



*Workshop on Announcement of Low Carbon Development
Cooperation in Southeast Asia through the Belt and Road
Initiative and China's South-South Climate Cooperation*

Low-Carbon Development Targets, Planning and Policy Evaluation in China: *Theory and Practices*

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- 1. Background**
- 2. Methodology/Toolkit Development**
- 3. Case Study**
- 4. Experience & Next Step**

China's Green & Low-carbon Development Planning: *Political and Economic Background*

- **Building institutions for ecological civilization & green development** (2013): The 3rd Plenary Session of 18th CPC Central Committee
- **The Belt and Road Initiative** (2013): Greening the BRI and support the South-South cooperation, emphasize on energy and coping with climate change
- **The economic “New Normal”** (2014): on-going industrialization and urbanization
- **Political commitment** (2017-18): promote a high quality development pattern, guide the international cooperation on climate change, find sustainable solutions worldwide, and push to build a fair, reasonable, cooperative, and win-win global environment/climate governance system

China's Low-carbon Development Planning: *Policy*

● National Policy:

- Mandatory Targets – NDC(The Paris Agreement) Driven: Carbon Intensity reduction in 2030 by 60-65% compared with the level of 2005; non fossil energy share and forest stock increase targets
- Pilot program for Low-carbon development in 6 provinces and 81 cities (January, 2017);
- 7 ETS pilots and National ETS (December, 2017)
- New context: Eco-Civilization development

● Policy instruments

- Comprehensive policies adopted
- *Planning plays an important role in China*
- Market-based instruments crucial in the future

● Comprehensive implementation guarantee

Setting green targets in 2016-2020

● Mandatory targets: 10 types and 16 targets

➤ Resources and Energy: *double control* (efficiency + cap control)

- ✓ Land: arable land, keep stable at 1.865 Bn. mu; newly-increased construction land, < 32.56 Mn. mu
- ✓ Water: water use: 670 Bn. M³ (*non mandatory*), water use per 10000 yuan of GDP, 23% ↓
- ✓ Energy: total energy consumption: 5.0 bn. tce (*non mandatory*), energy intensity, 15% ↓ (16% in the 12th FYP)

➤ Environment: *the quality centered* (driving the economic restructuring)

✓ Environmental quality:

- Air quality: two targets, incl. PM2.5
- Quality of surface water: two targets

✓ Pollutant reduction:

- COD 10% ↓ (8% in the 12th FYP)
- NH₃-N 10% ↓ (10% in the 12th FYP)
- SO₂ 15% ↓ (8% in the 12th FYP)
- NO_x 15% ↓ (10% in the 12th FYP)

- Note: *the indicator with orange color refers to non-mandatory targets*

Low Carbon targets in 2016-2020

● Climate change targets in 2016-2020:

- ✓ Carbon intensity, **18% ↓** (17% in the 12th FYP, non fossil fuel contribution more than that in 12th FYP)
- ✓ **Share of non-fossil energy, reach at 15% (12% in 2015)**
- ✓ **Forest area: 23% (21.7% in 2015)**
- ✓ **Timber stock volume: 1.65 Bn m³ (1.51 Bn m³ ↑ in 2010-2015)**

● Coal targets in 13th FYP Energy Plan:

- ✓ Coal share: 58%
 - ✓ Coal use for coal-fired power plant: 310 gce/kWh
-
- ✓ Hopefully, CO₂ intensity will be 50% lower than that of 2005, which exceeds the goal of a 40~45% reduction China committed on Copenhagen Climate Accord

Low Carbon targets in 2030 and beyond

● **Targets in 2030 (China's NDC)**

- ✓ Carbon emissions peak by around 2030 or earlier
- ✓ Share of non-fossil energy, 20%
- ✓ CO₂ intensity, 60-65% ↓ (2005-2030)
- ✓ Timber stock volume: 4.5 Bn m³ ↑ (2005-2030)

● **In 2030, electricity from non-fossil fuel will account for 50% of total electricity generation**

- ✓ At that time about 50% of primary energy will go for power generating, so the proportion of non-fossil fuel in primary energy would be about 25%.

● ***Energy Production and Consumption Revolution Strategies 2016~2030 (EPCRS)***

- ✓ Propose to control total energy consumption to less than 5 billion tce in 2020, less than 6 billion tce in 2030, and to have it stabilized in 2050.

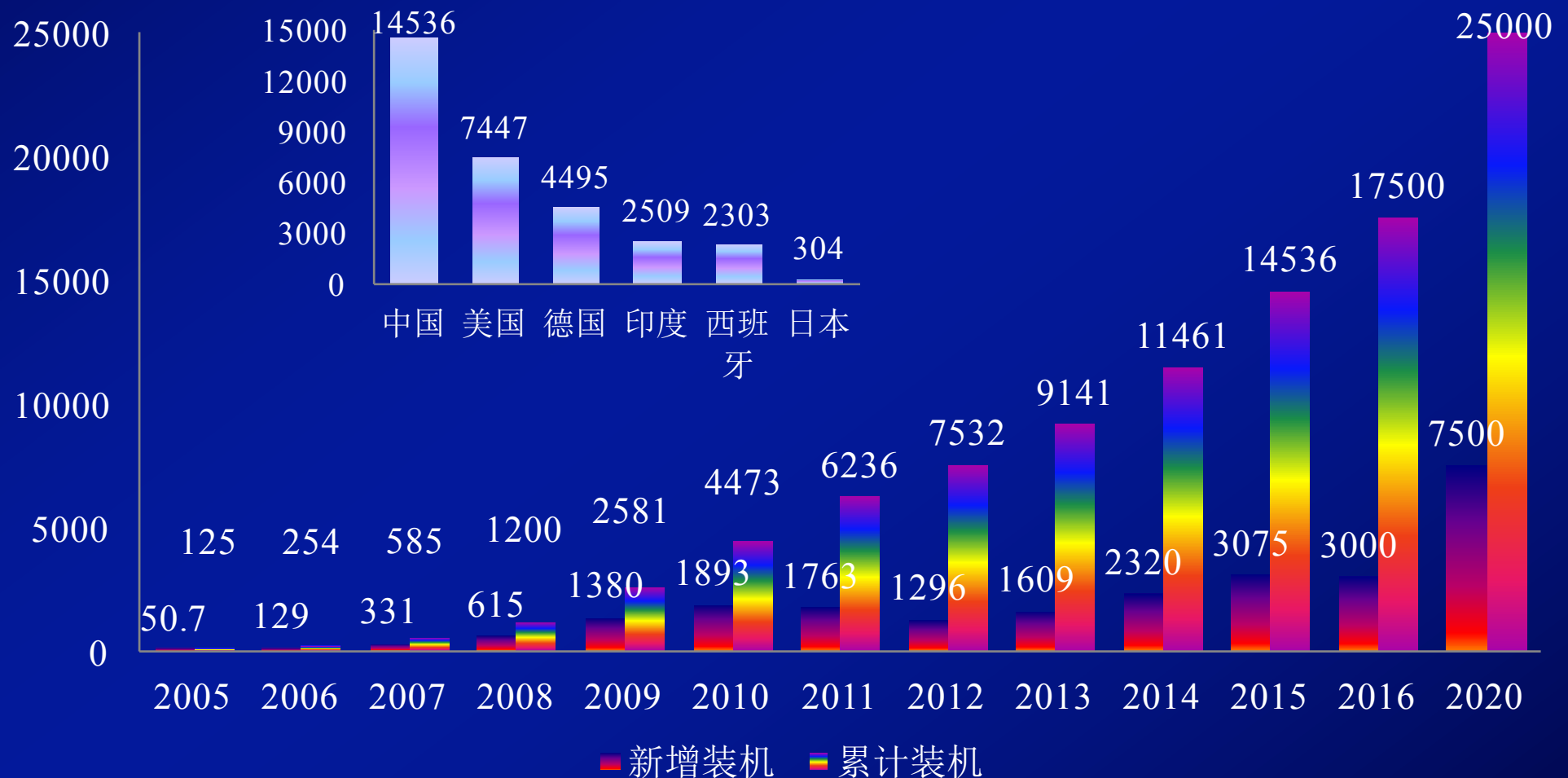
Targeted Poverty Alleviation in 2015-2020

