



ENERGY FOUNDATION

能源基金会

Catalyzing Subnational Action to Accelerate China's Transition to Carbon Neutrality

23 March 2022

This strategy was presented to EF China board in Mar 2022, and subjects to regular updates.

Contents



Roles, opportunities, and challenges of subnationals in achieving China's climate targets

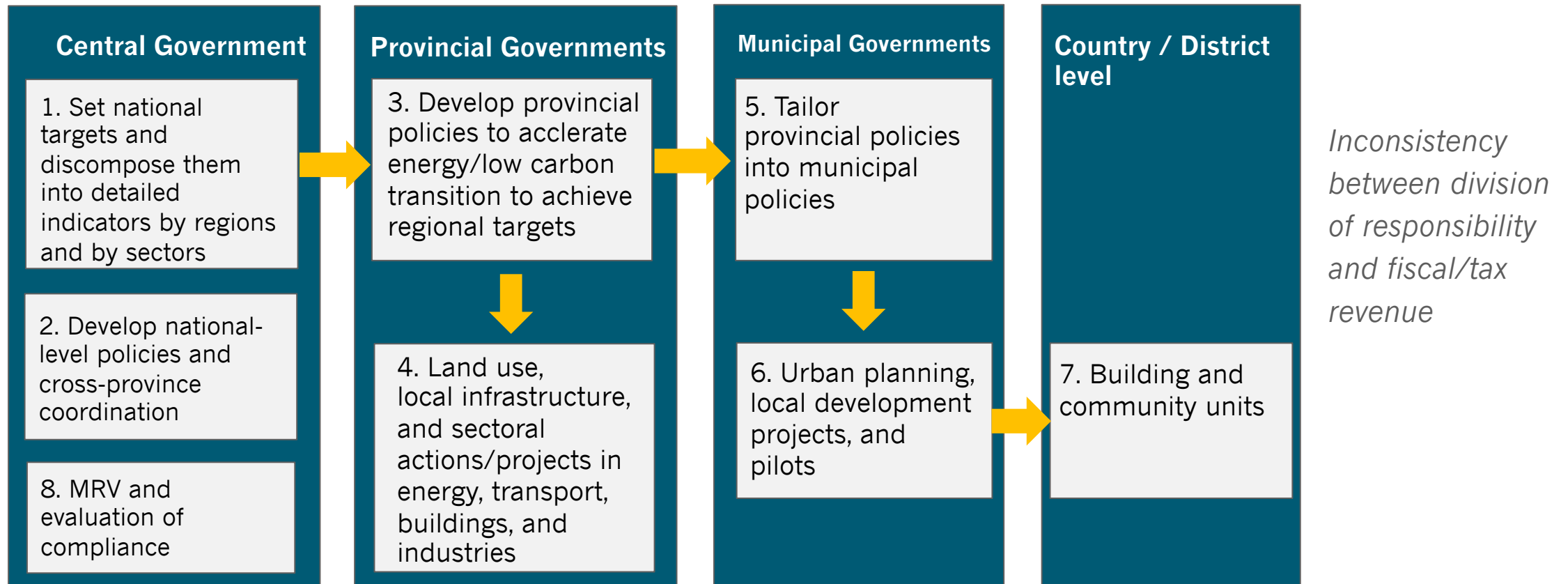
Mapping, understanding, and prioritizing local needs: Where and What

Vision, objectives, and key initiatives

Existing efforts & funding needs

Division of responsibilities

Local governments respond to the **top-down** requirements of the central government on **energy/climate/environment** with tailored regional plans.



The implementation of cross-regional affairs (environment, energy...) requires two-way interaction between central and local governments.

Implementing national climate targets

Carbon neutrality in the subnational context

China: Peak emissions before 2030, achieve carbon neutrality before 2060



Local governments: Implementer/Practitioner/Pioneer/Innovator

Develop and implement local mitigation policies in line with local development needs

Peaking targets

- **Target allocation**
- Beijing: peaked by 2012; Shanghai: peak emissions by 2025;
- ...

Action plans and policies

- **“1+N” peaking action plan** and implementation policy framework
- Infrastructure, industrial and land planning

Key sectoral actions

- Coal, power, steel, chemical, petrochemical, non-ferrous metals, building materials, building, transportation, livelihood, agriculture, new rural infrastructure...

Key projects

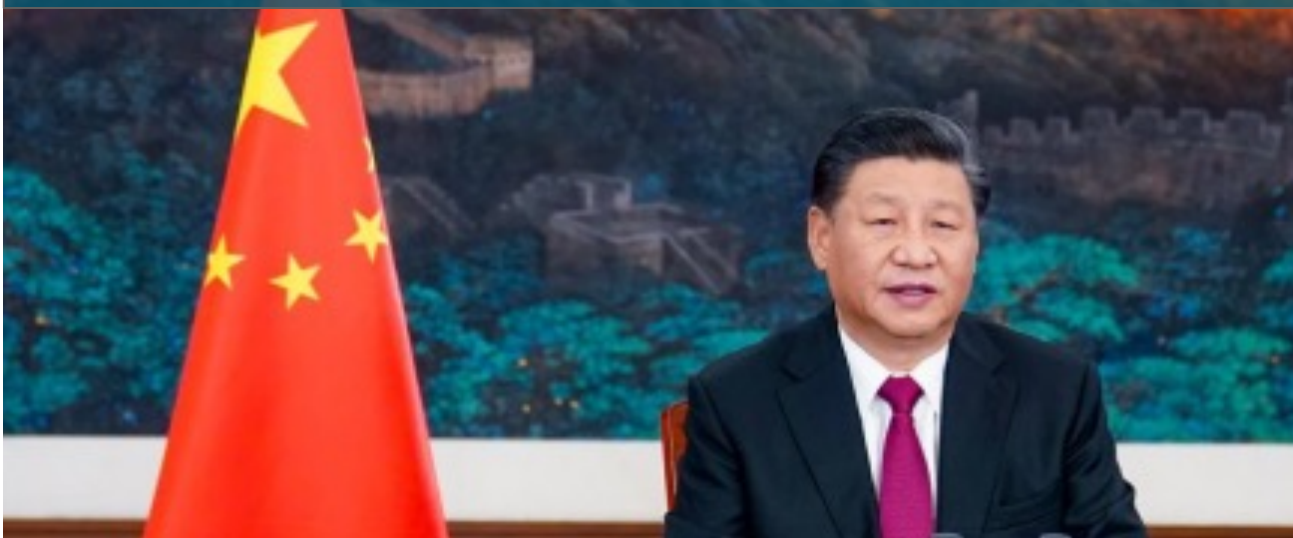
- Develop projects and pilots
- Industrial parks, enterprises, & community actions

Why focus on subnationals? Translate national pledges into subnational actions

1. All the major emission sources across sectors are **located, monitored, and regulated at subnational levels**, and corresponding local stakeholders are responsible for them.
2. All the **major socioeconomic and environmental impacts** from GHG reduction will be on local stakeholders, who are the major players for actions and implementation.
3. Within China's institutional framework, **local stakeholders have their own interests, responsibilities, and agenda** which need to be integrated into global and national carbon neutrality strategies with incentive compatibility, while avoiding compromising China's national targets.
4. A **systematic approach** will help China be more effective and efficient in achieving carbon neutrality by **taking comparative advantage** of uneven provinces in terms of energy resources, infrastructure, industries, and development levels.

