Regional Low-Carbon Development Planning in China: Theory and Practices

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- ➢ **Background**

- ➢ **Methodology Development**

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1.1 The Background of China's Low-carbon Development Planning

◆**National Policy**

➢ Mandatory Targets – Driven: Carbon Intensity reduction in 2020 by 40-45% compared with the level of 2005; non fossil energy share and forest stock increase targets

➢ INDC targets of China: Achieving the peaking of CO_2 emissions around 2030 and making best efforts to peak early, by 2030, reducing CO_2 emissions per unit of GDP by 60%-65% from the 2005 level

➢ On April, 2016, Vice Premier Zhang Gaoli, on behalf of Chinese President Xi Jinping, signed the Paris Agreement

➢ Pilot program for Low-carbon development in 6 provinces and 36 cities; 7 ETS pilot

◆ **The needs of national and local government**

➢ The implementation and reflection of national strategy of climate change in provincial level——*provincial and municipal governments carry out low-carbon planning*

➢ Functional departments and technical experts at all levels have explored how to provide scientific analysis method and technical support for the local government's low-carbon development policy, help the local government to carry out the mid-and-long-term low-carbon development planning, reach the dual goals of GHG emission reduction and economic growth at minimal costs

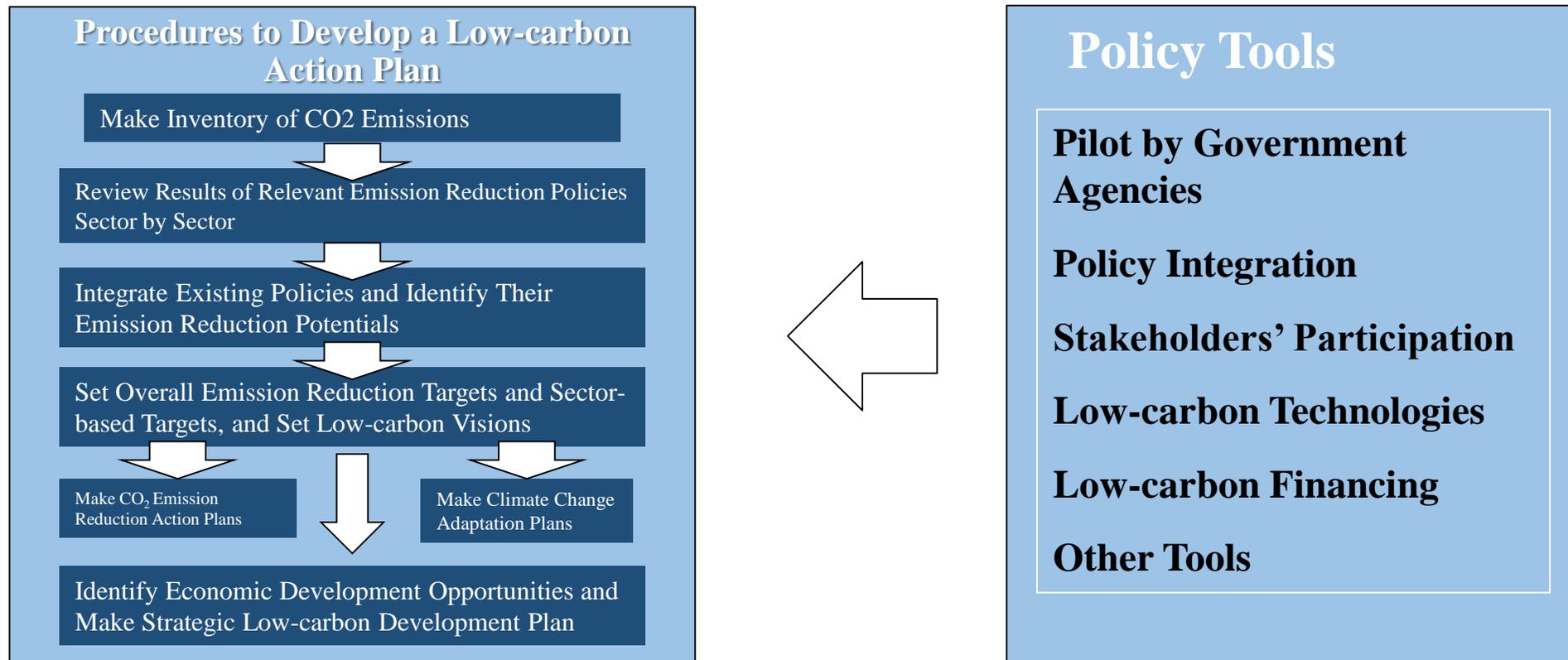# 1.2 Challenges of Planning for LC Development

