar	3.6%	4.5%	4.6%	4.8%
Philippines	4.3%	5.2%	5.4%	5.7%
Thailand	2.8%	3.0%	3.2%	3.3%
Vietnam	4.7%	5.6%	5.7%	5.9%
Avg	3.6%	4.4%	4.6%	4.8%

Source: Moody's Analytics

Energy and Transport dominate in all BRI investment, closely related with infrastructure

Chart 2: Energy & Transport Dominate
% of total, investment and construction contracts, 2013-2018

- Energy — 38%
- Transport — 27%
- Real estate — 10%
- Metals — 6%
- Other
- Utilities
- Agriculture
- Logistics
- Technology
- Chemicals
- Tourism
- Finance
- Entertainment
- Health

Sources: American Enterprise Institute, The Heritage Foundation, Moody's Analytics

Huge investment demand for infrastructure

- Investing in infrastructure is key for global growth, structural reform and Sustainable Development Goals (SDGs)

- The world is expected to invest around US$90 trillion in infrastructure over the next 15 years, more than twice the value of the entire stock of infrastructure today.

  - Developed countries: renovation of exiting infrastructure
  - Developing countries: growth needs, rapid urbanization, and already-large infrastructure backlogs

- Invested in infrastructure will significantly increase globally, from the estimated US$3.4 trillion per year currently to about US$6 trillion per year.

Source: The Global Commission on the Economy and Climate, 2016

Lock-in effect on carbon emissions

- Cumulative future CO2 emissions from combustion of fossil fuels by existing infrastructure: 496 (282 – 701 Gt CO2)

- Committed emissions concentrated in highly developed countries (e.g., EU, US, Japan) and emerging economies (e.g., China, India)

- Existing infrastructure will consume over half of carbon budget remaining for 2℃, if no **earlier phasing-out**
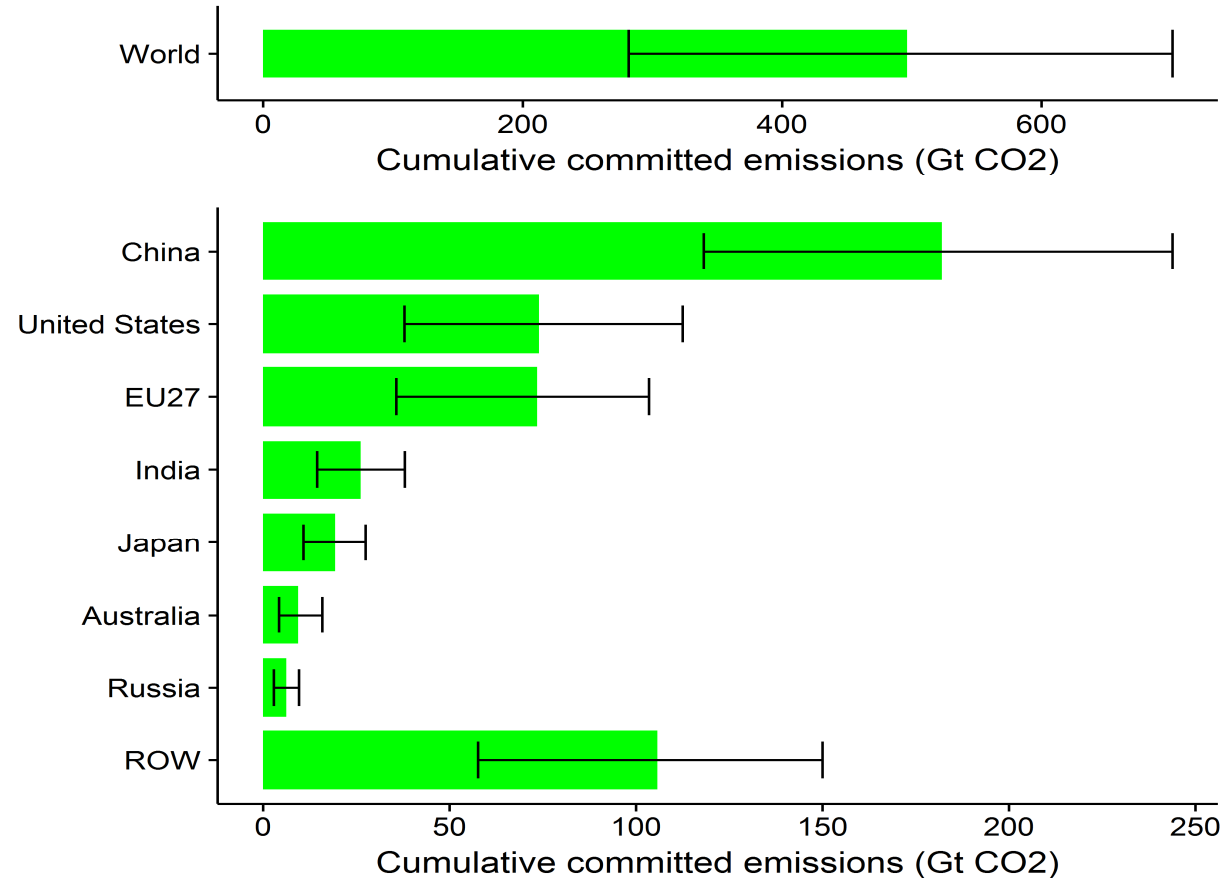
Source: Davis, J., et al., Science, 2010

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Infrastructure's carbon emission and lock-in effect

- The **existing** stock and use of **infrastructure** associated with more than 60% of the world's **GHG**.

- Infrastructure investment choices over the next 5-10 years will determine our development pathway in the future:

- **A high-carbon, inefficient and unsustainable pathway** or **climate-smart, inclusive growth pathway?**

Source: The Global Commission on the Economy and Climate, 2016

Origin of BRI Green Development Concept

"Countries should jointly **pursue new idea of green development**, promote a lifestyle that is green, low-carbon, circular and sustainable, and strengthen the cooperation among countries in ecological conservation and environmental protection in order to achieve a common 2030 goal of sustainable development."

　　——President Xi's speech on the 2017 Belt and Road Summit

Significance of BRI green development

- Some major fossil fuel producers and consumers as well as many ecologically fragile countries are both involved in BRI

- BRI Green Development has great significance both for the successful implementation of BRI and for world's green & low carbon transition as well as successful implementation of global SDGs

- BRI green development can help other developing countries avoid reliance on traditional high-carbon growth models and pursue more efficient and innovative paths which is demonstrated by China.

BRI green development can help other developing countries avoid reliance on traditional high-carbon growth models

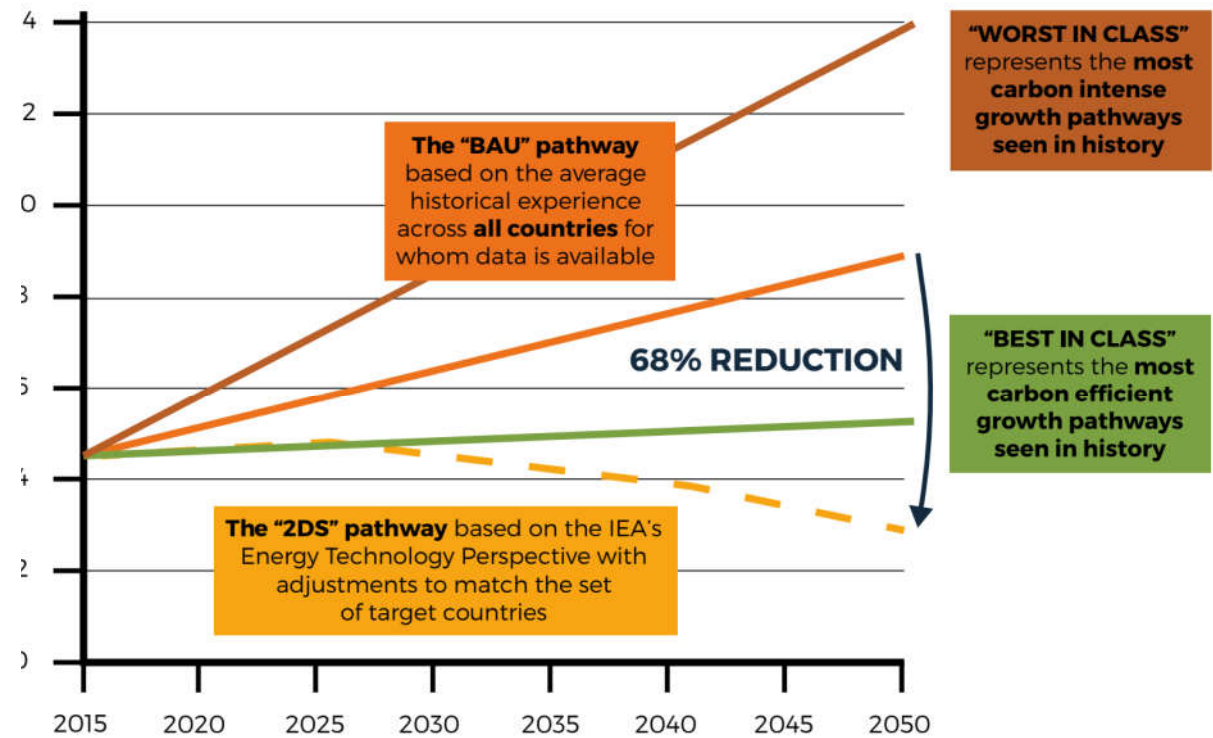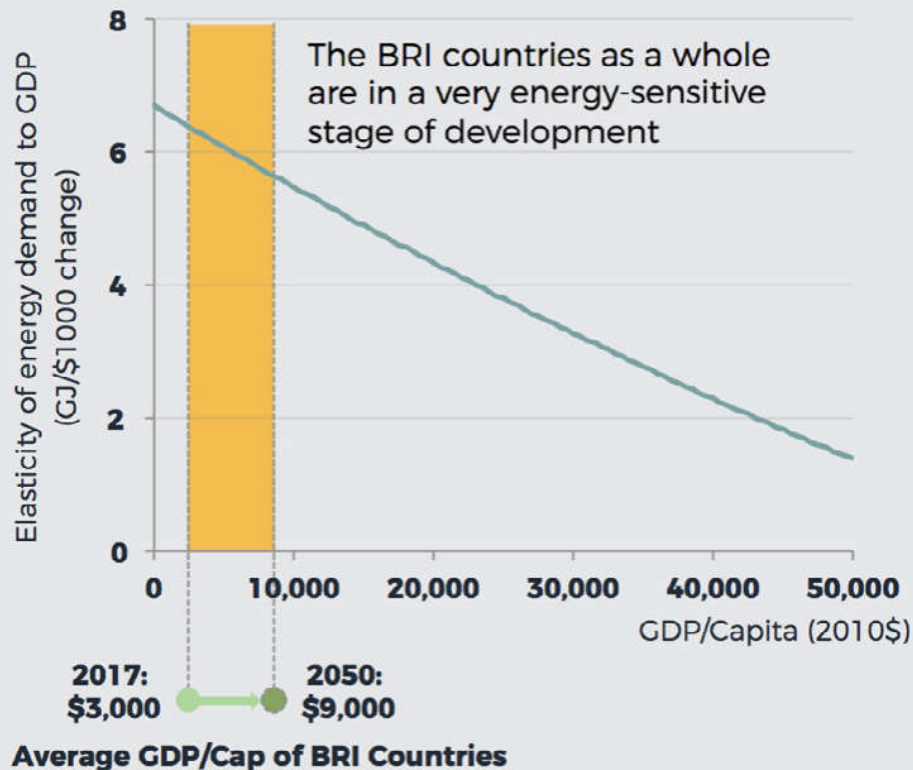**Analysis of historical data suggests energy demand changes most rapidly at low income levels**

The BRI countries as a whole are in a very energy-sensitive stage of development

Elasticity of energy demand to GDP (GJ/$1000 change) vs GDP/Capita (2010$)

2017: $3,000 → 2050: $9,000

Average GDP/Cap of BRI Countries

The "BAU" pathway based on the average historical experience across **all countries** for whom data is available

"WORST IN CLASS" represents the **most carbon intense growth pathways** seen in history

"BEST IN CLASS" represents the **most carbon efficient growth pathways** seen in history

68% REDUCTION

The "2DS" pathway based on the IEA's Energy Technology Perspective with adjustments to match the set of target countries

Figure 1. Compared to Business as Usual, a 2 Degree Scenario requires 68% lower carbon emissions in Belt & Road Countries by 2050

Source: Tsinghua and VIVID, Decarbonizing the Belt and Road: A Green Finance Roadmap

