



# The China Coal Consumption Cap Plan and Policy Research Project

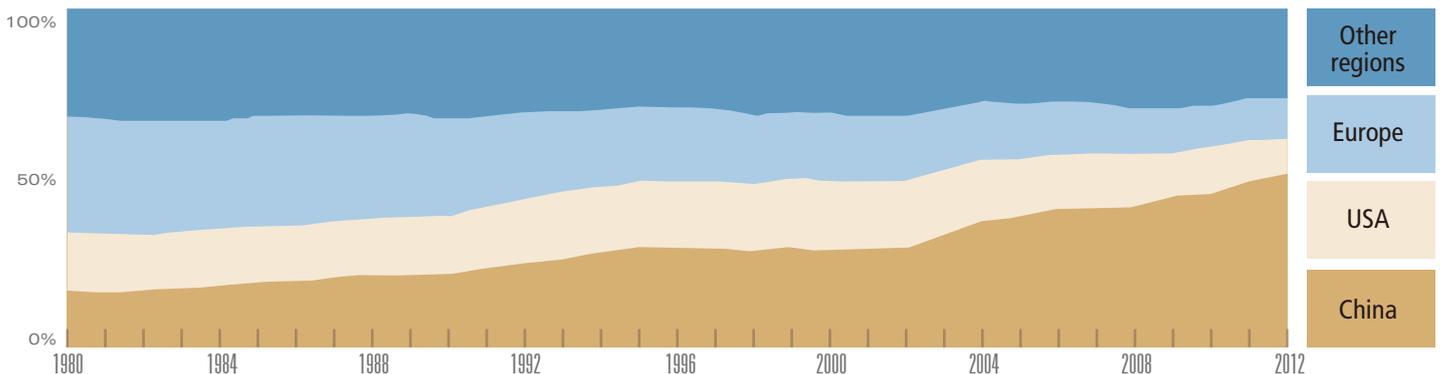


China is the world's largest producer and consumer of coal, accounting for nearly half of the world's total annual coal consumption. While coal is the main energy source for China's economic development, it has also caused serious damage to the environment and public health. In recent years, large areas of China have experienced frequent and severe air pollution in the form of thick smog, which poses a grave threat to public health. In response to climate change and air pollution, the Natural Resources Defense Council (NRDC) launched a China Coal Consumption Cap Project in October 2013. The project brings together 17 leading Chinese stakeholders, including government think tanks, research institutes, and industry associations, to develop a comprehensive roadmap and policy package for establishing and implementing a binding national coal consumption cap that aims to help China peak its coal consumption by 2020. Accelerating the replacement of coal with energy efficiency and cleaner energy sources will fundamentally help China achieve its long-term economic, environmental, and climate goals.

In recent years, the Chinese government has implemented

energy and carbon intensity targets, renewable energy development targets, and an energy consumption cap goal, which have all helped increase the Chinese economy's energy and carbon efficiency. However, despite these energy and environmental policies, coal consumption continues to rise. To address this rising coal consumption, the State Council in its September 2013 "Air Pollution Prevention Action Plan" called for "a medium and long-term national coal consumption cap target and target responsibility management system," and set regional coal consumption caps for key air pollution regions such as Beijing-Tianjin-Hebei, the Yangtze River Delta and the Pearl River Delta, requiring them to cap and reduce their coal consumption by 2017. The Air Pollution Action Plan recognizes that in order for China to address its severe air pollution, it must transform its energy structure. This requires a nationwide effort in which every sector and every region, province, and city needs to formulate a coal consumption cap target and implementation plan that will rationally control coal consumption, help develop cleaner energy sources, and improve air quality, and other environmental and public health measures.

## Global Coal Consumption By Region



Data Source: China Energy Statistical Yearbook 2013, Department of Energy Statistics, National Bureau of Statistics

# Project Objectives and Organizational Framework

## Overall Strategic Objective

To implement a coal consumption cap strategy and roadmap for achieving negative growth in Chinese total coal consumption by 2020. To facilitate China's carbon dioxide emissions peak as early as possible. To use higher energy efficiency, reasonable economic and management measures, and cleaner alternative energies by 2050 to lower coal consumption and achieve the goal of keeping global temperature rise below 2°C by the end of the century.