Opportunities

China announced its new pledge to peak before 2030 and achieve carbon neutrality by 2060



This requires efforts at **sectoral** and **subnational** levels to make sure their FYPs and other policy documents have the highest ambition possible to lead China to a low carbon path.

Central government:

- **High political willingness and clear nationwide goals** e.g. 14 FYP, NDC, 2060
- Released *Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality*

Local governments:

- **Strong need for implementation support** is well recognized for:
 - Timeline and roadmap to net zero
 - Sub-national/sectoral carbon peaking action plan
 - Capacity building

Key sectors and thematic areas:

- Emerging and urgent requests from:
 - Low carbon transition pathways and solutions for energy/power/industry/transportation/buildings
 - Coal transition
 - Technology innovation/green finance/ETS/supply chain

Major challenges

However, there is a huge gap between the ambition of the national targets and the capacities, interests, and motivations of subnational entities.

- 1 Lack of vision and ambition to facilitate the social economic transition to carbon neutrality, and the ability to seek new engine/industries for economy diversification;
- 2 Lack of awareness and knowledge on the roadmap to achieving the “30/60” goals, charting a comprehensive energy transition pathway, and developing and implementing climate policies;
- 3 Lack of systematic transition solutions for key sectors, e.g., power, industry, transportation, and buildings, as well as key issues, e.g., infrastructure, innovation;
- 4 Lack of national policy and market instruments to facilitate the local transition; current taxation system and performance measurements foster GDP first and impulsive investments in carbon intensive projects;
- 5 Lack of local research capacity and expertise in the form of local supporting institutions and officials with climate experience.

In order to realize China’s early peaking and early neutrality, there is a big need to support local partners and relevant stakeholders to link national planning with local implementation and develop innovative climate action initiatives.

Contents

Roles, opportunities, and challenges of subnationals in achieving China's climate targets



Mapping, understanding, and prioritizing local needs: Where and What

Vision, objectives, and key initiatives

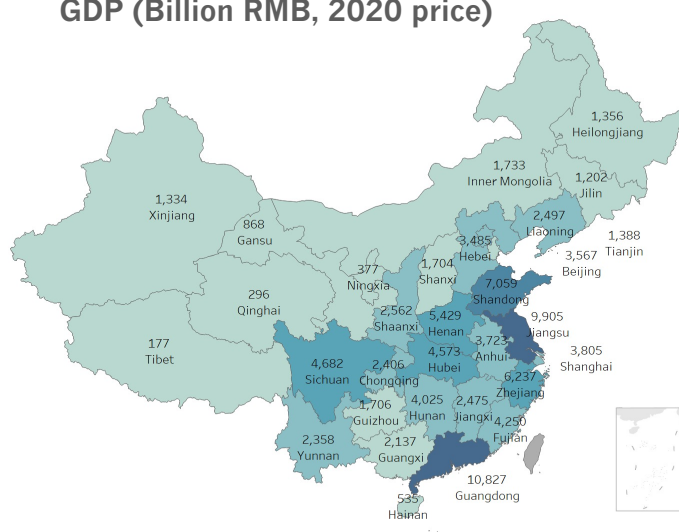
Existing efforts & funding needs

Landscape among provinces: uneven development

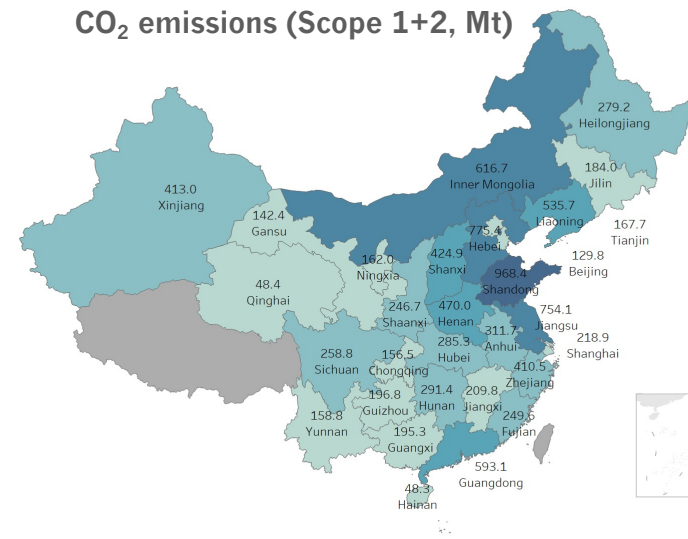
Population (million)



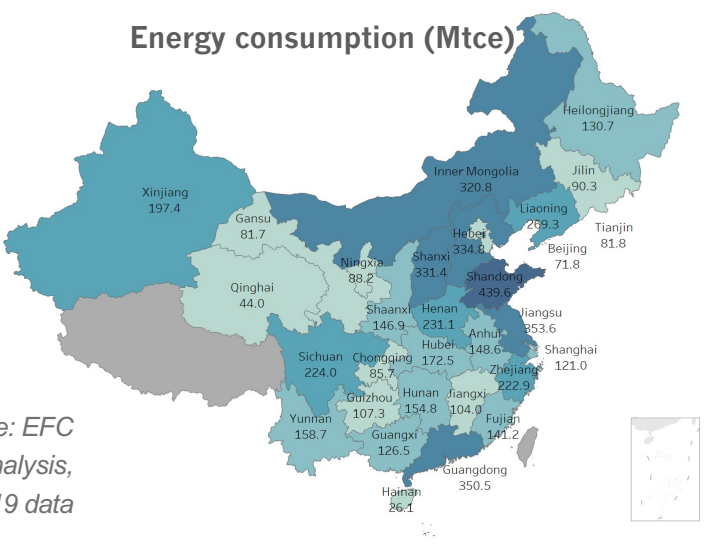
GDP (Billion RMB, 2020 price)