- **From 2013-2016:** reduce rural poverty people by 55.64 million, 13.91 million annually; but 43.35 million still
- **Actions adopted:**
 - Goal: poverty eradication in 2020 at current poverty standard (per capita net income ¥2300/a.)
 - Establish a poverty alleviation system, set up action plan, and issue some key policies, including eco-compensation improvement
 - Promote a targeted poverty alleviation from identifying poverty people
 - Comprehensive solutions adopted, such as, **poverty reduction by ecological conservation**
 - ✓ Provide jobs for conservation
 - ✓ PV support
 - ✓ Eco-tourism
 - ✓ E-business pilot, etc.
- **Current problems:** heavy task, alternative livelihood, funds, differentiated policy, etc.
- **It depends on China's political system resource, maybe it's difficult to copy**

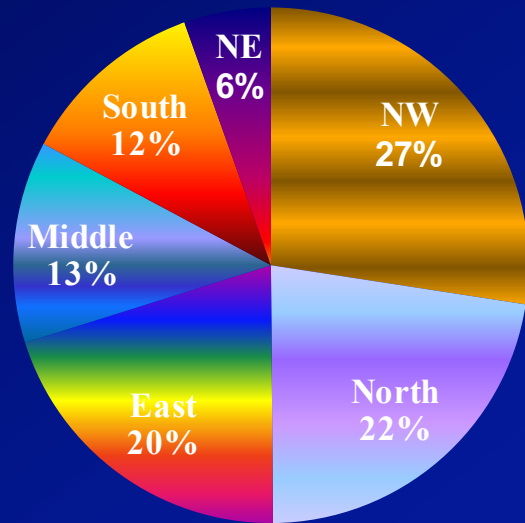
Wind Growth in China

Top 6 countries of Wind installed in 2015

New added and accumulated Wind Capacity Installed

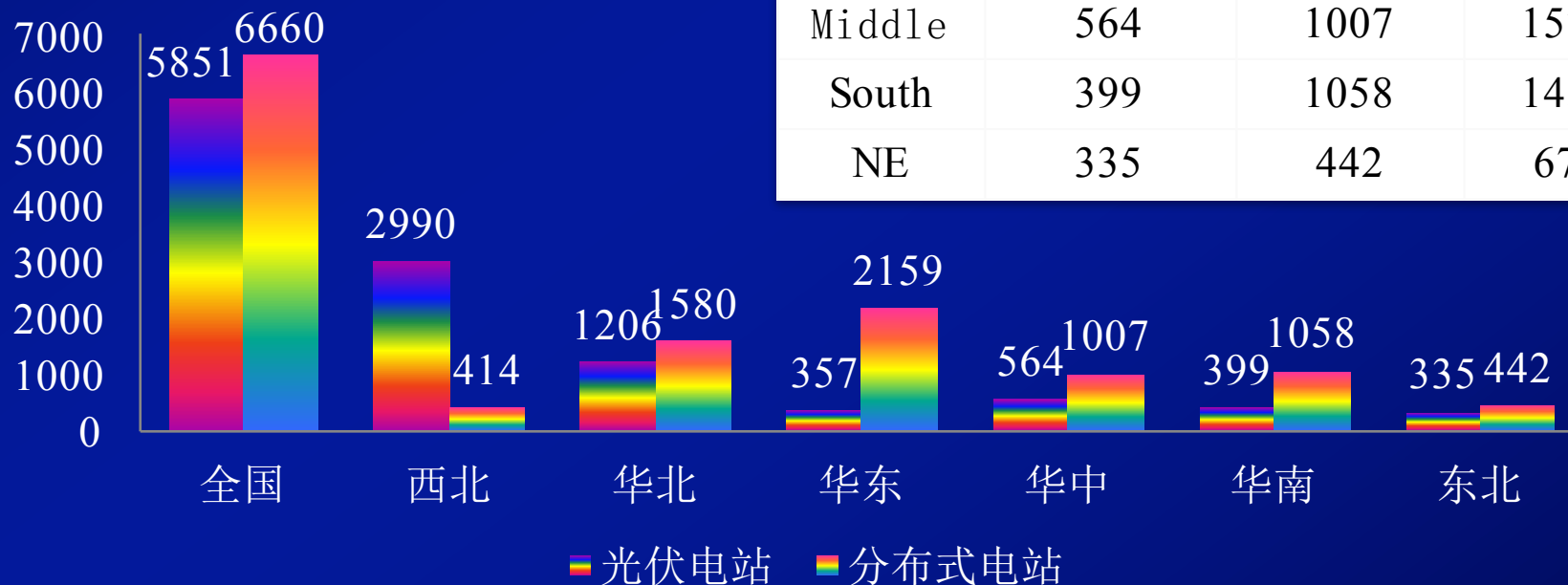


PV Growth in China



PV development Plan to 2020

Region	PV station	Distributed	Total Installed	Share
Total	5851	6660	12411	100%
NW	2990	414	3404	27.4%
North	1206	1580	2786	22.4%
East	357	2159	2516	20.3%
Middle	564	1007	1571	12.7%
South	399	1058	1457	11.7%
NE	335	442	677	5.5%





LC Development Planning: Challenges

● Approaches:

- Long-term and short-term
- Action coordination among different sectors / stakeholders
- Objectives, roadmaps and policies
- Managing the transitional and dynamic system

● Challenges

- Not enough legal support
- Data and statistical system imperfection
- Lack of evidence-based, quantitative methodology and guideline
- Planning conflicts

Regional Low-carbon Development Planning Framework: *Int'l Experience*

- **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 CO₂ Emission Reduction Action Plans

Make Climate Change Adaptation Plans

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

Policy Toolkit

Pilot by Government Agencies

Policy Integration

Stakeholders' Participation

Low-carbon Technologies

Low-carbon Financing

Other Tools

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Main points of the toolkit

- **Data Base:** data collection, investigation, evaluation, structuralized and standardized; 7 fields, 244 types of emission source, 100 items of tech and policy
- **Modelling:** Top-down + Bottom-up
- **Institutional negotiation:** stakeholder involvement
- **Best practice:** capacity development, scenario analysis, case study at national, provincial, city, and sectoral levels

Regional Low-carbon Planning Toolkit: *R&D*

● Joint Research and Development (2010)

- Under the framework of China-US Eco-partnership
- Collaboration among:
 - ✓ Institutes of Science and Development, Chinese Academy of Sciences (CASISD)
 - ✓ Global Environmental Institute (GEI)
 - ✓ Center for Climate Strategies (CCS)
 - ✓ Others
- The intellectual property is shared by all parties.

