Impacts of Climate Risks on Digital Economy

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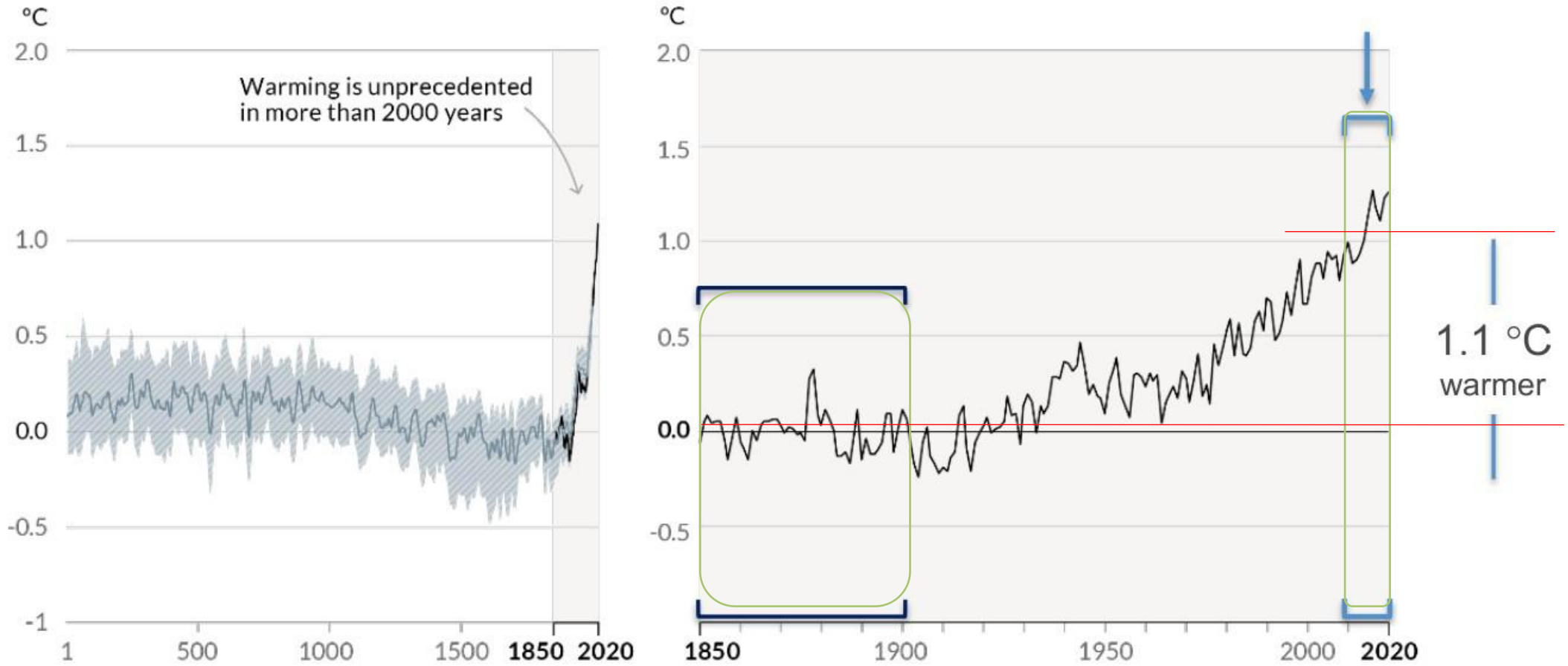
Nov. 25, 2021

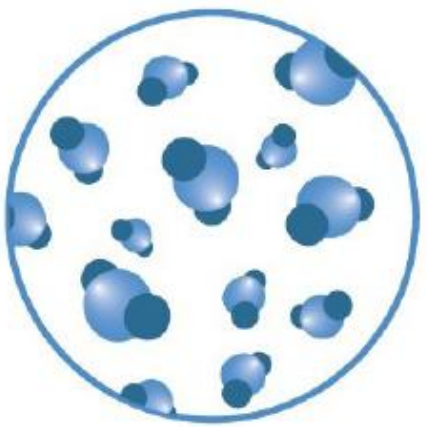
- **What Are the Climate Risks?**
- **What Mean for Digital Economy?**

Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years

Changes in global surface temperature relative to 1850-1900



CO_2 concentration



Highest

in at least

2 million years

Sea level rise

Fastest rates

in at least

3000 years

Arctic sea ice area

Lowest level

in at least

1000 years

Glaciers retreat

Unprecedented

in at least

2000 years

Significant Impacts of Climate Change

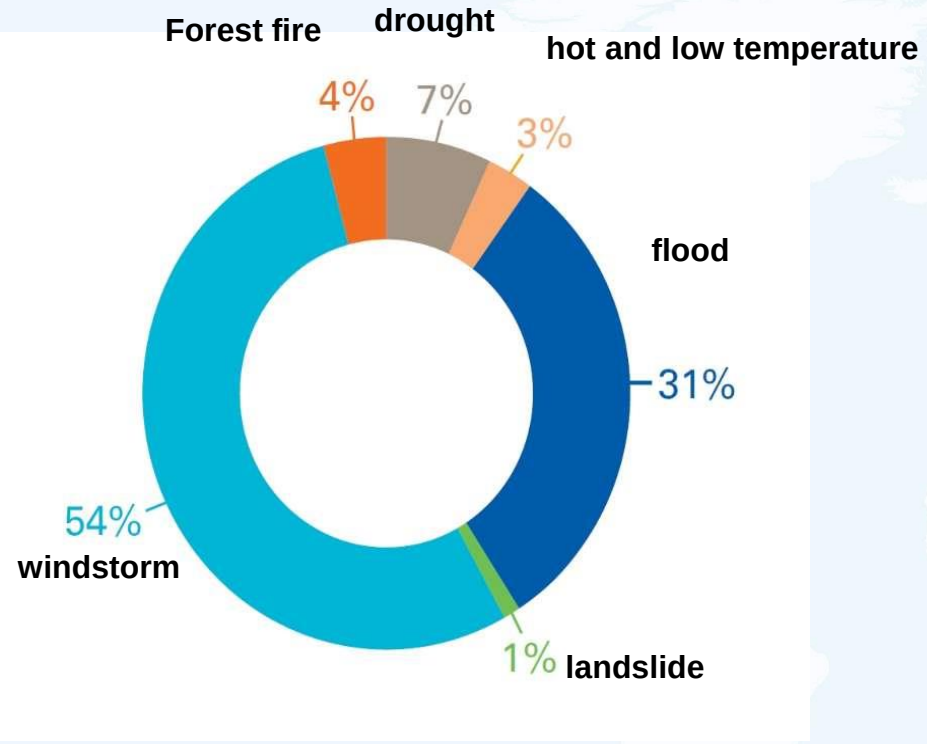
Climate Change
Temperature
Precipitation
Sea Level Rise
……

Trade，Market fluctuations，Social instability

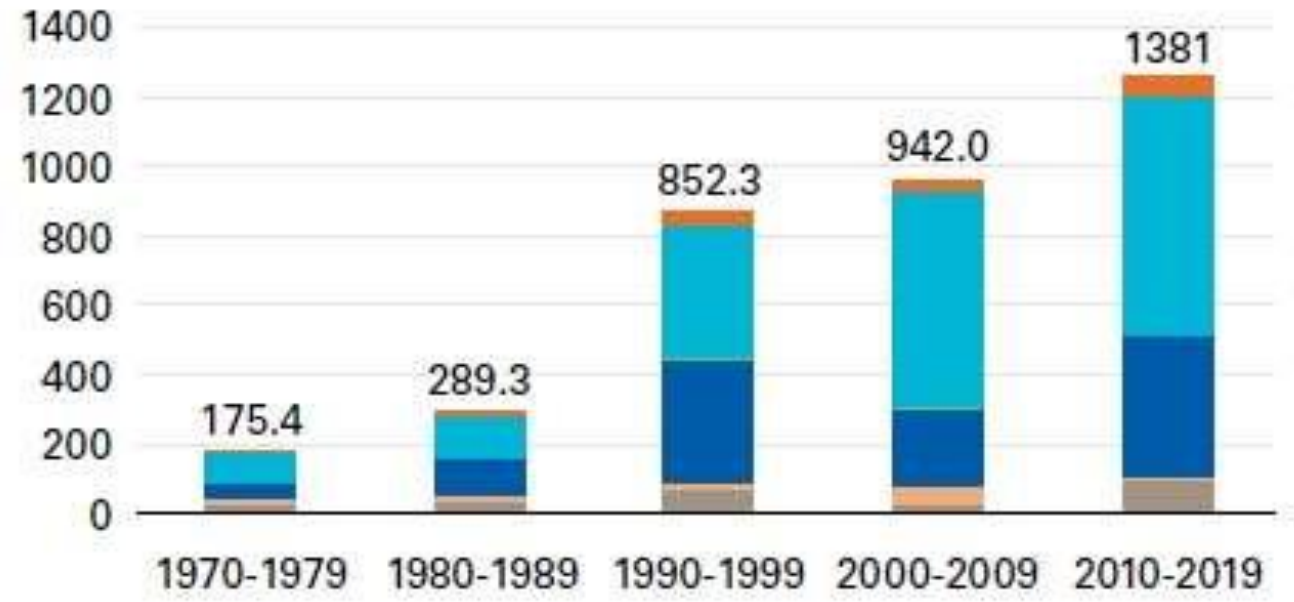
Possible Impacts
Natural disaster Frequency, Intensity Geographical distribution
Agriculture Crop yield and quality
Water Resources Water quantity, quality Water competition
Coastal Zone Coastal erosion Inundation of coastal land Cost of coastal urban and rural protection
Ecological system Species and habitats loss, degradation and fragmentation
Health Disease, death, infection