"We need to have the same resolve on the war on pollution as we did on the war on poverty."

**Li Keqiang**

Premier of the People's Republic of China

## Sub-target 1

To establish and implement national, sectoral, and sub-national (regional, provincial and city) coal consumption cap strategic targets, roadmaps and plans.

## Sub-target 2

To establish and improve market mechanisms, integrate effective administrative methods, and strengthen implementation measures in order to achieve the coal consumption cap strategic target.

## Sub-target 3

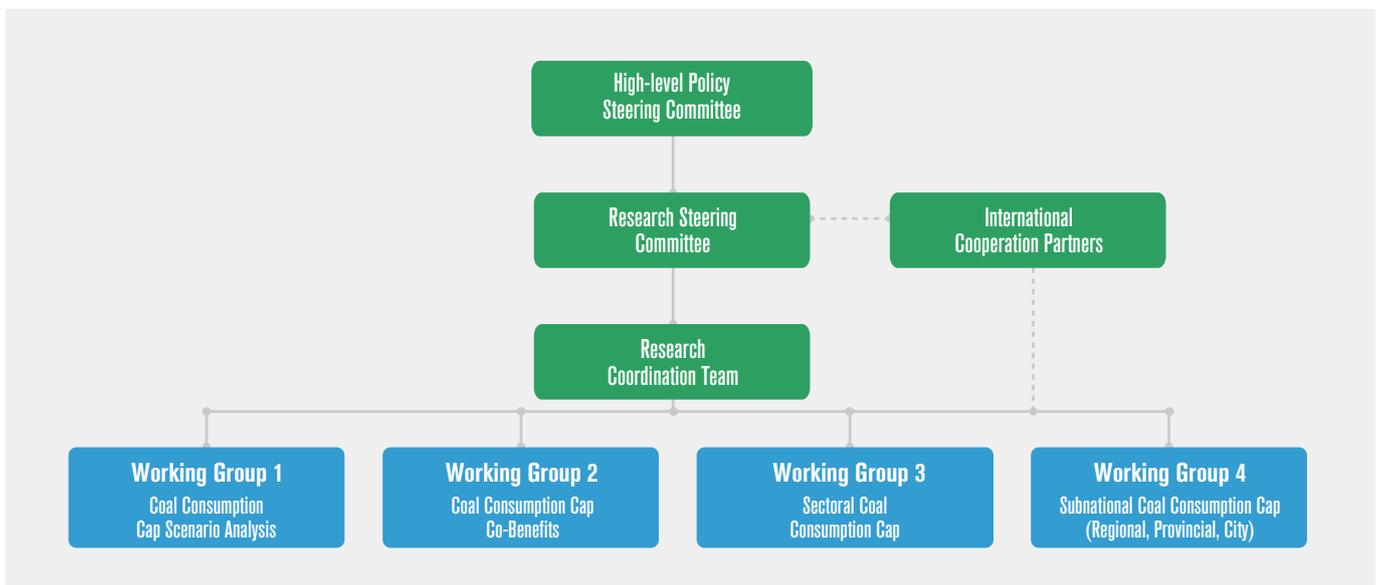
To incorporate the coal consumption cap target, plan and policy into the Thirteenth Five-Year Plan. To establish and implement an action plan and a responsibility system to realize the coal cap target during each key phase.

## Collaboration Network

The Natural Resources Defense Council is working closely with funders and supporting 17 leading Chinese institutes to conduct research for the project. Other international organizations will also provide technical support. This project will provide independent, innovative, objective, practical, and high quality research and recommendations. By gathering specialized knowledge and experience and establishing a multi-disciplinary, cross-sector research network, the project research partners will develop an effective coal consumption cap plan and implementation measures.