◆ **Challenges**

➢ Lack of legal support

➢ Data and statistical system imperfection

➢ Lack of evidence-based, quantitative methodology and guideline

➢ Planning conflicts

◆ **Approaches:**

➢ Long-term and short-term

➢ Top-down and bottom-up

➢ Action coordination among different departments / stakeholders

➢ Objectives, roadmaps and policies

➢ Managing the transitional and dynamic system

1.3 Framework of Regional Low-carbon Development Planning

- **Prerequisite: Reasonable targets + clear political will**
- **Government agencies take the lead**
- **Integrated policies with actions**
- **Stakeholders' participation and coordination mechanisms**
- **Key: Low-carbon technologies and financing**

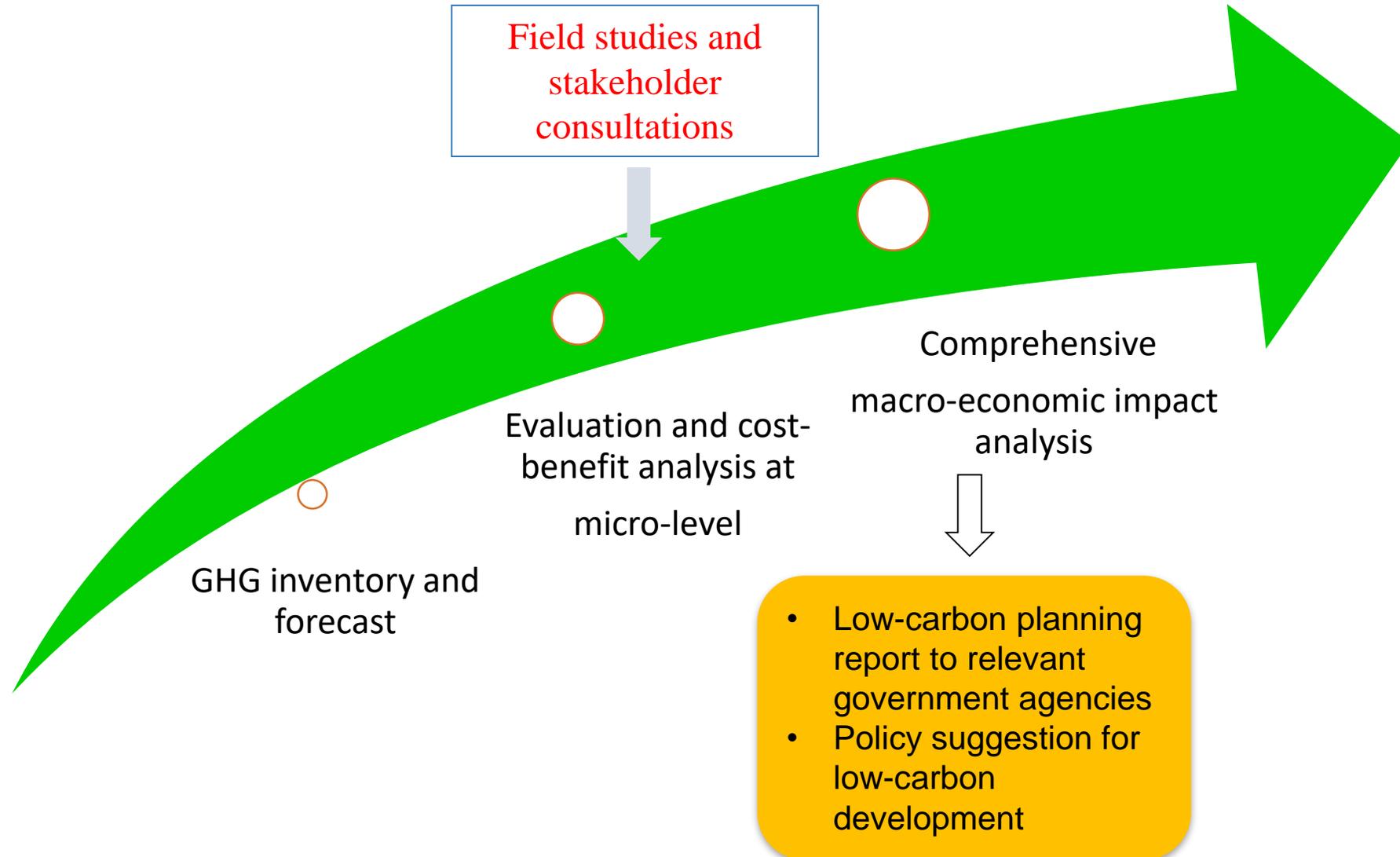## Procedures to Develop a Low-carbon Action Plan