Meteorological Disasters Increased Significantly in Past 50 Years



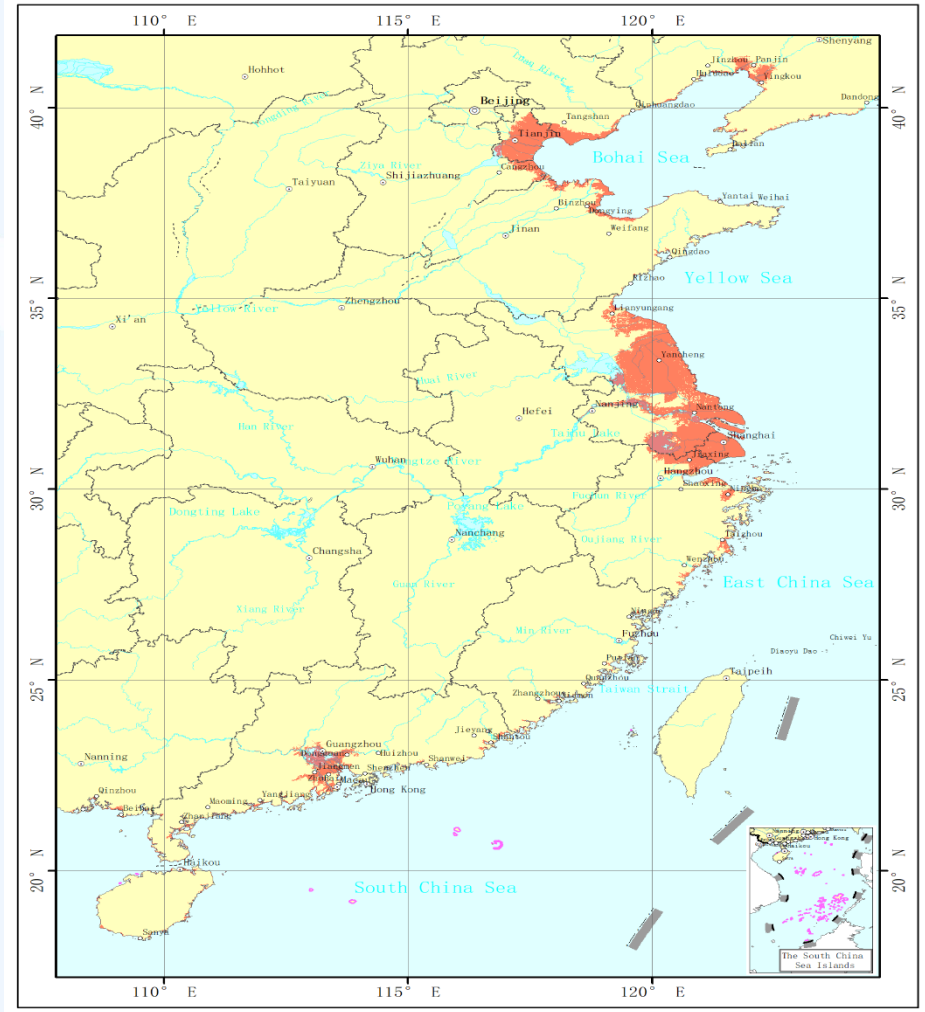
Composition of economic losses caused by natural disasters

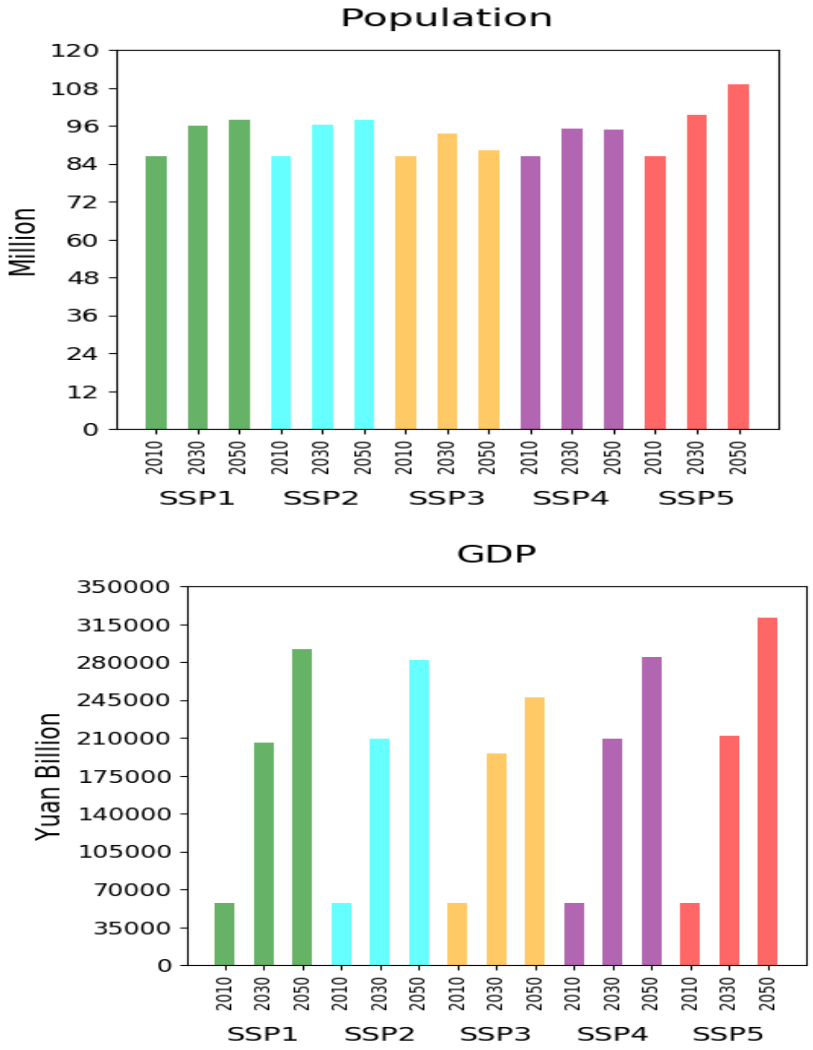


Economic losses caused by natural disasters (Unit: US $billion)

(WMO, 2021)