International Energy Agency predicts that the decline in energy demand caused by the epidemic may reduce global carbon emissions by 8% in 2020

Global energy-related CO_2 emissions and annual change, 1900-2020
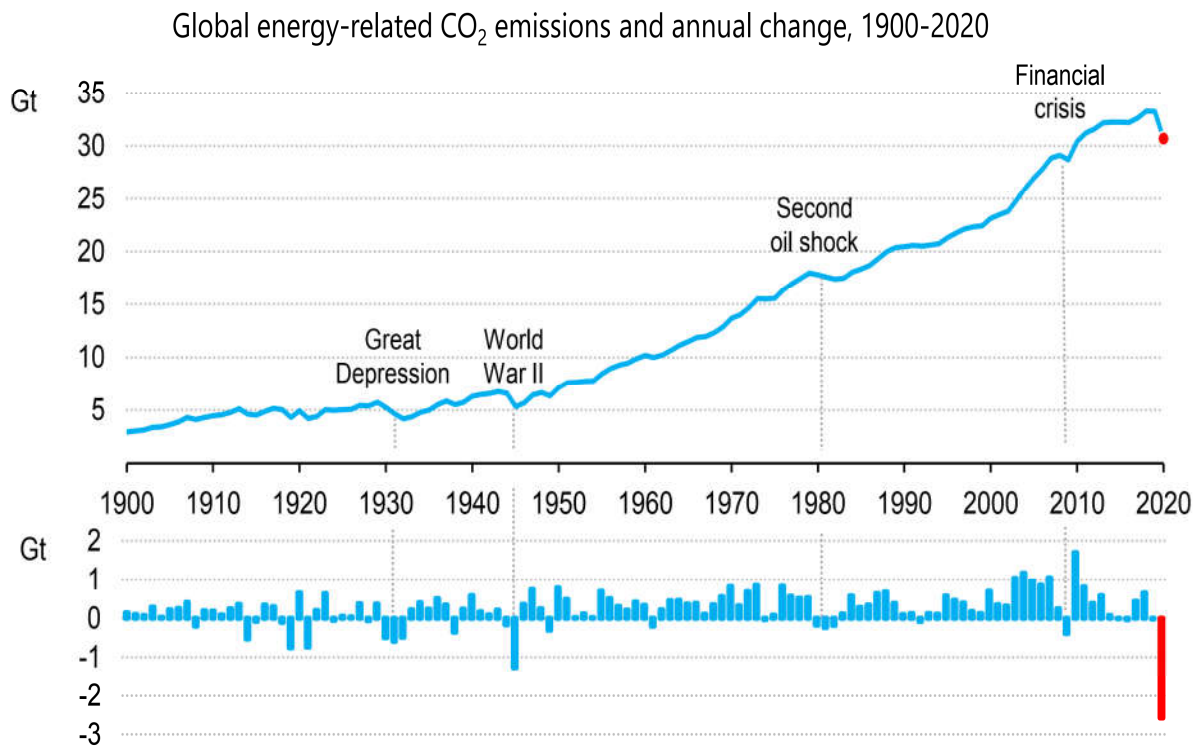
- Global climate change has not stopped because of covid-19, and the concentration of greenhouse gases in the atmosphere continues to rise （United in Science, 2020）

- Economic recovery should move towards the goal of green, high-quality and sustainable development, and continue to promote low-carbon transformation and ecological civilization construction （CCICED, 2020）

Source：IEA, Global Energy Review 2020

Vision: how to Build the green development road for BRI after the epidemic?

- BRI shows strong resilience: Despite the impact of the epidemic, China's investment in BRI countries increased by 11.7% in the first quarter of this year, and the trade volume increased by 3.2% (Wang Yi, May 24, 2020)

- The "road of development" to drive the global economic recovery: as the region with the largest contribution to global economic growth and the fastest growth rate, BRI countries have stronger willingness to cooperate after the epidemic, and BRI will effectively promote the rapid recovery of the global economy

- Green Development Roald：
  - Resolving crisis: minimizing the loss of epidemic situation
  - Seize the opportunity: reshape the economy, strengthen green technology cooperation, increase green investment, and accelerate structural green transformation

Assessment of BRI Green Development: Based on Green Development Index (GDI)

Objectives: Developing BRI green development index (GDI) indicating the direction of green cooperation after the epidemic

- Create an index system on BRI Green Development
  - Assess the level of green development for BRI countries
  - Find gaps and main reasons behind those gaps
- Identify key areas and technologies that contribute to the level of green development in BRI countries
- Offer policy recommendations to promote green development for BRI

GDI Framework

Natural Assets		Green Technologies		Development Outcomes

- **Endowment**
- **Input**
- **Impact**
- **Constraint**

- **Process**
- **Method**
- **Transformation**
- **Potential**

- **Result**
- **Goal**
- **Output**
- **Economic +**

Green Development (Stage & Process)
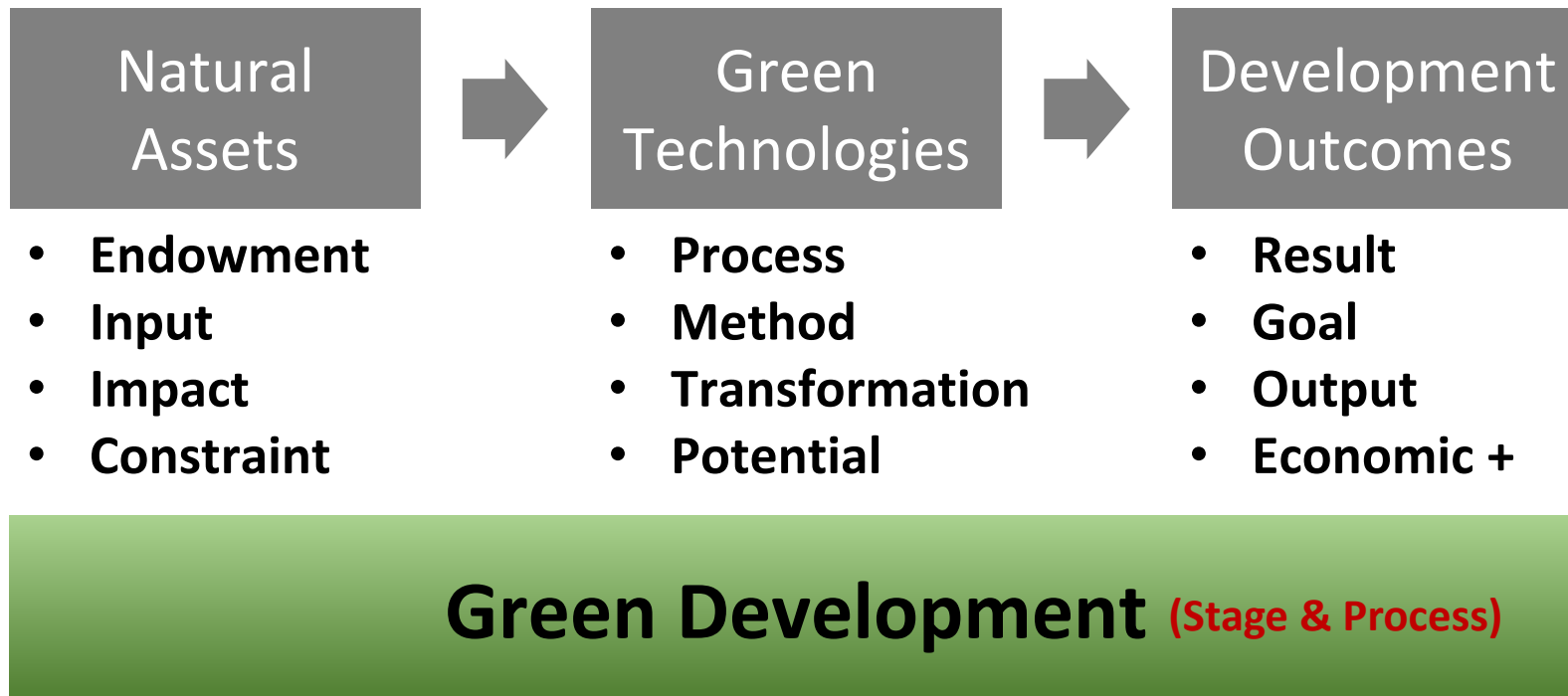
Methodology

- Assemble a GDI database that covers 98 countries, including 65 countries under the BRI, China, all OECD countries, as well as BRI-relevant countries
    - Countries like Turkey, Greece and Poland are both BRI and OECD
    - Data sources from World Bank, UNDP, UNEP, IEA, IRENA, UNESCO, Yale University, and UNU etc.
- Come up with a GDI index system that is consisted of 3 categories, 15 sub-categories and 20 specific indicators
- Use factor analysis to calculate the final weight for each indicator
- Calculate GDI scores (0~100) for each country and year from 2006 to 2015

GDI: A Three-Layer Index System

Category	Sub-Category	Indicator (Unit)
Natural Assets	Forest resource	Forest area (% of land area)
	Biodiversity	Biodiversity and habitat (Standardized, EPI score)
	Water resource	Renewable internal freshwater resources, average (m³/capita)
	Natural resources	Total natural resources rents (USD)
		Total natural resources rents (% of GDP)

Category	Sub-Category	Indicator (Unit)
Green Technologies	Renewable energy generation	Non-hydro renewable electricity output (GWh)
		Non-hydro renewable electricity output (% of total output)
	Renewable energy capacity	Non-hydro renewable electricity capacity (GW)
		Non-hydro renewable electricity capacity (% of total)
	Energy efficiency	Energy consumption per GDP per capita (kgtoe /USD)
	Green transportation	CO_2 emission in transportation, average (kg/capita)
	Green building	CO_2 emission in building, average (kg/capita)
	Technology Competitiveness	Research and development expenditure (million USD)
		Research and development expenditure (% of GDP)

Category	Sub-Category	Indicator (Unit)
Development Outcomes	HDI	Human Development Index
	Inequality	Gini index
	Access to Electricity	Access to electricity (% of population)
	CO2	CO2 emissions from fuel combustion, average (kg/capita)
	PM2.5	Annual mean concentration (mg/m3)
		Average exposure to PM2.5 (Standardized, EPI score)

Category	Sub-Category	Indicator (Unit)	Indicator Influence	Indicator Type	Weight	Data Source
Development Outcomes	HDI	Human Development Index	Positive	Average Level	0.091	UNDP
	Inequality	Gini index	Negative	Average Level	0.018	UNU
	Access to Electricity	Access to electricity (% of population)	Positive	Average Level	0.050	WB
	CO2	CO2 emissions from fuel combustion, average (kg/capita)	Negative	Average Level	0.063	IEA
	PM2.5	Annual mean concentration (mg/m3)	Negative	Average Level	0.031	EPI
		Average exposure to PM2.5 (Standardized, EPI score)	Positive	Average Level	0.042	

Category	Sub-Category	Indicator (Unit)	Indicator Influence	Indicator Type	Weight	Data Source
Green Technologies	Renewable energy generation	Non-hydro renewable electricity output (GWh)	Positive	Total Scale	0.066	IEA
		Non-hydro renewable electricity output (% of total output)	Positive	Average Level	0.067	
	Renewable energy capacity	Non-hydro renewable electricity capacity (GW)	Positive	Total Scale	0.067	UN
		Non-hydro renewable electricity capacity (% of total)	Positive	Average Level	0.077	
	Energy efficiency	Energy consumption per GDP per capita (kgtoe /USD)	Negative	Average Level	0.071	WB
	Green transportation	CO_2 emission in transportation, average (kg/capita)	Negative	Average Level	0.038	IEA
	Green building	CO_2 emission in building, average (kg/capita)	Negative	Average Level	0.047	IEA
	R&D technology Competitiveness	Research and development expenditure (million USD)	Positive	Total Scale	0.065	WB
		Research and development expenditure (% of GDP)	Positive	Average Level	0.067	