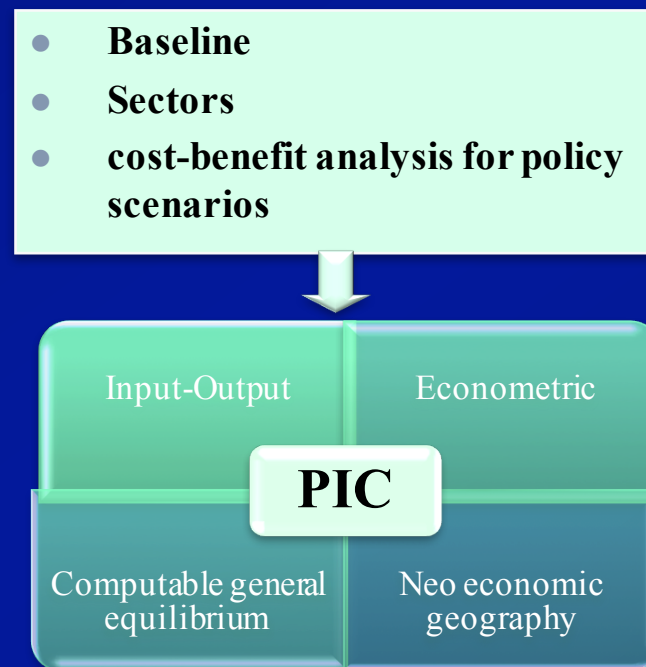
● Progress

- Finish the development of China's Regional Low-carbon Planning Toolkit in 2013, and revise continuously

Modelling Development and Policy Simulation

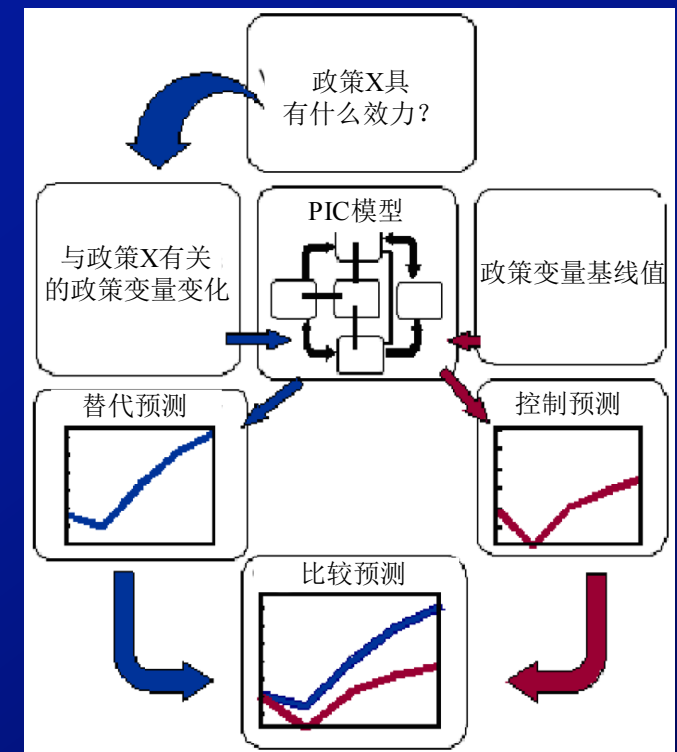
- **Policy Insight and package of China model: *PIC+PAC***, top down & bottom up, jointly develop by the CASISD, GEI, CCS and REMI under the China-US Eco-Partnership

- Difficulty: rapid growth and structural changes, uncertainty management
- Sectors and provincial emission accounts: 32 regions, 58 sectors