Sea Level Rising and Coastal Flooding



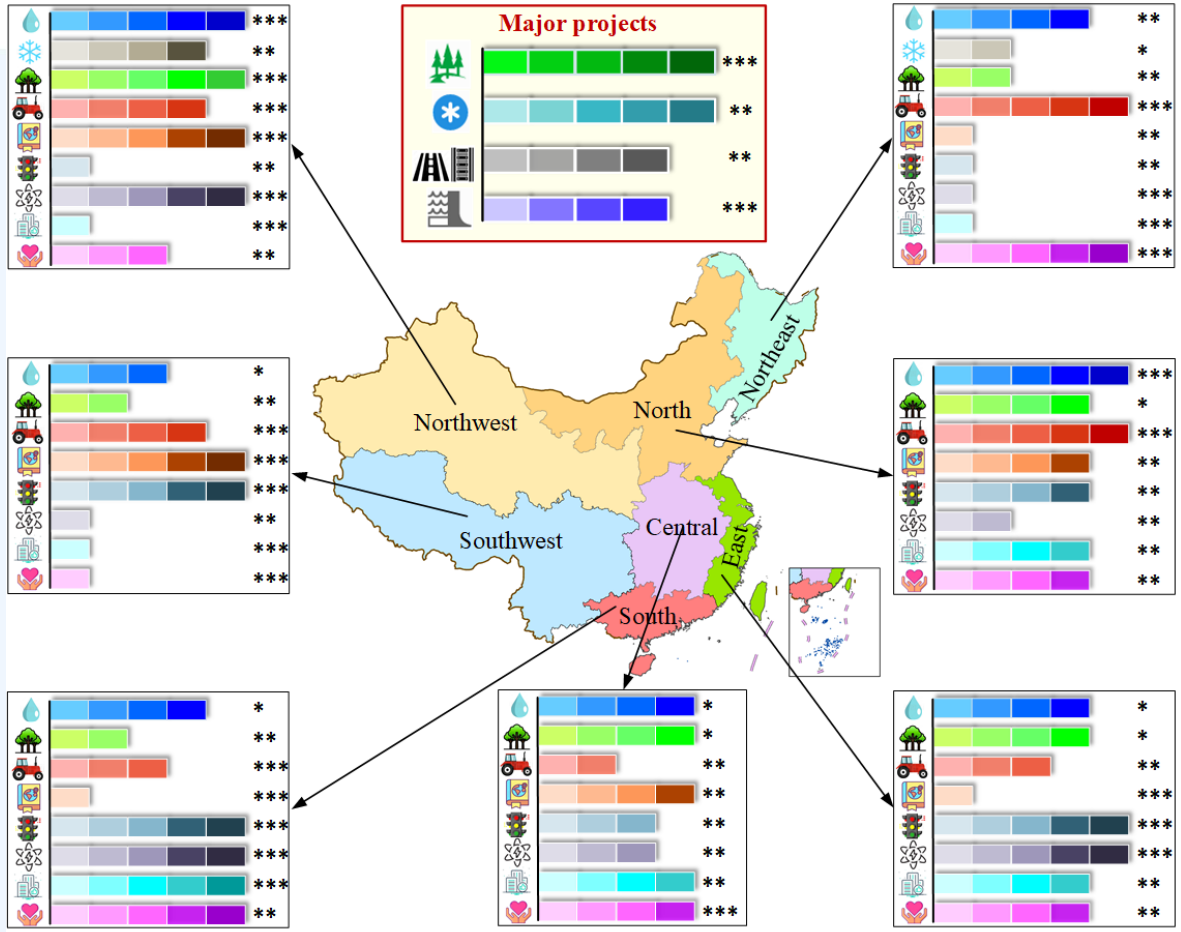


Area exposed to 100-year flood in 2050, with high emissions (sea level rise approximately 25cm)

Population and GDP within the 100-year coastal flood level: high emissions

(Chao et al, 2018)

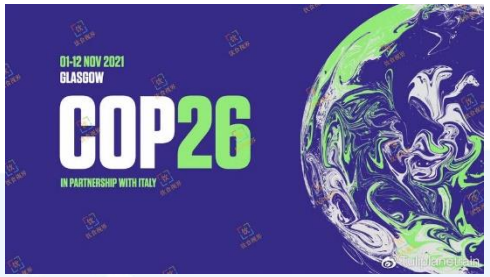
Climate Change Risk over China



- **Northwest:** water resources, ecosystem, cryosphere
- **North China:** agriculture, water resources
- **East and South China:** transportation, energy
- **Major Engineering Projects:** Ecological and frozen soil engineering; road/railway engineering and water conservancy engineering

（Feng and Chao. 2020）

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11



Article 2

1. This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:

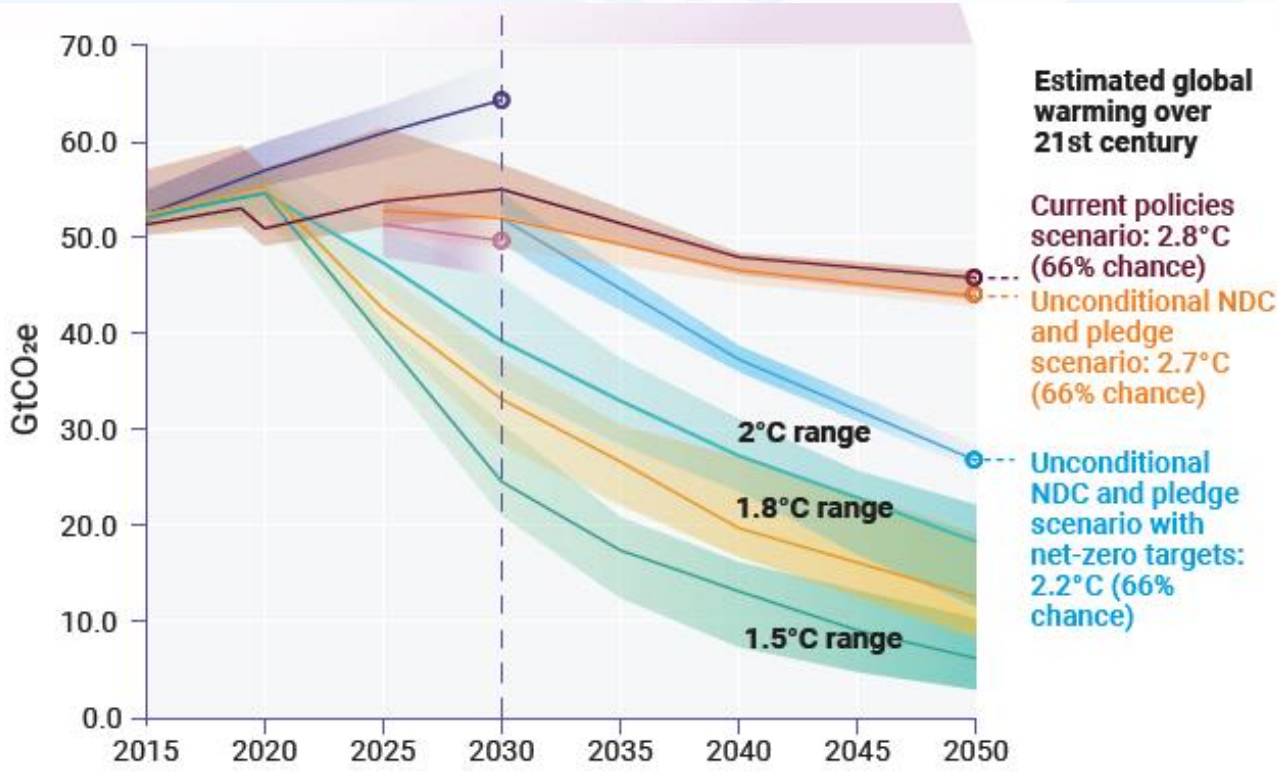
(a) Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;

(b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; and

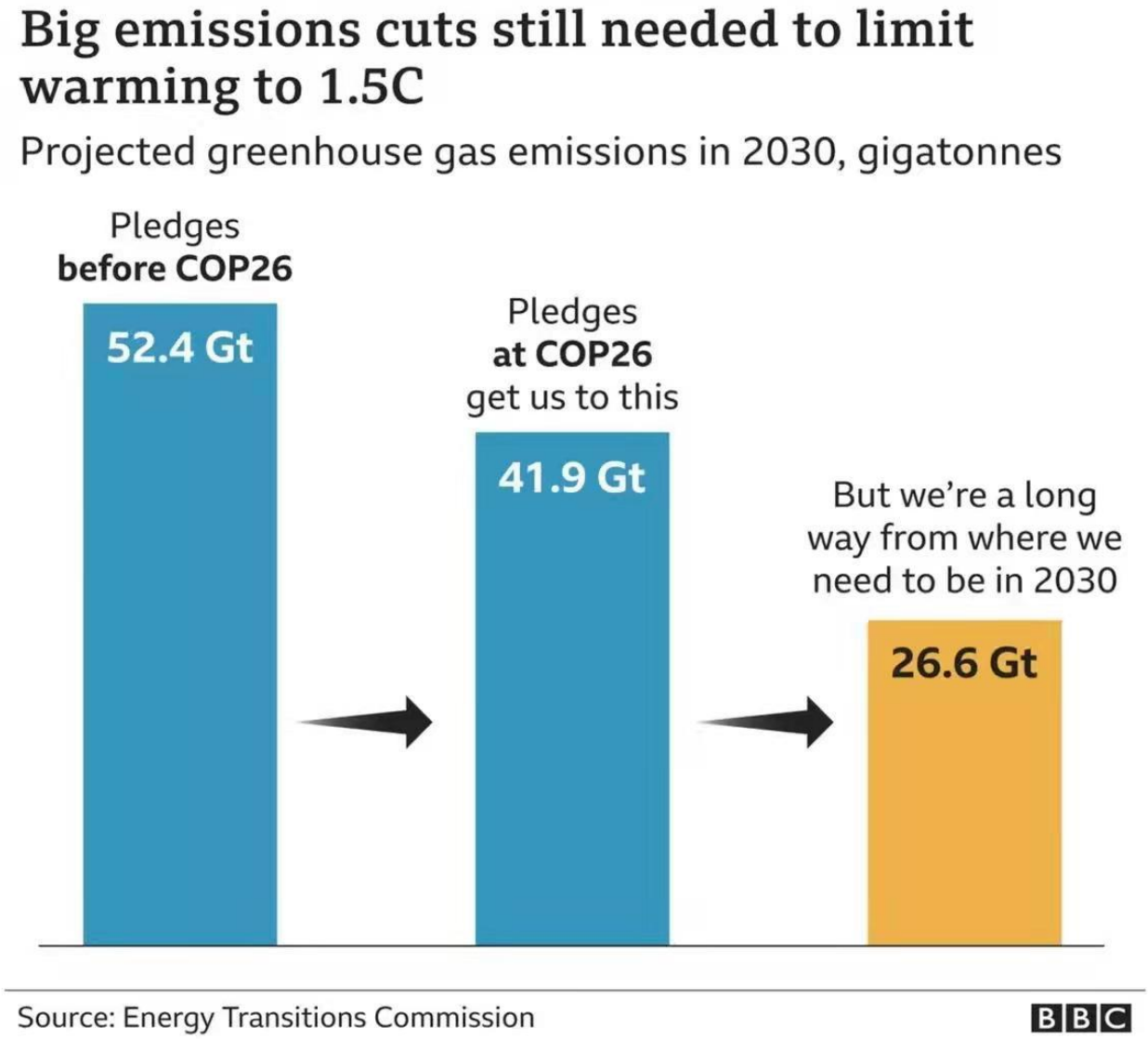
(c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.