The research group visited many countries, such as US, Australia and Sri Lanka, communicate with Columbia University, National University of Australia and other institutions to discuss the methodology and results of GDI and BRI green development case.
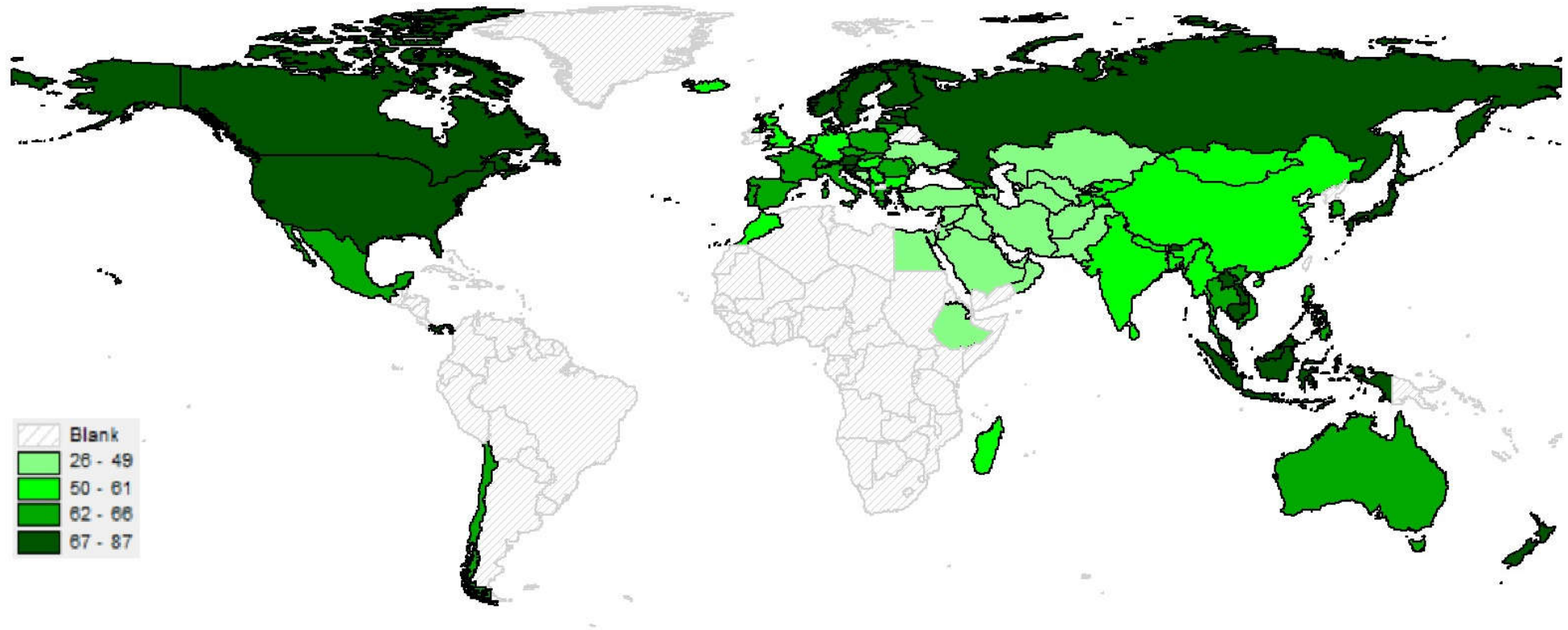
GDI: Final Score 2015

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- 28 - 51
- 52 - 59
- 60 - 68
- 69 - 79
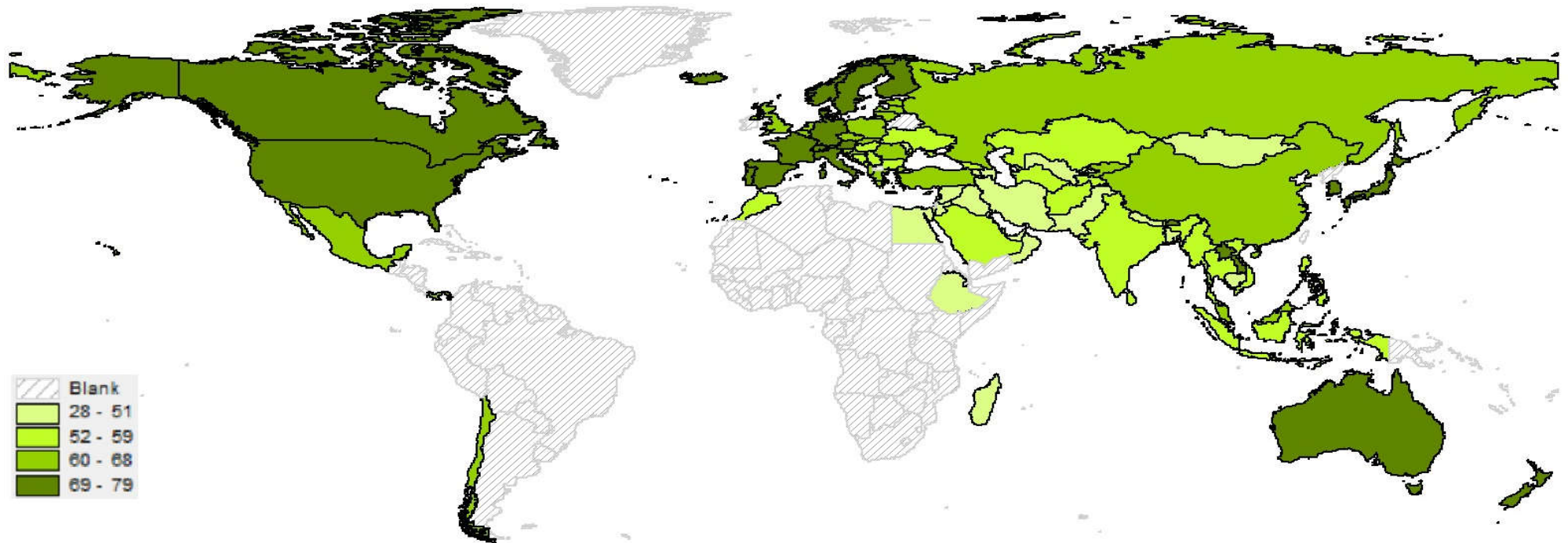
Notes: (1) Data used: 2015; (2) Classification by: Quartile

GDI-sub: Natural Assets 2015

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- 60 - 68
- 69 - 79
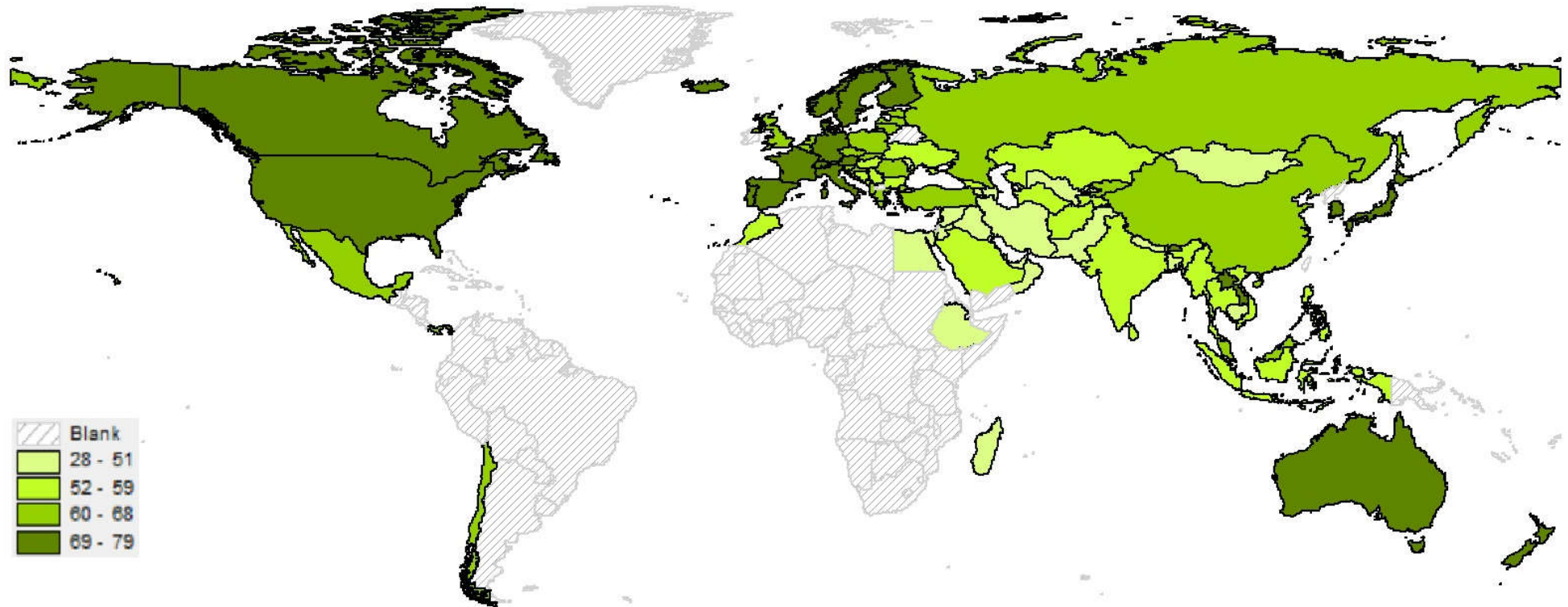
Notes: (1) Data used: 2015; (2) Classification by: Quartile

GDI-sub: Green Technologies 2015

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- 50 - 61
- 62 - 66
- 67 - 87

Notes: (1) Data used: 2015; (2) Classification by: Quartile

GDI-sub: Development Outcomes 2015

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- 46 - 54
- 55 - 64
- 65 - 86
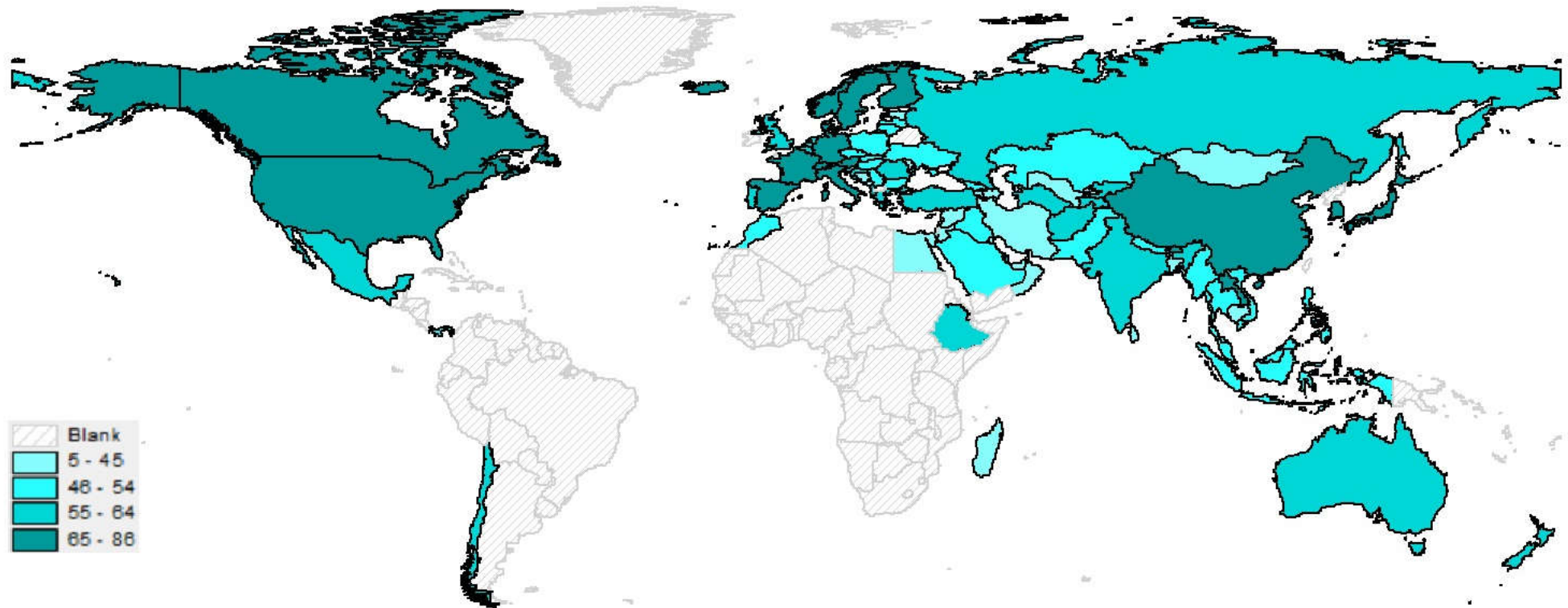
Notes: (1) Data used: 2015; (2) Classification by: Quartile