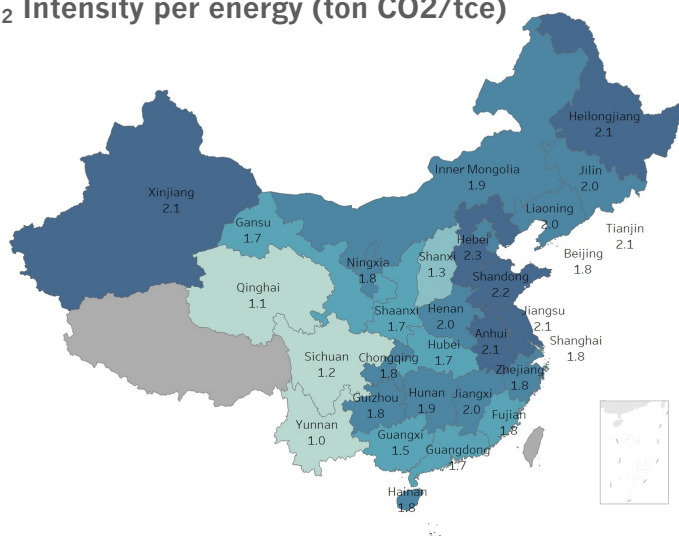
CO₂ emissions (Scope 1+2, Mt)



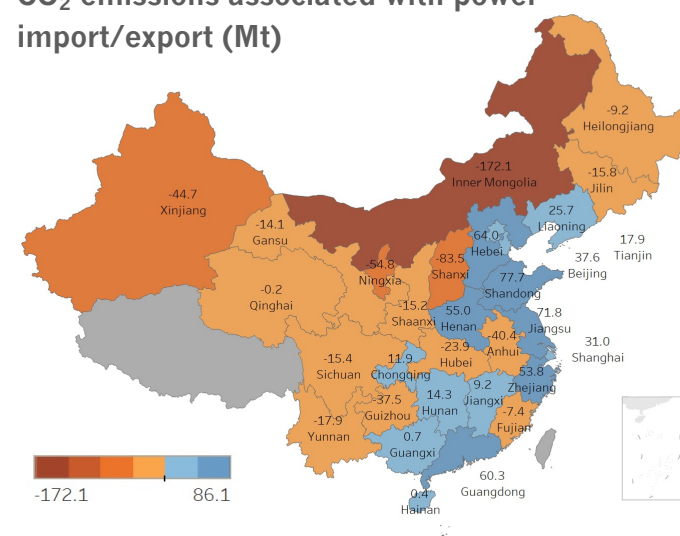
Energy consumption (Mtce)



CO₂ Intensity per energy (ton CO₂/tce)



CO₂ emissions associated with power import/export (Mt)



Source: EFC own analysis, 2019 data

Differing needs and priorities among provinces

Province	Population (10,000 persons)	GDP (billion Yuan)	CO2 emissions (Scope 1+2, Mt CO2)	Primary energy consumption (Mt)	Primary energy production (Mt)	Industrial emissions (Mt CO2)	Building emissions (Mt CO2)	Transportation emissions (Mt CO2)	Cement production (Mt)	Crude steel production (Mt)	Installed thermal power capacity (GW)	Installed wind capacity (GW)	Installed solar PV (GW)
Anhui (4)	9								5		9		6
Fujian (1)		7											
Gansu (1)												9	
Guangdong (10)	1	1	5	3		6	3	1	1	9	3		
Guangxi (2)									8	8			
Guizhou (1)					8								
Hebei (10)	6		2	4		2	1		9	1	10	3	2
Henan (12)	3	5	7	8	10	9	5	8	10	7	5	7	
Heilongjiang (2)					9		7						
Hubei (4)	10	8						6		6			
Hunan (4)	7	9					9	9					
Jiangsu (12)	4	2	3	2		3	4	2	3	2	2	6	3
Liaoning (7)			6	7		5	8	5		4		10	
Inner Mongolia (9)			4	6	1	4	6			10	4	1	9
Ningxia (2)												8	10
Qinghai (1)													4
Shandong (13)	2	3	1	1	7	1	2	4	2	3	1	5	1
Shanxi (8)			8	5	2	7				5	6	4	7
Shaanxi (1)					3								
Shanghai (2)		10						3					
Sichuan (6)	5	6		9	5			7	4				
Xinjiang (6)			9		4	8					8	2	8
Yunnan (2)					6				7				
Zhejiang (10)	8	4	10	10		10	10	10	6		7		5
Share of Top 10	58%	62%	60%	57%	79%	65%	58%	55%	58%	72%	62%	67%	62%