- **Science and urgency**
- **Adaptation**
- **Adaptation finance**
- **Mitigation**
- **Finance, technology transfer and capacity-building for mitigation and adaptation**
- **Loss and damage**
- **Implementation**
- **Collaboration**

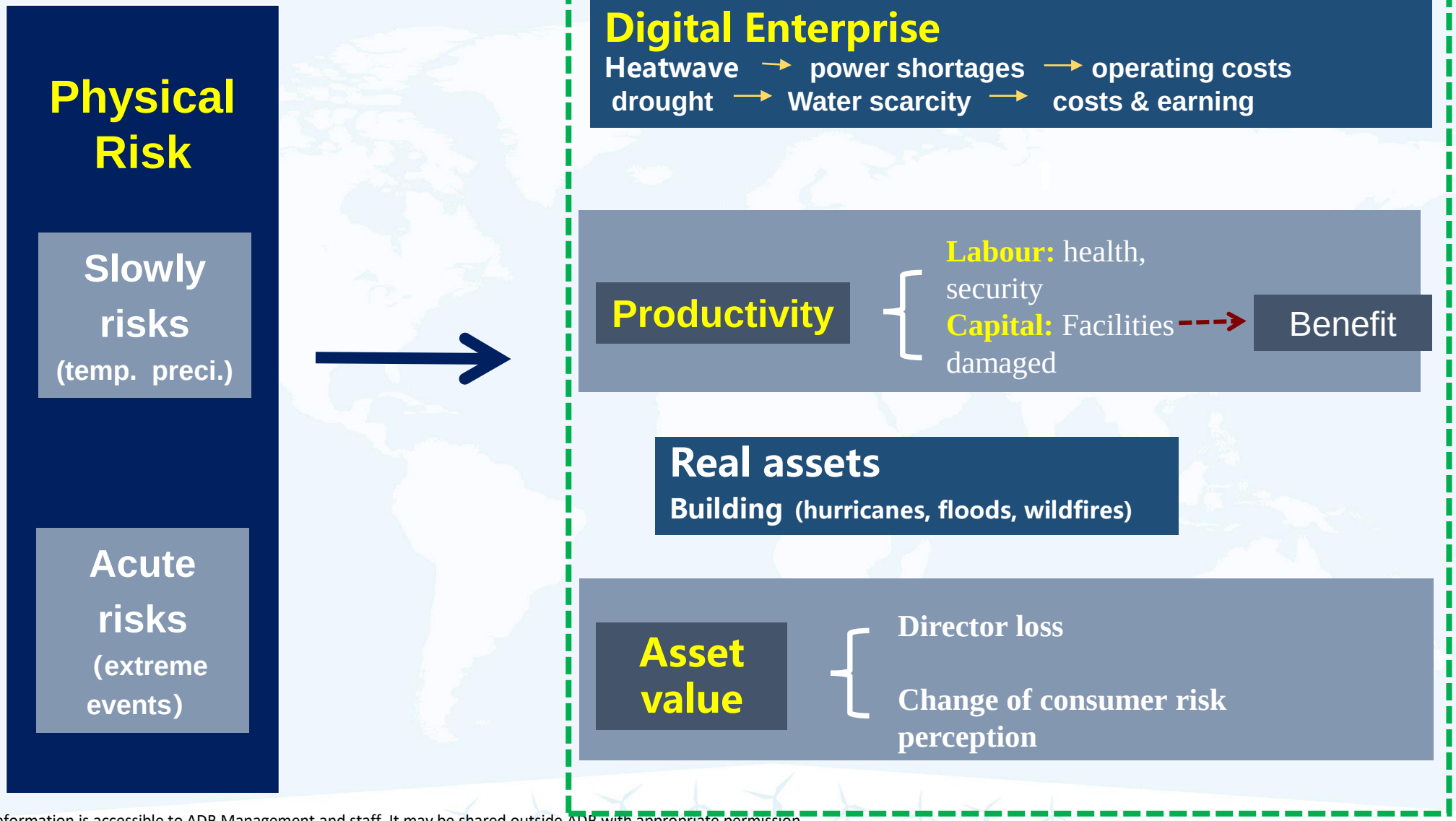
Adaptation and Mitigation Are Both Necessary