GDI: BRI, China & OECD

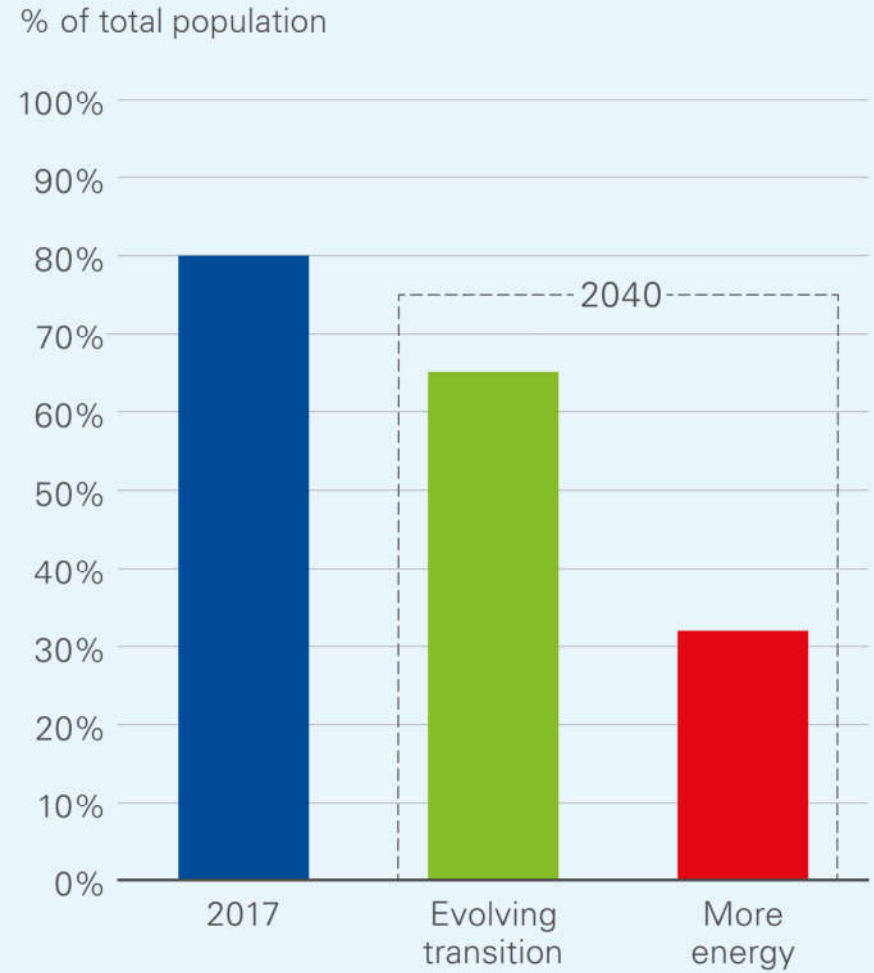- GDI score increases for all countries, but larger gap exists between BRI and OECD, where China can play an important bridging role.
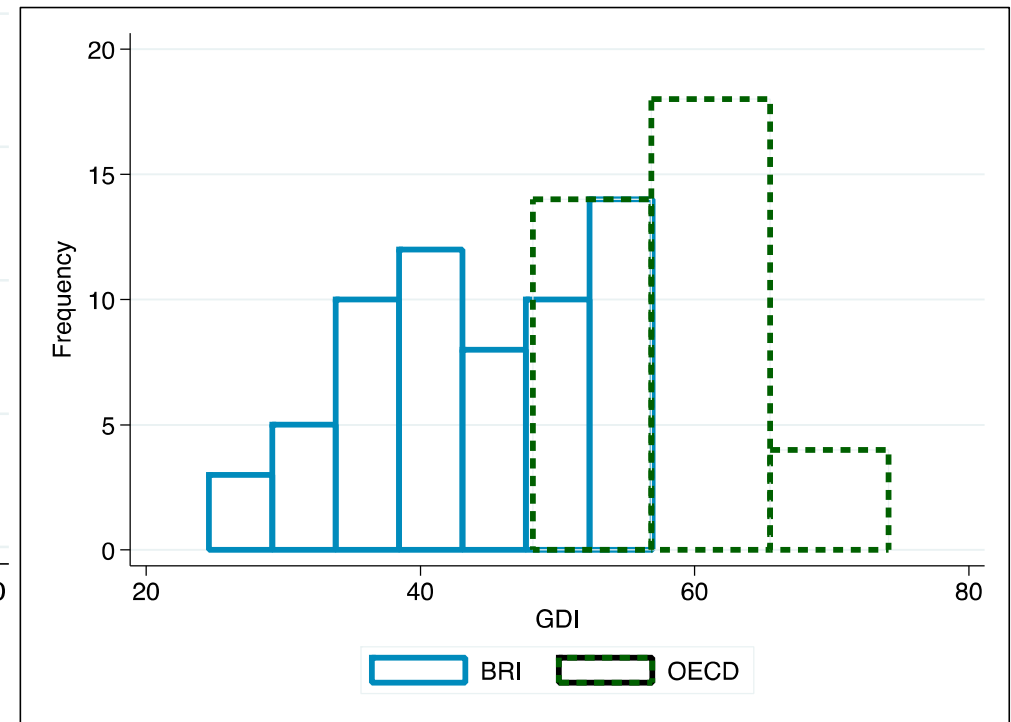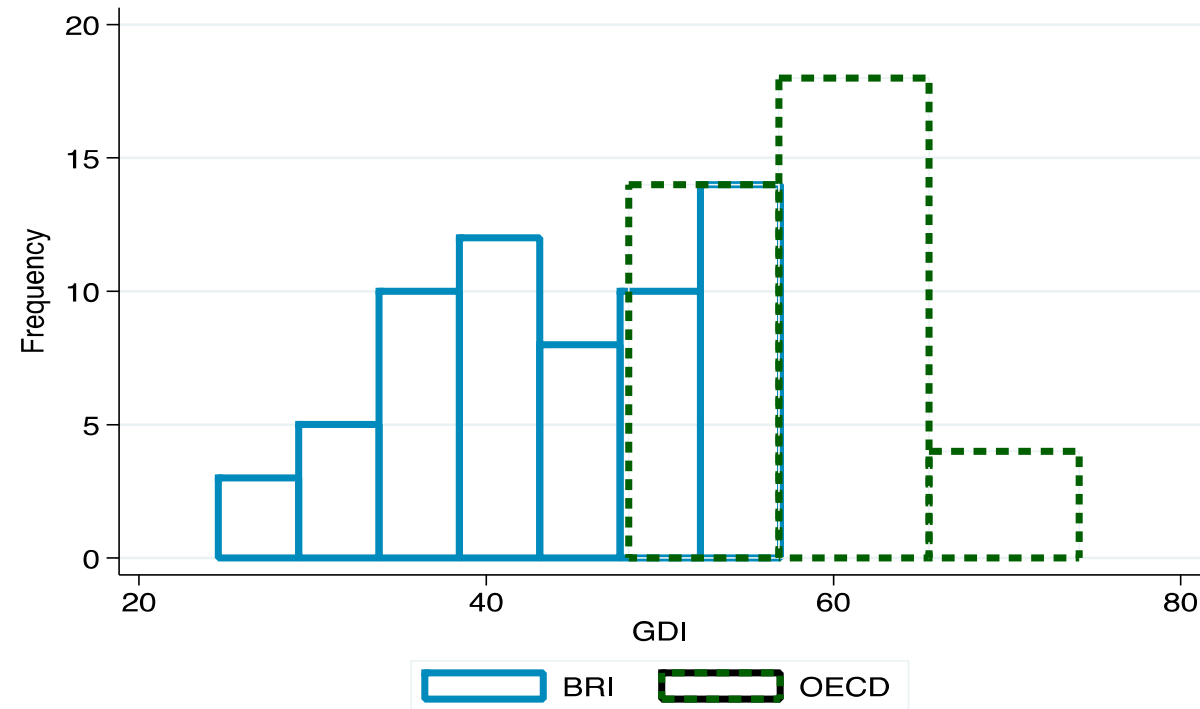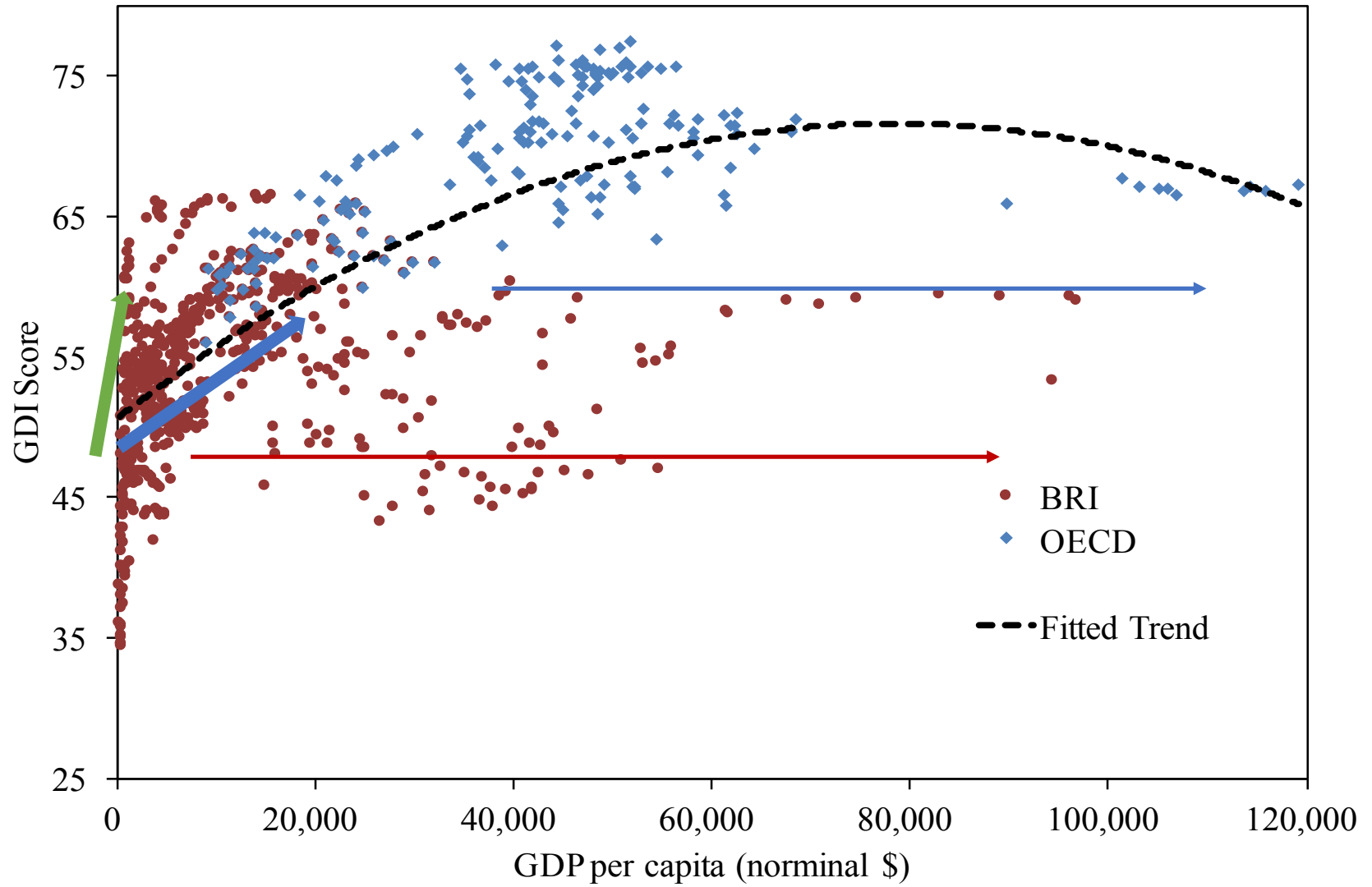
Human development index and energy consumption per head, 2017

