



Carbon Emission
Accounts & Datasets
for emerging economies

[http:// www.ceads.net](http://www.ceads.net)

中国
碳核算
数据库

Planning For Global Carbon Neutrality: Carbon Emission Accounts & Datasets For Global Corporates

Up to date energy, emission and socioeconomic accounting inventories for
all developing countries, regions and cities

Dabo Guan

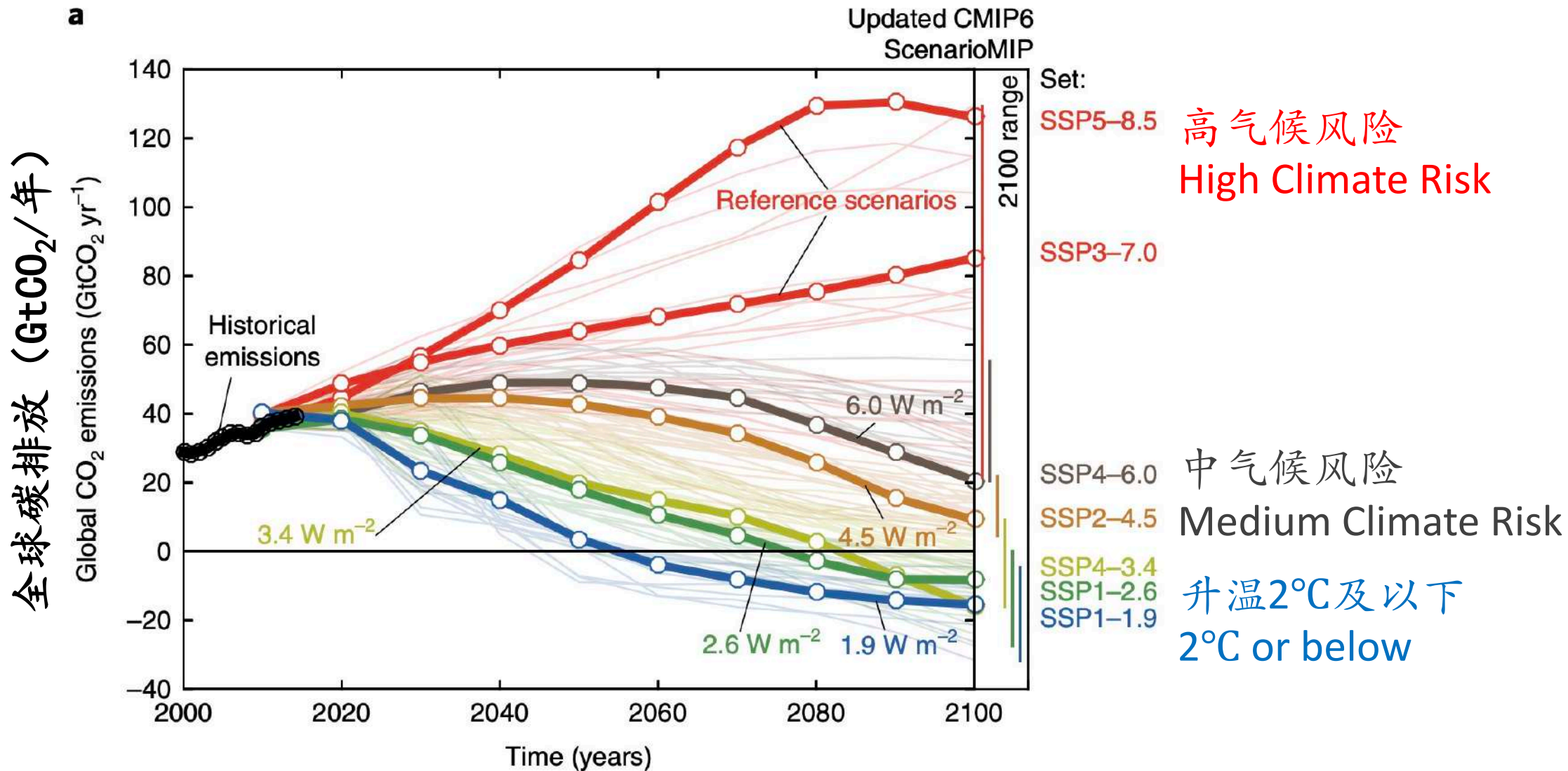
Climate Change Economics
University College London
Tsinghua University





全球均温持续上升

Global mean temperature keeps rising

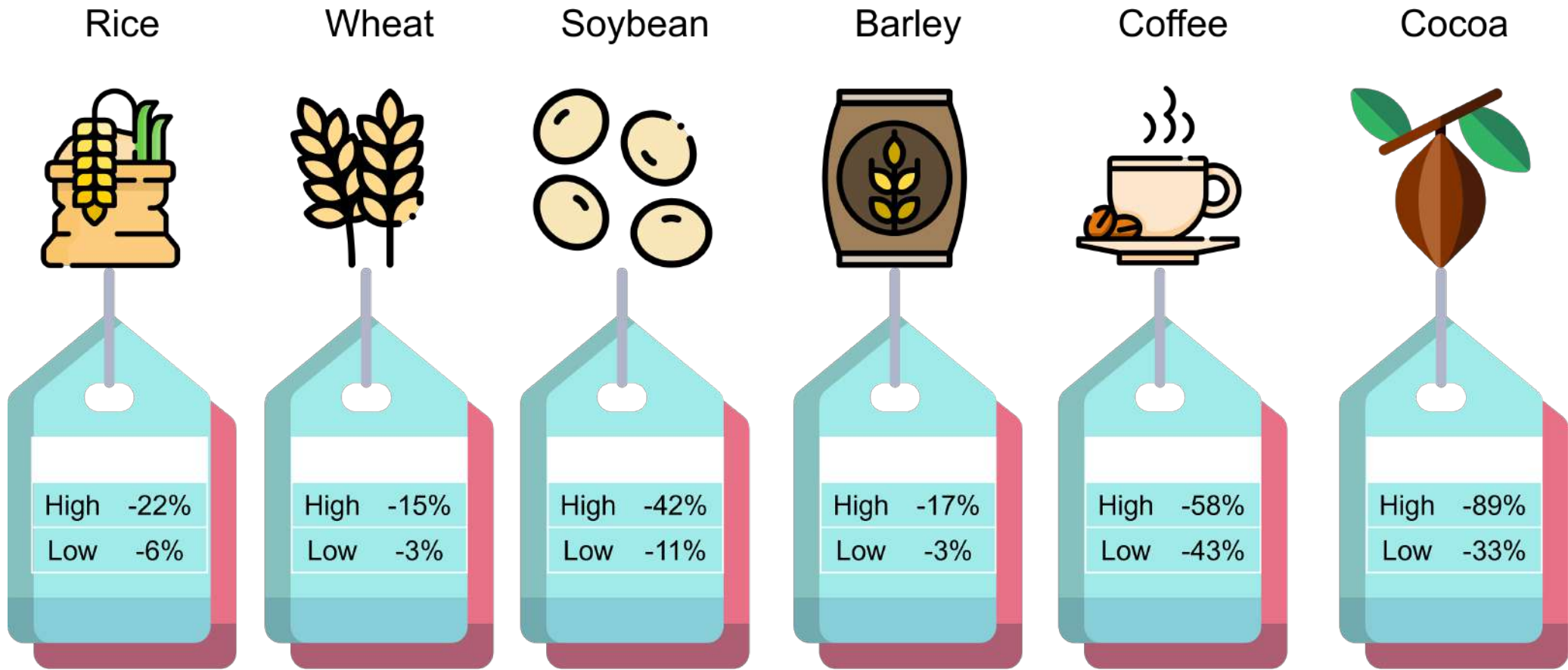




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高气候风险对“吃货们”的影响巨大

High climate risk affects 'your consumption'!



Sources:
Emergent constraint on crop yield response to warmer temperature from field experiments, *Nature Sustainability*, 2020
A bitter cup: climate change profile of global production of Arabica and Robusta coffee, *Climatic Change*, 2015
Vulnerability to climate change of cocoa in West Africa, *Science of the Total Environment*, 2016



气候变化将减少“哈啤酒”的快乐 Climate change will jeopardize your beer consumption

由于气候变化导致啤酒产量下降之后

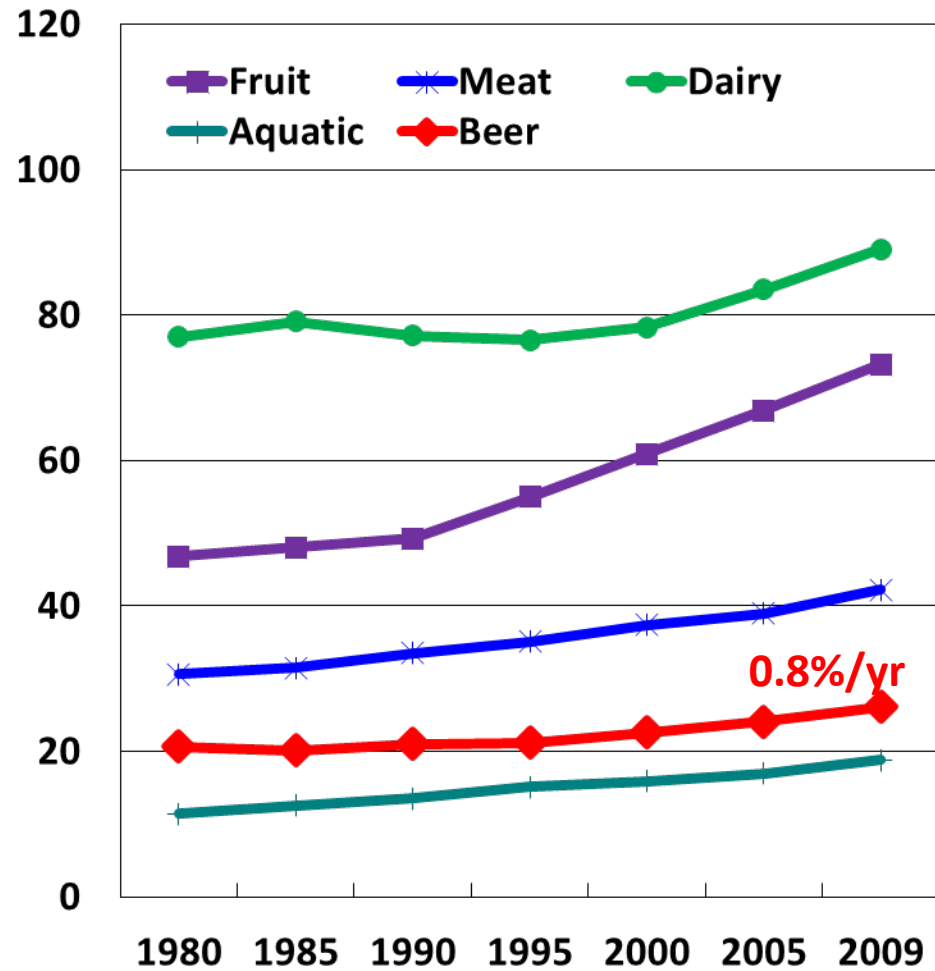
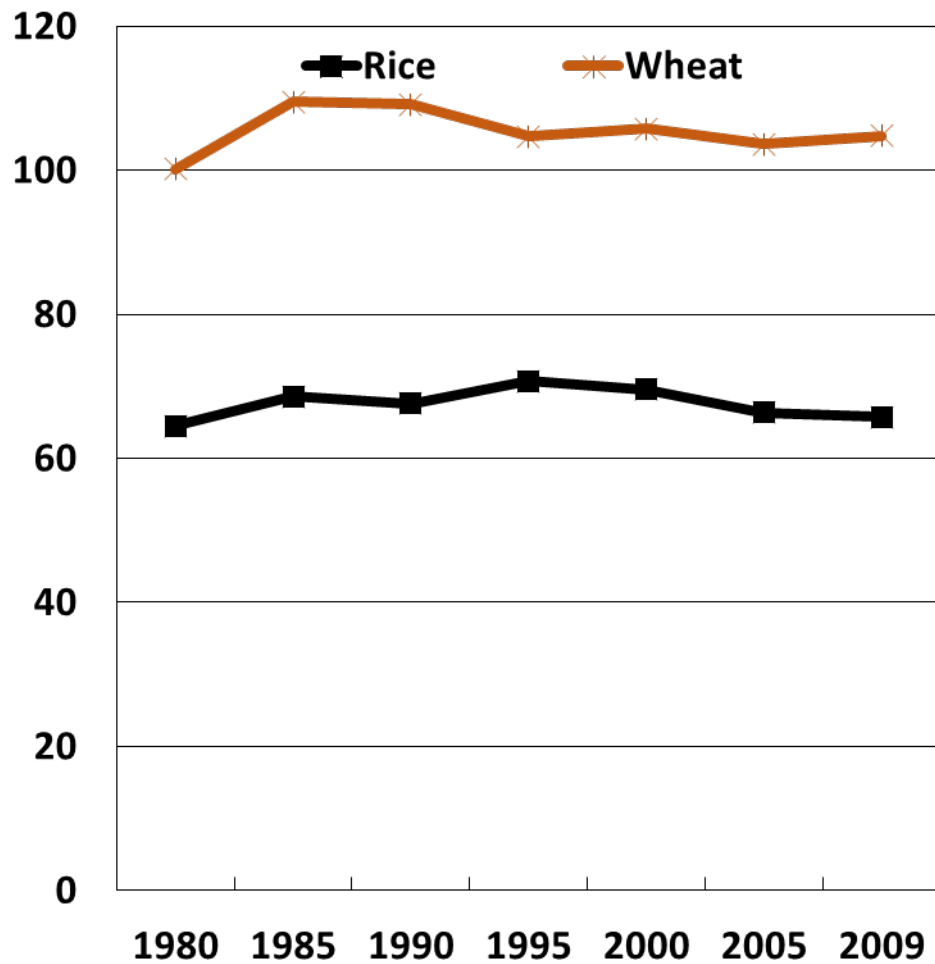