Make Inventory of CO2 Emissions

↓

Review Results of Relevant Emission Reduction Policies Sector by Sector

↓

Integrate Existing Policies and Identify Their Emission Reduction Potentials

↓

Set Overall Emission Reduction Targets and Sector-based Targets, and Set Low-carbon Visions

Make CO_2 Emission Reduction Action Plans

Make Climate Change Adaptation Plans

Identify Economic Development Opportunities and Make Strategic Low-carbon Development Plan

Policy Tools

Pilot by Government Agencies

Policy Integration

Stakeholders' Participation

Low-carbon Technologies

Low-carbon Financing

Other Tools

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2.1 The research objects of regional low carbon planning

◆**7 sectors, 26 industries, 244 sources of emissions (based on products), including:**

➤ Energy: 7 industries, 61 kinds of emission sources

➤ Industry: 5 industries, 19 kinds of emission sources

➤ Building: 2 industries, 27 kinds of emission sources

➤ Transportation: 4 industries, 13 kinds of emission sources

➤ Agriculture: 5 industries, 31 kinds of emission sources

➤ Forestry: 1 industry, 11 kinds of emission sources

➤ Waste management: 2 industries, 26 kinds of emission sources

2.2 Procedures of Regional Low-carbon Planning

Field studies and stakeholder consultations

Comprehensive macro-economic impact analysis

Evaluation and cost-benefit analysis at micro-level

GHG inventory and forecast

- Low-carbon planning report to relevant government agencies
- Policy suggestion for low-carbon development

2.3 China Low-carbon Development Planning Toolkit(1)

◆ "Bottom-up" Low-carbon Policies Analysis System (PAC)

Objective: Build the GHG inventory, forecast GHG emission and analyze the marginal abatement cost of low carbon policy