HDI
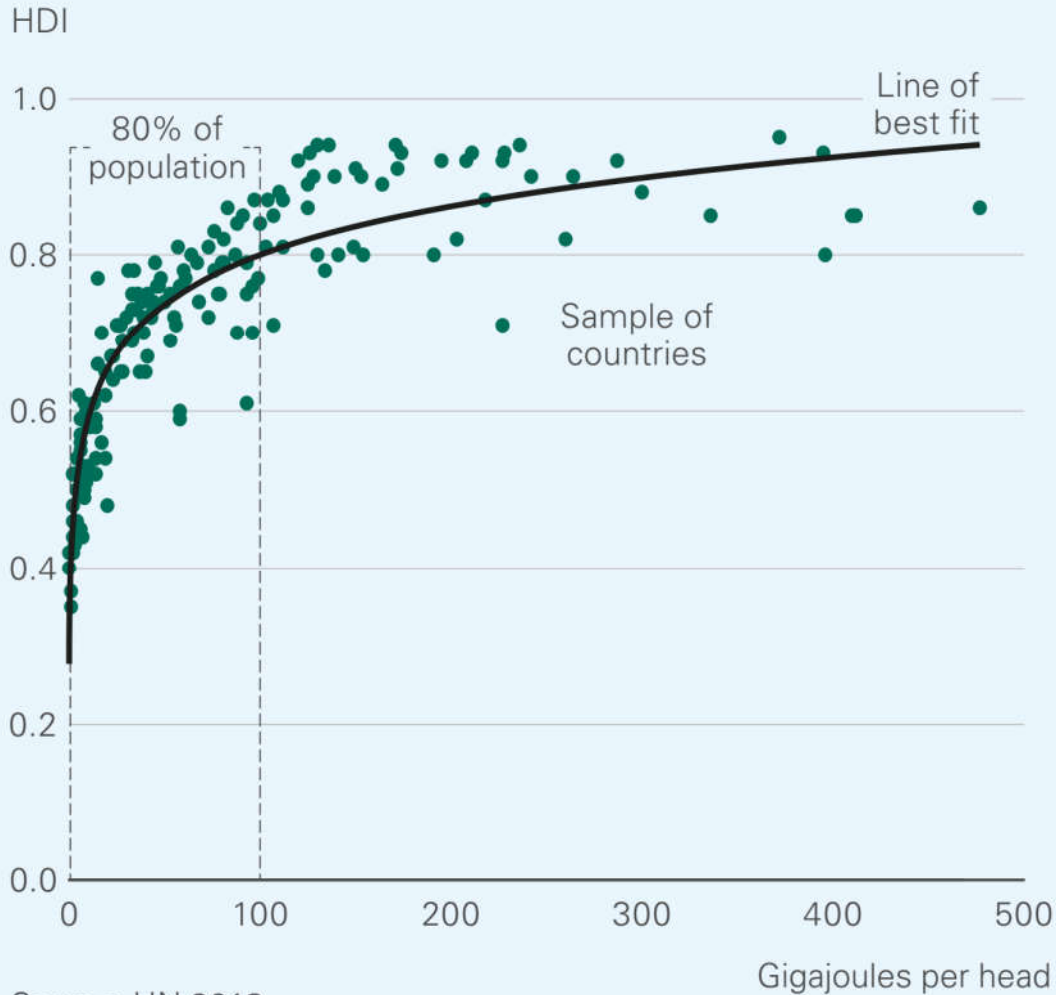
Source: UN 2018

## Share of world population consuming less than 100 Gigajoules per head

% of total population

Source: BP Energy Outlook 2019

Top 10 GDI Improvements (BRI 2006~2015)

Countries	GDI Improvement	Rank Improvement
Romania	17.34	30
Bulgaria	12.64	13
Afghanistan	12.36	1
Cyprus	11.58	19
Mongolia	11.44	21
Poland	11.27	15
Greece	10.65	10
Israel	10.02	10
Moldova	9.92	7
China	9.58	9

Green Technologies: RE, EE, R&D, Emission Reduction

33
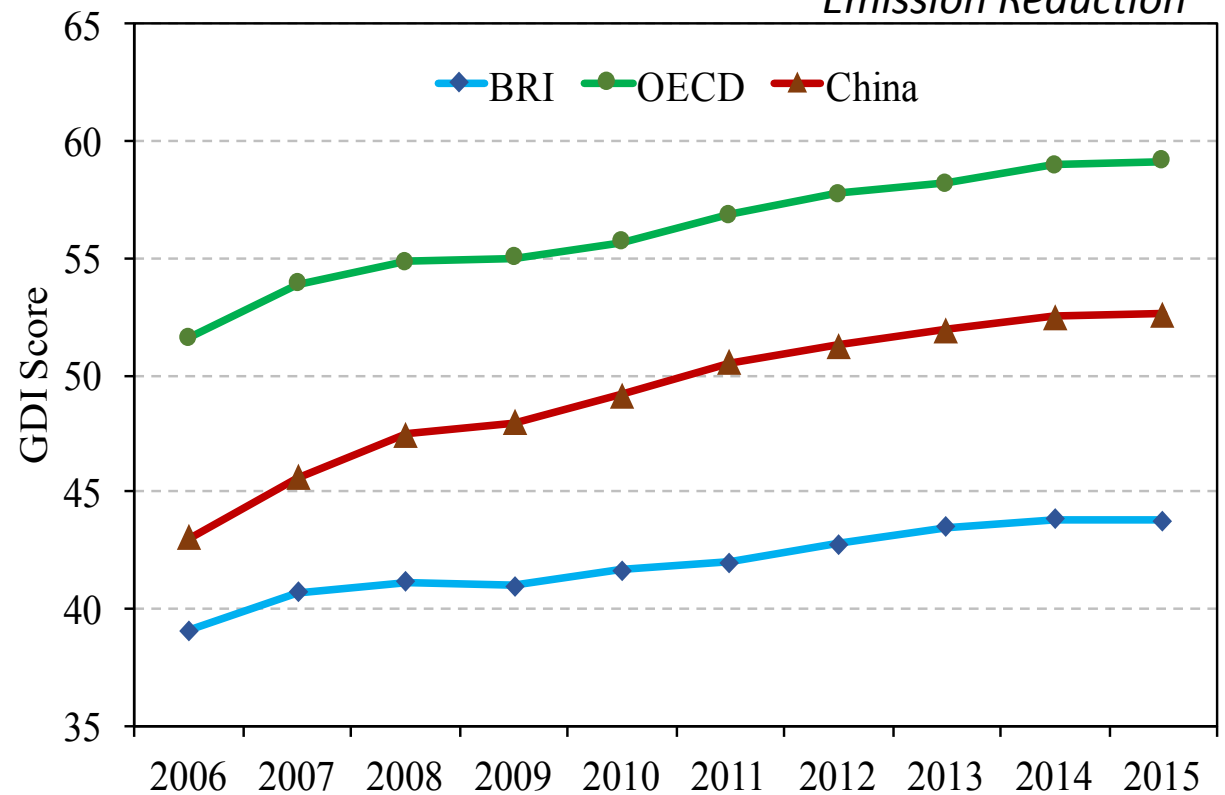
Discussion of GDI results

- BRI green development has great potential, but it needs to identify the cooperation focus and design different cooperation strategy in different regions

- The promotion and application of green technology is not only the weak point of green development in BRI countries, but also the key field with the greatest potential for improvement

- After the epidemic, the green development of BRI is of great significance to the global economic recovery and the realization of global sustainable development goals

Current Situation and Country-driven Demand of Green Development in LMCs

# Opportunities and Challenges of the LMC Mechanism

- The LMC mechanism is characterized by win-win and South-South cooperation: covering governance, economy and sustainable development and social and cultural areas, which can effectively connect with the UN 2030 Agenda for Sustainable Development , BRI and other development initiatives.

- Challenges:
  - Uneven regional development, deficits in governance systems, deficits in sustainable infrastructure construction, and deficits in the supply of international public goods.
  - Environmental issues such as climate change, as a long-term challenge faced by all countries, also have a systemic impact on the security of the Lancang-Mekong region.
  - The interference of some large countries outside the region has added to the uncertainty of the LMC.

Significance of green development in deepening the LMC Mechanism

- Green development is an inevitable requirement to support the Lancang-Mekong region to achieve sustainable and high-quality development.

- Green development is the biggest intersection of the interests, the key to solve the problem of regional environment and development, and an organic part of the community of destiny of LMC countries facing peace and prosperity.

- In the post-epidemic era, the demand for global green recovery also provides new opportunities for the Lancang-Mekong region to respond to climate change, environmental governance and green transformation, and will also inject new momentum into LMC.
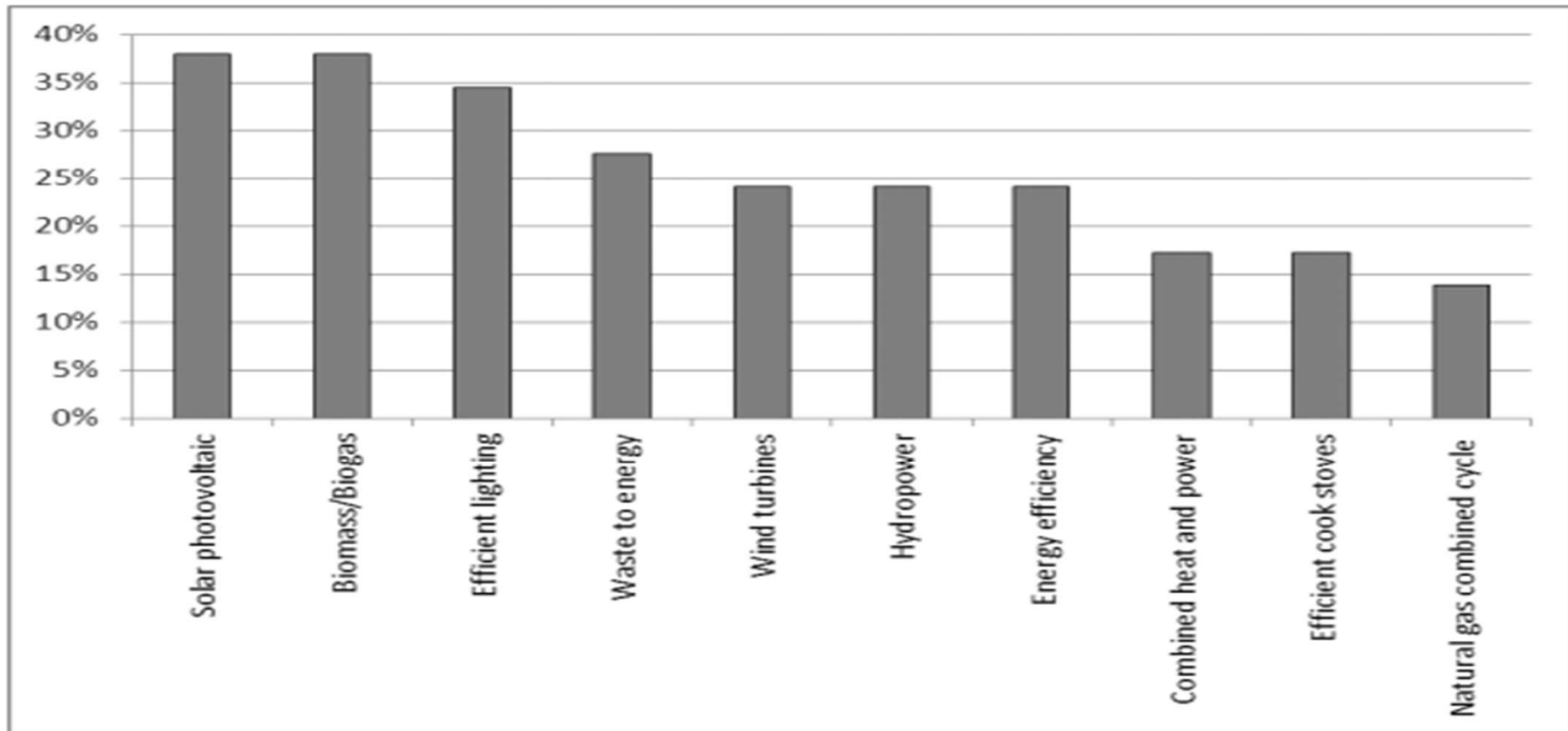
Prioritized mitigation sectors in TNA by regions