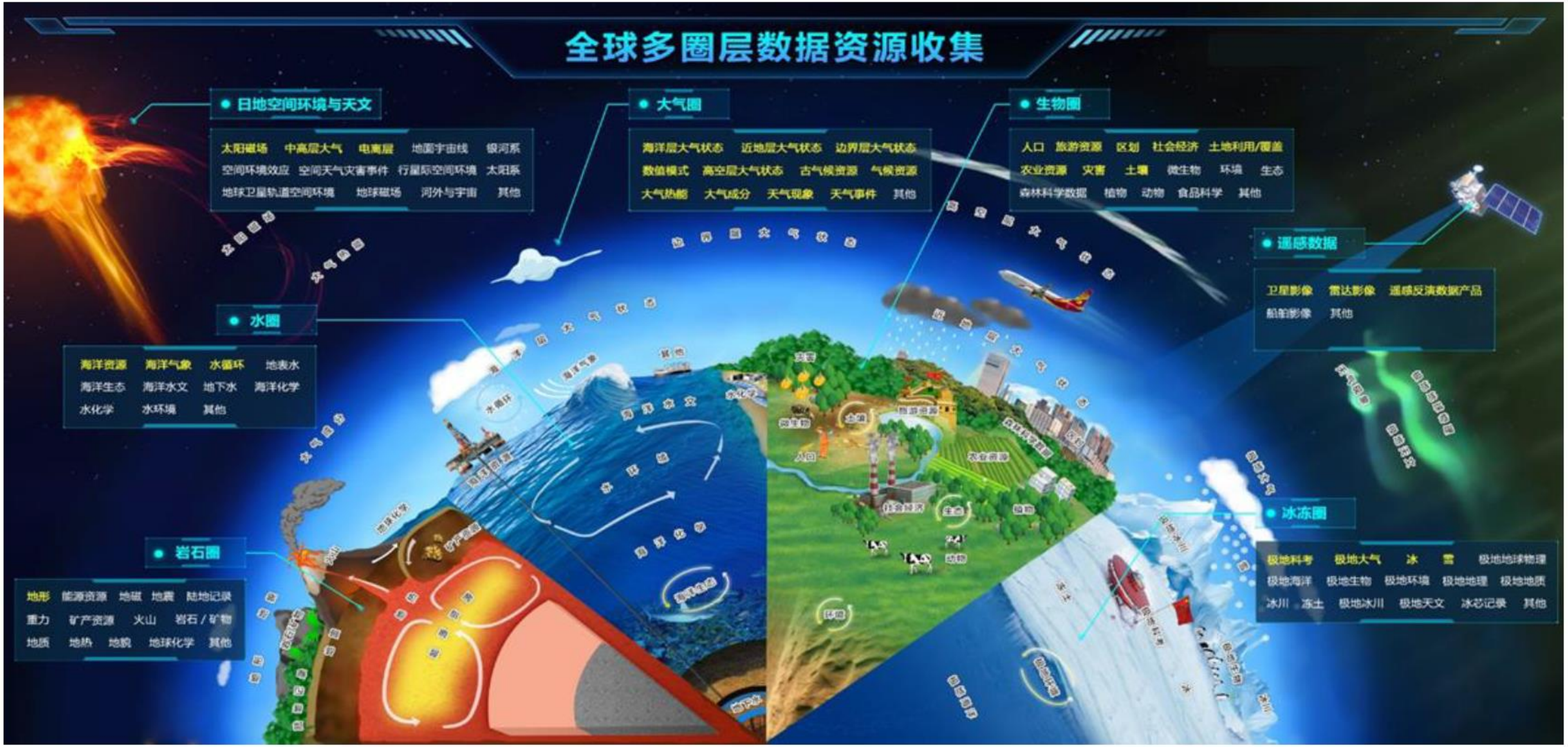
（UNEP， 2021）



Climate Physical Risks to Digital Industries



Scientific Data Systems for Earth Systems



Develop Objectified Disaster Risk Assessment Models and Products

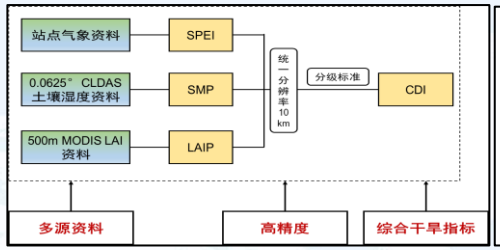
Index Model

Precise monitoring

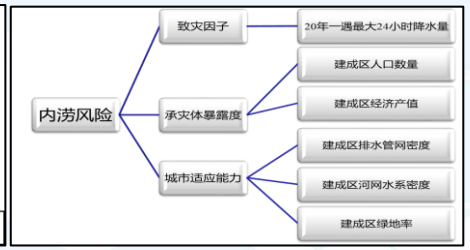
Accurate prediction

Fine service

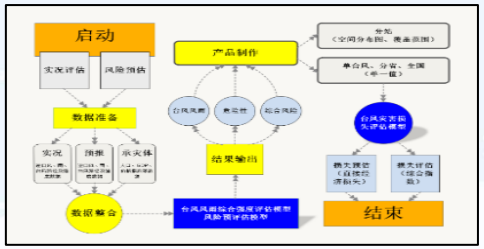
干旱指标研发



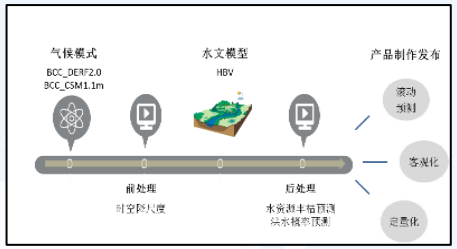
城市内涝模型研发



台风（预）评估模型研发

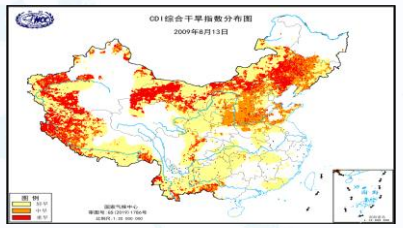


洪水风险模型研发

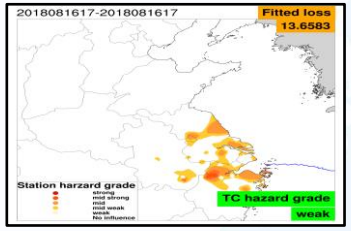


大数据应用中心监控大屏

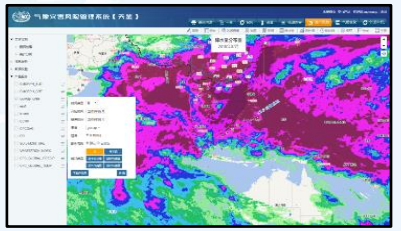
公里级干旱监测



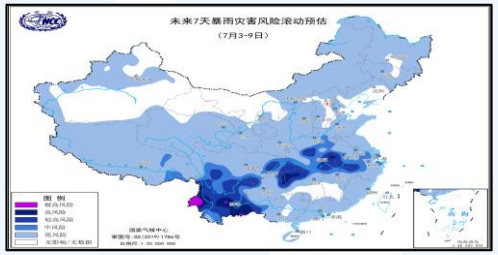
小时级台风危险性监测



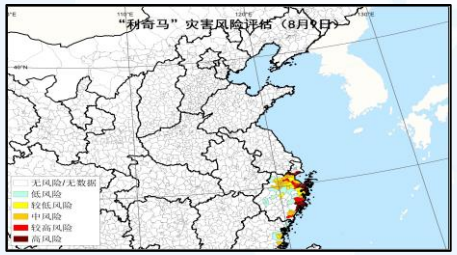
精细化亚太极端降水监测



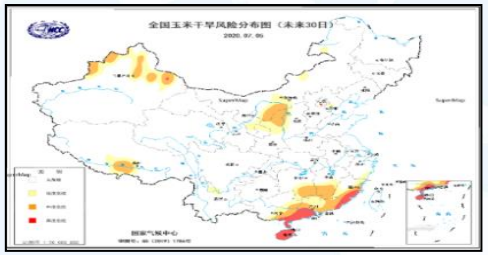
未来7天暴雨灾害风险滚动预评估



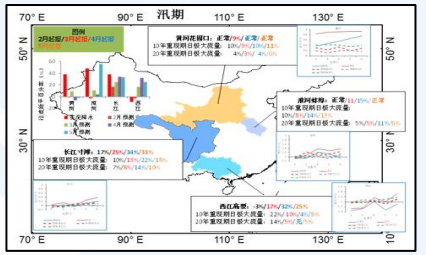
台风灾害风险滚动预评估

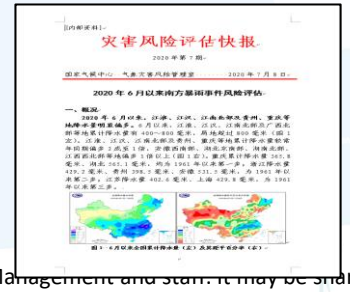


未来30日玉米干旱风险

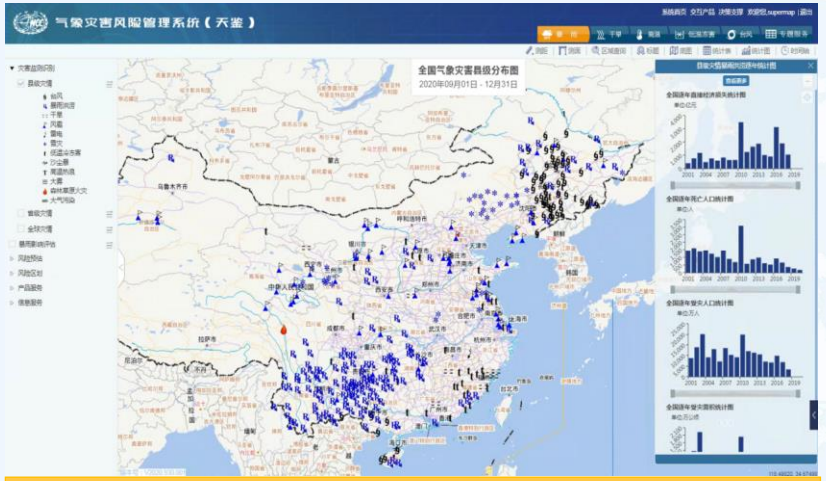


2020年径流丰枯情势预估

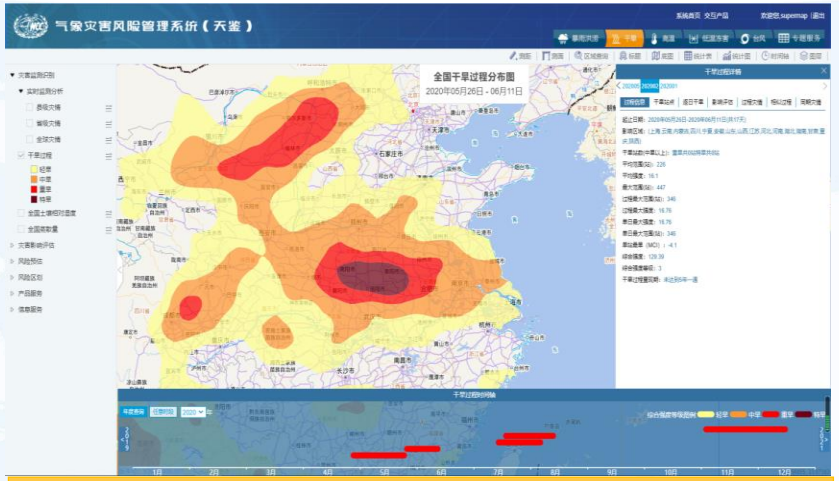




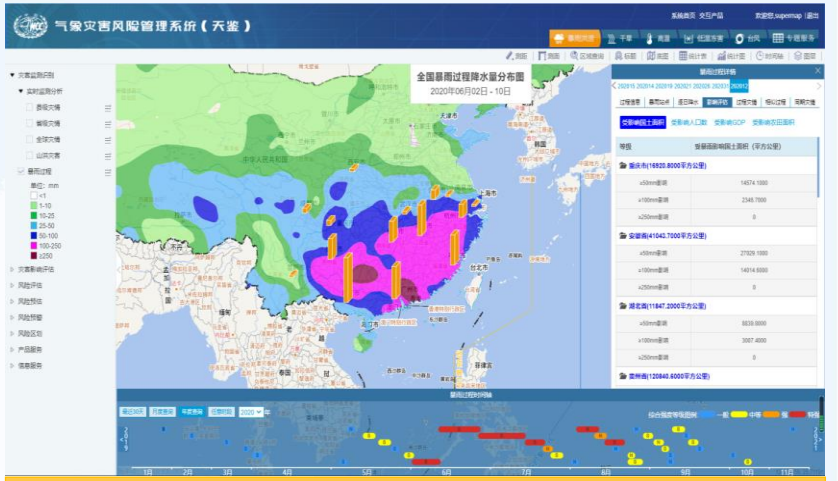