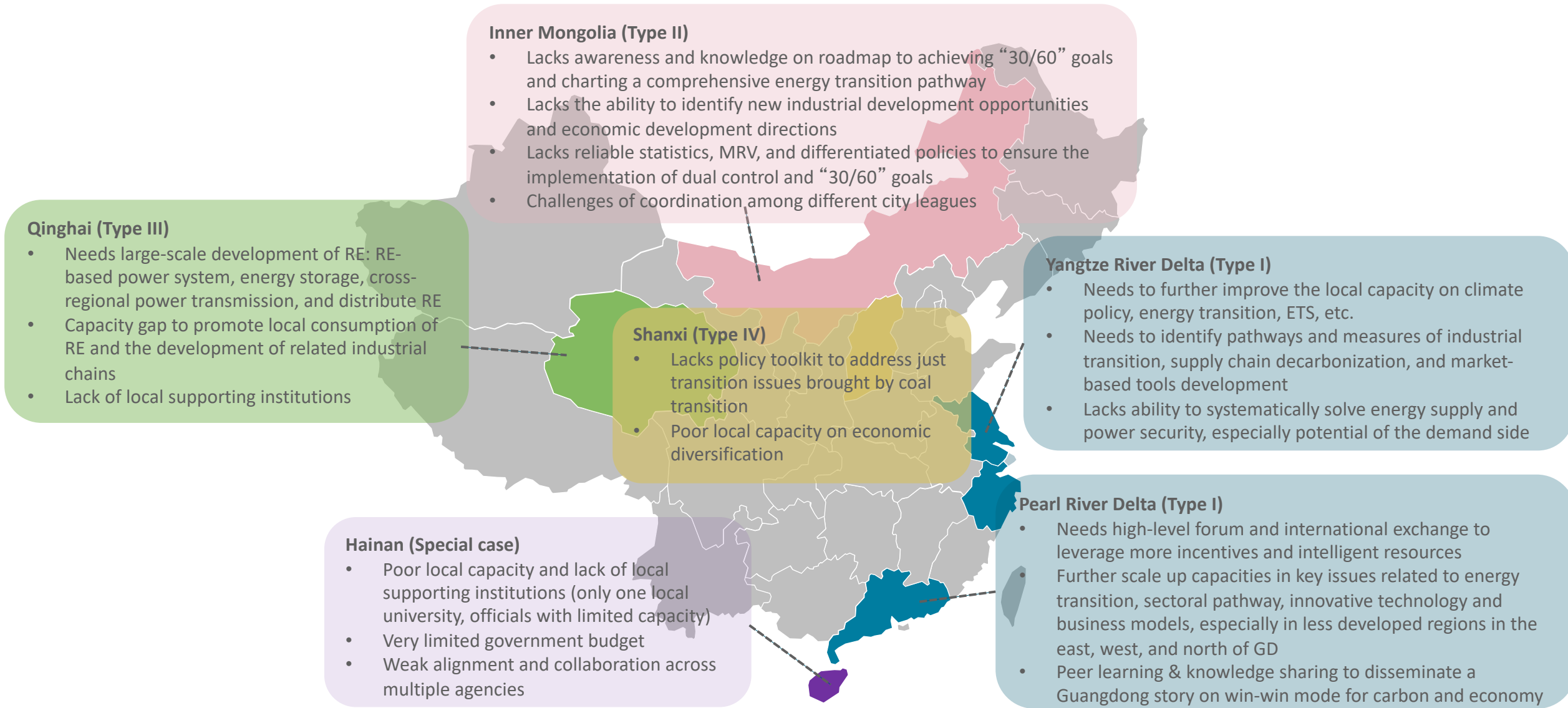
Prioritization Criteria

- **Influence:** GDP, emissions, energy, environment
- **Typicality:** type of problems, potential for scaling up
- **Local engagement:** political commitment, high level relationships; implementation capacity

Categorizing subnationals according to type

Category	Type I Scarce fossil fuel, scarce RE, developed economy	Type II Abundant fossil fuel & RE, less developed economy	Type III Scarce fossil fuel, abundant RE, less developed economy	Type IV Abundant fossil fuel, limited RE, less developed economy	Special case Net-zero pilot potential
Key selected province(s)	Yangtze River Delta, Guangdong, Beijing, Shandong	Inner Mongolia, Ningxia, Gansu, Xinjiang	Qinghai, Sichuan, Yunnan	Shanxi	Hainan
Economic development strategies	Phase out of high-carbon industries Low-carbon strategic and emerging industries/services: innovative solutions	RE-based low carbon industries Retrofit of existing industries with RE and ICT Just transition for coal industry	Expand the scale of industries that consume RE locally	Economic diversification: new development engines; Just transition: re-training/re-employment and other social security measures	Zero-carbon free trade island with world-class air quality An international model for low-carbon innovation and development
Energy transition strategies	RE importer Promote local nuclear and distributed RE, etc. Fuel switching in manufacture Improve energy efficiency	RE exporter RE to replace fossil fuels: strategy, infrastructure, and policies Stop new coal and retrofit existing coal power to provide flexibility Improve energy efficiency	RE exporter Enable and increase RE: solar-wind-hydro nexus power Promote electrification in transportation, heating, etc. Improve energy efficiency	Stop new coal power plants Promote profitable coal power equipment (CCS) Transferring green power from other provinces Improve energy efficiency	Zero energy system Pilots on new energy technologies, policy research, and project implementation

Analyzing capacities gaps of subnational governments



Contents

Roles, opportunities, and challenges of subnationals in achieving China's climate targets

Mapping, understanding, and prioritizing local needs: Where and What



Vision, objectives, and key initiatives

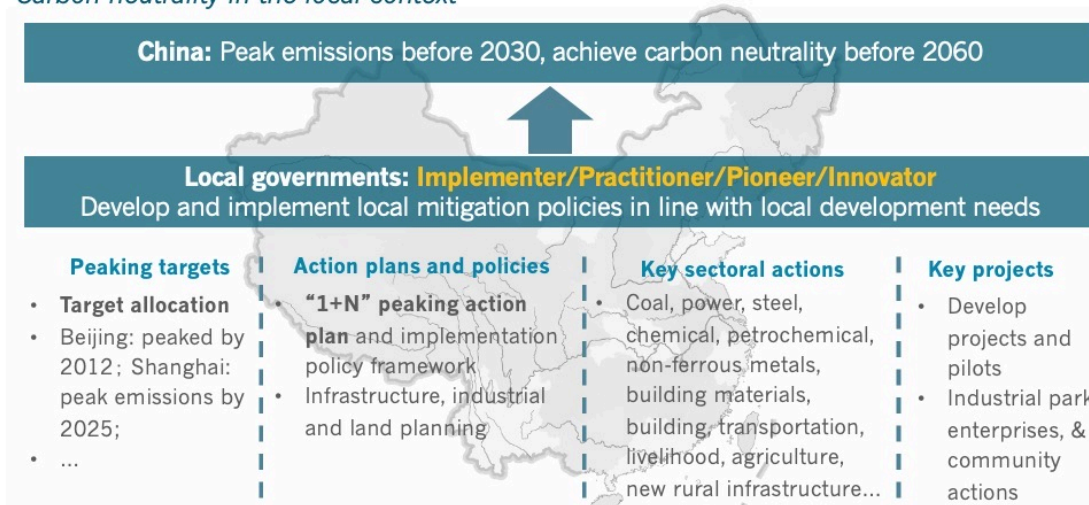
Existing efforts & funding needs

Vision and Objectives

Our vision: to help key provinces and regions adopt **a new economic model** that harnesses **fresh growth drivers** to deliver high quality development, improve **implementation capacity**, **peak** carbon emissions **before 2025**, and contribute to greenhouse gas emissions **neutrality** for the whole country **before 2060**.

Implementing national climate targets

Carbon neutrality in the local context



- **Objective 1:** To **set vision and targets** for a new growth model in key provinces and regions aligned with the “30/60” goals;
- **Objective 2:** To develop **tailored provincial or regional solutions** for different types of provinces and regions to accelerate the energy/low carbon transition, including action plans, sectoral pathways, and supporting measures;
- **Objective 3:** To **build top runners** for national replication and **help laggards** to ensure successful, complete transformation;
- **Objective 4:** To establish **peer learning and knowledge sharing** channels and **cross-province/regional coordination** mechanisms, to improve local capacity.