Source: Decreases in Global Beer Supply Due to Extreme Drought and Heat." *Nature Plants*, 2018

Climate change and your diet security

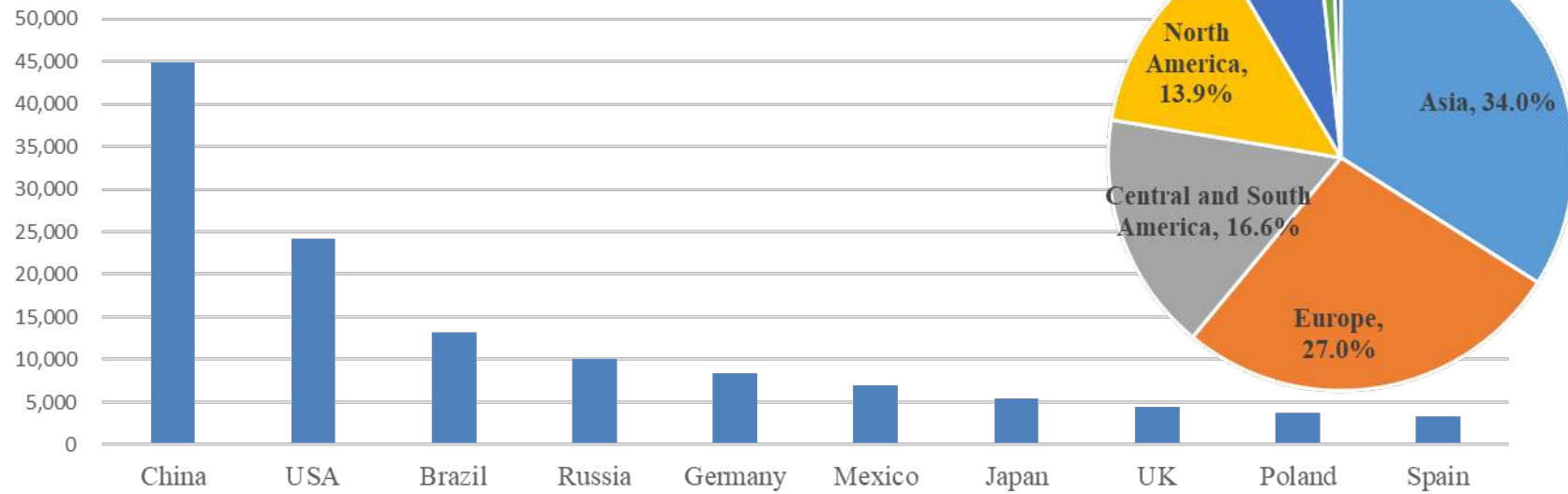


Global Food Consumption (kg/capita/yr)



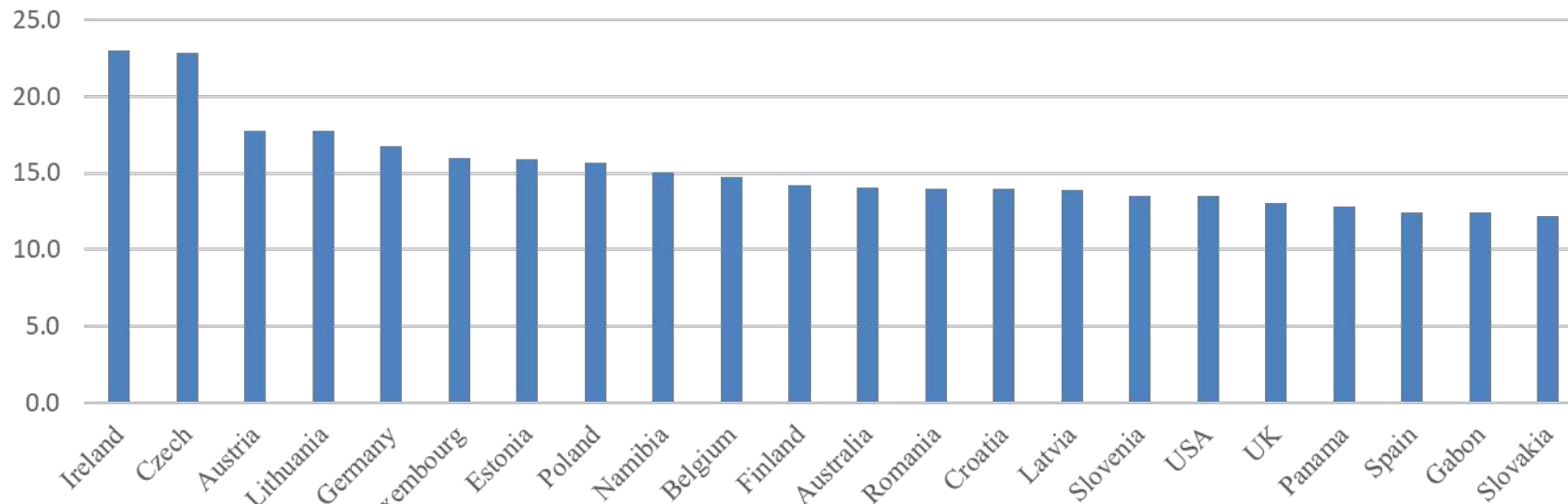
Source: FAOSTAT

Top 10 Beer Consumption by Country (10⁶L)



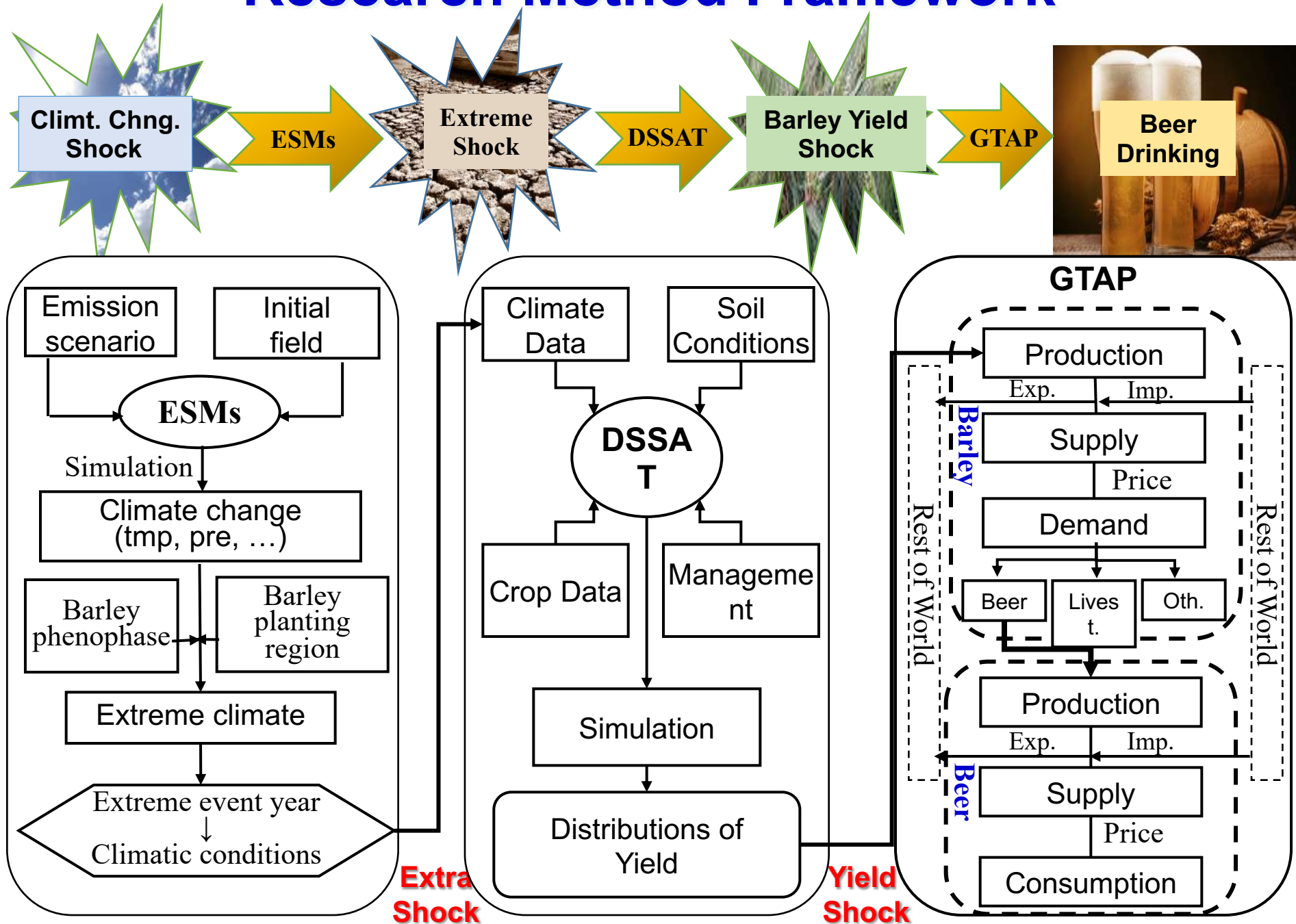
Source: KIRIN

Top 20 Monthly Beer Consumption (500 ml bottle/capita)