Prioritized mitigation sectors in technology needs assessments by region (percentage of all prioritized sectors in the region)
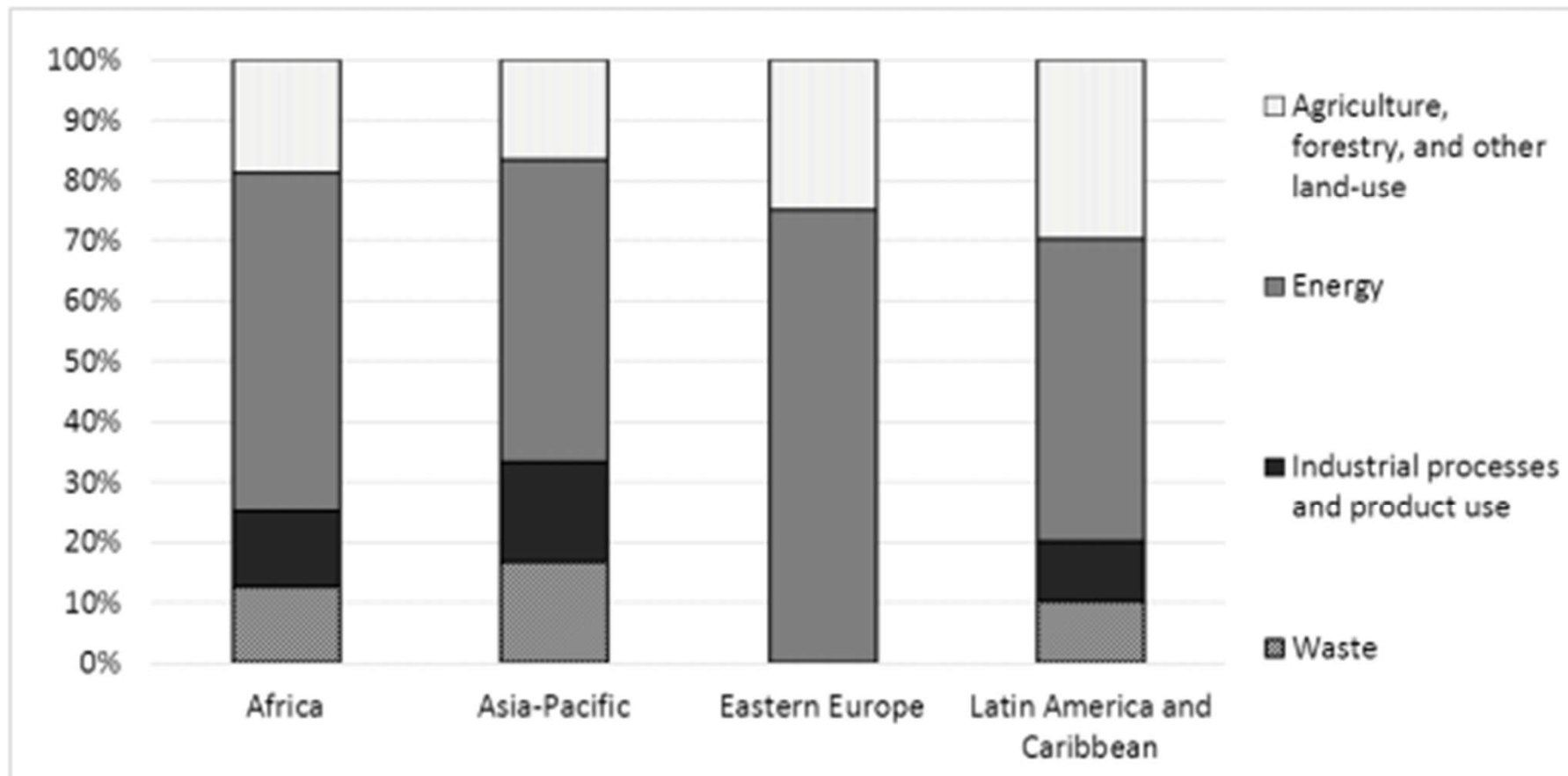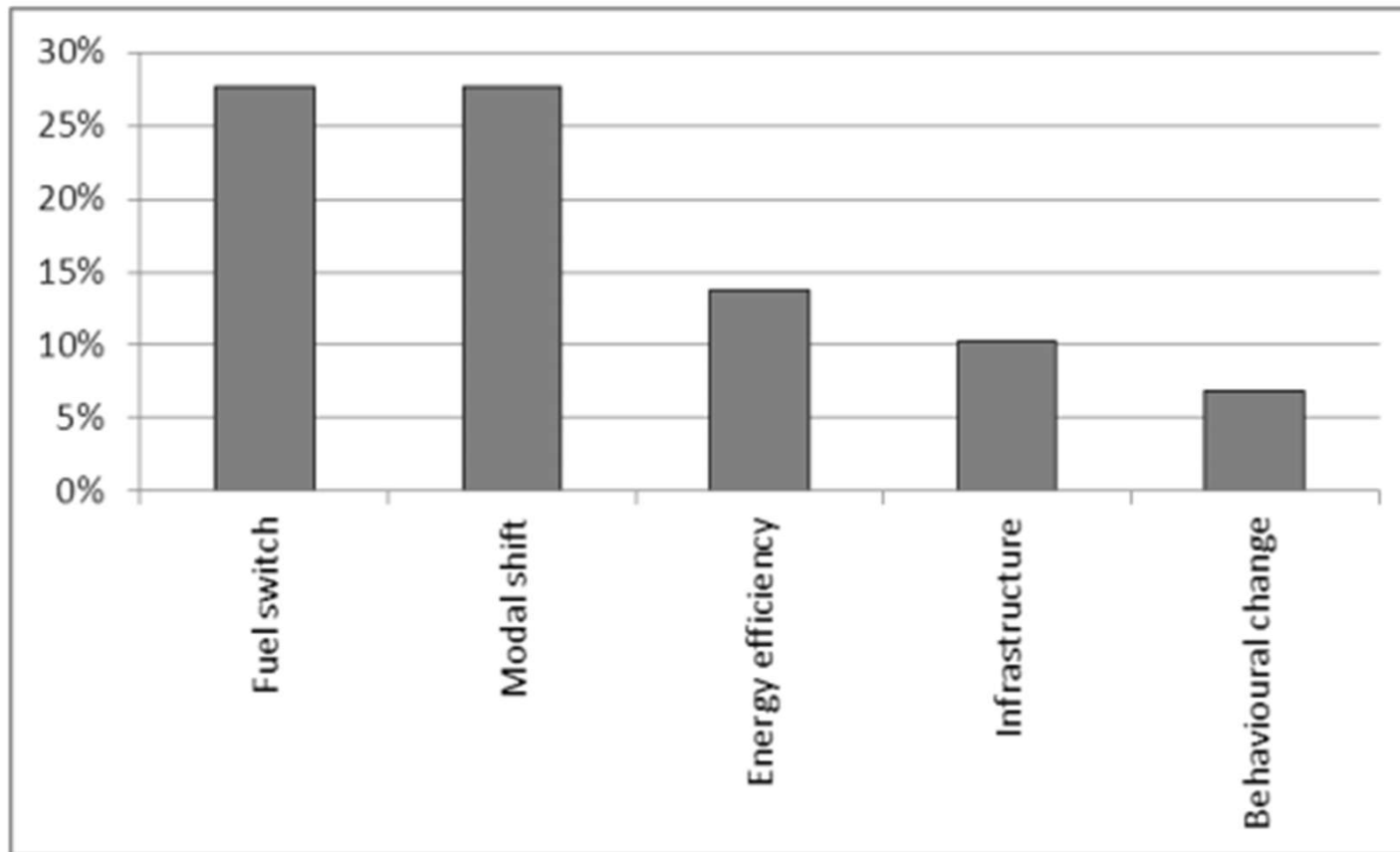
Prioritized technologies for the energy sector in TNA reports

Prioritized technologies for the energy industries subsector as reported in Parties' technology needs assessment reports (percentage of the Parties that undertook mitigation technology needs assessments)
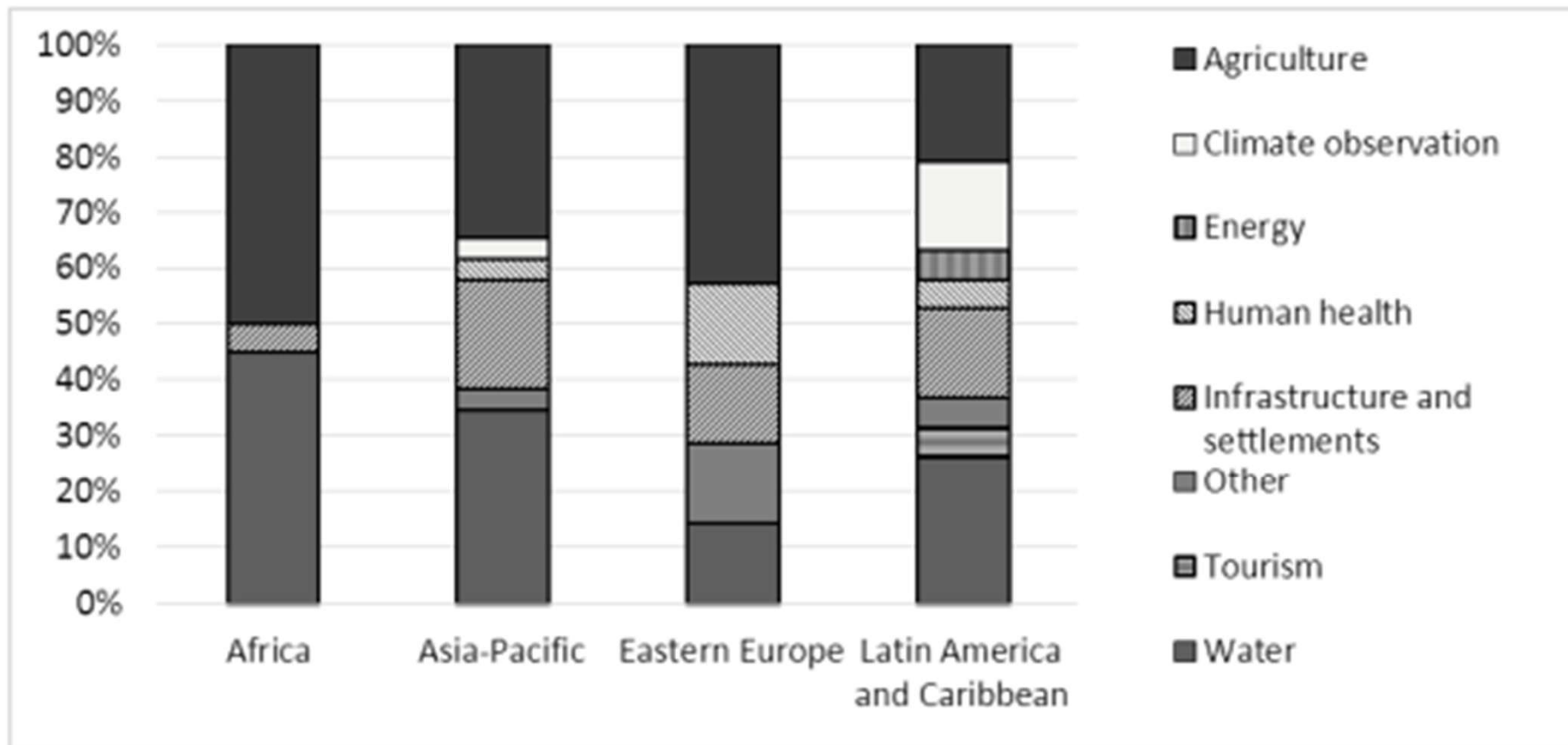
Prioritized technologies for transport sector in TNA reports

Prioritized technology categories in the transport subsector as reported in Parties' technology needs assessment reports (percentage of the Parties that undertook mitigation technology needs assessments)