## Organizational Structure

- The Research Steering Committee is composed of well-known Chinese policy and technical experts who guide and determine research direction and scope;
- The Policy Steering Committee is composed of policymakers and leaders from relevant government departments and industry, who provide feedback on the policy analysis and recommendations, as well as their implementation feasibility;
- Research results will be submitted to relevant ministries for consideration in establishing a national coal consumption cap policy and target for the Thirteenth Five Year Plan;
- The coal consumption cap policy research will cover the period 2015-2050, with research mainly focusing on the 2015-2030 period;



## National Coal Consumption Scenario Analysis

Working Group I will develop and analyze three scenarios for China's coal demand, considering not only international and domestic medium and long-term economic development trends and outlooks, but also taking into account climate change, energy-saving, environmental, and public health goals that mandate that coal consumption be controlled. Based on these different constraints, the research will develop corresponding coal consumption cap implementation plans and policy options.

### Energy System Analysis Research Center, Energy Research Institute, National Development and Reform Commission (Working Group Head)

The research group developed medium and long-term scenarios for China's energy and coal demand using general equilibrium, energy technology optimization and other system analysis tools under different social, economic, industrial technology, and alternative, non-fossil fuel energy development conditions. By analyzing and comparing the feasibility of different scenarios of coal consumption reduction in China, while taking into account sustainable economic and social development requirements and resource conservation constraints, this research will propose national coal consumption control targets, pathways, and key indicators as well as clarify the overall framework for a coal consumption control policy.

### National Center for Climate Change Strategy and International Cooperation

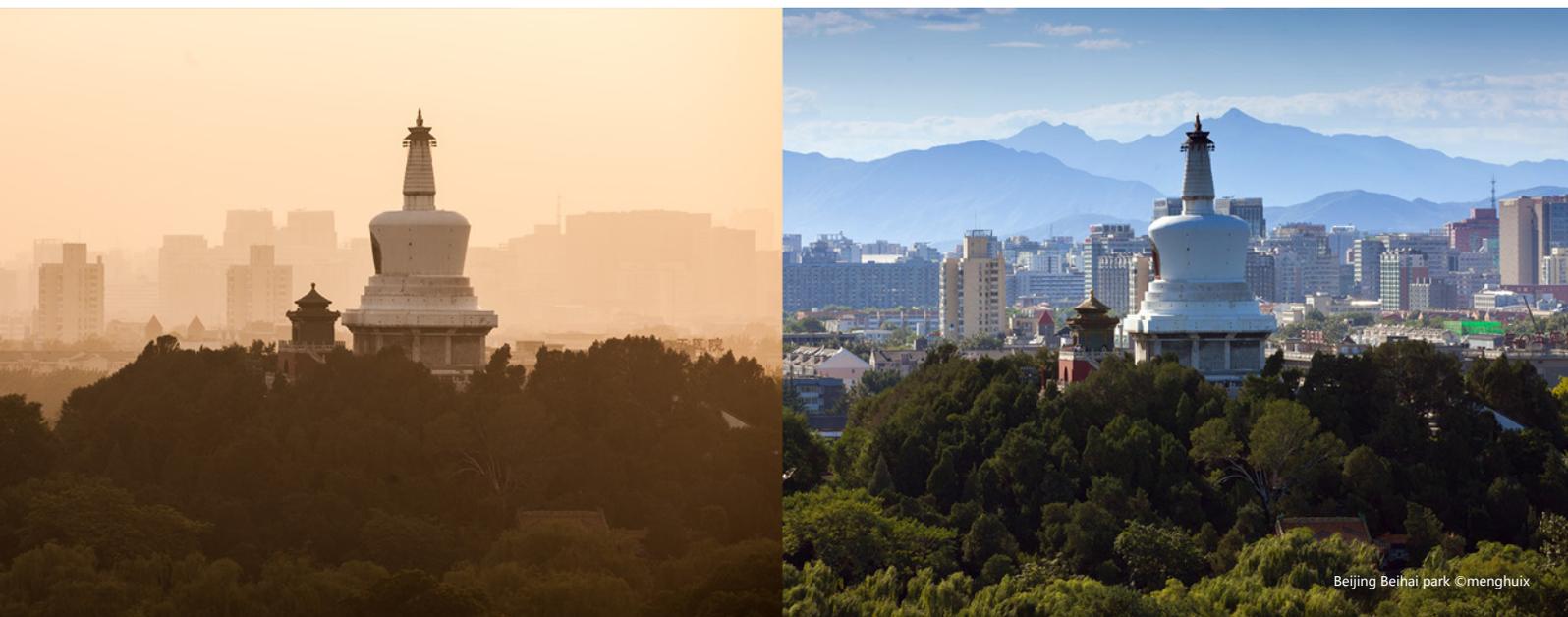
The National Center for Climate Change Strategy Research and International Cooperation will analyze and forecast medium and long-term global carbon emissions scenarios and provide recommendations for China's role and responsibility for mitigating global carbon emissions at different development stages. The center will also analyze other countries' changing coal consumption trends, their driving force, and factors restricting global coal consumption.