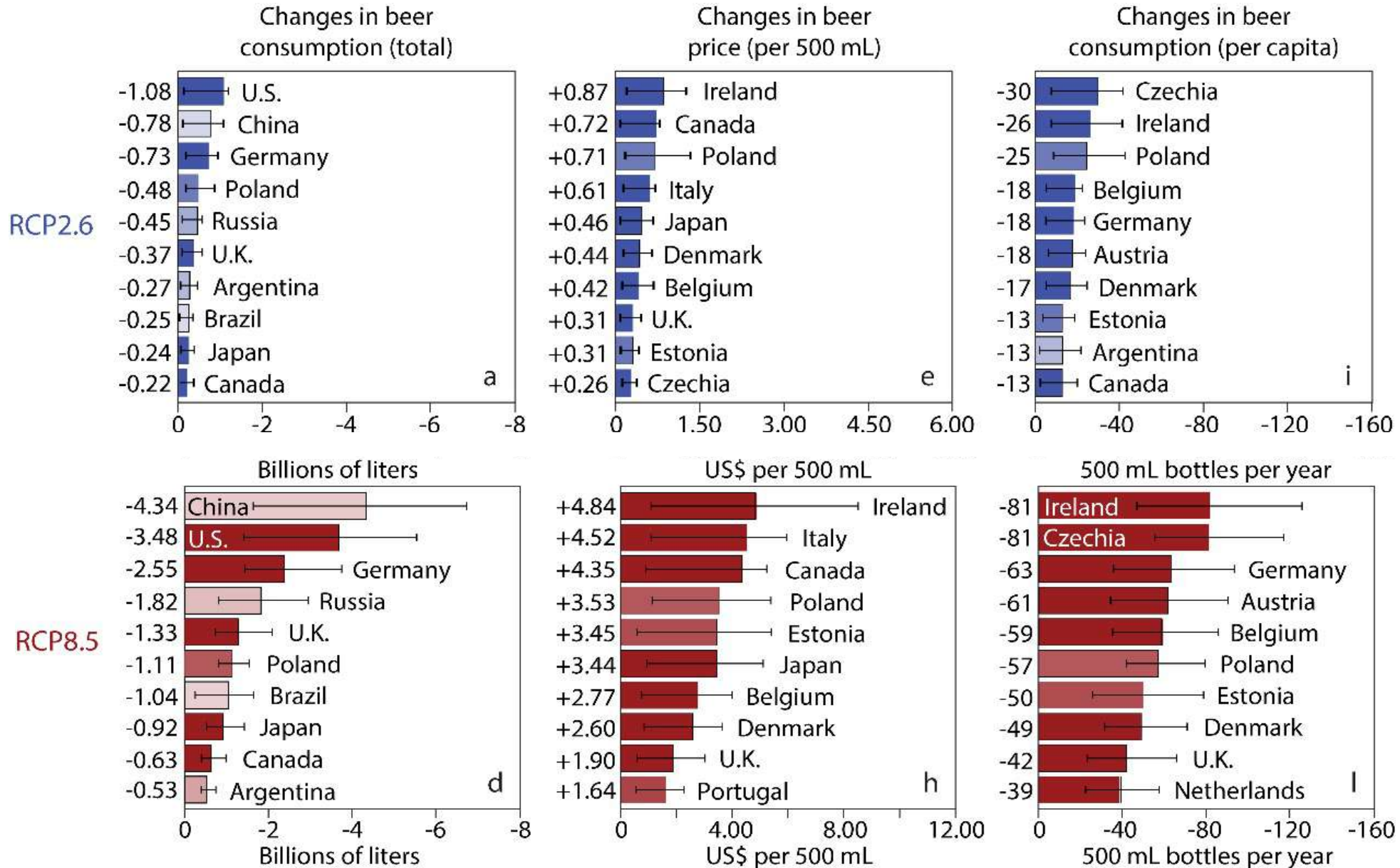


Source: FAOSTAT

Research Method Framework



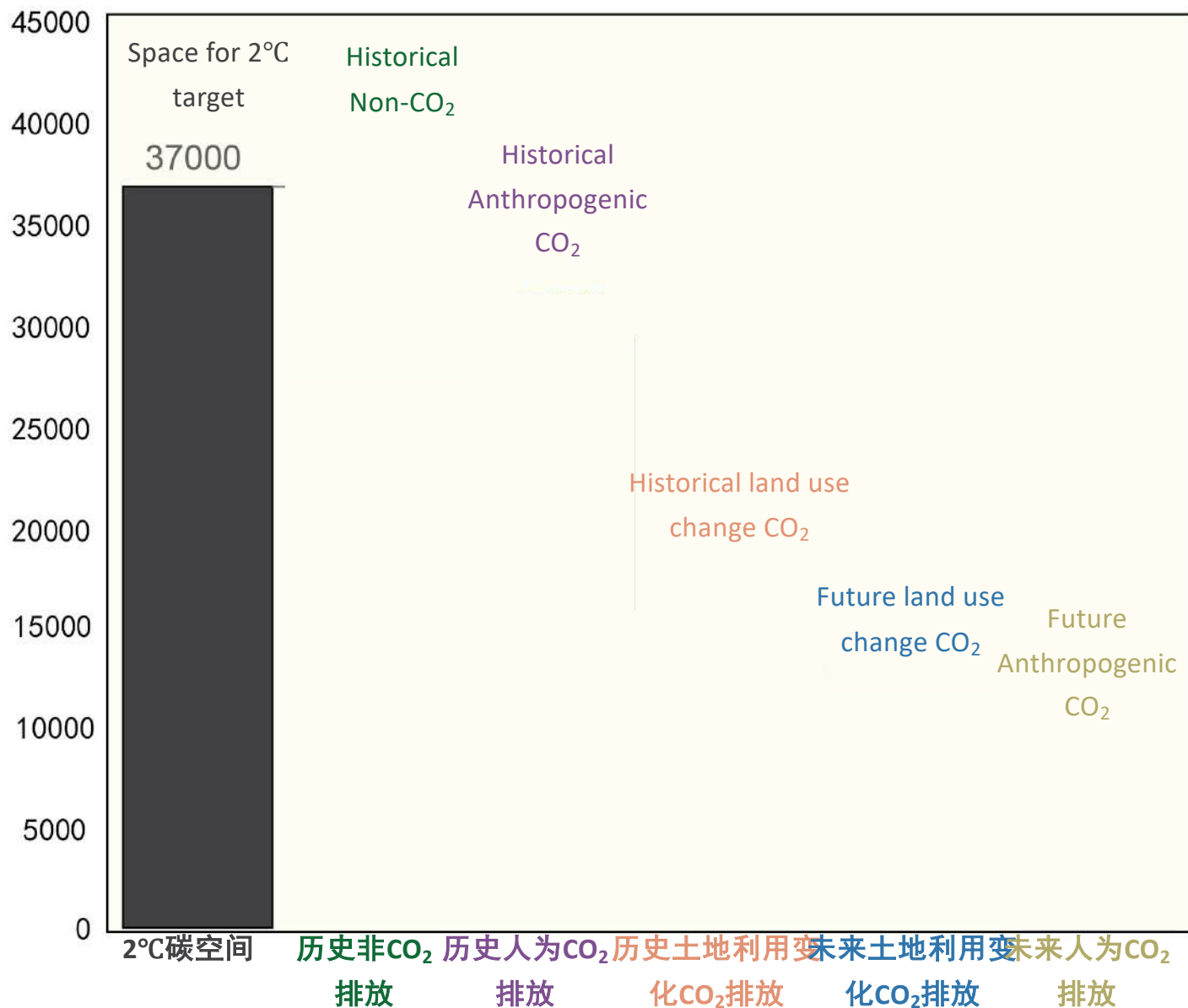
Changes in beer consumption and price under increasingly severe drought-heat events





全球“碳的账” How much left?

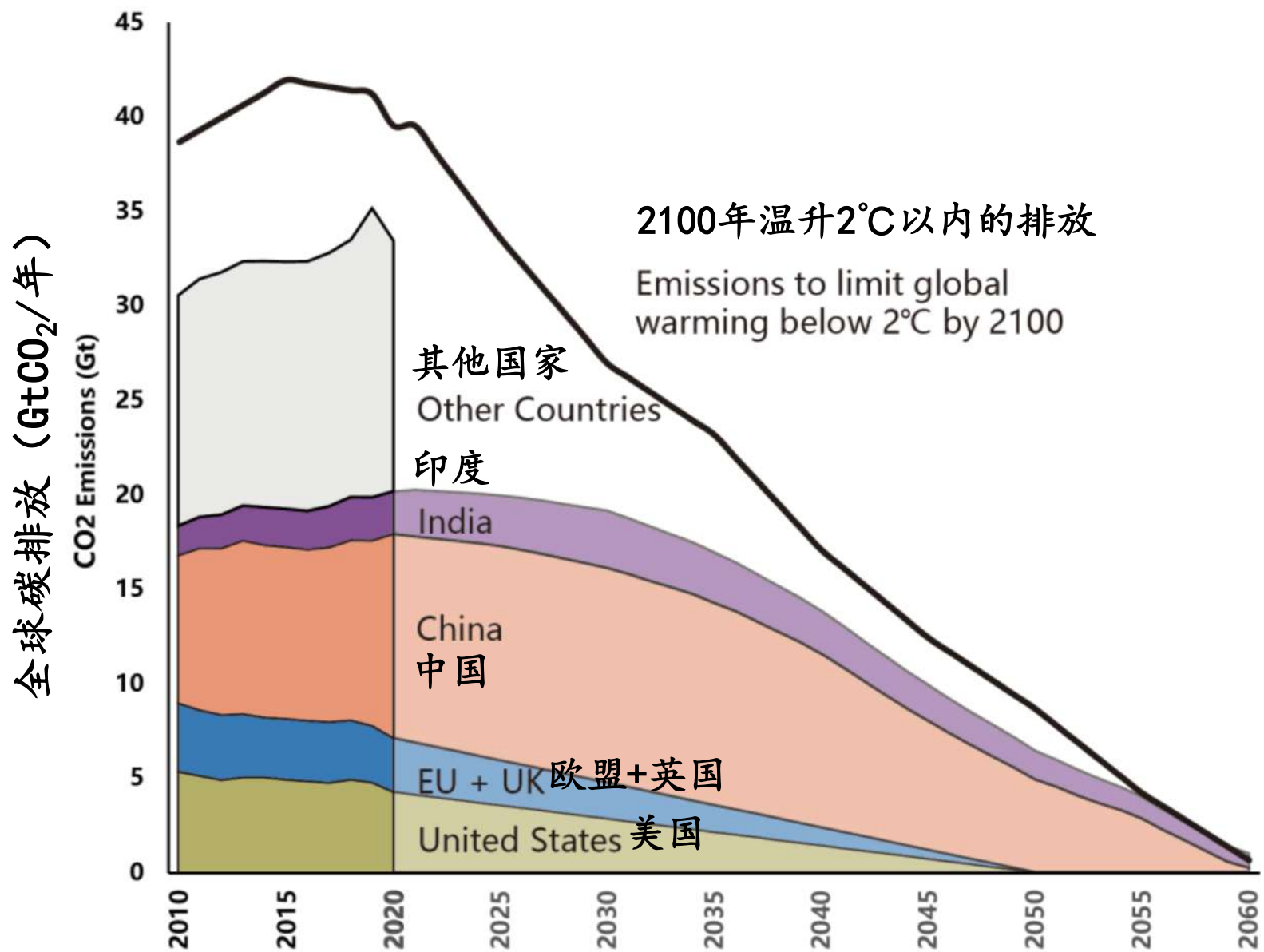
累积碳排放 Cumulative emissions (亿吨 CO₂当量 10⁸ ton CO₂ eq.)



全球剩余CO₂排放空间
Global emission space remained

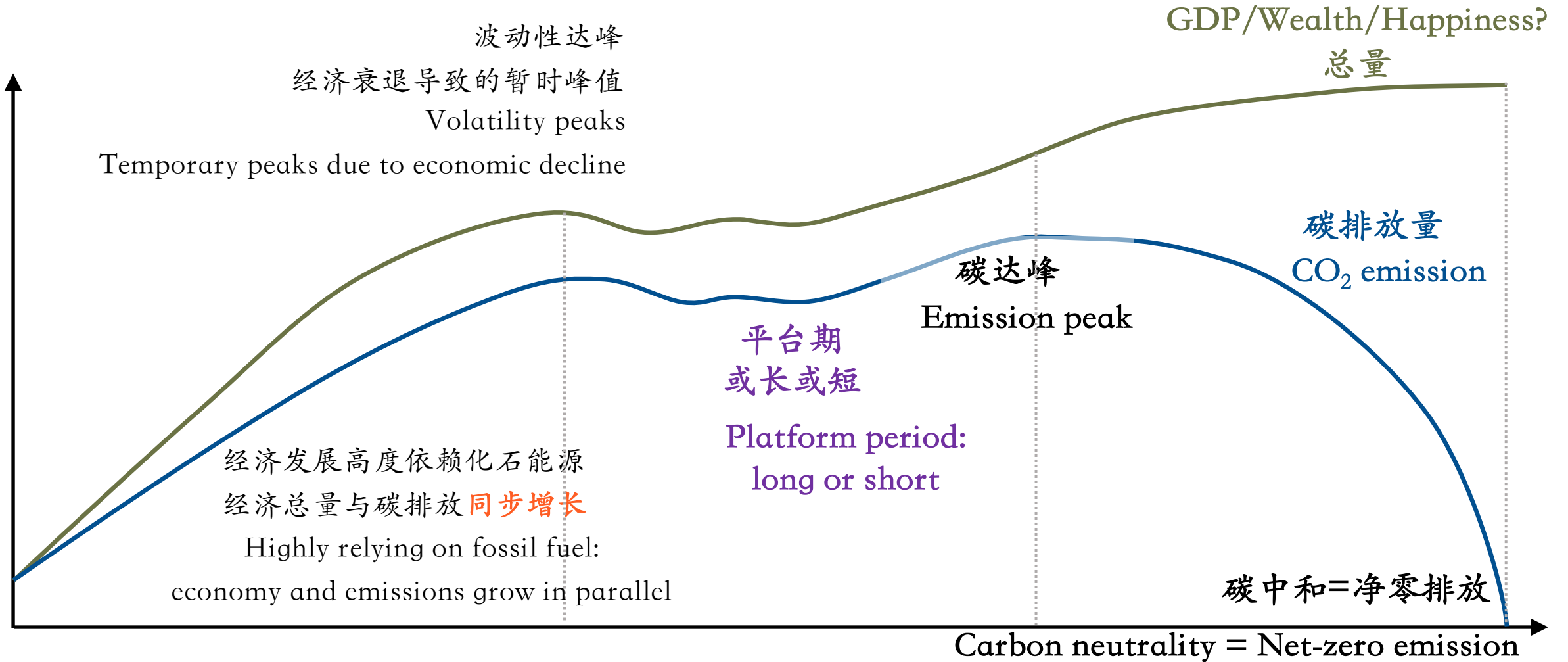


全球“碳空间”如何划分？ Who gets the quota?