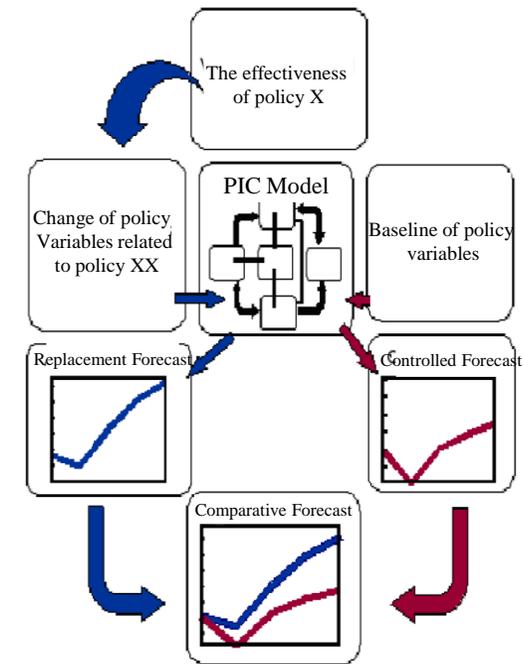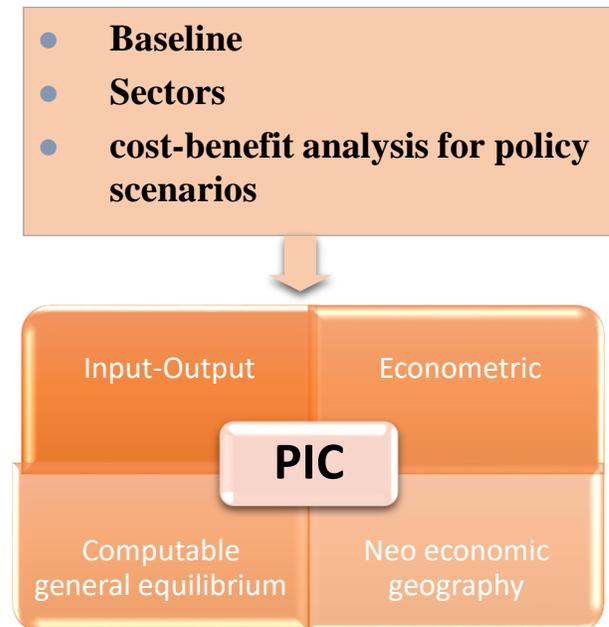| Function	Process	Step	Outcome
Make sure the emission source and the industry which emission lager GHG	Complementing the GHG emission inventory	• Depart the GHG emission of a region into all the industries • Make sure the definition of the bounds of each industry • Working out the initial inventory • Choosing the accounting method • Develop the tool using for accounting based on the inventory	• Using the bottom-up and up-bottom method to calculate the emission of the region • The inventory contains seven sectors, including energy sector, industry sector, Transportation sector, Building Sector and so on; • The inventory contains 23 industries and 244 typical emission source
Forecast the emission of the region in the future under the BAU scene	The forecast of the baseline	• Making sure the target to account • Making sure the year used as the base year and the year used for target year • Develop the forecasting model • Searching and collecting the data useful • Check the result and make the result reasonable	• The emission under the baseline of region in the future, which is from year 2011 to 205 • The emission of each sector in the region in the future under the baseline • The energy consumption in the future under the baseline
Calculate the emission change under the new policy, as well as the cost of implementing these policies	The analysis of the policy	• Gathering the policies and classifying • Making the Policy base • Develop and modify the model used for account the emission decreased and cost of each policy • Check the result and make the result reasonable	• Quantify the policy on one place and on one or some industries about low carbon, including the policies published in region, national, and international • Together quantifying 327 policies, including policies on Scale, Economy, Technology, Management

2.3 China Low-carbon Development Planning Toolkit(2)

◆ "Top-Down" Policy Analysis System (PIC)

Objective: Analyze the macroeconomic impact of low carbon policy, including the impact on the GDP, employment, CPI, as well as on the upstream and downstream industries.

- National/Regional
- Mitigation/Adaptation/whole process
- Key department

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- Migrant
- Resources mobilization
- Products transportation

⬇

- Various markets
- Quasi-markets

- **Baseline**
- **Sectors**
- **cost-benefit analysis for policy scenarios**

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Input-Output	Econometric
PIC	
Computable general equilibrium	Neo economic geography

2.3 China Low-carbon Development Planning Toolkit(3)

China dynamic model, CAS-GE (CAS General Equilibrium) model is based on MONASH CGE and is jointly developed by CASIPM and CoPS Center of Victoria University, Melbourne Australia.