Prioritized adaptation sectors in TNA reports

Prioritized adaptation sectors in technology needs assessments by region (percentage of all prioritized sectors in the region)
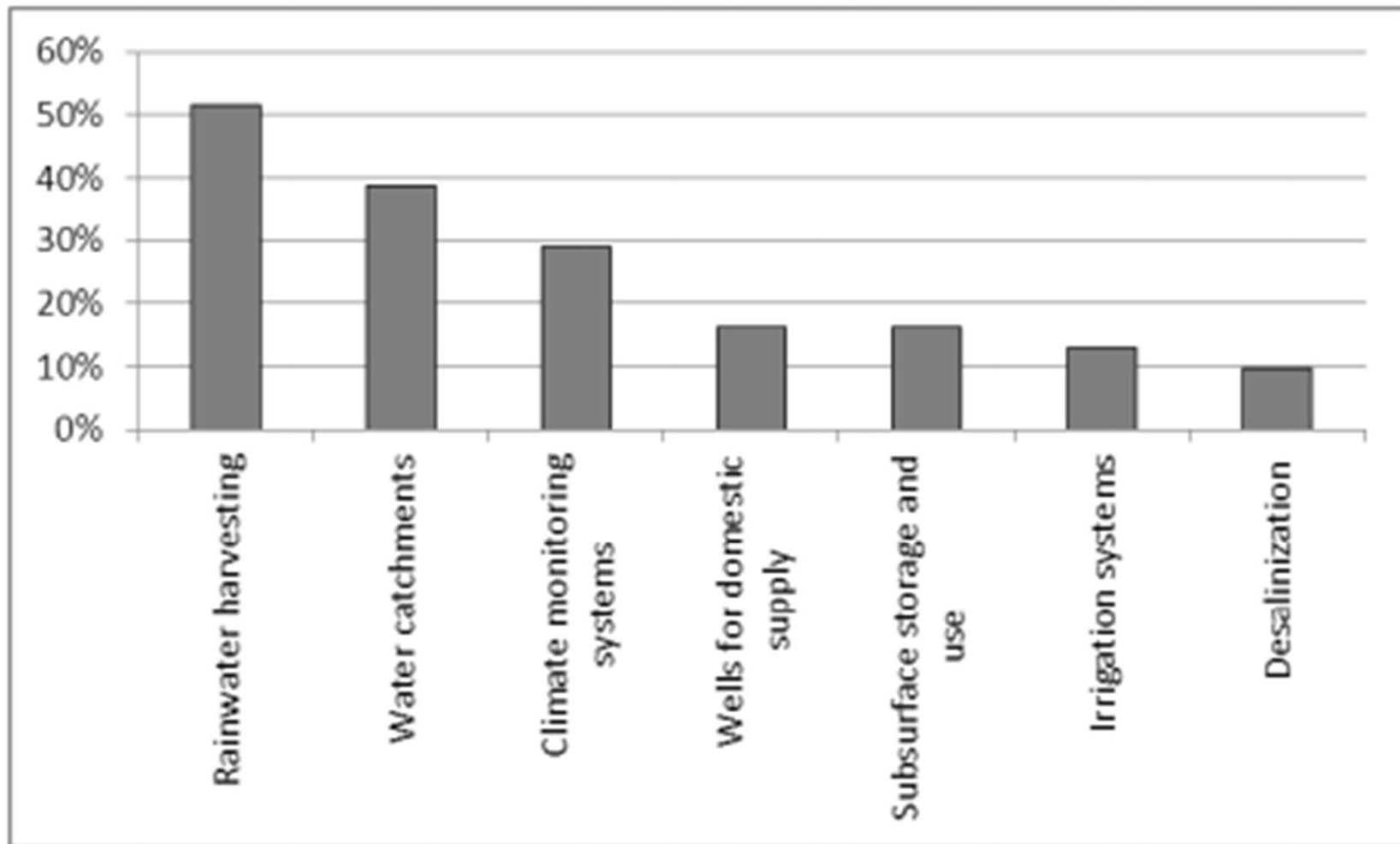
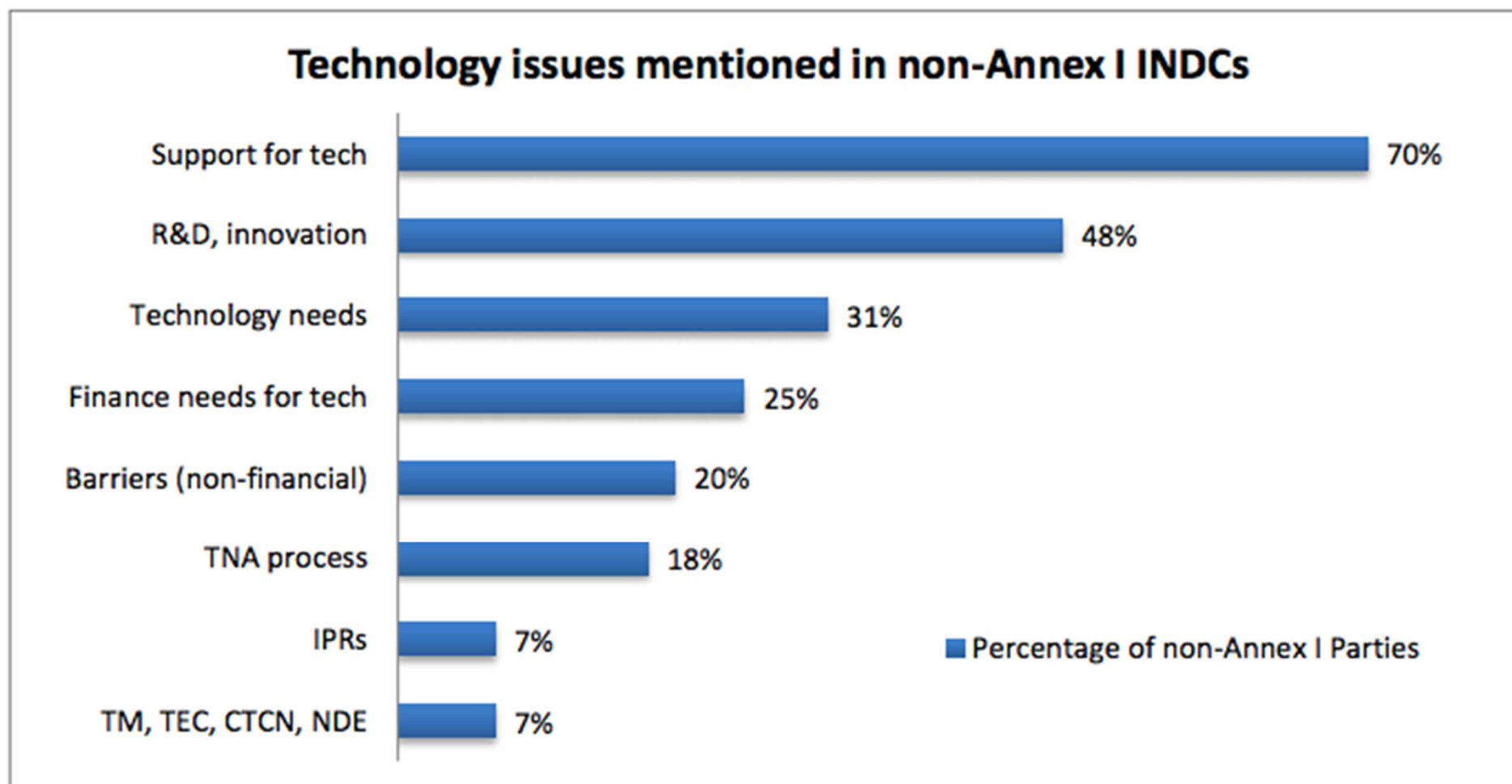# Prioritized technologies in the agriculture sector

Prioritized technologies in the agriculture sector as reported in Parties' technology needs assessment reports (percentage of Parties)
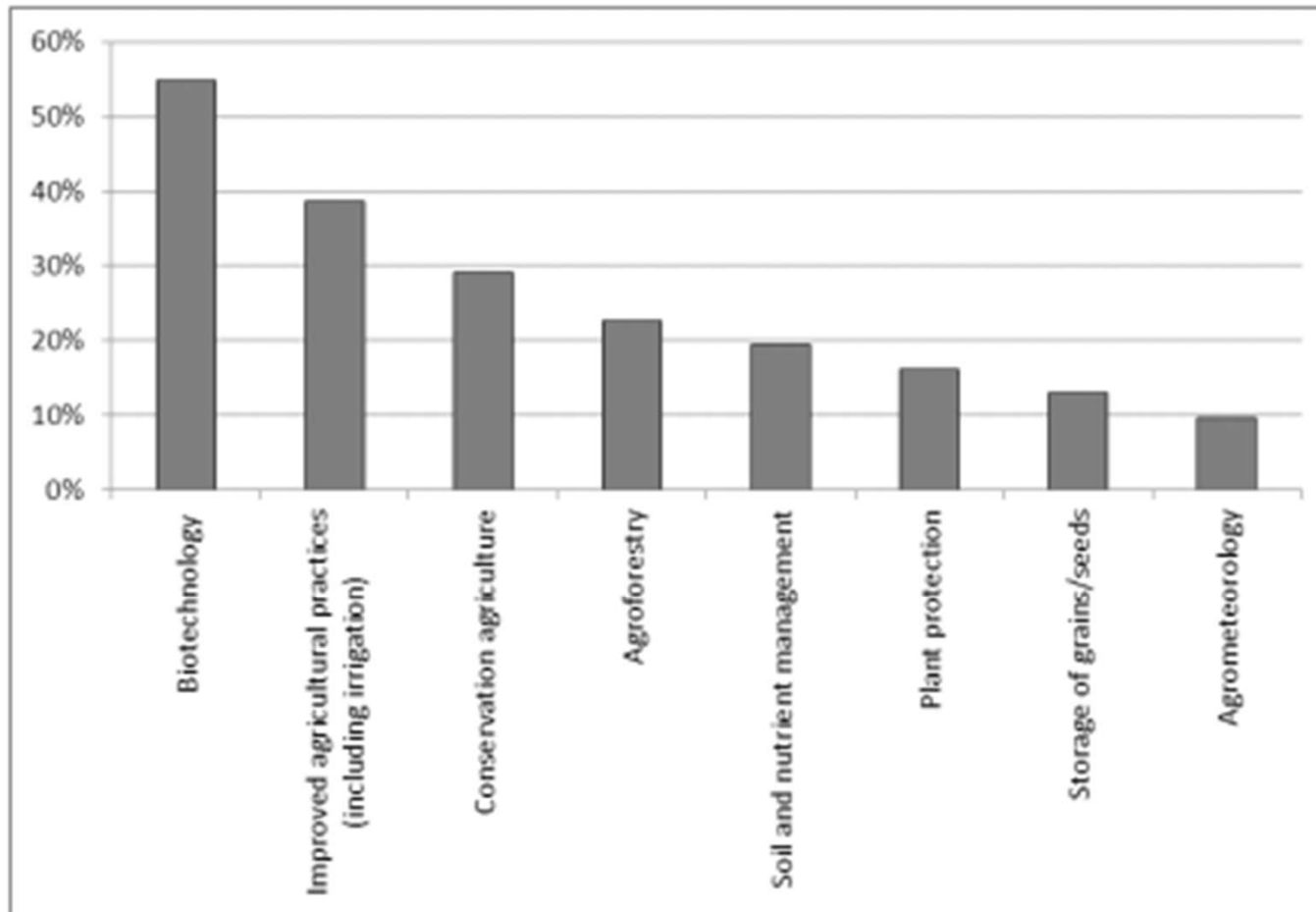
Prioritized technologies in the water sector as reported in Parties' technology needs assessment reports (percentage of Parties)

Technology issues mentioned in non-Annex I NDCs

Technology issues mentioned in non-Annex I INDCs

Issue	Percentage of non-Annex I Parties
Support for tech	70%
R&D, innovation	48%
Technology needs	31%
Finance needs for tech	25%
Barriers (non-financial)	20%
TNA process	18%
IPRs	7%
TM, TEC, CTCN, NDE	7%

Cambodia

- Target:
    - Compared to the BAU scenario, up to 3,100 Gg CO2e will be reduced by 2030.
    - LULUCF: By 2030, the forest coverage will increase to 60% of the country's land area.
    - Improve food, water and energy climate resilience of protected areas and cultural heritage

- Key areas:
    - Industry: Industrial renewable energy utilization and improvement of energy efficiency.
    - Transportation: public transportation; new energy vehicles; vehicle maintenance
    - Agriculture: adaptive agriculture; crop breeding; aquaculture
    - Coastal Zone Management: Early Warning System; Climate Information System; Flood Dike Repair
    - Public health: disease control; water-borne and food-borne disease surveillance and research
    - Water resources: mobile pumping station; groundwater research
    - Infrastructure: road infrastructure repair, operation and maintenance
    - Natural ecosystem management: community adaptation; protected area management

Laos

- Targets:
  - Realizes mitigation and adaptation to climate change by promoting sustainable economic development, reducing poverty, protecting public health and safety, improving the quality of natural environment, and improving the quality of life.

- Key areas:
  - Energy: renewable energy; rural electrification; large hydropower
  - Transportation: Biofuel
  - Rural electrification: by 2020, provide electricity to 90% of households in rural areas
  - Agriculture: agricultural infrastructure construction; adaptive agricultural technology
  - LULUCF: Forestry sector management; forestry technology
  - Water resources: water resources information system; watershed and wetland management; infrastructure construction
  - Transportation and construction: infrastructure construction
  - Public health: infrastructure construction; improving public health services

Myanmar

- Targets:
  - Forestry: National forest coverage increases
  - Energy: Hydropower generation will reach 9.4GW by 2030; rural electrification, which will achieve rural electrification by using at least 30% of renewable energy to generate electricity; energy-saving stoves, about 260,000 energy-saving stoves will be distributed between 2016 and 2031
  - Improve the country's ability to respond to and recover from such disasters by rebuilding in a sustainable manner to mitigate future losses

- Key areas:
  - Forest: protect natural forests; reduce the risk of soil erosion; improve mangrove resilience; sustainable forest management
  - Energy: renewable energy; sustainable policy and strategy formulation in the energy sector; renewable energy power generation to achieve rural electrification
  - Transportation: Road Transportation Management
  - Agriculture: Agricultural residue burning management; rice planting management
  - Public health protection and water management
  - Coastal protection
  - Biodiversity conservation

Thailand

- Targets:
  - Thailand will reduce its greenhouse gas emissions by 20% from the projected BAU level by 2030, and may reach 25% with international support
  - Build adaptability and enhance climate adaptability in 6 priority areas including water resources management, agriculture and food security, tourism, public health, natural resource management, and human settlements and security

- Key areas:
  - Energy, transportation, industry and waste management sectors
  - Water resources: integrated water resources management
  - Agriculture and food security: managing climate risks
  - Tourism sector: strengthening disaster management and reducing climate risk
  - Public health sector: establish health impact monitoring and prevention mechanisms; increase access to public health services
  - Natural resources management sector: strengthen the conservation, restoration and sustainable use of natural resources and biodiversity; strengthen public participation
  - Human settlements and security sector: development of mechanisms to manage climate risks and impacts

Vietnam

- Targets:
  - By 2030, reduce greenhouse gas emissions by 8% compared to the BAU scenario. With international support, this contribution can reach up to 25%.
  - Minimize the loss of life and property caused by climate change
- Key areas:
  - Energy: energy saving; energy efficiency improvement; industrial energy structure; renewable energy
  - Transportation: Passenger and freight transportation improvements; energy structure adjustment
  - LULUCF: Sustainable Agriculture; Sustainable Forests; Biodiversity
  - Waste: Waste Management
  - Agriculture, natural ecosystems, biodiversity, water resources, public health and infrastructure

Key technologies needs of LMCs

- The technical requirements for green development in various countries are mainly concentrated in energy, agriculture, forestry and other sectors closely related to social and economic development.
  - Renewable energy technologies and energy efficiency improvement technologies;
  - Adaptive agriculture, especially crop breeding and infrastructure construction;
  - Sustainable forest management and forest restoration.
  - Climate observation and early warning systems.