Prioritizing subnationals according to scale-up potential and political willingness

Category	Type I Scarce fossil fuel, scarce RE, developed economy	Type II Abundant fossil fuel & RE, less developed economy	Type III Scarce fossil fuel, abundant RE, less developed economy	Type IV Abundant fossil fuel, scarce RE, less developed economy	Special case Net-zero pilot
Selected deep dive province & features (2020 data; 2019 for CO ₂ emissions)	<p><u>Guangdong</u></p> <ul style="list-style-type: none"> • Highest provincial GDP: USD 1.98 trillion • Largest and growing population: 126M • 75% energy reliant on imported fossil fuel 	<p><u>Inner Mongolia</u></p> <ul style="list-style-type: none"> • Largest coal producer/reserve and large installed capacity in RE • GDP: USD 0.25 trillion, ranked 21 out of 31 • CO₂ emission: 617 Mt • Population: 24.05M 	<p><u>Qinghai</u></p> <ul style="list-style-type: none"> • High RE potential • GDP: USD 43.59 billion, ranked 30 out of 31 • CO₂ emission: 48 Mt • Population: 6M 	<p><u>Shanxi</u></p> <ul style="list-style-type: none"> • Large coal producer • GDP: USD 0.26 trillion, ranked 20 out of 31 • CO₂ emission: 425 Mt • Population: 35M 	<p><u>Hainan</u></p> <ul style="list-style-type: none"> • Largest special economic zone • Best AQ and ecology conservation demonstration • Zero carbon energy pilot • Innovative hub

Five key initiatives to catalyze subnational action

1



New Economic Growth Strategies

- Redefine high-quality new growth model, improve the industrial competitiveness, incubate new growth engines
- Facilitate a just and equitable transition and regional economic diversity solutions

2



Overall action plans

- Carbon peaking/neutrality plans
- Energy transition plans
- Co-control of pollution and carbon mitigation

3



Sectoral actions

Power, Industry, Transportation, Buildings, Carbon neutrality zone, Urban planning and urban regeneration, Pilots of innovative technology solutions and policies

4



Enabling policies from national and interprovincial levels

- Key enabling policies
- Cross-regional/provincial coordination

5



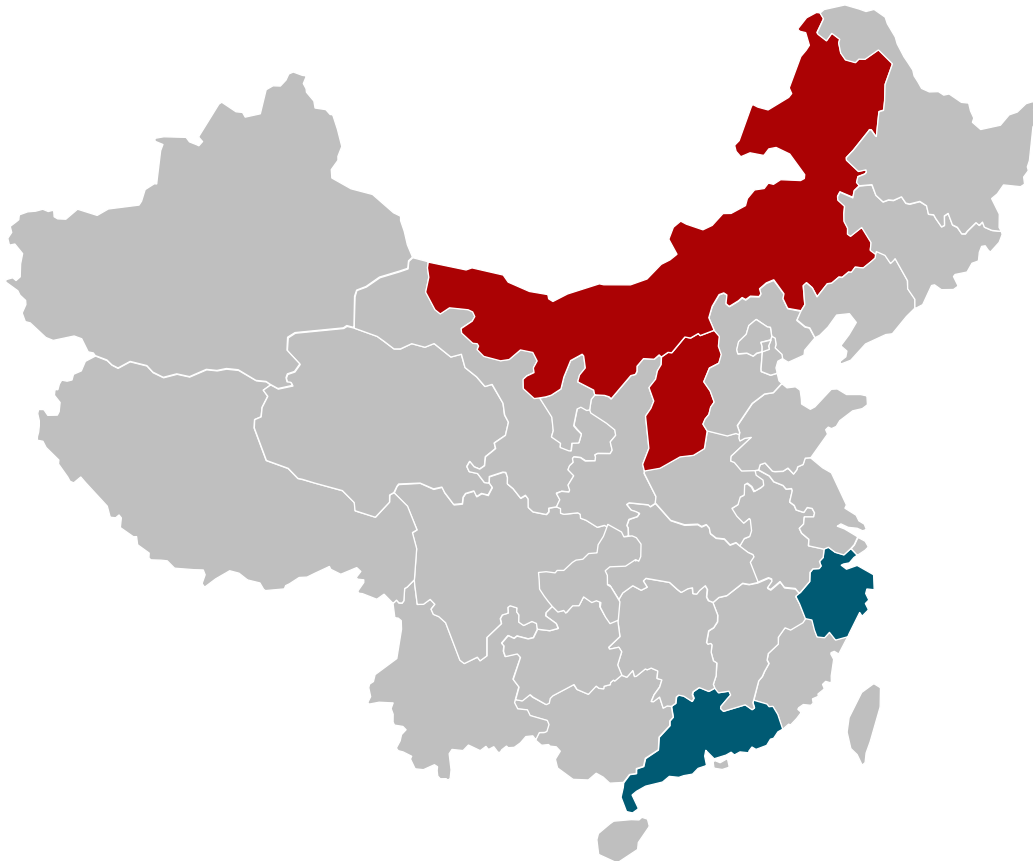
Capacity-building & Communications

- Build up narratives, Reshape vision, Build capacity
- Facilitate local champion/peer learning/knowledge sharing
- Set up a knowledge hub on data and policies

1

New Economic Growth Strategies

To balance economic development and carbon mitigation, local governments need a new economic growth strategy that ensures just transition and consistency between economic development and climate actions.



For provinces that benefit from transition (e.g. Guangdong, Yangtze River Delta, Qinghai):

Support moving out of the unsustainable oil growth model, redefine the high-quality new growth model towards carbon neutrality, develop practical guidance to improve the industrial competitiveness, and incubate new growth engines.

For provinces that rely on high intensity of fossil fuel (e.g. Inner Mongolia, Shanxi)

Facilitate a just and equitable transition as well as regional economic diversity solutions. Support addressing short-term socioeconomic impacts and share added costs of energy transformation by optimizing governance and financial management, improving transparency and information, and supporting the development of training programs.

Source: EFC own analysis

Overall action plans

Support stronger climate, energy, and environmental action plans by providing top-notch technical support through trusted channels during the decision-making process.

Carbon peaking/neutrality plans

Support key provinces/cities to set up clear targets, design the pathway of green and low-carbon development, prioritize energy conservation and carbon emissions reduction, optimize energy mix, peak emissions in line with the target of carbon neutrality, and facilitate pioneer provinces and cities for more ambitious targets.

Energy transition plans

Reshape a new energy landscape and a new industrial landscape.

Support Type II and III provinces with abundant renewable resources to develop large-scale clean energy bases, to play a role as green power producer and exporter and re-layout the local industry chain based on RE.