CAS-GE (CAS General Equilibrium) Model
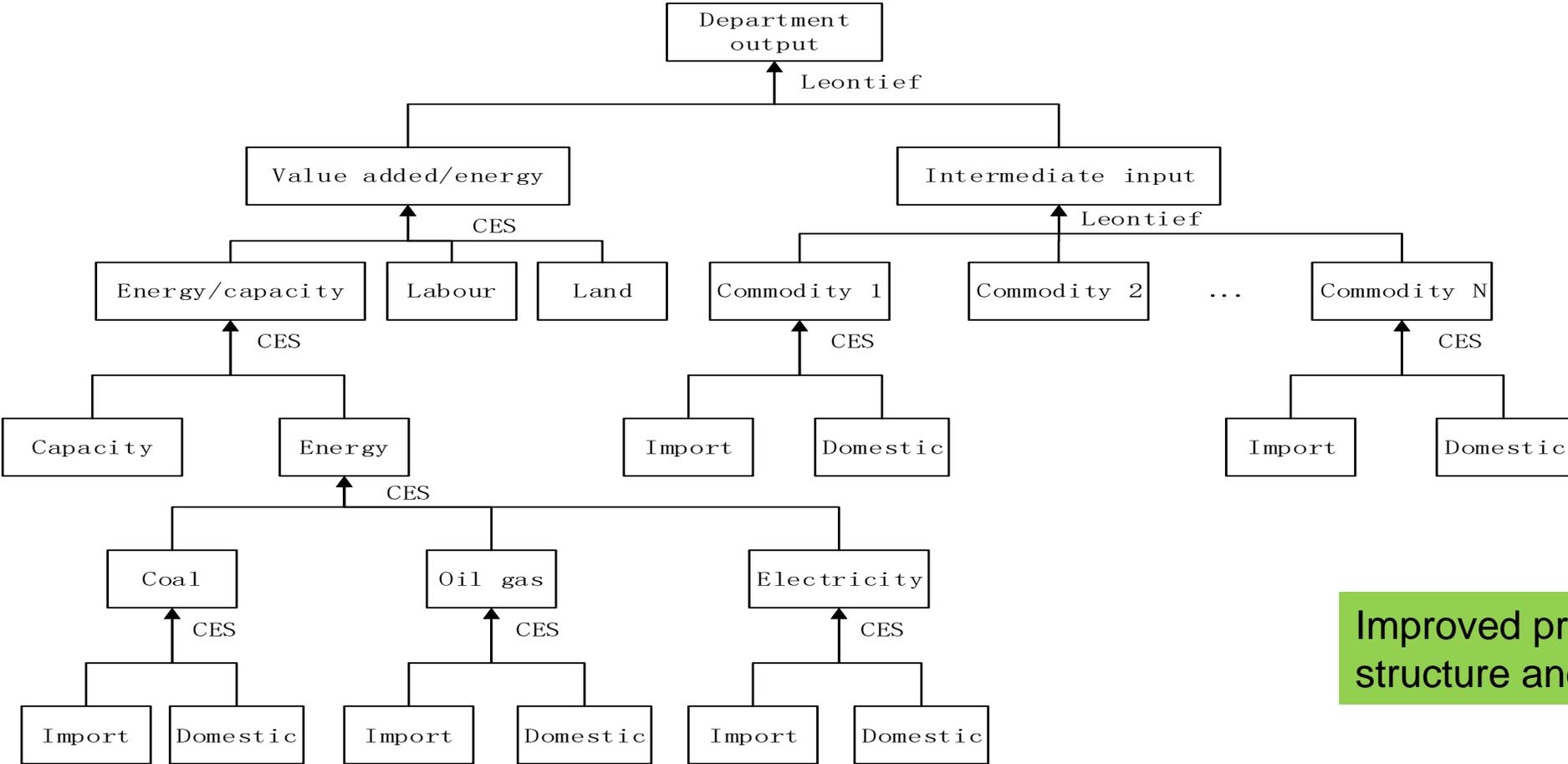
Improved production structure and database

2.4 Advantages of PIC and PAC combination

◆ **Full Process Analysis of Policy**

➢ Sort out the interrelations and differentiates between low-carbon policies and other related policies

➢ Full consideration of the integration and coordination of low-carbon policies among different sectors, as reflected by policy design, framework and the structure of policy database

➢ Take cross impact of policies at different levels into consideration

◆ **Policy Quantification and Optimization at Micro and Macro Levels**

➢ GHG emissions reduction effectiveness and cost-benefit analysis of a single policy

➢ Impact Analysis on macro economics indicators such as GDP, income and employment of a single policy

➢ Performance analysis of policy packages and their impact on macro economics

2.5 Application

◆**Low carbon policy quantitative toolkit" training in provincial level of China**

    Training nearly a hundred people worked in National Development and Reform Commission climate change and related research institutions of many provinces and cities.(Chongqing, Guangdong, Hubei, Gansu, Lanzhou, Yunnan, Hunan, Ningxia)

◆**The application on low-carbon pilot provinces and cities in China**

    Eastern cities: Low-carbon development planning and policy analysis of Guangdong province (completed)

    Western cities: Low-carbon development planning and policy analysis of Chongqing province (completed)

    Central cities: Low-carbon development planning and policy analysis of Hubei province (in progress)

◆**National level:**

    Project: China's "13th Five-Year" climate change planning ideas and objective research (2015)

    Project: The assessment of current policy in China and suggestions or formulation studies of "13th Five-Year" long-term low-carbon policy adjustment (2014)

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3.1The low carbon development policy framework in Chongqing

➤ Through questionnaire investigation and expert consultation, about 40 policies are screened from about 300 policies of various industries(energy, industry, transportation, building, agriculture and forestry crucial sectors) to be analyzed.