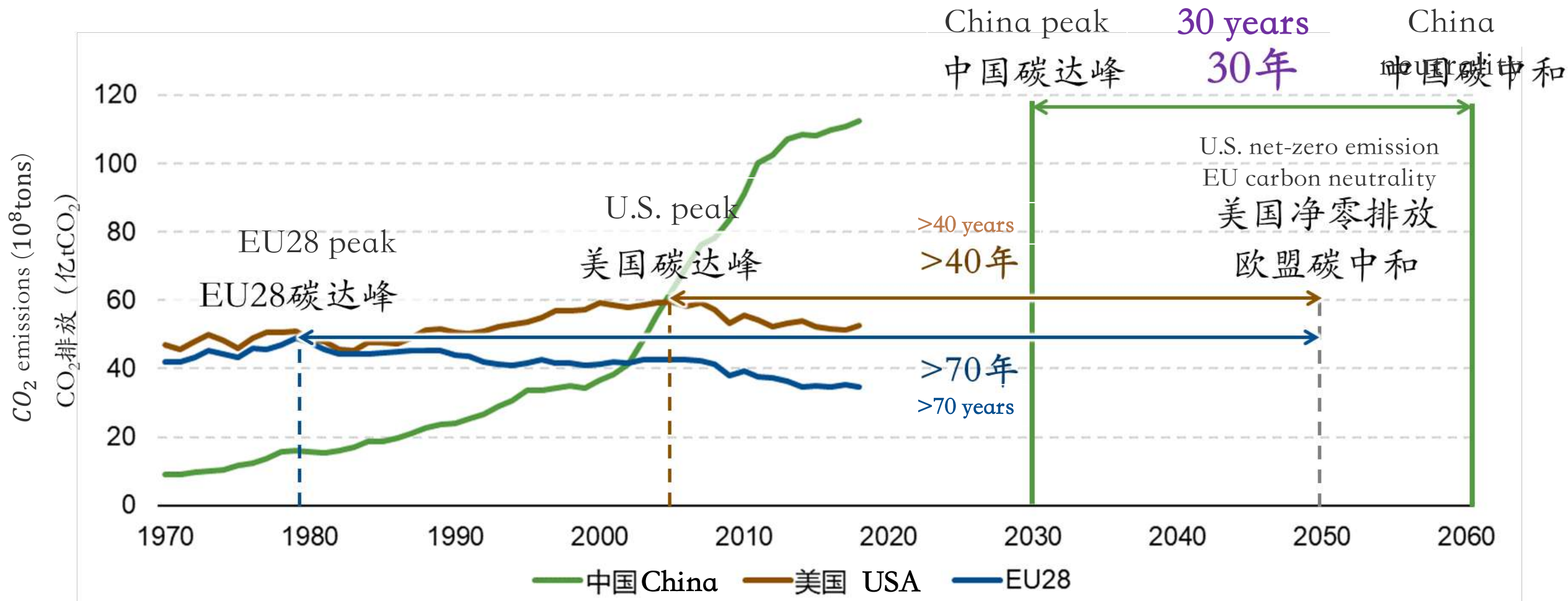
碳达峰、碳中和的内涵是什么？ Rational of emission peak and neutrality?





中、美、欧双碳目标对比

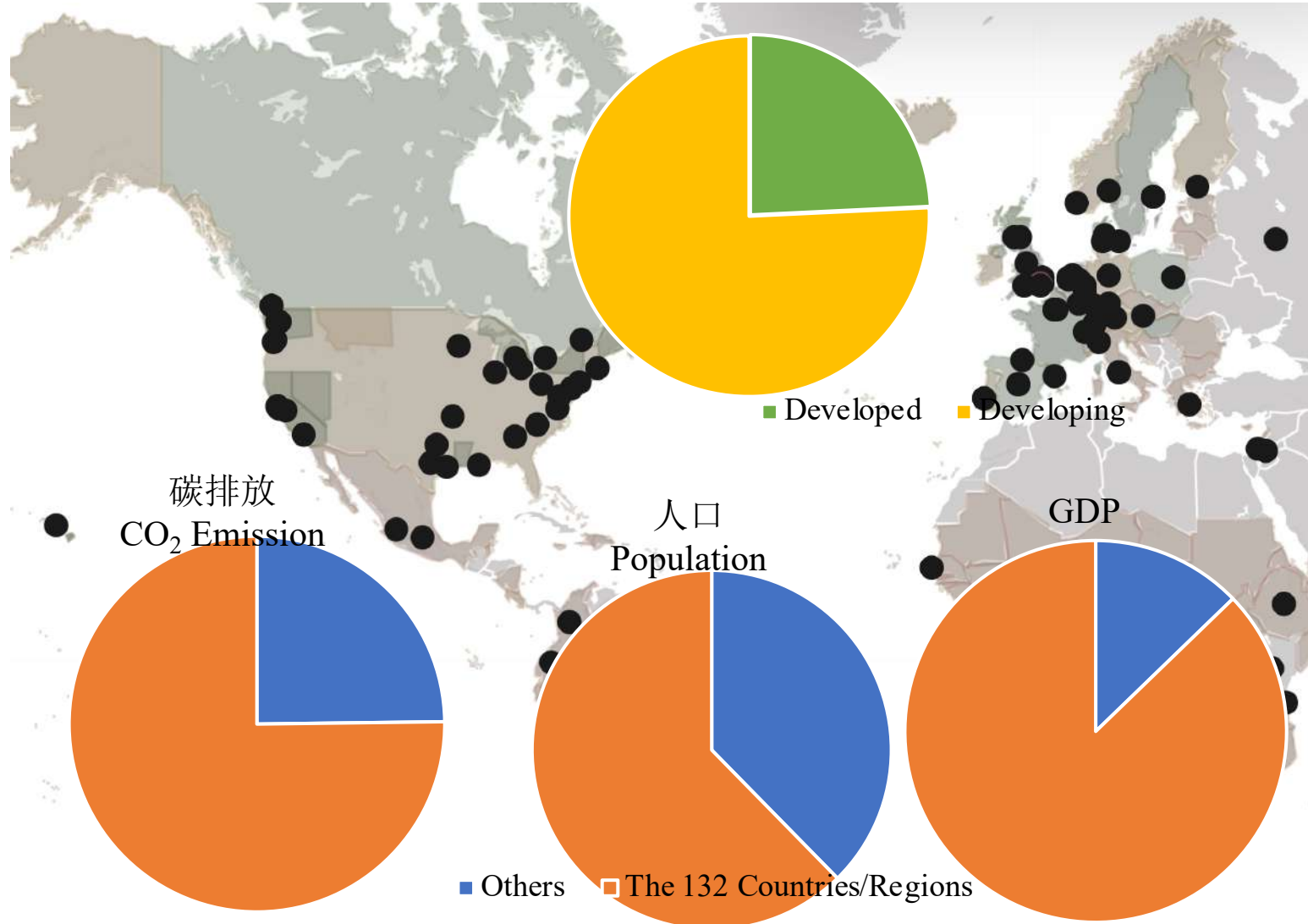
Comparing emission targets and effort





Carbon Emission
Accounts & Datasets
for emerging economies

137国家承诺/计划碳中和 137 Countries/regions has committed (or plan to) carbon neutrality



- 137国家/地区中，超过75%是发展中国家/地区
- Among the 137 countries/regions, more than 75% are developing countries/regions
- 137国家占据了**全球75%的碳排放、60%的人口、75%的GDP**
- The 132 countries/regions accounts: **75% of global CO₂ emissions, 60% of the global population, and 75% of global GDP.**



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ACCOUNT

CARBON EMISSION ACCOUNTS AND DATASETS FOR EMERGING ECONOMIES

UP-TO-DATE ENERGY, EMISSION AND SOCIOECONOMIC ACCOUNTING INVENTORIES
FOR ALL DEVELOPING COUNTRIES, REGIONS AND CITIES.

Data Download

<https://www.ceads.net.cn/> (中文版)

<https://www.ceads.net> (English)



CI
Acco

Hohhot 2010 Mt

Total Final Consumption	60.26	0.02	0.00	1.21	0.28	0.00	0.00	0.12	0.00	0.00	0.00	4.26	0.05	0.07	0.02	0.00	1.85	0.00	0.00	0.00	5.00	73.15
Farming, Forestry, Animal Husbandry, Fishery & Water Conservancy	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43
Coal Mining and Dressing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Petroleum and Natural Gas Extraction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ferrous Metals Mining and Dressing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nonferrous Metals Mining and Dressing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nonmetal Minerals Mining and Dressing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Minerals Mining and Dressing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Logging and Transport of Wood and Bamboo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Food Processing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Food Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beverage Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tobacco Processing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Textile Industry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Garments and Other Fiber Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Leather, Furs, Down and Related Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Timber Processing, Bamboo, Cane, Palm & Straw Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Furniture Manufacturing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Papermaking and Paper Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Printing and Record Medium Reproduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cultural, Educ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum Pro	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Raw Chemicals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Medical and P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chemical Fiber	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rubber Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plastic Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nonmetal Mineral Products	0.50	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Smelting and Pressing of Ferrous Metals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Smelting and Pressing of Nonferrous Metals	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Metal Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ordinary Machinery	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment for Special Purpose	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transportation Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electric Equipment and Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electronic and Telecommunications Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Instruments, Meters Cultural and Office Machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Manufacturing Industry	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Scrap and waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electric Power, Steam and Hot Water Production and Supply	49.28	0.02	0.00	0.14	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.92	0.00	0.00	0.00	0.00	50.49
Gas Production and Supply	0.56	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.61
Tap Water Production and Supply	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Construction	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32
Transport, Storage, Postal & Telecommunications Services	1.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.33	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	3.58
Wholesale, Retail Trade and Catering Service	1.98	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.00	0.02	0.00	0.00	0.11	0.00	0.00	0.00	0.00	4.00
Other	1.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	1.83
Urban	2.68	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.00	0.24	0.00	0.00	0.00	0.00	3.06
Rural	2.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.24	0.00	0.00	0.00	0.00	2.49