Climate Risk Operation Platform



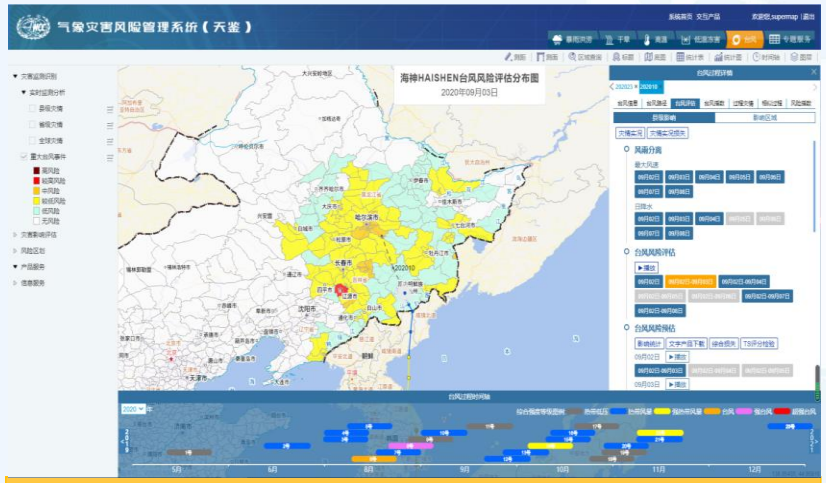
Montoring for disaster



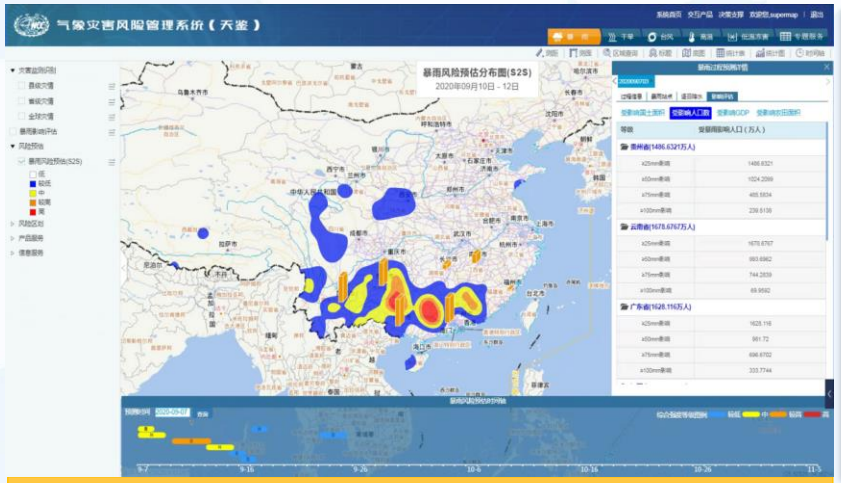
Disaster event identification



Impact assessment



Risk assessment



Risk prediction

Risk zoning

Digital Technology Play a Bigger Role in Disaster Risk Prediction Future

Intelligent Monitoring and Forecasting System for Seamless Severe Convection

Montor（-2~0h）

thunderstorms（2015）

Thunderstorm gale（2017）

Radar echo retrieval from satellite

（2018）

forecast（0~2h）

Multisource data fusion for severe convection near prediction

（2019-2021）

Forecast（2~6h）

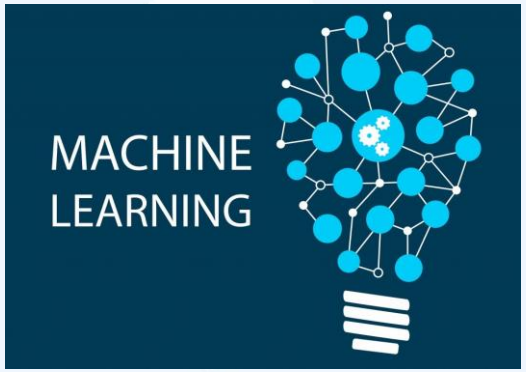
Multi-source observational data and mesoscale model fusion（2020-2021）

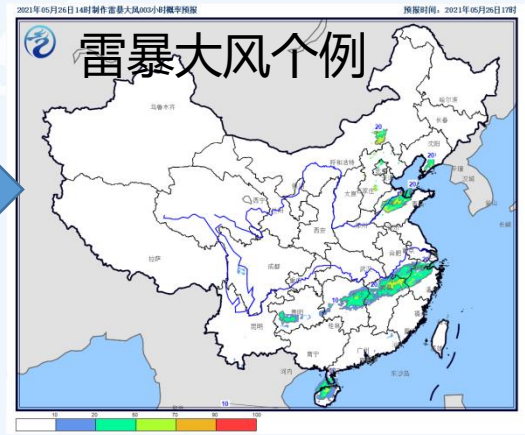
Forecast（6~72h）

Potential Prediction of strong convective（2017）

Multiscale model fusion for severe convection prediction （2021）

Mesoscale numerical model



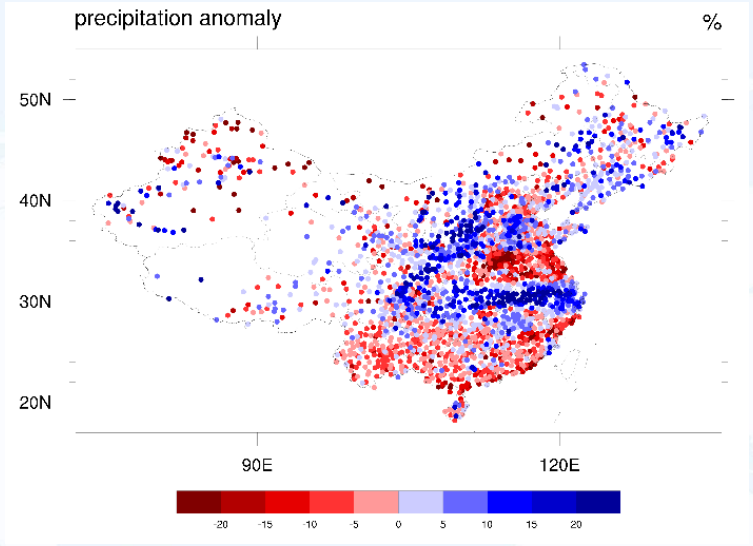


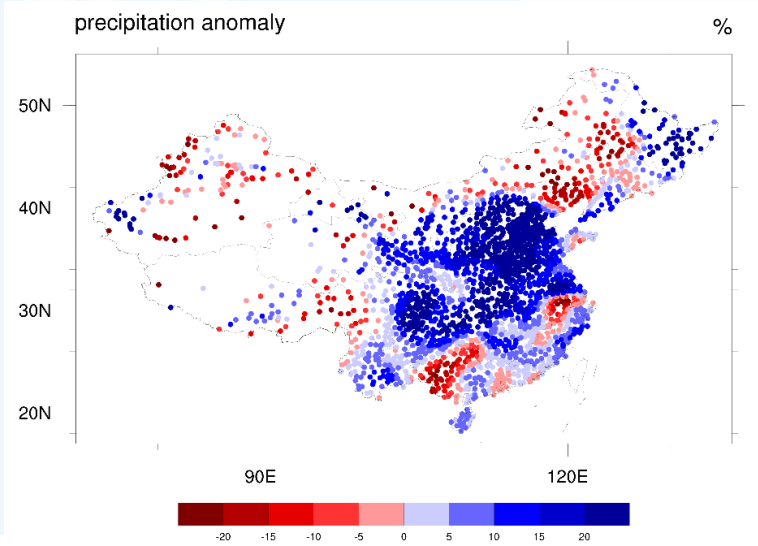
(Zhou Kanghui and Wang Chao provided)