➤ Policies can be divided into structural adjustment, technology progress, and fine management .
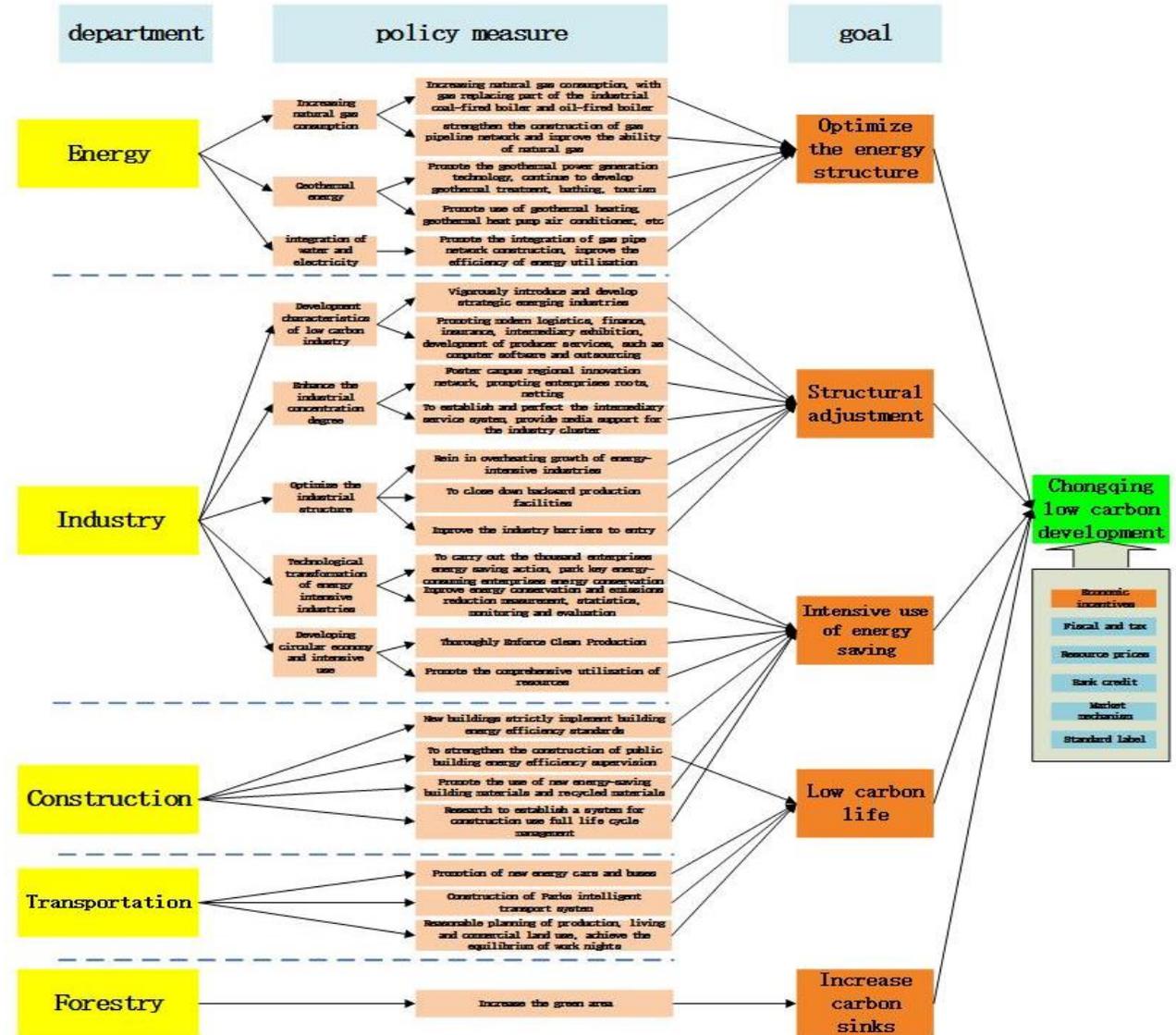
3.2 Chongqing Case Study: Bottom - up approach