47 sectors

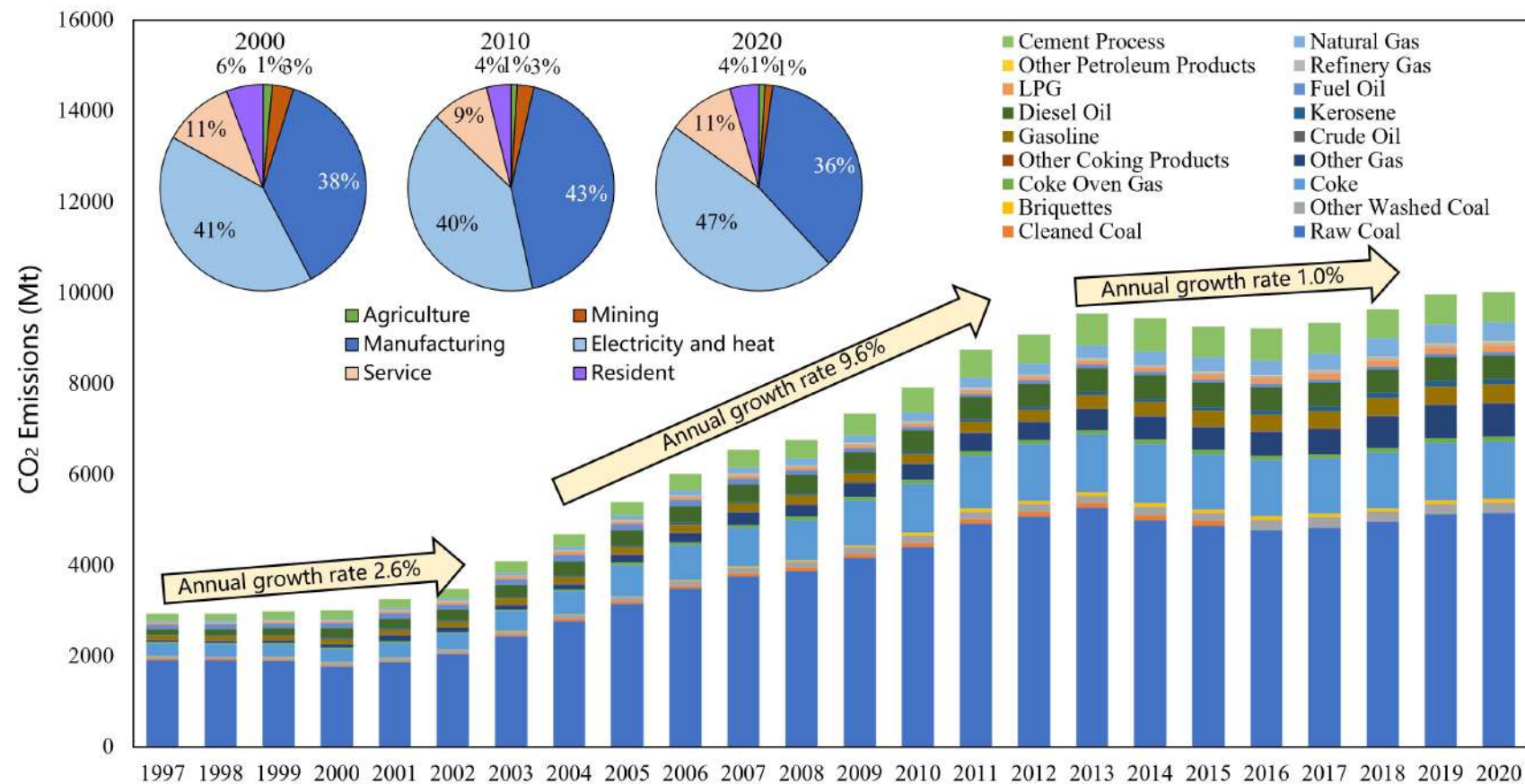
碳排放清单细分20种能源品种、
47个行业部门及近20种工业产品

Emissions from fossil fuel consumption
20 energy types

P
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China Carbon Emission Accounts 1997-2020



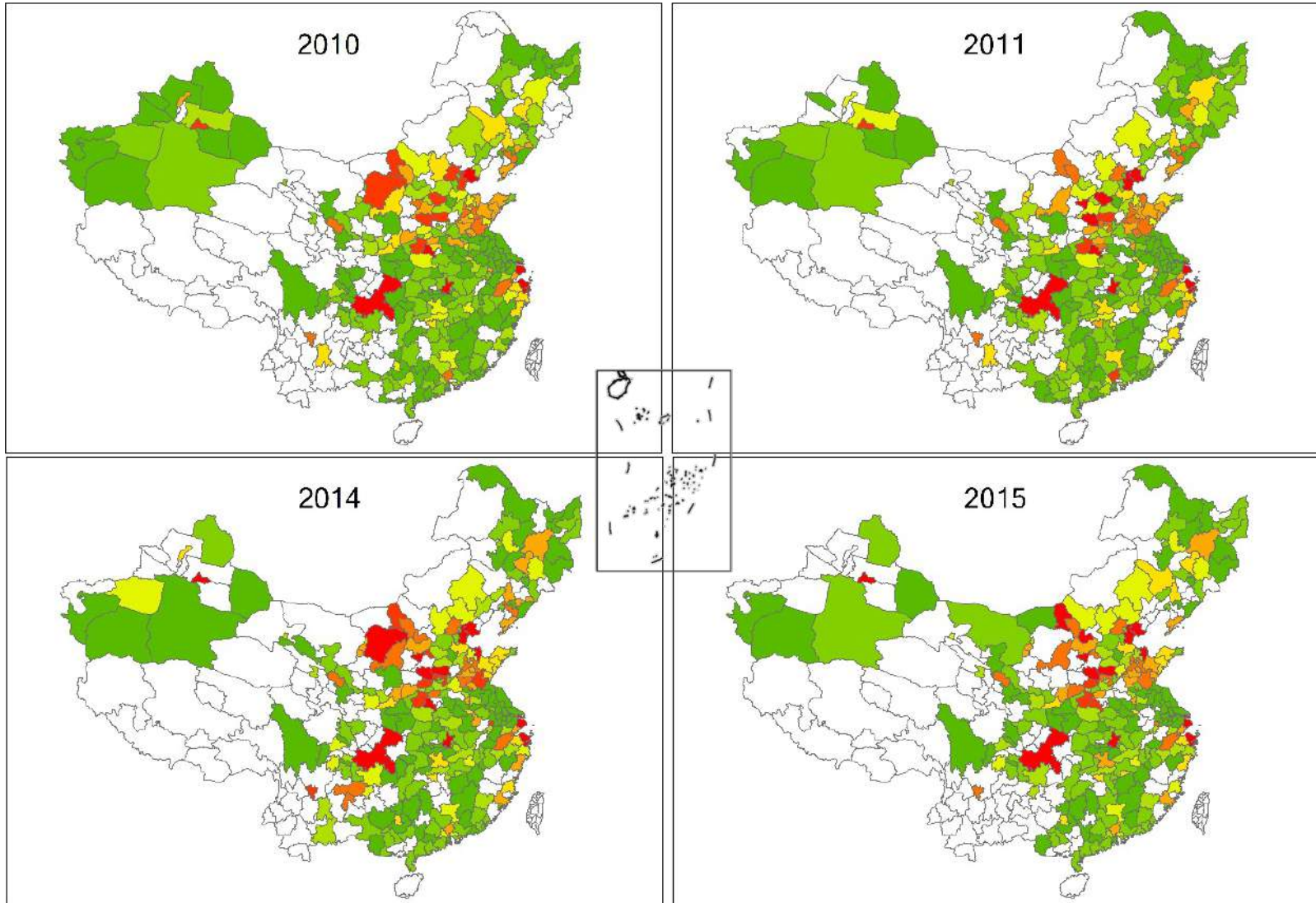
针对工业重点行业的化石能源燃烧直接排放、净购入电力热力的间接排放、及近20种工业产品的生产过程排放进行了详实的核算。

与各行业协会数据相互验证，交叉比较，编制了可精准反映我国工业重点行业碳排放历史发展与现状特征的碳排放核算数据集。

Data is mutually verified and cross-checked with various industry associations. The emission accounting data can accurately reflect the historical development and current characteristics of carbon emissions in key industrial industries in China.



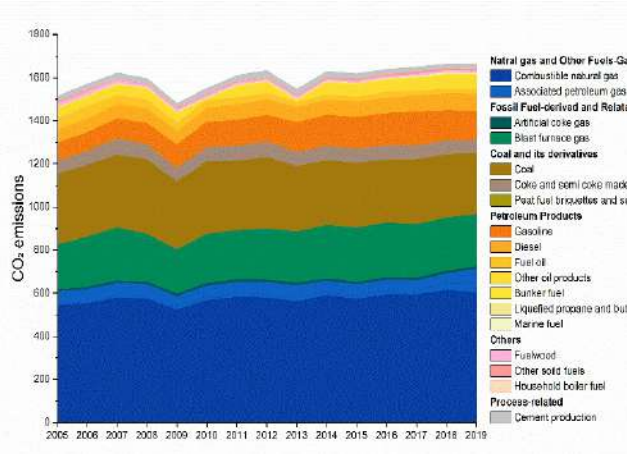
300+ city level emission dataset



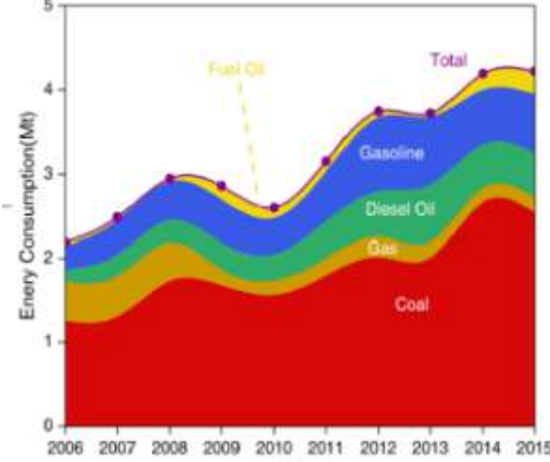
CEADs 团队开展多次夏令营，采用“数据众筹”的方式，对中国 300+ 地级市进行了 1997-2018 年长时间序列的碳排放核算。城市尺度清单与国家层面、省级层面数据清单具有相同的核算方法、数据来源、核算口径、行业分类，可形成交叉验证。全部数据公开、透明、可验证且免费获取，为城市低碳发展及相关科学研究提供坚实的理论依据和技术支持。

CEADs organized several summer camps and implemented “data crowdsourcing” to compile emission data for 300+ prefecture-level cities in China from 1997 to 2018. All data are open, transparent, verifiable and free to obtain from CEADs website

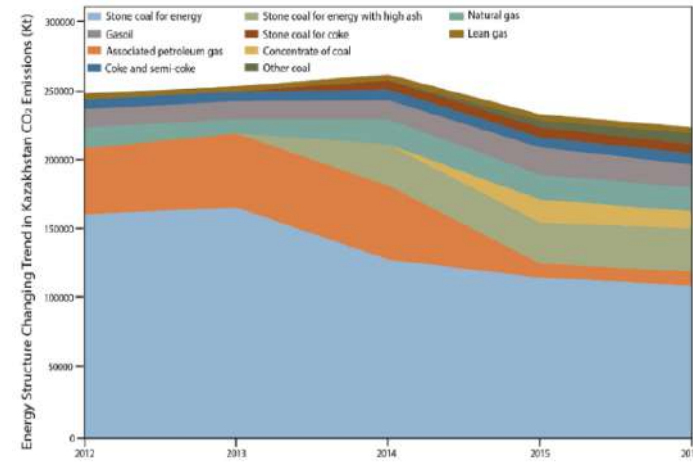
Socio-Environmental Datasets for emerging economies



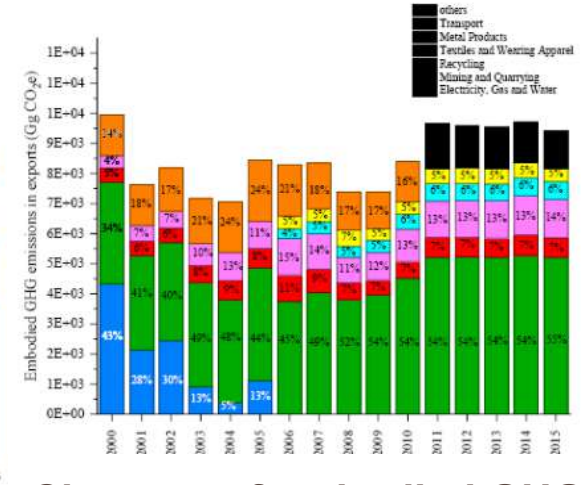
Energy structure of Russia's 83 federations