Progress of China's Climate Change Strategy and Its Role in Lancang-Mekong Green Development Cooperation

China aim to achieve carbon neutrality before 2060

- We aim to have CO2 emissions peak before 2030 and achieve carbon neutrality before 2060. We call on all countries to pursue innovative, coordinated, green and open development for all,… achieve a green recovery of the world economy in the post-COVID era and thus create a powerful force driving sustainable development.。

- ——Xi Jinping's statement at the general debate of the 75th session of the UN General Assembly
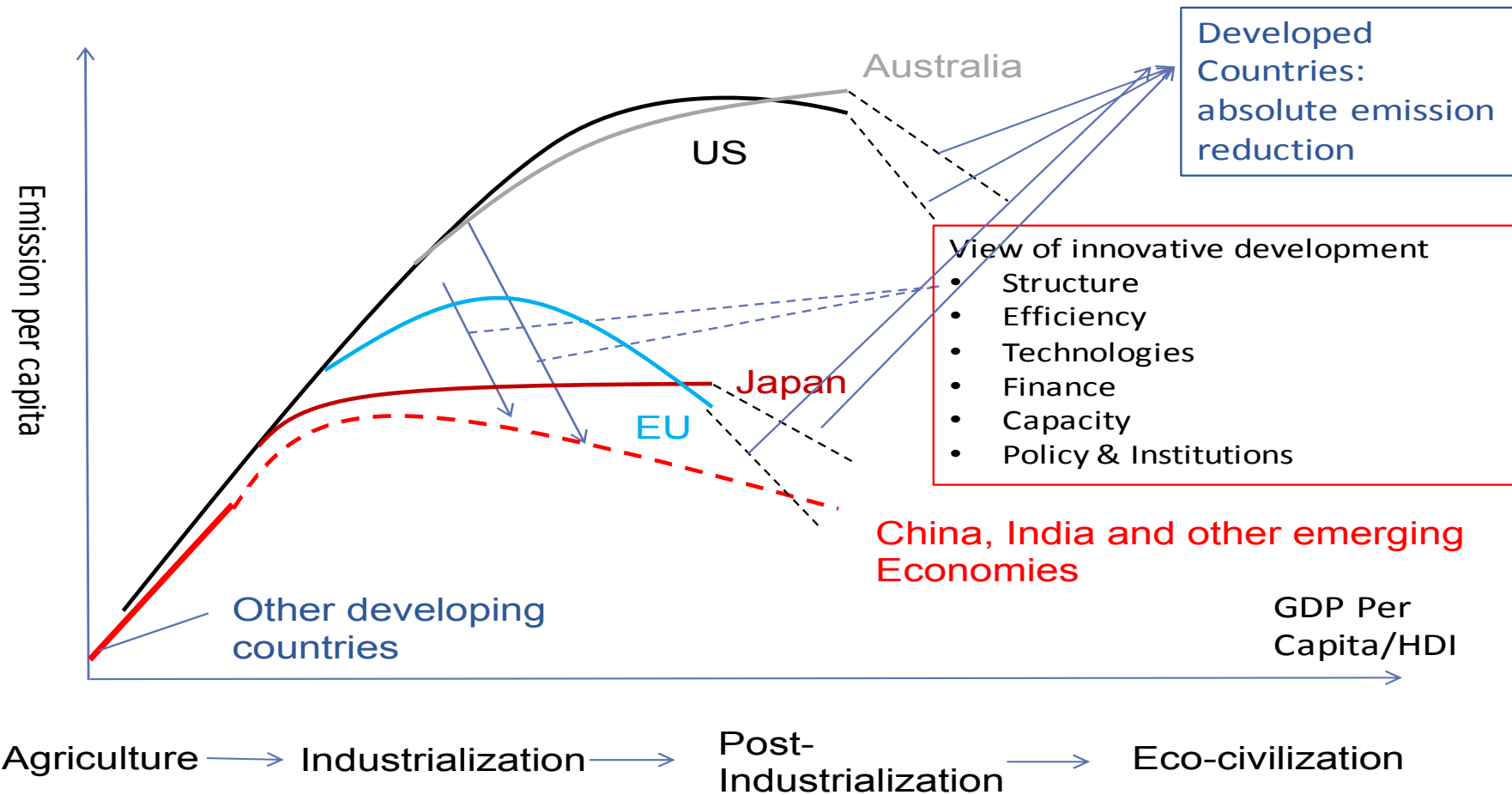
China: innovative Development Pathway

- Successfully moving onto the innovative development pathway can allow China to peak its emissions **at a lower GDP per capita and at an earlier stage of development** than any developed country has done.

- China's innovative development pathway constitutes a new example of development that other developing countries could follow.
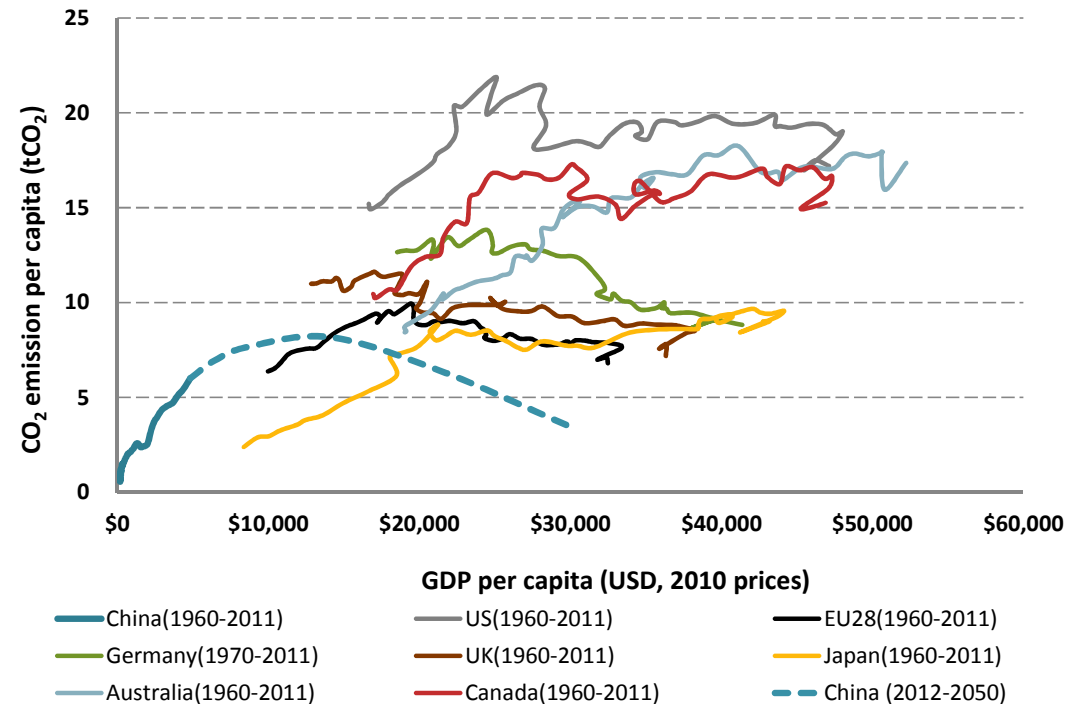
Note: Includes only energy-related CO2 emissions.

Source: Historical CO2 emissions data from 1960 to 2012 is from CDIAC. Population and GDP data is from the World Bank. Data after 2012 is calculated based on NDC targets.

Innovative development pathway

Emission per capita

Developed Countries: absolute emission reduction

Australia

US

View of innovative development
- Structure
- Efficiency
- Technologies
- Finance
- Capacity
- Policy & Institutions

Japan

EU

China, India and other emerging Economies

Other developing countries

GDP Per Capita/HDI

Agriculture → Industrialization → Post-Industrialization → Eco-civilization

China's experiences can serve as an example for other developing countries

- In its transition to the innovative development pathway, China has the opportunity to **demonstrate a sustainable framework for development to these countries, supported by active South-South cooperation.**

- By sharing China's experiences, other developing countries can avoid reliance on traditional high-carbon growth models and pursue more efficient and innovative paths that result in less pollution and lower emissions.

- China's move to the innovative development pathway could therefore promote a global transition to low-carbon development models.

The Chinese government is deepening South-South cooperation on climate change

- China actively pushed forward South-South cooperation on climate change and helped other developing countries to improve their capacities on climate change by **developing low-carbon demonstration areas, donating energy-efficient and low-carbon materials and monitoring and warning facilities, and holding climate change South-South cooperation training workshops**.

China's Policies and Actions for Addressing Climate Change, 2017

New Agency: National Agency for International Cooperation and Development

Climate friendly technology needs by developing countries: knowable, available, affordable, and effective

- Developed countries including Germany generally excels at technological innovation, and **China generally excels at deployment of these technologies in the production process**. By working together, both sides can combine strengths in order to excel across the value chain.

- When both sides combine forces, it allows business sector to shape the global supply chain and global division of labor, to drive down the cost of low-carbon technology more quickly, and to expand the global market of low-carbon technology and products

- Research and industrial collaboration between China and developed countries could, **significantly reduce the cost of low-carbon technologies and expand the scope of the global market of low-carbon technologies and products. Such collaboration could create benefits for both developed and developing countries**.

Suggestions on deepening green development cooperation among LMCs

Suggestions on deepening green development cooperation among LMCs

- **Focus on the green development key needs of LMC countries and enrich the connotation of LMC**
  - focusing on the characteristics of the green development and technological needs of LMC countries, and further strengthen the capacities building of the above-mentioned needs.

- **Deepen the LMC Mechanism and Green BRI and construct a green Lancang-Mekong economic development belt**
  - deepening the link between the LMC and the green BRI, and promote the exchange and cooperation, especially the ecological and environmental protection concepts, policies and technologies

Key areas of green development cooperation with LMCs in the future

- Supporting technology needs assessment in developing countries and technology transfer/technology cooperation

- Low carbon infrastructure in developing countries: AIIB/Avoiding Lock-in effect

- Carbon market: technical support and capacity building for other developing countries' market readiness and possible linkage of carbon market in the future: important topic in World Bank PMR meeting

- Sharing low carbon urbanization experiences with other developing countries

- Human resources development and capacity building for other developing countries: technology/finance/planning etc.

- Green finance and investment in developing countries: **RECP**, combing BRI other other initiatives /G20 outcome

- Combing combating climate change actions with Sustainable Development Goals 2030: China's experiences in Poverty Alleviation

Incentives, Institutions, and Innovation for Investment on sustainable Infrastructure

- Policy agenda setting: Lan-cang Mekong Cooperation Mechanism/RECP

- Regulatory clarity and long-term policy stability of low-carbon infrastructure transition: global climate target and policy framework

- Public-Private Partnership: Strong public policy leadership and active involvement of private-sector

- Innovative financing structures based on stable carbon pricing mechanism and phase-out of inappropriate subsidy for fossil-fuel

- Stricter low-carbon standards for designing, constructing and operating of infrastructures, monitoring and evaluating their emissions

- Encourage "low-carbon ready" designing standards for infrastructures building, to make space for low-carbon transition in the future: CCS-Ready for coal-fire plants

Photovoltaic greenhouse in Qingdao

Nujiang River Basin in Yunnan Province: poverty alleviation and prosperity can be achieved through ecological protection, active response to climate change and protection of biodiversity

Thank you for your attention!

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