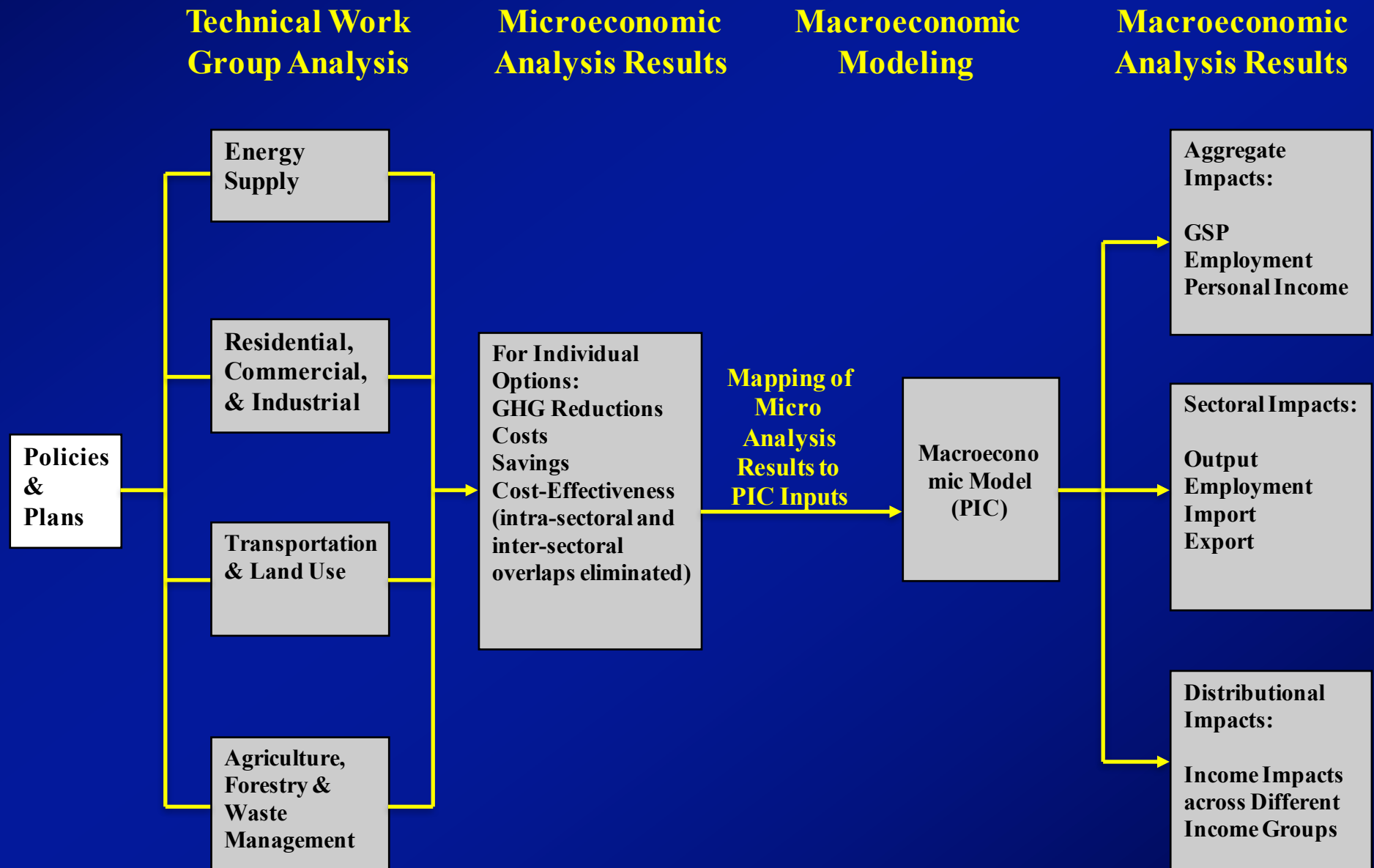


- Population, employment, economic growth, Energy & emissions, sustainability, costs

...



Linkages of Micro and Macro Analysis



Regional low-carbon planning toolkit:

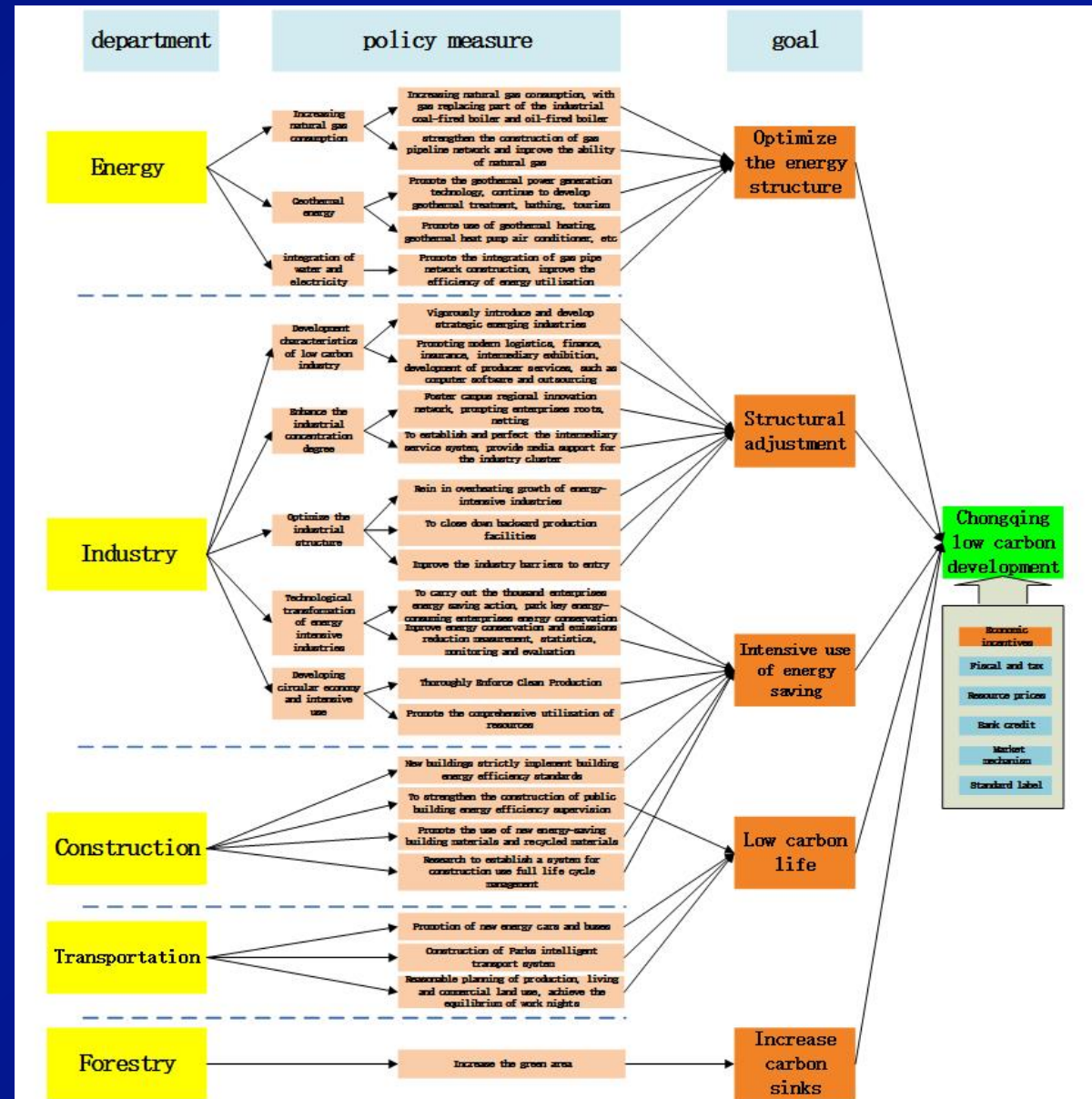
Data base

■ 7 sectors, 26 industries, 244 types of emission sources (based on products), including:

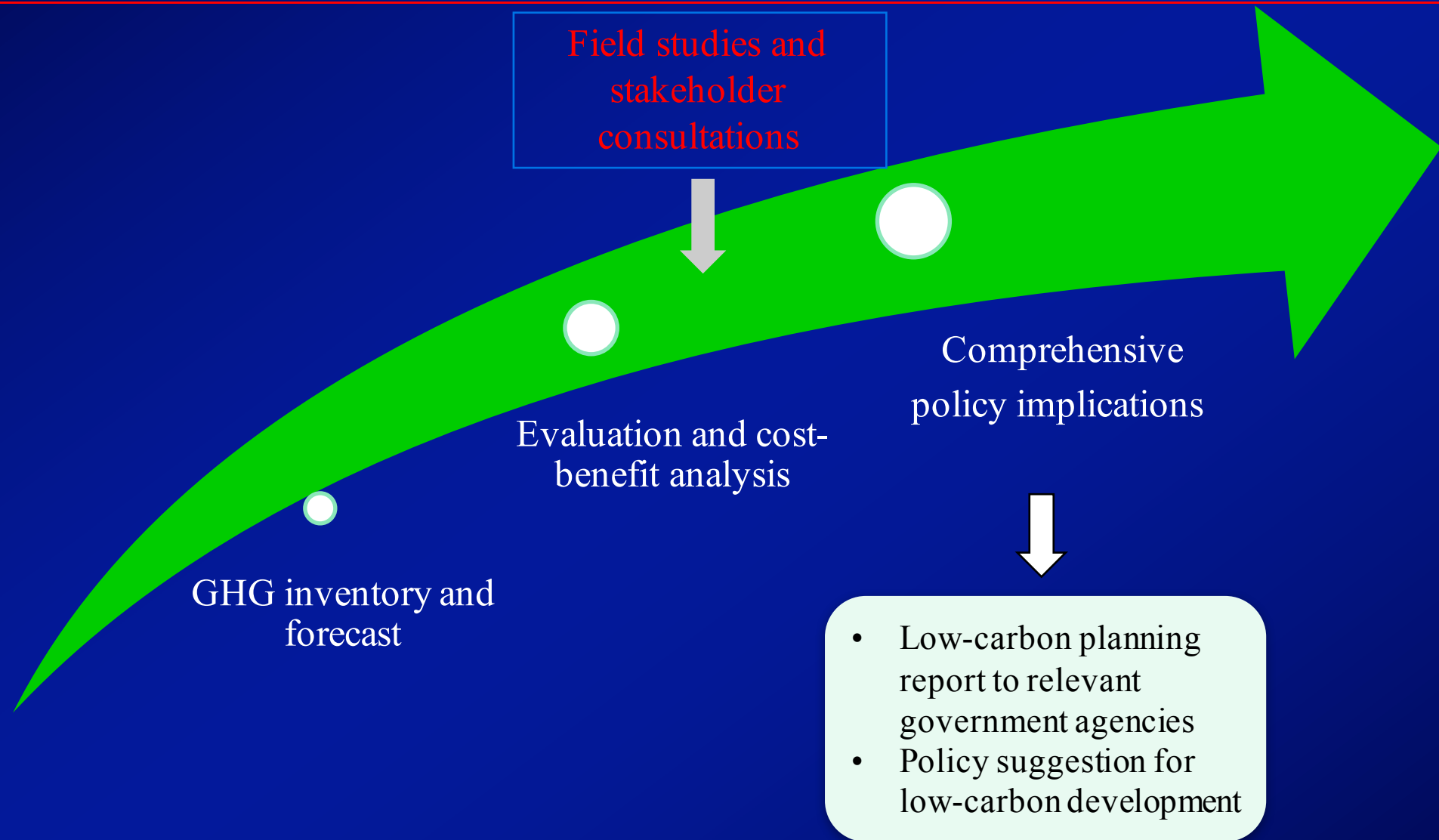
- Energy: 7 industries, 61 emission sources
- Industry: 5 industries, 19 emission sources
- Building: 2 industries, 27 emission sources
- Transportation: 4 industries, 13 emission sources
- Agriculture: 5 industries, 31 emission sources
- Forestry: 1 industry, 11 emission sources
- Waste management: 2 industries, 26 emission sources

The low carbon development policy library

- Through questionnaire investigation and expert consultation, about 40 policies are screened from about 300 policies of various industries as the key object to analysis.
- Policies can be divided into structural adjustment, technology progress, and fine management .
- Now 92% policies has been completed by quantitative analysis.



Procedures of Regional Low-carbon Planning



Low-carbon Policies Analysis System (PAC): *bottom-up*

Function

Process

Step

Outcome

Make sure the emission source and the industry which emission larger 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

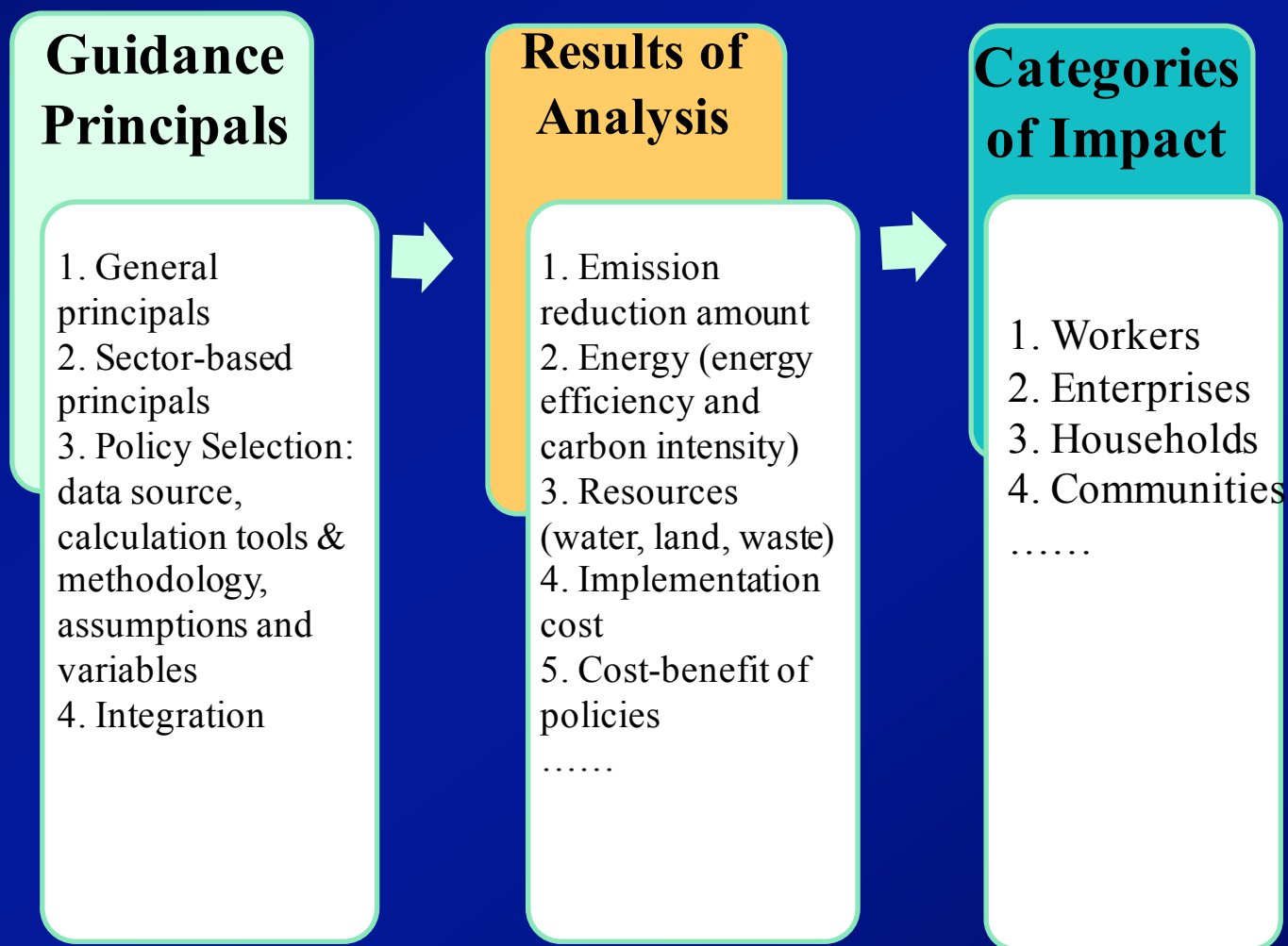
The analysis of the policy

- 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

China's LC policy analysis system (Policy Package of China. PAC)