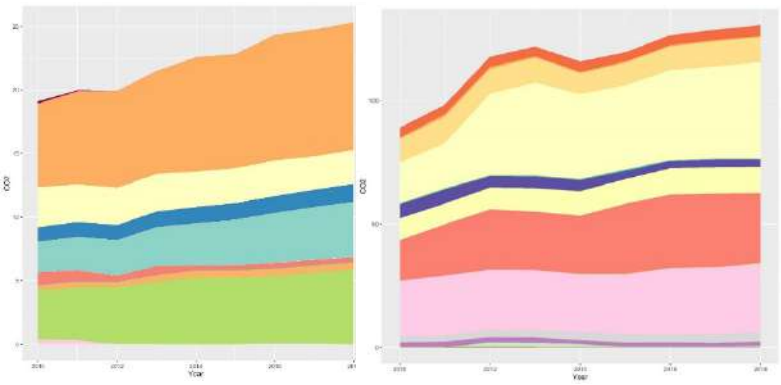
Energy structure of Kyrgyzstan



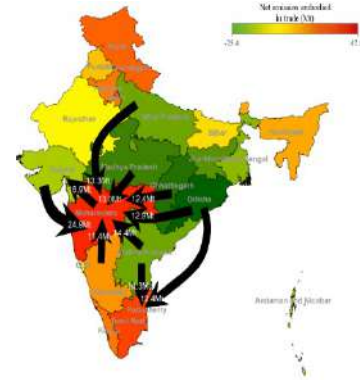
Energy structure & carbon emissions in Kazakhstan



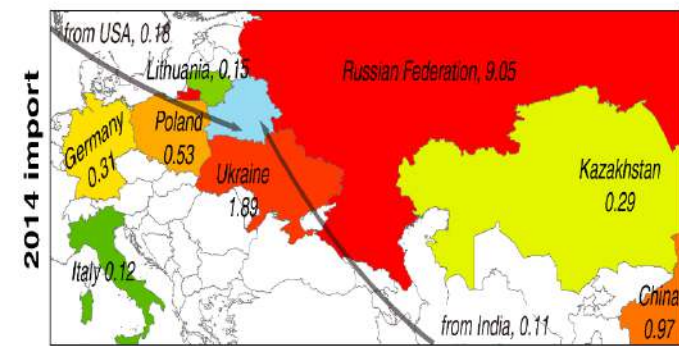
Changes of embodied GHGs emissions in Mongolia



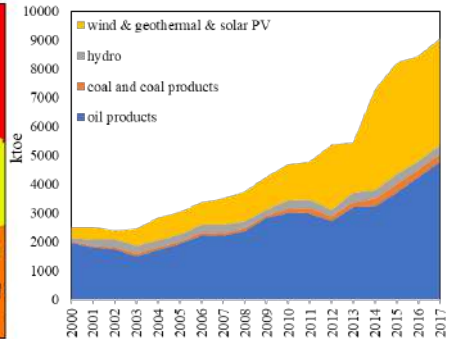
Changes of energy structure and carbon emission structure in Bolivia and Chile



Embodied carbon emissions among 33 federations of India



Transfer of carbon emissions embodied in trade in Belarus

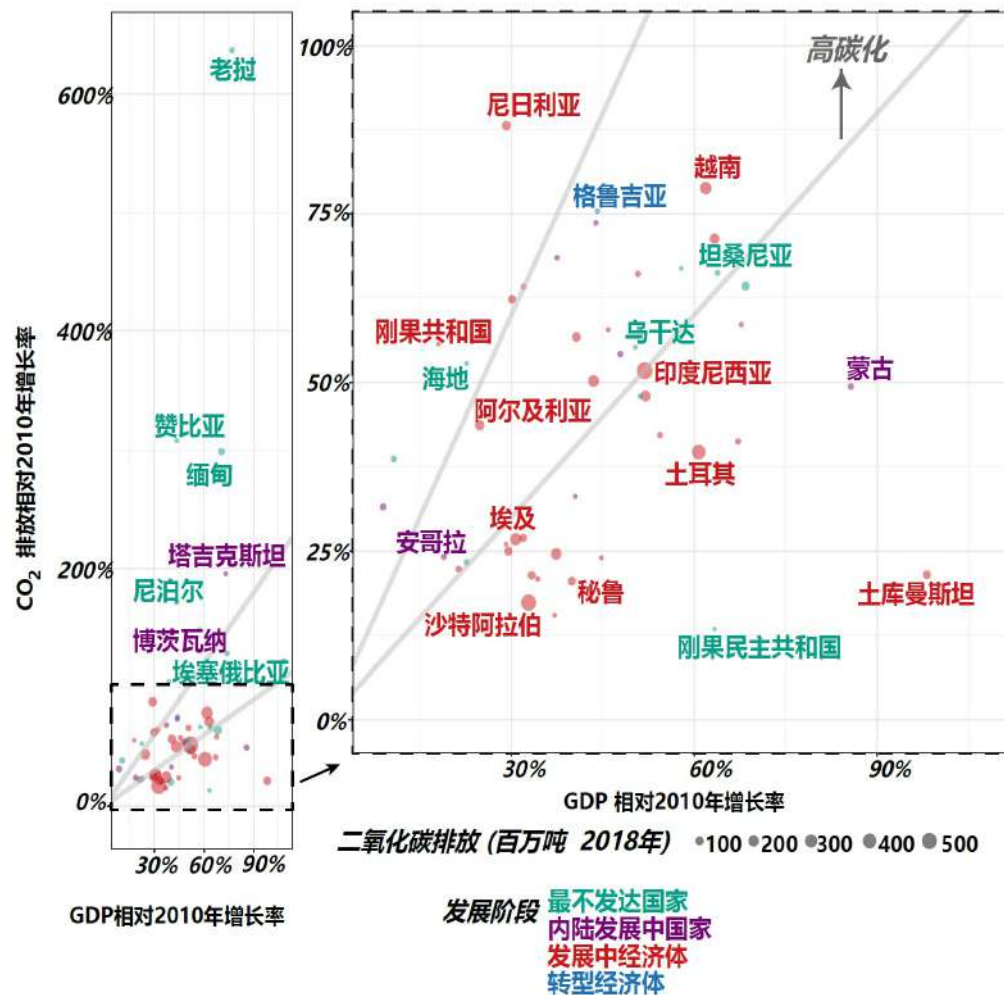


Energy structure of Kenya



《全球新兴经济体二氧化碳排放年度报告2021》的说明

Annual Report 2021 for Carbon Dioxide Emission Accounts of Global Emerging Economies

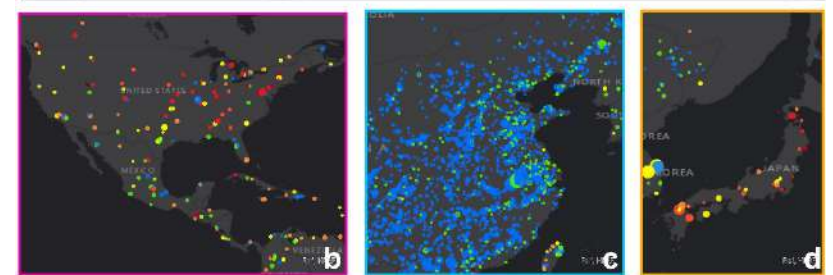
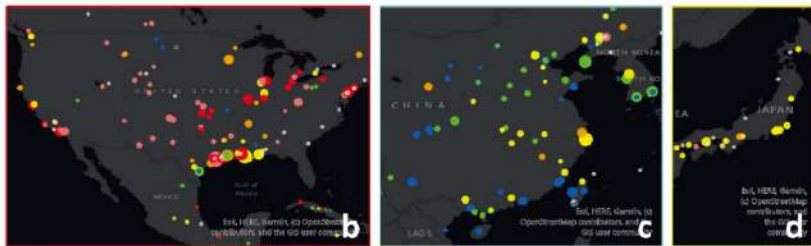
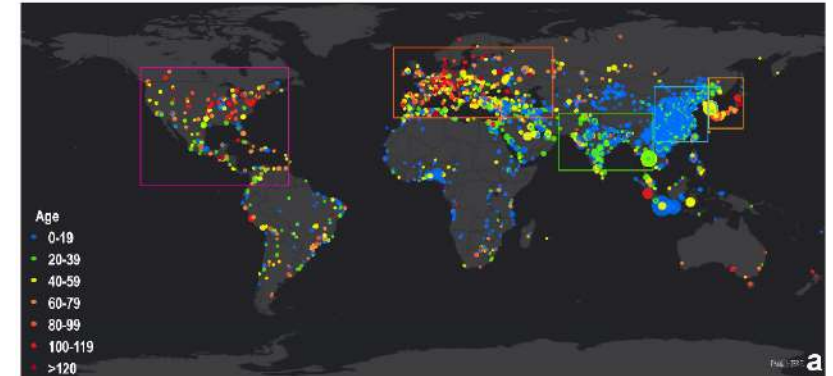
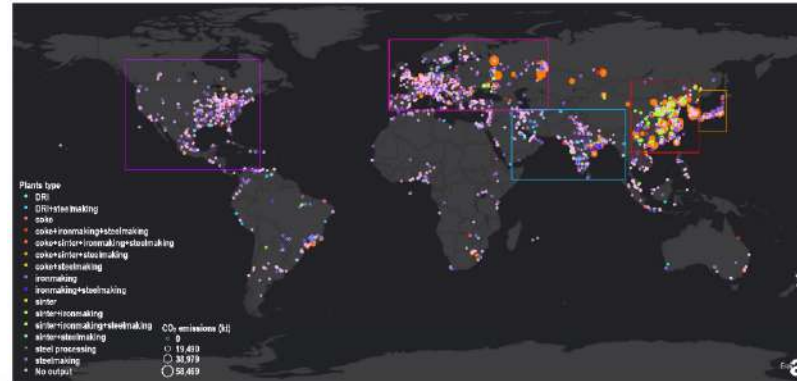
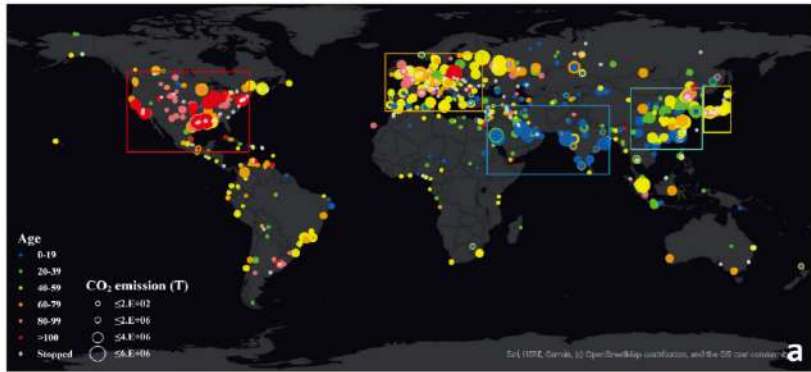




Carbon Emission
Accounts & Datasets
for emerging economies

全球重点行业点源碳核算数据集：钢铁、水泥、炼油

Global key industry point-source carbon accounts: iron&steel, cement, oil refinery