Facilitate Type I provinces on the eastern coast to develop distributed renewable energy and offshore wind power, and import green power.

Support Type IV provinces for an orderly low carbon transition away from fossil fuel energy.

Co-control plan for pollution and carbon mitigation

Support regions/provinces suffering from heavy pollution to develop co-control plans.

Support pioneer provinces to pursue world-class air quality with stricter standards in order to further decarbonize the key sectors.

3

Sectoral actions

Power

Support provinces with high RE to explore policy mechanisms for RE integration and improve power system complementarity; Facilitate provinces lacking RE but with high energy consumption to develop local distributed RE, smart microgrids, and demand-side management; Deepen electricity market reform and price-based instruments.

Industry

For provinces with high potential to upgrade industry structure: optimize industry structure, establish a green manufacturing system, and accelerate R&D; For provinces facing the difficult industrial transition: deploy digital and efficiency tools, speed up systematic retrofit of industrial parks, and develop new solutions for hard-to-abate sectors.

Transport

Optimize transportation structure, raise the proportion of rail and water transportation, promote green planning and design for city clusters. Accelerate the adoption of a zero-emission vehicle mandate policy, conduct heavy-duty truck electrification pilots, promote low-carbon infrastructure, and launch pioneer activities.

Buildings

Support provincial peaking action plan and carbon neutrality pathway for building sector: mandatory green building standard, pilots of PEDF buildings. Support policy research and local pilots on low carbon space heating, scaling up heating solution with waste heats, renewables, and heat pumps

Urban planning and regeneration

Support the optimization of land use standards, strengthen compactness and carbon evaluation of land use, and scale up land-saving technologies and low carbon-oriented development patterns. Support urban retrofit pilot projects to provide holistic low carbon solutions like installation of charging piles, PV facilities, building 15-min life cycle communities, etc.

Pilot innovative technology and policies

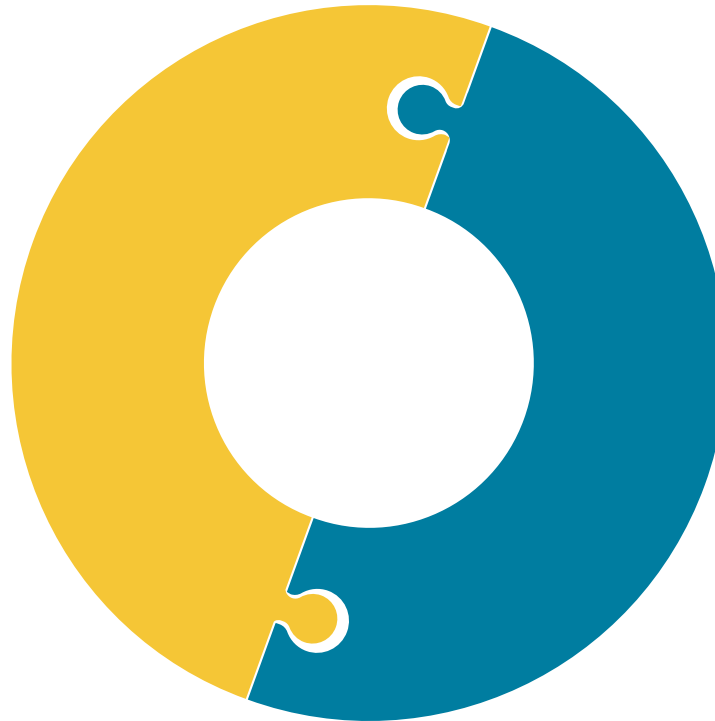
Support innovative technologies such as PDEF to be piloted at local level, identify market and policy barriers, set up standards systems, explore business and financing models, and suggest policies to lower upfront investment.

4

Enabling policies from the national and interprovincial levels

Enabling policies

Support research on the total volume control system of CO₂ emissions, develop recommendations for national target allocation among the provinces, and enhancement of central environmental inspection, MRV, tax and fiscal system, finance instruments and pricing.



Cross-regional/provincial coordination

Facilitate strategic research on evolving national energy landscape and industrial landscape under “30/60” goals, the key investment plan on national energy and industry infrastructure construction to fit the net-zero goal, the coordination of regional grid and state grid to balance the power supply and demand, plan for building or expanding electrification infrastructure, and relevant supporting measures at national level.

5

Capacity-building & communication

Local obstacles

- Lack of awareness and knowledge on low-carbon roadmap;
- Lack of local capacity;
- Lack of systematic transition solutions for key sectors;
- Lack of policy and market instruments.



Solutions: Capacity-building priorities

- Build the narrative to tell a new high-quality growth story to align with the “30/60” goals, and disseminate successful experiences from pilots;
- Reshape the vision and build up capacity for less advanced provinces on key issues related to energy transition, sectoral pathway, economy diversification, and just transition;
- Facilitate local champions for pioneer provinces with further improvement of local capacity;
- Convene multi-players and facilitate exchanges. Organize high-level forums and international exchanges to leverage more incentives and intelligent resources;
- Facilitate peer learning & knowledge sharing;
- Set up a knowledge hub on data and policies relating to the transition to net-zero.

Contents

Roles, opportunities, and challenges of subnationals in achieving China's climate targets