Quantitative Analysis of Climate Action Plans



Regional Low-carbon Planning Toolkit:

Application

● Application and Promotion in Low-carbon Pilot Cities/Provinces (2013-2018)

➤ Industrial Park

- 39 low-carbon industrial parks in Chongqing
- Shenzhen International Low Carbon City

➤ Sectoral Road Map

- Energy, Industry, Building, Transportation, Agriculture, Forestry, and Waste management

➤ Province and City Low-carbon Planning

- West China: Chongqing, Chengdu, Guiyang
- East China: Guangdong, Shenzhen
- Middle China: Hubei, Xiangtan, Liuzhou

➤ National Low-carbon Policy and Peak analysis

➤ International expanding

- The Belt and Road regions

Regional Low-carbon Planning Toolkit: *capacity development*

● Capacity Building and Promotion

- Training: there are 5 training courses on the planning toolkit to be carried out during 2013-2018.
- Participants: including local government officials, climate change scholars, business practitioners, etc. More than 200 people have been trained up to now.
- The GEI had more training activities.

Introduction to Regional Low-carbon Planning Toolkit: *software copyrights*

● Achievements, 5 items of software copyrights.

1. Greenhouse gas emission inventories and emission forecasting tools in China's **energy** sector V1.0 (2016: 1472776)
2. Greenhouse gas emission inventories and emission forecasting tools in China's **industrial** sector V1.0 (2016: 1472783)
3. Greenhouse gas emission inventory and emission forecasting tool for China's **agriculture and forestry** sector V1.0 (2016: 1472726)
4. Greenhouse gas emission inventory and emission forecasting tool for China's **waste management** sector V1.0 (2016: 1472714)
5. China's sub sector greenhouse gas emission inventory and emission forecast **summary tool** V1.0 (2016: 1472721)



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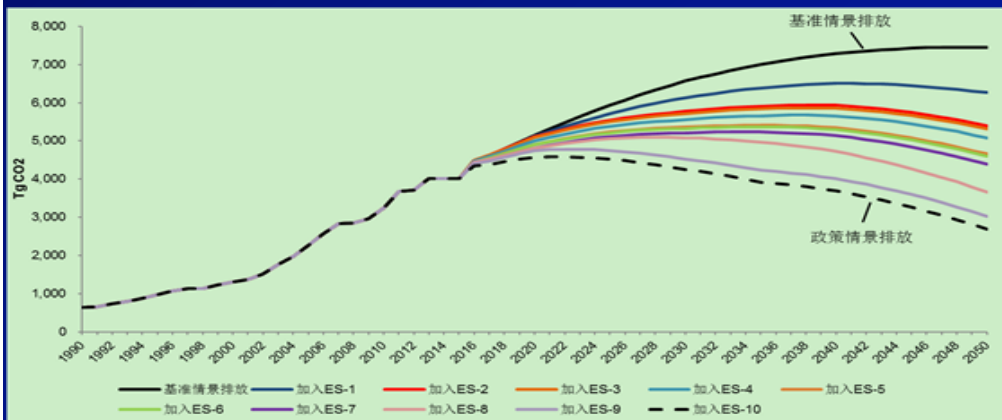
1. Background
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Empirical study on green and low carbon policy assessment

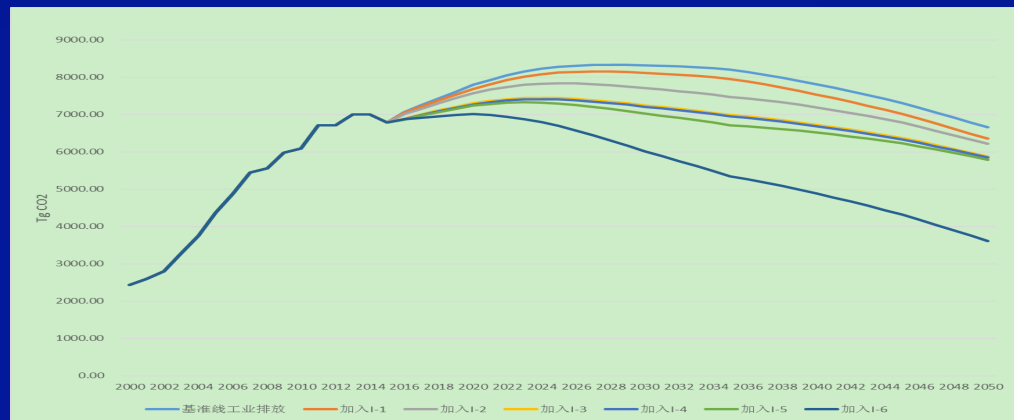
- **Sectors level** : Research on green and low carbon transition roadmap for key industries and sectors
- **Provinces and Cities level** : GHGs reduction evaluation and cost-benefit analysis of policies of low-carbon pilot provinces and cities
- **National level** : The simulation and policy mix analysis of China's carbon emission peak
- **Additional applications:**
 - Financing project planning
 - Chongqing low carbon transition planning (key sectors and projects layout)
 - Shenzhen International Low-carbon City planning assessment (key projects selection and layout proposal)

Empirical Study on green low carbon policy assessment: *sectors*

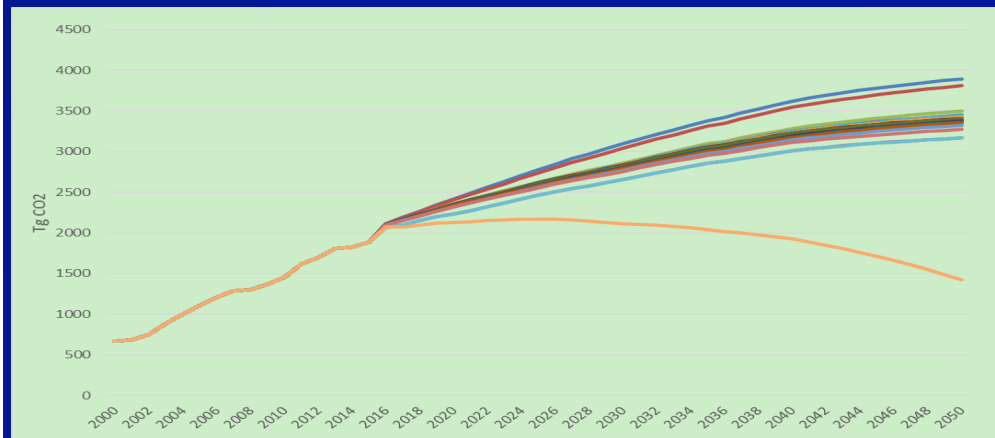
- **Sectors level** : Research on green and low carbon transition roadmap for key industries and sectors
Energy, Industry, Building, Transportation