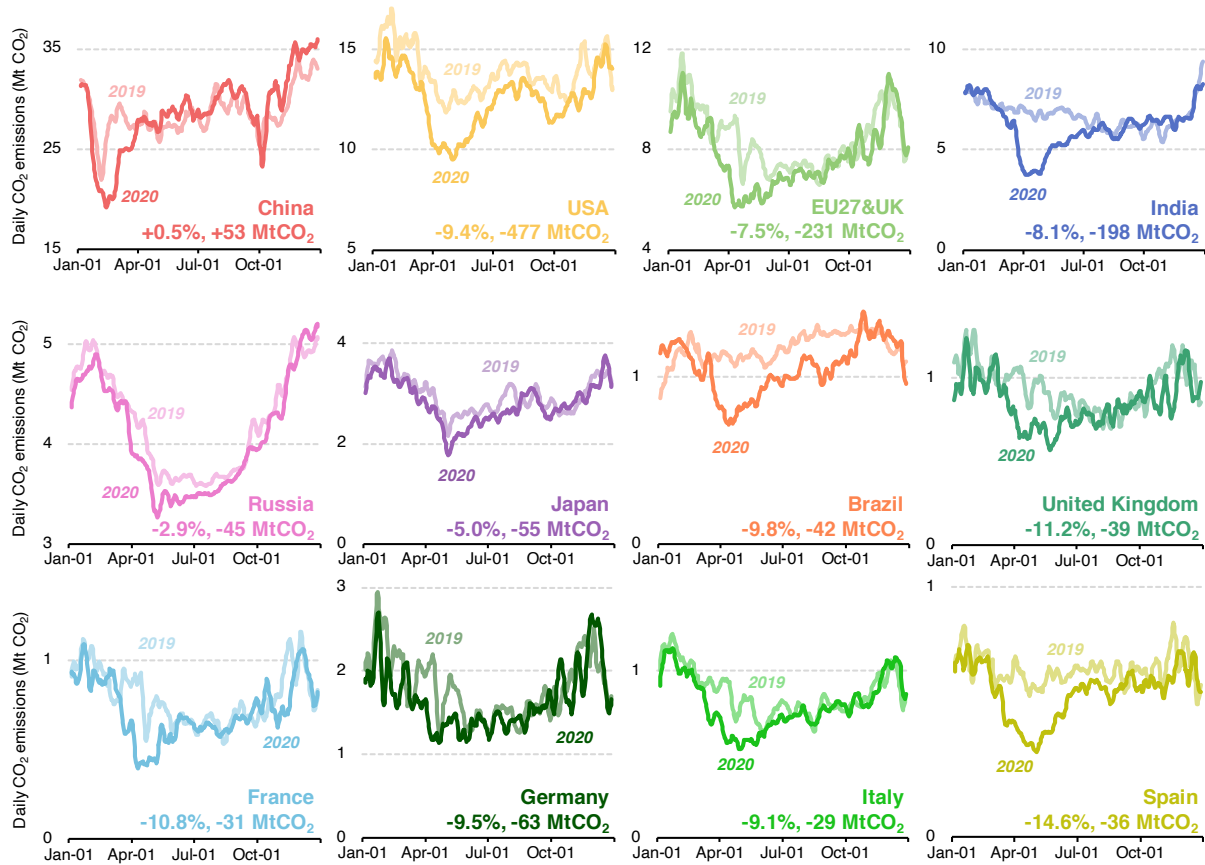
近百年以来全球炼油厂点源排放 (1600+)
Global refinery point source emissions
for nearly a century (1600+)

全球钢铁厂点源排放
16种冶炼工艺, 2万+点源
Global steel plant point source emissions
of 16 kinds of smelting processes
20,000+ points

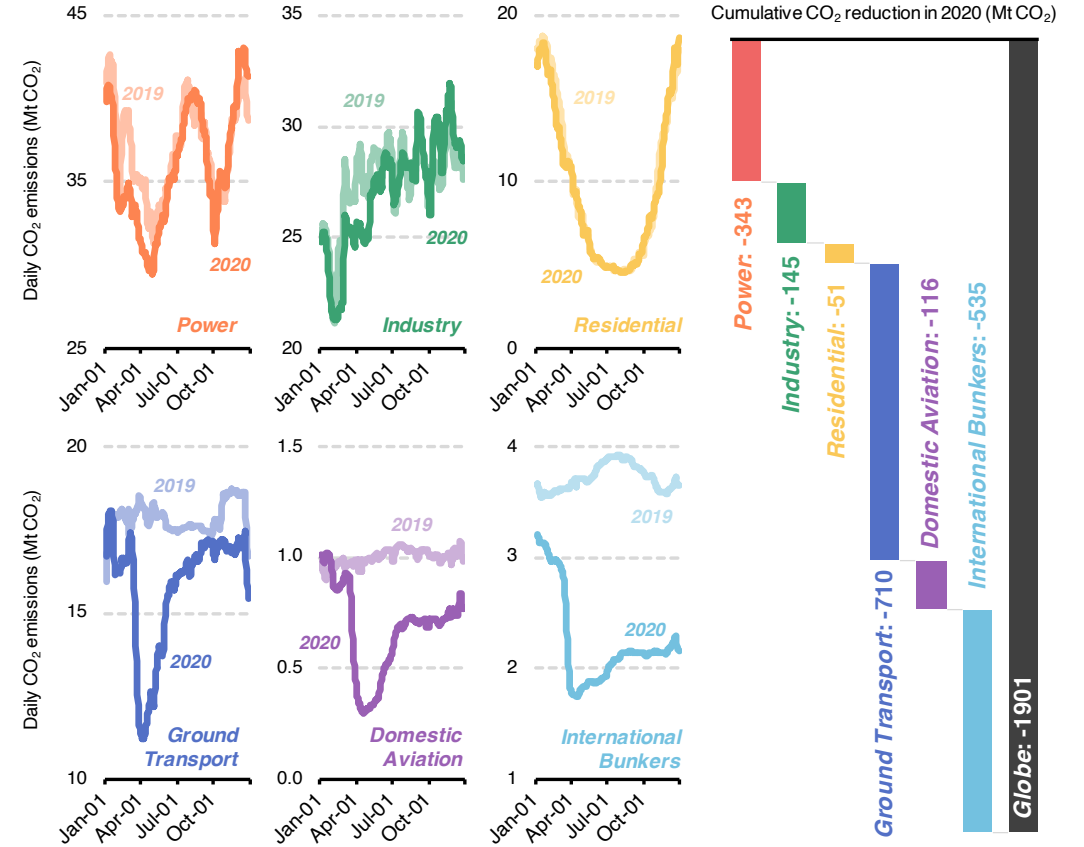
全球水泥厂点源排放
5000+点源
Global cement plants' emissions of
5000+ points

Near real-time carbon emission monitor

2019年和2020年主要排放体日度碳排放变化趋势



2019年和2020年各部门日度碳排放变化趋势



(刘竹等, 科学通报, 2020)



CEADs数据库国际影响力 International Influence

CEADs自2016年成立以来在国际上受到广泛认可，国际影响力不断提升，截至2022年6月提及或使用“中国碳核算数据库（CEADs）”的外文文献共计**296**篇，分别来自20余个国家的研究机构，且引用文献**逐年上升**，涉及物理学、工程技术、经济商贸等多个领域。

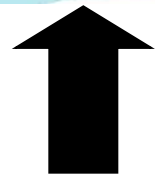
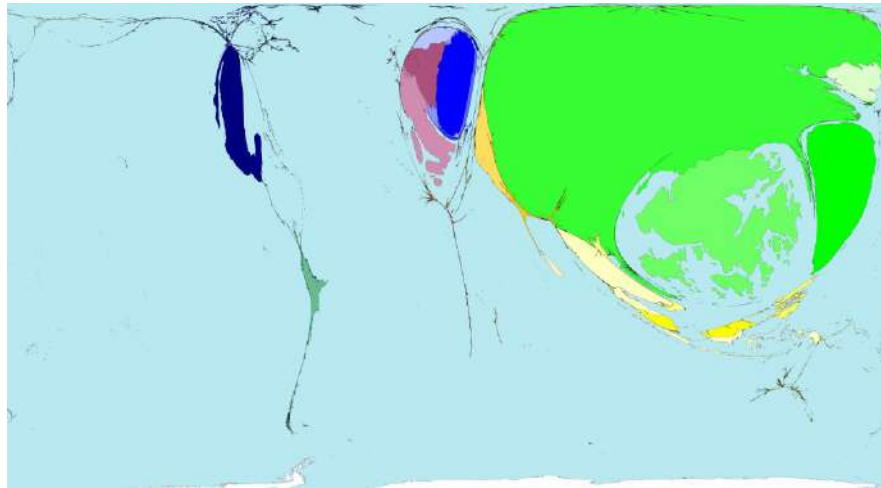
Since its establishment in 2016, CEADs has been widely recognized internationally, and its international influence has been increasing. **296** foreign-language documents mentioning or using "China Carbon Accounting Database (CEADs)" have been published by June 2022, respectively from research institutions in more than 20 countries, and the cited documents have been **increasing** year by year, covering many fields such as physics, engineering and technology, economic and trade.

数据库	全部年份被引量	2016以来被引量
中国碳核算数据库 (CEADs)	296	296
英国全球碳报告 (GCP)	383	287
美国国家CO ₂ 分析研究中心 (CDIAC)	709	302
欧盟环境署排放数据库 (EDGAR)	611	451
各数据库全字条检索被引量		

全部年份被引量	2016以来被引量
260	260
198	159
300	177
177	133
在“Carbon Emission”相关研究中被引量	

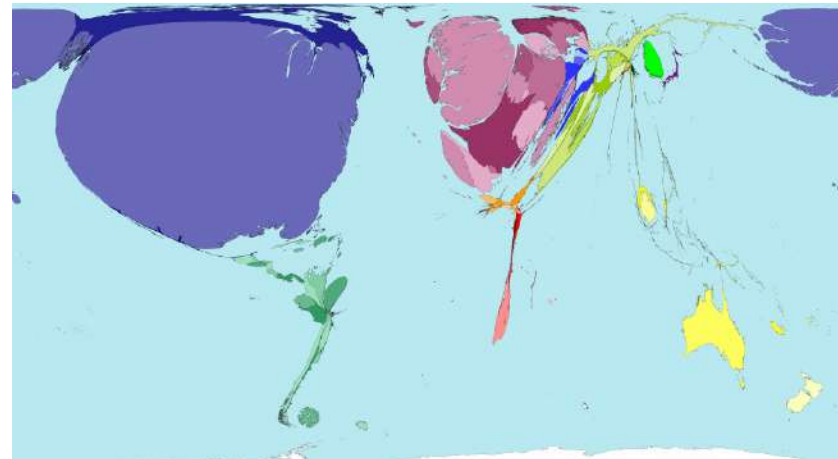
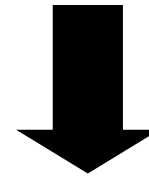
From production to consumption approach