◆Contribution of policies

From the view of different sectors:

➢ The largest contribution to the CO_2 emissions reduction is made from industry and energy sector. In 2015, their total contribution is more than 70%. In the future, with the development of urbanization, CO_2 emission reduction potential of transportation and construction will be gradually increased.

From the view of the different policy types:

➢ Technology improvement (48.8%)>Industrial structure adjustment (26.5%)>Energy structure optimization (19.3%)>Carbon sink (5.4%)
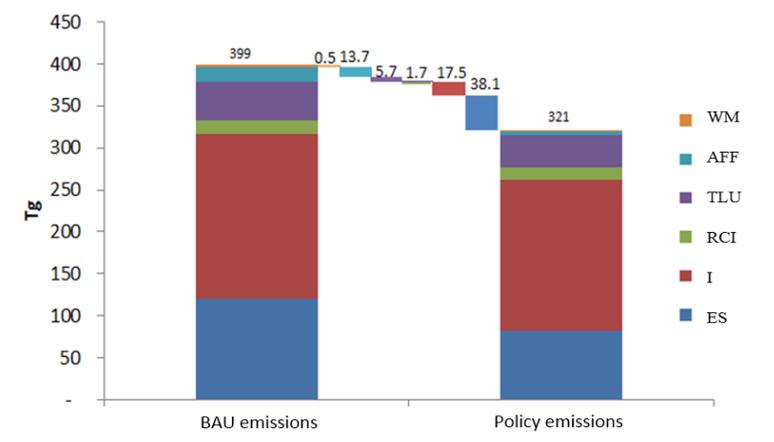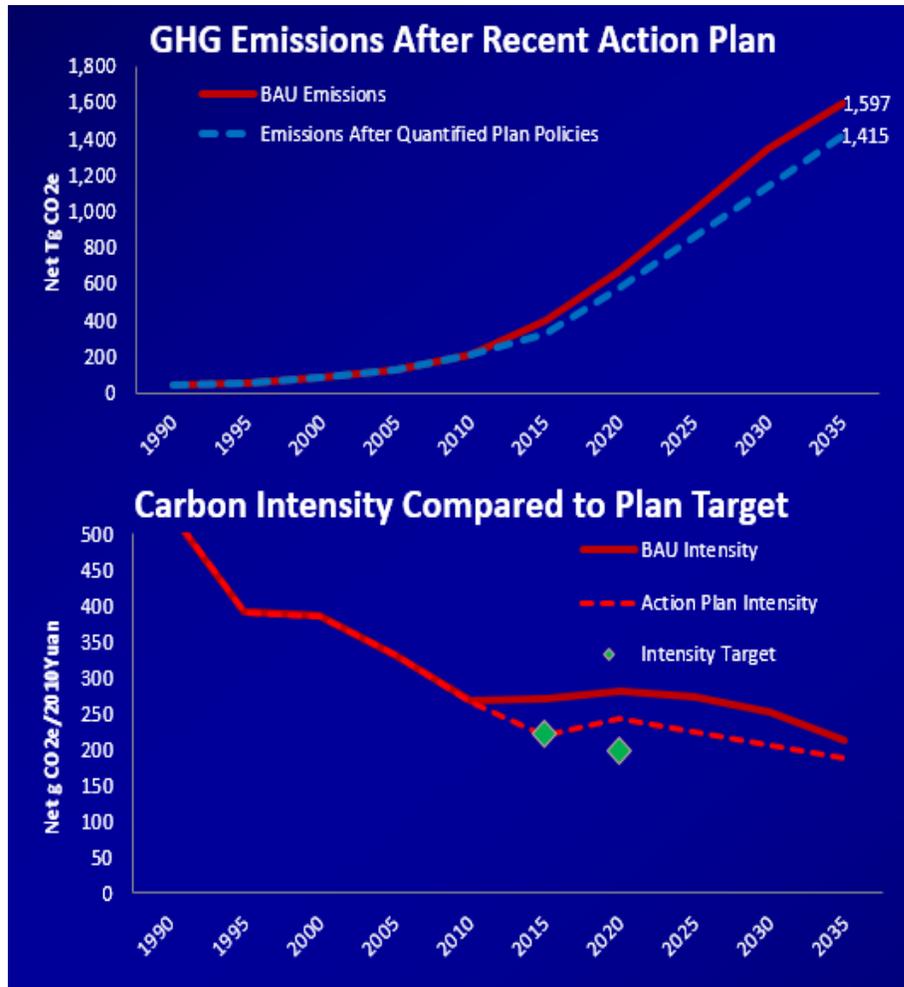