Machine Learning

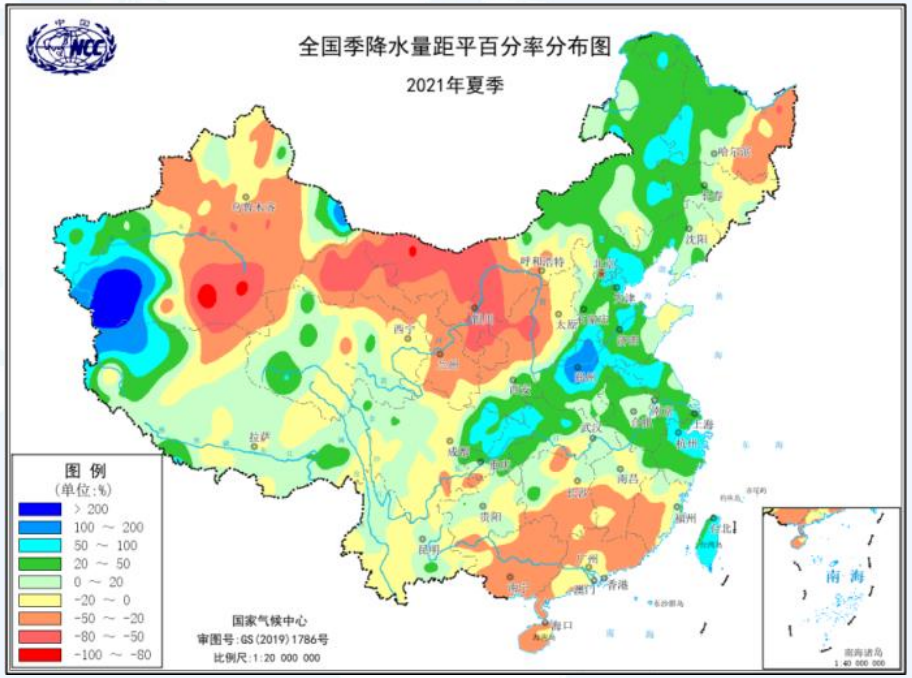
Historical forecast data by 6 organizations

BCC、CFS、TCC、ECMWF、GLOSEA5



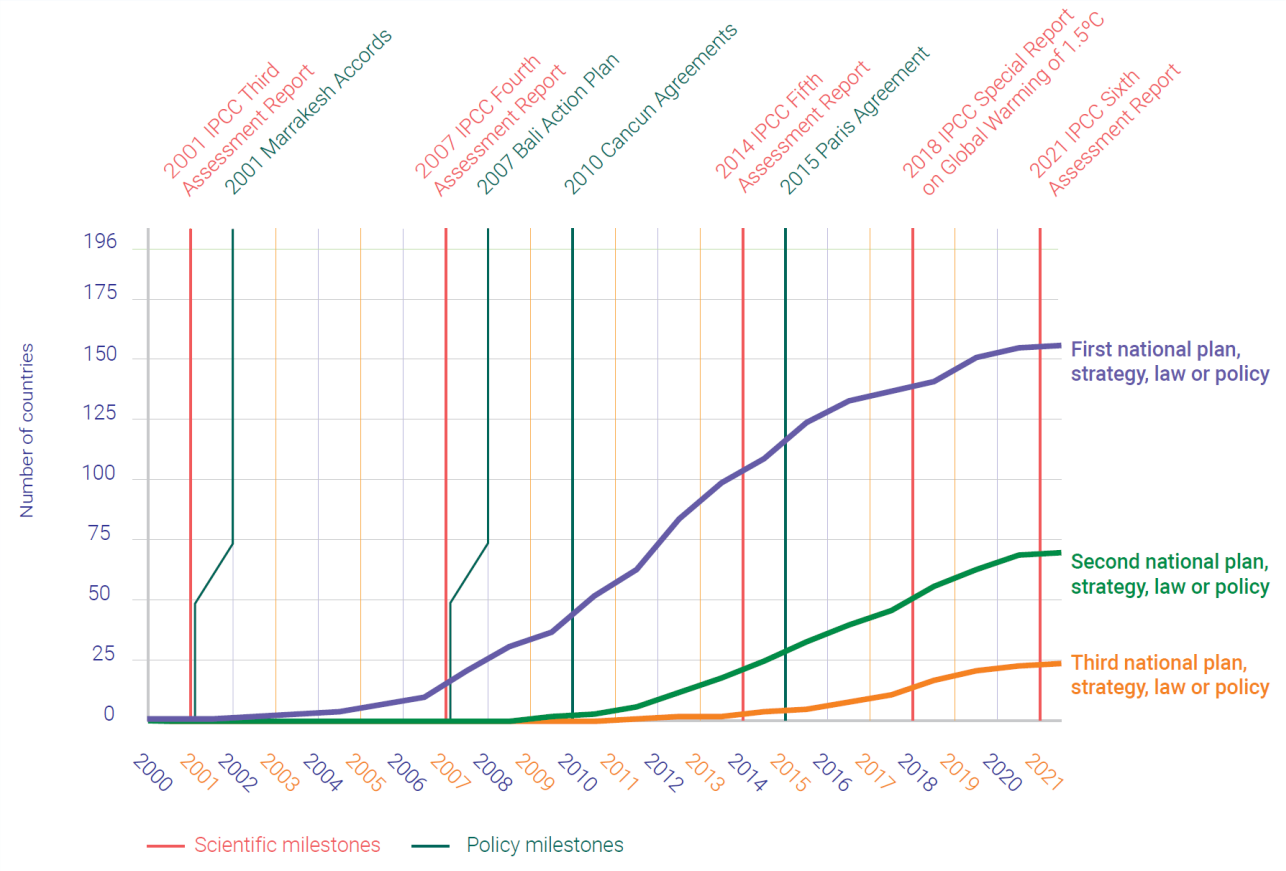


Observed



Reduce Climate Risks and Improve Resilience

- Empower Individuals and Communities to build Climate Resilience
- Build readiness to respond to increases in climate-driven emergencies
- Incorporate foresight and climate science into strategy, policy, programs, and budgets
- Invest in a sustainable and resilient society



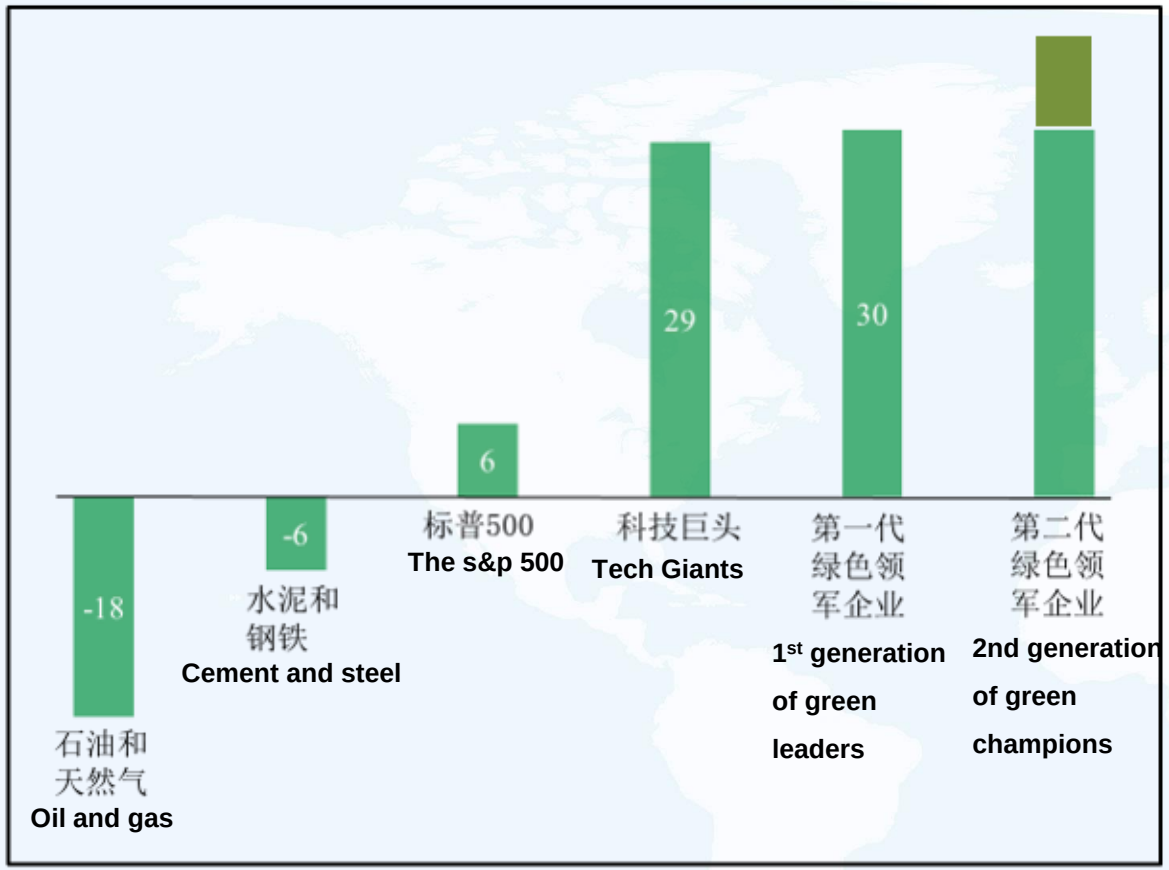
(UNEP 2021)