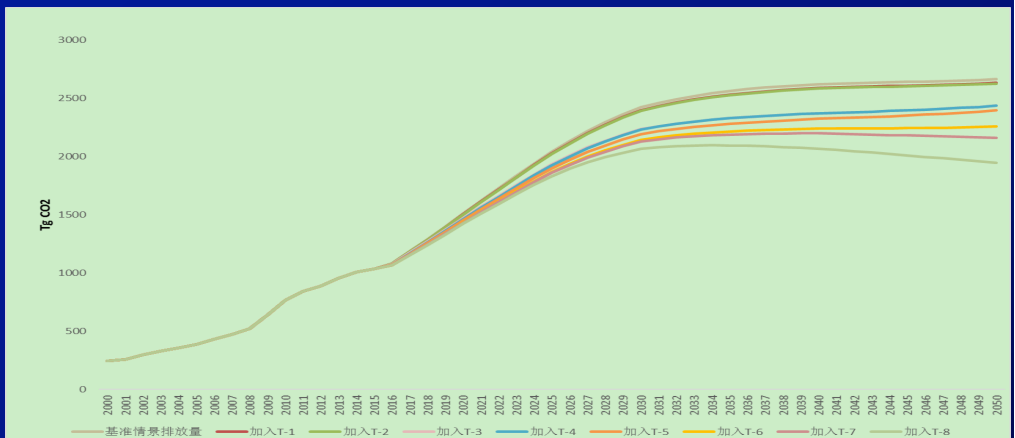
CO2 emissions from China's power and thermal supply sector under different scenarios



CO2 emissions from China's industrial sector under different scenarios



CO2 emissions from Chinese building sector under different scenarios



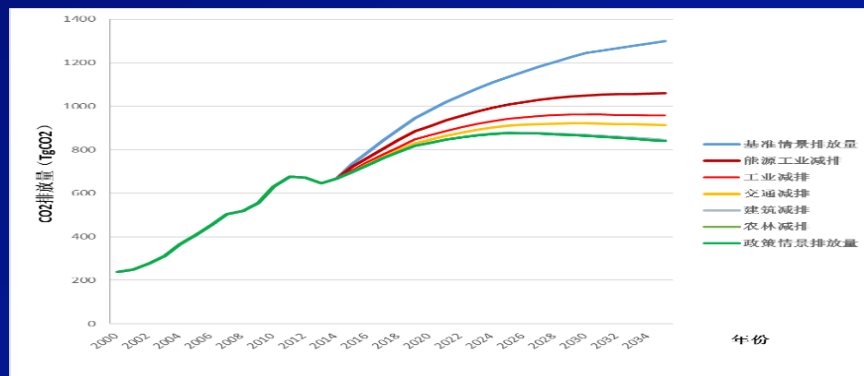
CO2 emissions from China's transportation sector under different scenarios

Empirical Study on green low carbon policy assessment: *local level*

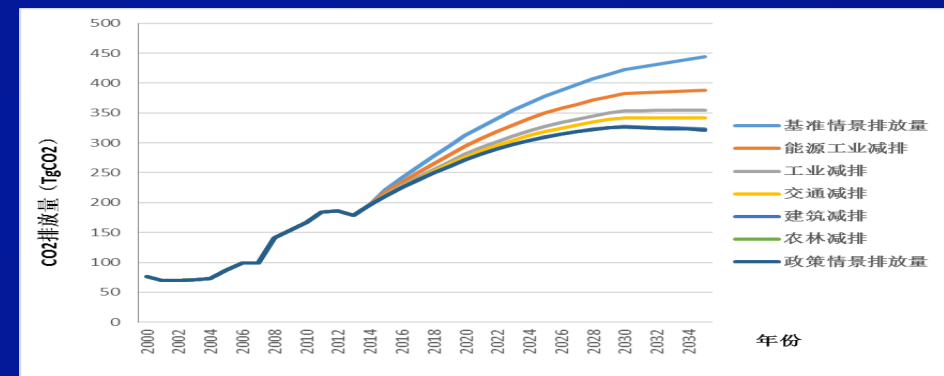
- **Provinces and Cities level** : Take the lead in carrying out GHG reduction evaluation and cost-benefit analysis of policies of low-carbon pilot provinces and cities

First batch: East (Guangdong, Shenzhen), Middle (Hubei), West (Chongqing)

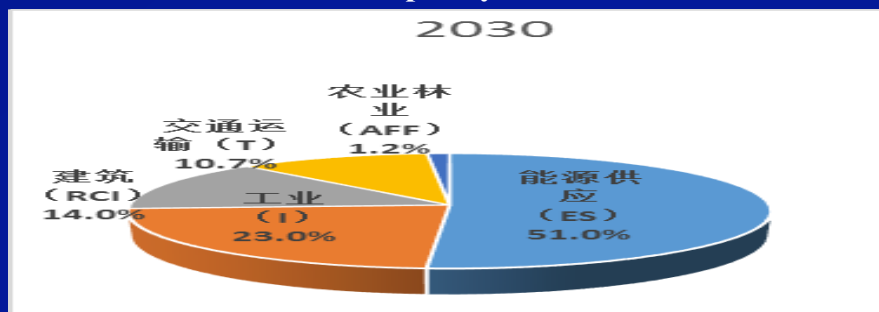
Second batch: Xiangtan, Liuzhou, Chengdu, Guiyang



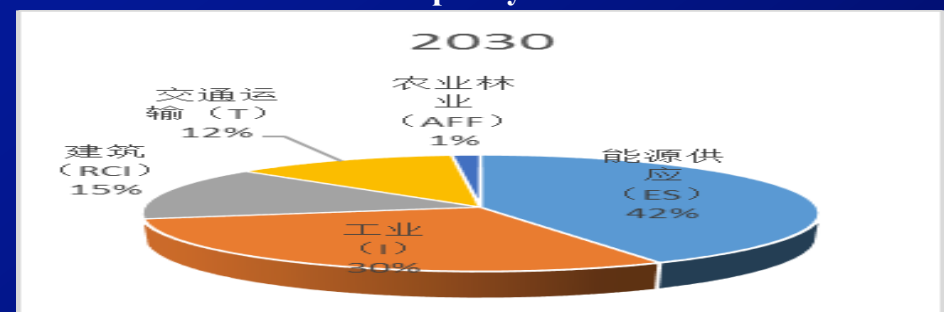
2000-2035 Guangdong GHG emissions of
BAU and policy scenarios