CO2 emissions of Chongqing in 2015
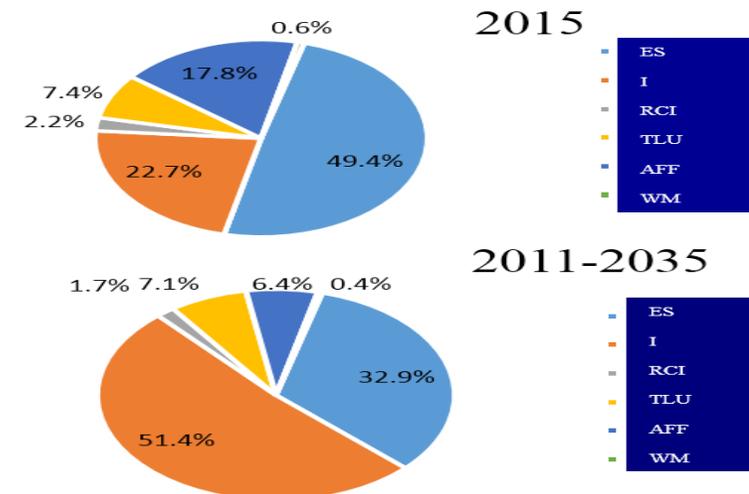
3.2 Chongqing Case Study: Bottom - up approach

◆ **CO$_2$ emission reduction potential**

GHG Emissions After Recent Action Plan
- BAU Emissions
- Emissions After Quantified Plan Policies

Carbon Intensity Compared to Plan Target
- BAU Intensity
- Action Plan Intensity
- Intensity Target

➤ Through policy quantitative analysis, we find that Chongqing can complete the goal of reducing CO$_2$ emissions intensity by 17% during the period of "twelfth five-year" basically.

➤ We also find that the "twelfth five-year" low carbon policy is difficult to achieve the target to reduce the intensity of CO$_2$ emissions per unit of GDP in 2020 by 40-45% compared with the level of 2005.

➤ *During "thirteenth five-year"(2016-2020), more attention need to be paid to low carbon development, developing and implementing more positive low carbon development measures.*

3.5 Chongqing Case Study： Policy Suggestions

◆**The core development targets**

- ➢ By 2020, carbon intensity decreased by 40%~45%
- ➢ During the "12th FYP" period, carbon intensity decreased by 17%

◆**Strategic tasks**

- ➢ Speed up the adjustment industrial structure, make the low carbon industry system
- ➢ Develop low-carbon energy, build a low carbon energy system
- ➢ Promote saving and comprehensive utilization of resources, to promote saving energy and reducing consumption
- ➢ Afforestation, make efforts to increase carbon sinks
- ➢ Promote community construction and low carbon life, building a green low carbon city
- ➢ Strengthen science and technology support, and promote low-carbon technology innovation
- ➢ Accelerate the establishment of a low carbon system, promote the construction of carbon emissions trading market

Conclusions and Next Step

➢ Legal role of LC development planning

➢ Planning tools should reflect the integration of green and low carbon practice, model system development and policy supporting system for co-benefit

➢ Model system development should be based on the real problems and developed systematically

➢ Combine the data collection, questionnaire, and stakeholder negotiation

➢ Mutual corroboration and model improvement of top-down and bottom-up analysis

➢ Establishment of the planning guideline, quantitative policy base and framework

➢ Model forums for comparison and cooperation

Thanks for your attention!

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