Mapping, understanding, and prioritizing local needs: Where and What

Vision, objectives, and key initiatives



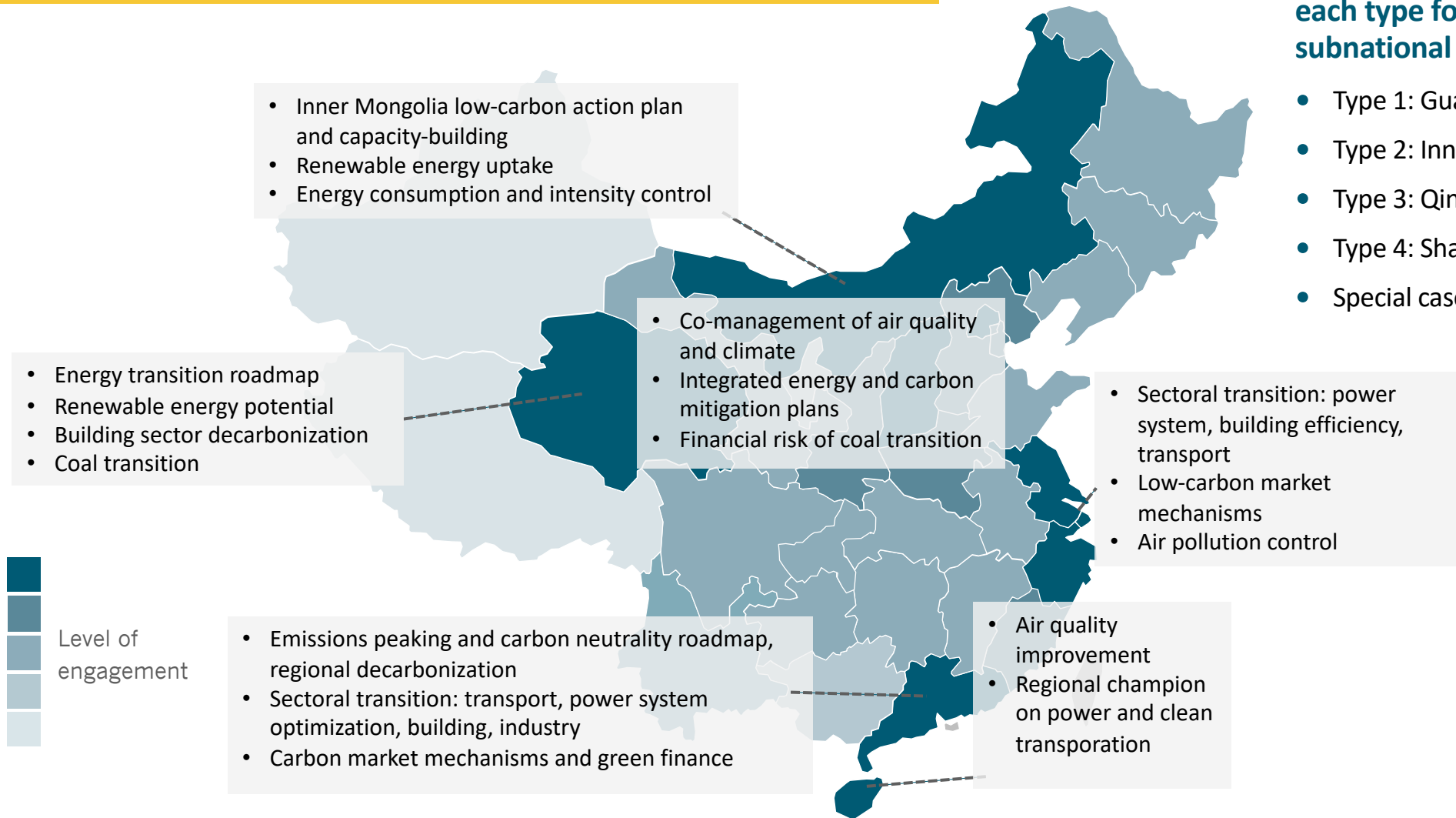
Existing efforts & funding needs

EF China's ongoing subnational work in typical provinces

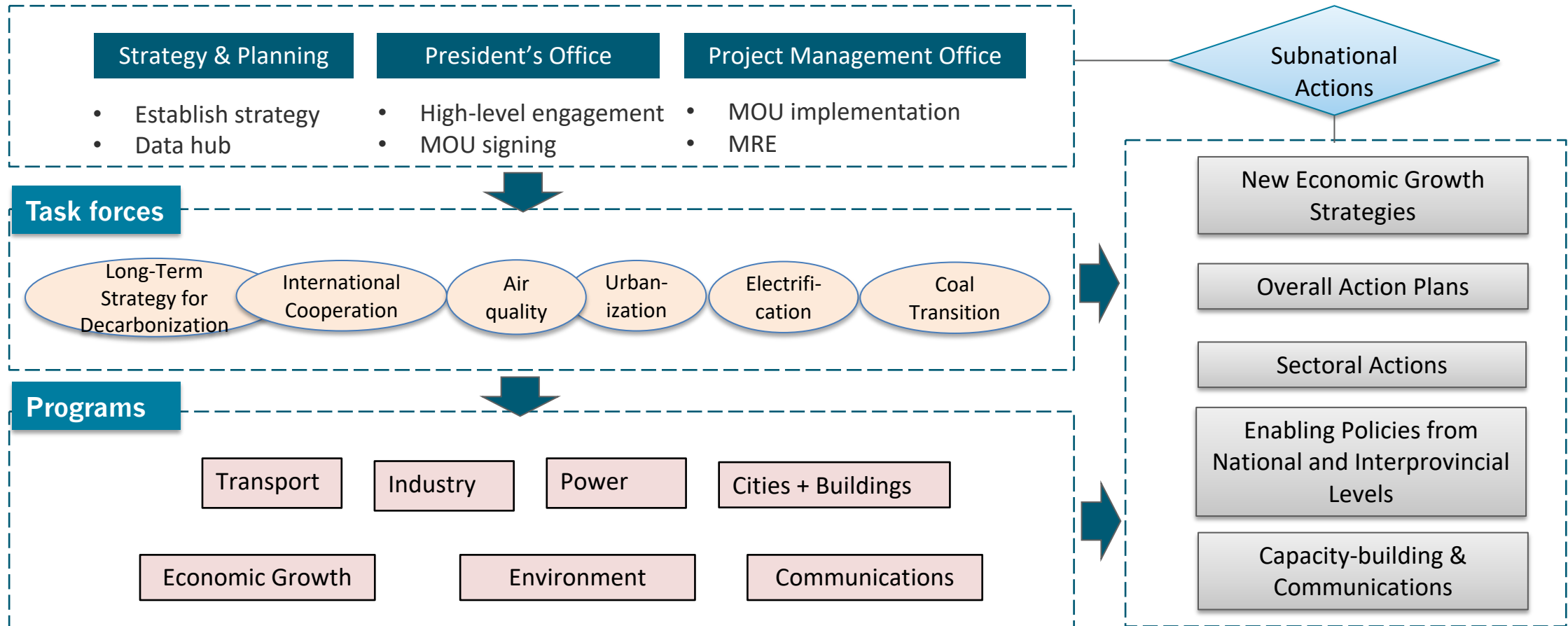
Need to be deeper, broader, and more systematic

We have selected priority provinces in each type for initial elaboration of our subnational strategy:

- Type 1: Guangdong, Yangtze River Delta
- Type 2: Inner Mongolia
- Type 3: Qinghai
- Type 4: Shanxi
- Special case: Hainan



Internal coordination





ENERGY FOUNDATION
能源基金会

THANK YOU

Annex: Deep Dive in Key Provinces/Regions

Guangdong

Characteristics



- Highest provincial GDP: USD 1.98 trillion
- Largest and growing population: 126M
- 75% energy reliant on imported fossil fuel

Current cooperation

- Cooperated with **Guangdong Development and Reform Commission (DRC)** and **Guangdong Bureau of Ecology and Environment** to launch projects on low-carbon roadmap, power, transport, buildings, industrial sectors, air quality, and green finance
- Signed MOU with **Shenzhen DRC** in November 2019, granting 1.31 million USD.
- Preparing MOU with **Guangdong DRC**

Future work

1

Subnational 1+N

Continue to support provincial policy-makers and institutes to formulate province-level subnational “1+N” series of climate policies.