2000-2035 Chongqing GHG emissions of
BAU and policy scenarios



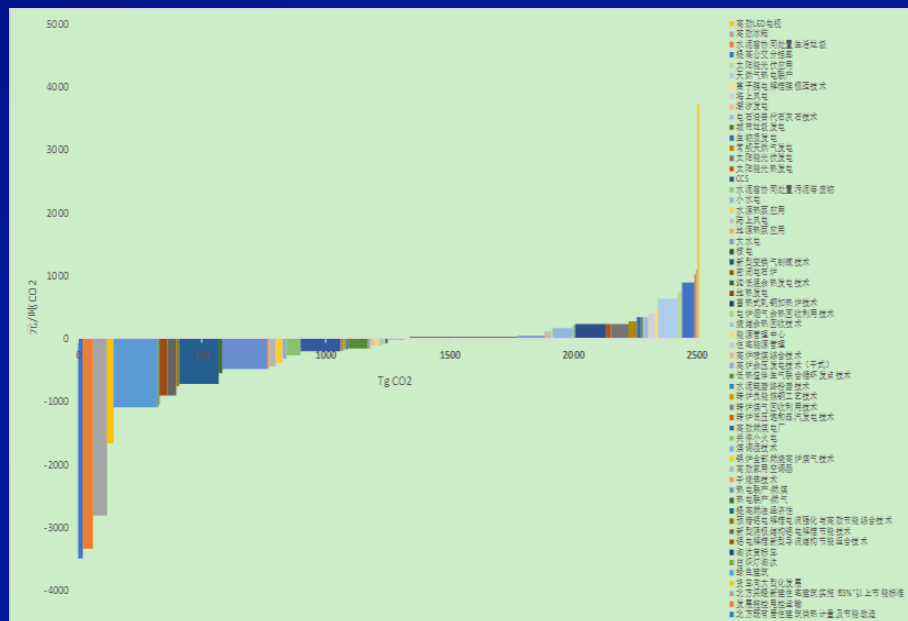
The contribution ratio of various sectors in Guangdong
in 2030



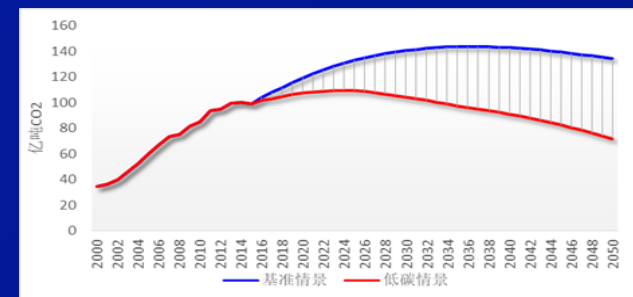
The contribution ratio of various sectors in Chongqing
in 2030

Empirical Study on green & low carbon policy assessment: *national level*

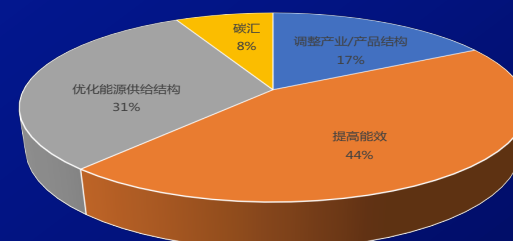
National level: An empirical study based on the low carbon pilots in the East, the Middle and the West regions, we simulated and analyzed the mixed low-carbon policies of China's carbon emission peak, evaluated the existing low carbon policies and the expected effect in the future, and proposed the suggestions on the adjustment of the low carbon policies at the national and regional level in 13th Five-Year.



Marginal abatement cost curve for China in 2030



The trend of GHG emissions in China (2000-2050)



GHG reduction contribution of four types of technology and policy options in 2030

Outcomes and Effects at both national and province/city levels

- We made the implementation scheme of the low-carbon pilot of Chongqing, which has been applicated by Chongqing development and Reform Commission. (2014)
- On the basis of the analysis results, the "climate change response" in the "13th Five-Year Plan" was drafted and submitted to the NDRC's climate division and planning department, which directly supported the making of the climate change part in the "13th Five-Year" plan. (2016)

重庆市发展和改革委员会

成果应用证明

中国科学院科技政策与管理科学研究所承担的英国外交和联邦事务部繁荣战略基金(SPF)项目《Evaluating Low Carbon Policies in 12th FYP and Planning for 13th FYP》,对重庆市“十二五”低碳相关政策进行了统筹分析和系统评价,提出的意见和建议具有针对性和操作性,研究成果对于我委制定重庆市“十三五”低碳相关政策具有参考意义,我委将在下一步工作规划中吸收和采纳部分研究成果。

特此证明。



“十三五”我国应对气候变化规划 思路与目标研究

“十三五”时期是我国全面建成小康社会的决胜阶段,是经济转型升级、全面推进现代化建设的时期,也是生态文明建设、应对气候变化的重要机遇期。深刻认识和把握气候变化对经济社会发展的重大意义,准确研判应对气候变化的新阶段新特点,明确“十三五”应对气候变化的目标与思路,对推动我国全面建成小康社会、实现经济社会可持续发展、资源可持续利用与生态环境保护,具有重大的意义和作用。

一、“十三五”我国应对气候变化背景及形势的判断

(一)“十三五”应对气候变化总体进展

1. 中央高层提出一系列新的发展理念,对应对气候变化战略引领作用

进入“十三五”时期,我国社会经济发展发生重大转变,经济增速有所放缓并逐步接近“新常态”,同时资源能源约束趋紧,在国内外都不合宜,引起社会广泛关注。在新的历史节点上,党和国家领导人审时度势,提出一系列新的发展理念,为未来发展方向指明了方向。这些理念有:包括生态文明建设在内的“五位一体”总体布局(2012)、能源革命(2012)、生态文明体制改革(2013)、一带一路建设(2013)、依法治国(2014)等。这些理念是在充分总结我国的认识和实践以及国际经验基础上提出和发展的,是立足于国情又符合世界潮流的发展方向。

2. 碳排放强度和能源强度不断下降,应对气候变化重大目标有所进展

碳排放强度和能源强度不断下降,尽管与经济放缓有一定关系,但据统计,“十二五”前三年,碳排放强度和能源强度分别下降了10.68%和9.03%,碳强度则比2005年降低28.5%。

能源结构不断优化。2012年底,中国煤炭占一次能源消费量比重下降为67.1%,2013年底化石能源在一次能源中的比重提高到9.8%,水电装机容量、风电装机容量、太阳能热水器集热面积等均居世界第一。

增加森林汇工作稳步推进,森林覆盖率由2005年的18.21%提高到21.6%,农业、林业、水资源、防灾减灾等重点领域适应气候变化能力有所增强。

3. 探索建立应对气候变化的制度框架

(1) 出台一系列综合性规划文件,初步形成应对气候变化的顶层设计。“十二五”时期,中国综合国家可持续发展战略的总体要求,加强了应对气候变化制度建设,陆续发布《“十二五”控制温室气体排放工作方案》、《国家适应气候变化

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Experience and Next Step

- **Legal role** of LC development planning
- The toolkit of planning should reflect the **integration** of green and low carbon practice, model system development and policy supporting system for **co-benefit**
- Establishment of the **planning guideline**, quantitative policy base and framework
- **Model forums** for comparison and cooperation
- Suitable for **developing economies (localization)**, and support the carbon emission peak prediction, the made of emission reduction roadmap, low carbon technology and policy optimization, and the planning and analysis function of the financing project library, **both at the regional level and national level**.
- The proposed **policy recommendations** have a solid foundation of model analysis, which can provide operational proposals and financed project planning for the local industry, with great potential for application.

**Thanks for your
attention!**

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