Two sides of the same coin



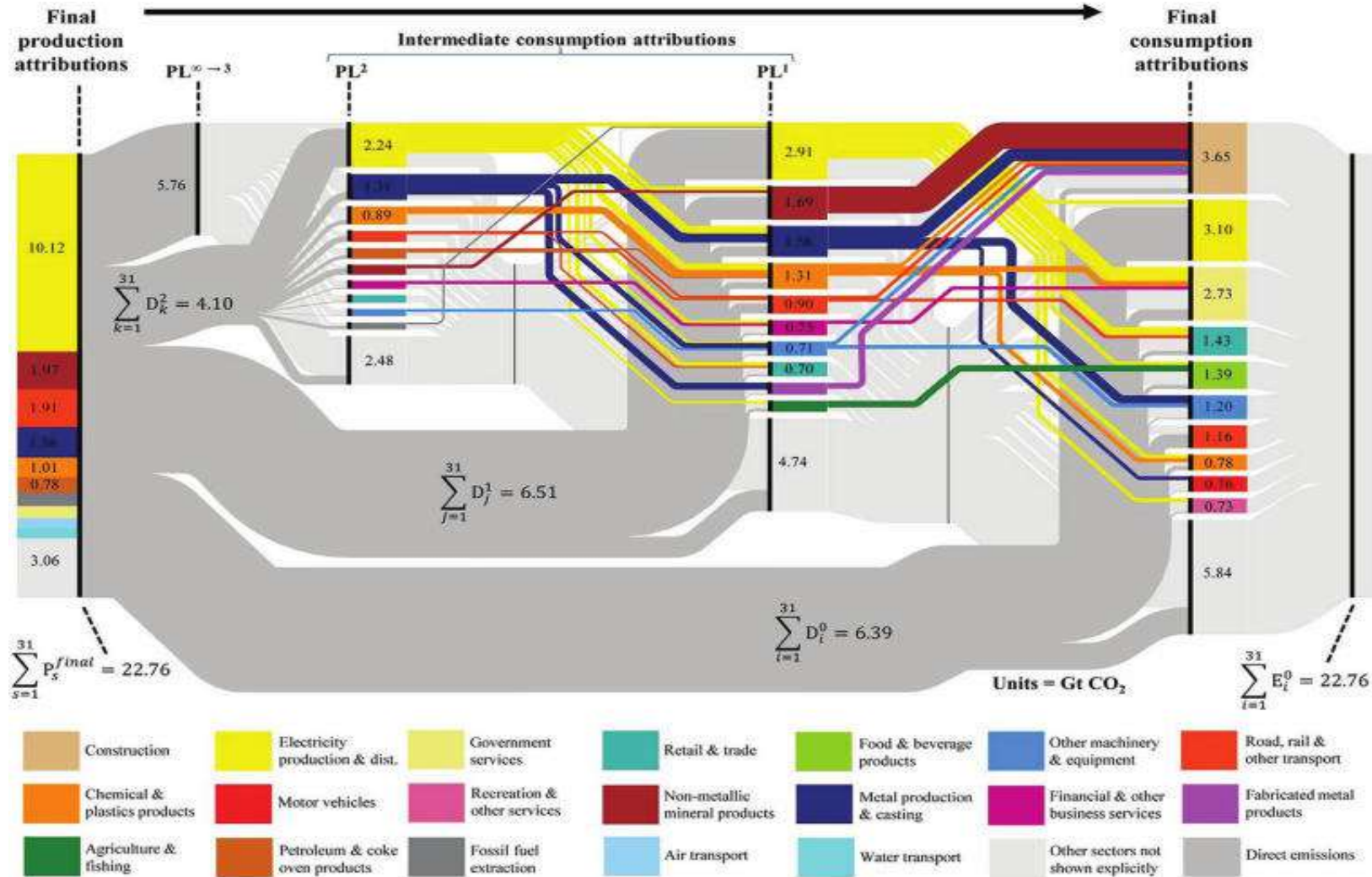
World toy production

World toy consumption



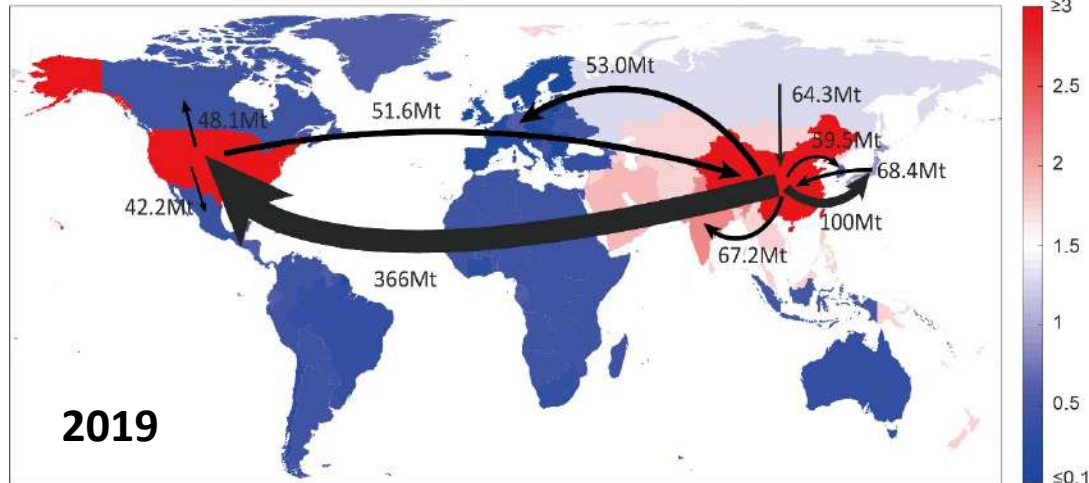


From production to consumption approach

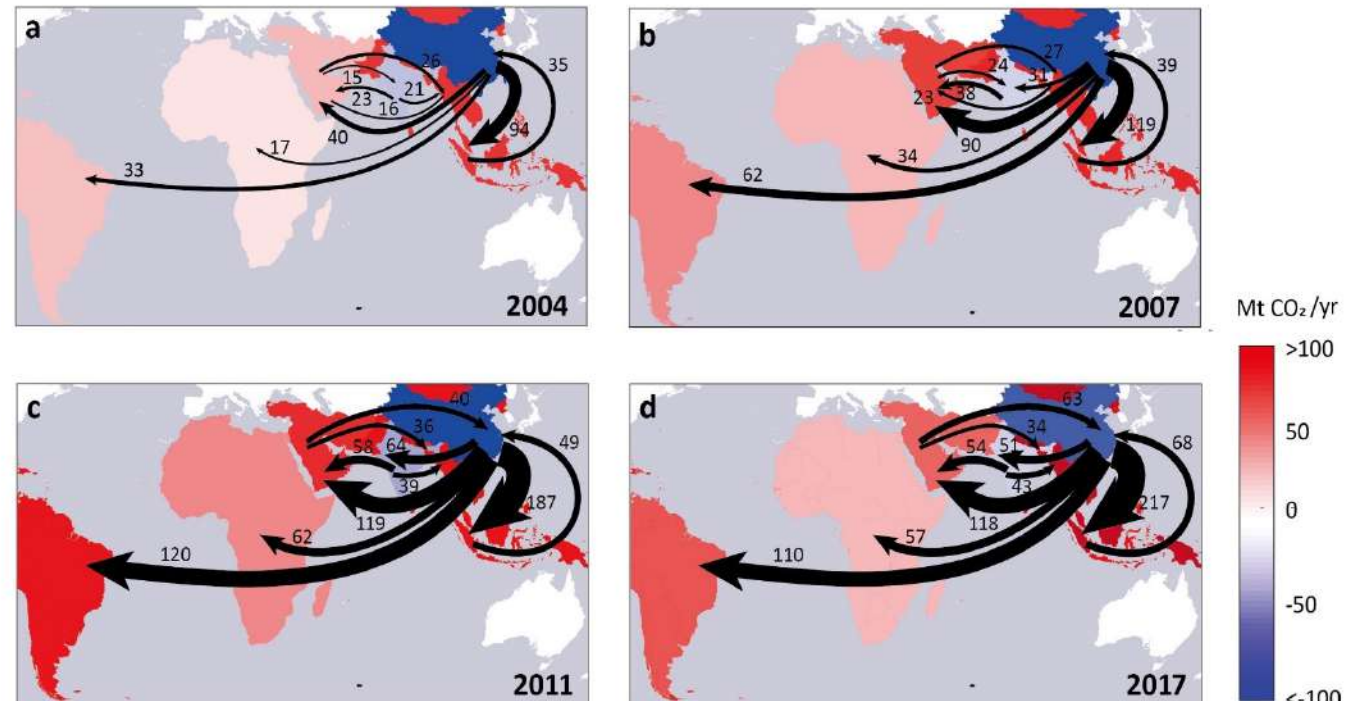


Embodied carbon emissions in global trade

The carbon emissions generated in developing countries during the production of products finally consumed in the developed countries can be seen as **a transfer of carbon emissions** from developed countries to developing ones. This **'embodied carbon emission'** is of great interest as it relates to the international responsibility for carbon reduction.

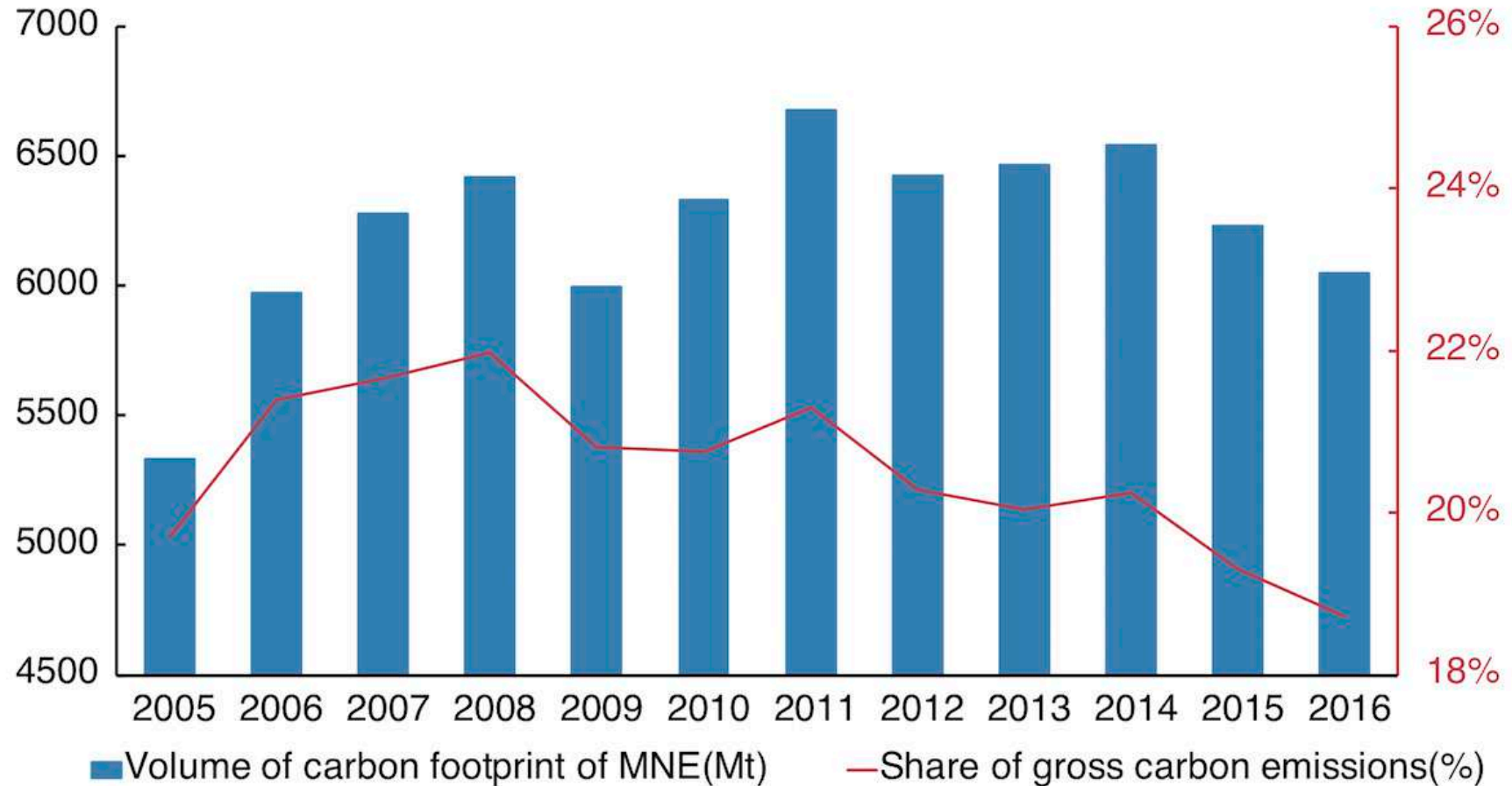


Top 10 global emission flows. Western countries are the main consumers for Chinese exports, with the **US** consumption resulting in **366Mt** of embodied carbon emissions in China's production for exports.



Emissions embodied in trade between **Global South** has increased 3 times from 0.47 Gt in 2004 to 1.5 Gt in 2017

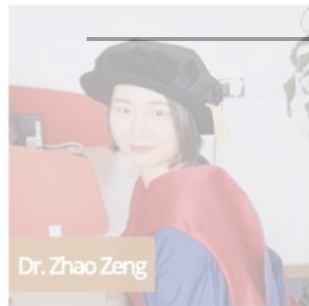
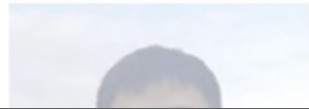
The global supply chains of multinational companies are responsible for nearly a fifth of global CO₂ emissions



Source: Embodied carbon emissions in the supply chains of multinational enterprises, *Nature Climate Change*, 2020

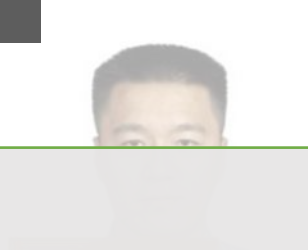
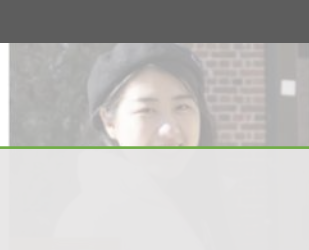
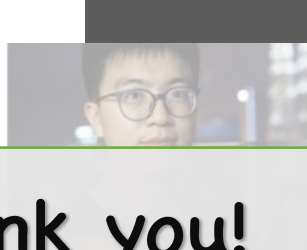
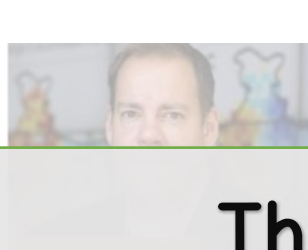
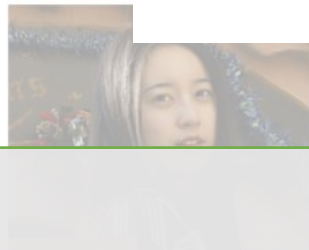


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