Social Transformation brings Opportunities

Transition Risks

- Policies and Laws
- Technology
- Market
- Reputation

1. Cost of emission reduction
   - Carbon tax, carbon market…
2. Cost of indirect emission reduction
   - Direct cost of emission reduction is passed on, and carbon-intensive energy prices rise
3. Capital expenditure for low carbon
   - Capital investment for low-carbon transition
4. Income Change
   - Costs push up prices, prompting consumers to adjust their demand



2017年10月-2020年10月股东总回报率（%）（波士顿咨询公司）

Return to shareholders between Oct 2017 and Oct 2020 (%)

(Boston Consulting Group)

Technology Giants： Amazon、Apple、Facebook、Google

1st Generation of "Green Leaders" :

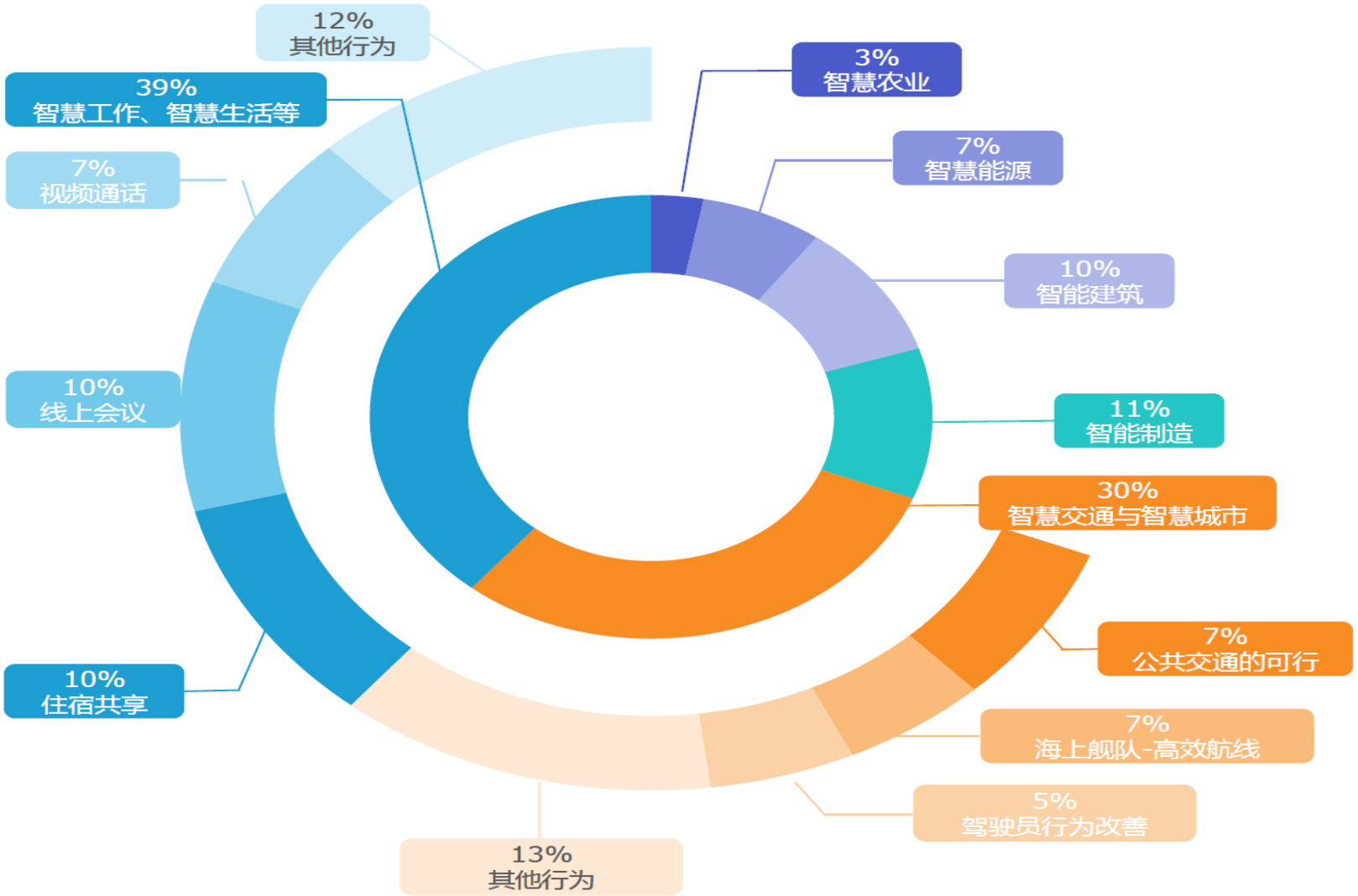
Enel of Italy, Eveldrola of Spain, Nextel Oil Group of Finland, New Era Energy of the United States, etc

2nd Generation Green Champions:

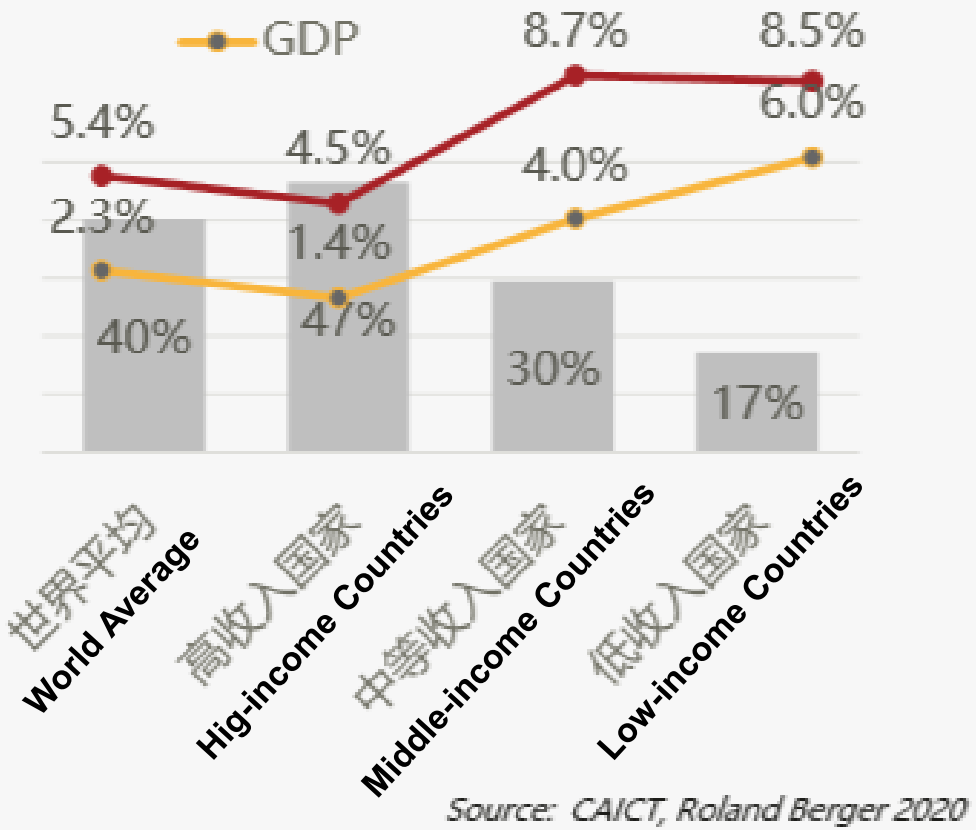
Beyond Meat, Tesla

Technology Companies Make Important Contribution to Carbon Neutrality

亿欧智库： Proportion of carbon emissions avoided by IT technologies in 2018



Digitalization has become the engine of economic growth



China

Report on CPC 19th Session

… Promote further integration of the internet, big data, and artificial intelligence with the real economy, and foster new growth areas and drivers of growth in medium-high end consumption, innovation-driven development, the green and low-carbon economy, the sharing economy, modern supply chains, and human capital services.

"1+N" Policy on Carbon Peak and Neutrality

…Accelerate low-carbon technological innovation and digital transformation in the industrial sector…

…Drive integrated development of digital, smart, and green technology in the industrial domain …

Digital Economy Enables Adaptation and Mitigation Strategy Implementation

- Disaster monitoring, early warning and risk management
- Natural ecological domain
- Economic and social field
- Regional patterns of adaptation to climate change
- Adaptation in major national strategic region

Idea transformation

Technological pathway

Development Mechanism

Carbon Peak

Carbon Neutrality