2

Economy transition

Identify new drivers and new growth model for Guangdong’s economic development in a carbon neutrality future. Enhance economic competitiveness from emerging industries.

3

Reshaping energy system

Develop a low-cost, secure, stable and green energy system

4

Industrial low-carbon transition and emerging industries

Support the development of a high-level industrial peaking action plan and boost the province as a demonstration zone of industrial transition.

5

Carbon pricing and green finance/fiscal tools

Optimize Guangdong’s strengths as the first ETS pilots and the financial power of GBA.

Yangtze River Delta Region

Characteristics



- Manufacturing hub and strong growth engine in China
- 2020 GDP: nearly USD 2.99 trillion
- Population: 174 million

Current cooperation

- Signed MOU with Nanjing Municipal Development and Reform Committee in December 2020 to support a low-carbon transition strategy
- Signed a **five-year MOU with Suzhou Municipal Development and Reform Committee** in September 2021 on decarbonization

Future work

1

Low-carbon energy supply security strategy

Promote the development of decentralized wind and distributed solar, promote the expansion of ultra-high voltage transmission lines

2

Development of emerging low-carbon industries

Support emerging low-carbon industries and explore innovative solutions, and support low-carbon service industries as well as integration with digitalization

3

Zero-carbon supply chain

Support the construction of a supply chain management and information platform in pilot industries and facilitate carbon-labeling, carbon footprint calculation.

4

Experimental laboratories in innovative market solutions

Develop a carbon accounting/evaluation system and green finance products to direct investments to sustainable economic activities

5

Decarbonization of traditional industries

Facilitate the enhancement of energy and material efficiency, deployment of low-carbon technologies with the improvement of R&D capabilities, and circular economy

6

Urban regeneration

Support top line design and provide holistic solutions towards carbon neutral and summarize experiences

7

Carbon neutrality zone demonstration

Partner with a typical pilot to layout the roadmap and implementation plan to achieve carbon neutrality

Inner Mongolia

Characteristics



- Largest coal producer/reserve and large installed capacity in RE
- GDP: USD 0.25 trillion, ranked 21 out of 31
- CO₂ emissions: 617 Mt
- Population: 24.05M

Current cooperation

- **Signed MOU on strategic cooperation with Bayannur City (2021-2024)** to help Bayannur accelerate the implementation of “ecological civilization,” ecosystem protection, energy consumption and intensity control and carbon peaking and neutrality targets.
- Cooperated with the **Energy Administration of Inner Mongolia** to launch a package of low-carbon projects.

Future work

1

Energy diversification and high quality development

Support Inner Mongolia to draw a economy diversification blueprint and develop a phasing-out strategy for existing high energy consumption industries

2

Large scale renewable development and substitution

Facilitate large-scale development of renewables and green electricity, promote local consumption, and expand renewables substitution in industrial parks and end-use sectors

3

Coal transition and phase out

Speed up hydrogen energy substitution and avoid new investment on coal chemical and support orderly phasing-out plan without affecting energy security

4

Transition of carbon intensive sectors and industries

Develop carbon emissions peaking and neutrality roadmaps, carry out pilots of zero-emission industrial parks and elevate energy efficiency

5

Just transition

Support the establishment of a social policy system and explore how new financing instruments can help with an orderly phase-out of stranded assets

Qinghai

Characteristics



- High RE potential
- GDP: USD 43.59 billion, ranked 30 out of 31
- CO₂ emissions: 48 Mt
- Population: 6M

Current cooperation

- **Signed a five-year MOU on Strategic Cooperation (2021-2025) with Qinghai provincial government** to jointly promote research on carbon emissions reductions in November 2021

Future work

1

Low-carbon and high quality development based on renewables

Facilitate a top-level design of low-carbon development strategy, industrial structure change, and eco-civilization

2

Large-scale development of clean energy and outgoing transmission

Support the development of wind-solar-hydro nexus clean power system, and improvement of connection between local and regional grids and long distance transmission

3

Zero carbon power system and energy storage demonstration

Support technical solutions for source-network-load-storage matched with high-proportional clean energy system and new electric energy storage system

4

Local RE consumption and zero-carbon industry demonstration pilots

Support optimizing the utilization level of clean energy consumption in key industrials and support innovation and pilot demonstration projects

Shanxi

Characteristics



- Large coal producer
- Limited RE
- GDP: USD 0.26 trillion, ranked 20 out of 31
- CO₂ emissions: 425 Mt
- Population: 35M

Current cooperation

- Supported a wide range of projects in Shanxi on co-management of air quality and climate, local implementation of integrated energy and carbon mitigation plans, and analysis on macroeconomic impact and financial risk of coal transition.

Future work

1

Economic diversity solutions

Explore new growth direction and new drivers of get rid of the economy's dependence on coal and achieve economic diversification

2

Coal transition

Develop a comprehensive solution for co-control on air pollution and climate through structural transformation

3

Plan for just transition

Create overall planning to guide an orderly exit of coal assets, support the development of fiscal policies and transition finance instruments, design the re-employment and retraining plans

4

Innovation

Facilitate R&D supporting mechanisms, low-carbon technology research, and pilot projects

Hainan

Characteristics



- Largest special economic zone
- Best AQ and ecology conservation demonstration
- Zero carbon energy pilot
- Innovative hub

Current cooperation

- Signed **MOU (2018-2020) with the Hainan Department of Ecology and Environment** on improving environmental governance, helping achieve world-class environmental quality and resource utilization efficiency by 2035

Future work

1

Carbon neutrality free trade port development strategy and pathway

Develop high-quality economic growth strategy, and support feasibility and policy research on achieving the WHO guideline for air quality

2

Clean energy island development

Establish the new zero-carbon power system, strengthen the construction of distribution network and optimize dispatching and operating system

3

Cooling

Support the design of clean cooling action plan for Hainan, enhance energy efficiency of buildings, promote market share of green equipment, and HFC control

4

Zero carbon innovation solutions and demonstration

Facilitate the regulatory and incentive policy framework for innovation, promote zero-carbon technologies, and support the development of the goal setting and implementation plan for Carbon Emission Comprehensive Demonstration Zone