### Development Research Center of the State Council

The State Council Development Research Center will conduct research on the medium and long-term prospects for international and Chinese economic growth and industrial restructuring, in order to determine the energy and coal needed to satisfy economic development targets. Research will include both a qualitative analysis of China's environment, ecology, resource use, and climate change trends and a quantitative analysis of the effect of China's coal consumption on economic growth and industrial structure.

### Research Institute for Fiscal Science, Ministry of Finance

The Fiscal Science Research Institute will investigate how to use government taxation, investment, and finance policies and tools to guide and actively support the coal industry's restructuring and more sustainable development. Analysis will include rationalizing the existing complex fee structure of the coal industry and evaluating the use of a coal resource tax, environmental tax, carbon tax, ecological compensation tax, as well as clean energy subsidies to support a national coal consumption cap policy.



## Coal Consumption Cap Co-benefits Analysis

Limiting coal consumption is a key measure in addressing China's severe air pollution, while also bringing climate mitigation, water savings, health improvements, green jobs and other co-benefits. Working Group 2 will analyze the co-benefits of capping coal consumption by region, time, quantity, and monetized value. These quantified benefits form the foundation for internalizing the external costs of coal throughout its lifecycle and provide a basis for the formulation and implementation of policies to price coal's external costs. Working Group 2 will designate a series of ecological red lines and government planning blue lines to guide the establishment of coal consumption cap targets and scenarios.

### Institute of Energy, Environment and Economy, Tsinghua university (Working Group Head)

Tsinghua University is responsible for overall analysis of the cumulative effects from restructuring the energy system under a coal consumption cap policy. Research will include a quantitative calculation of the external costs of coal in order to arrive at a comprehensive analysis of the co-benefits of a coal cap policy nationally and in key regions. Tsinghua University will also research and compare alternative energy technologies (including costs and pollution reductions) and conduct an integrated assessment of energy supply options (including costs, efficiency, energy security, etc.)

### Chinese Academy for Environmental Planning

Based on the State Council's "Air Pollution Prevention Action Plan," this research will develop short, medium, and long-term goals for improving China's air and environmental quality, setting an environmental limit for coal consumption. The benefits from pollutant reductions and environmental improvement under different coal consumption cap scenarios will be calculated using the WRF-CMAQ model (Weather Research Forecasting-Community Multi-scale Air Quality Model), which analyzes air pollutants (PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>x</sub>), heavy metals (mercury), etc., to arrive at a summary of the monetized benefits and avoided costs of capping coal consumption.

### National Center for Climate Change Strategy and International Cooperation

The National Center for Climate Change Strategy Research and International Cooperation will analyze the impact of coal consumption control targets on greenhouse gas emissions to quantify the medium and long-term economic benefits of carbon dioxide, black carbon, and methane control, as well as CCUS (carbon capture, utilization, and storage) applications.

### China Institute of Water Resources and Hydropower Research

Based on the national distribution of water resources, the Institute of Water Resources and Hydropower Research will analyze water use and damage to water resources resulting from the coal industrial process in order to develop a water resource constraint for the coal consumption cap. Researchers will also determine the appropriate limits for regional coal mining and utilization, develop recommendations for reducing water use in coal mining and utilization, and quantify the water resource protection co-benefits of a coal cap policy.

### School of Public Health, Peking University

Using an internationally recognized model and health standards along with national air pollution health impacts data, the Peking University School of Occupational and Environmental Health will propose an air pollutants and public health "red line" and government planning "blue line" for establishing a national coal consumption cap. The red line will be based on analysis of occupational diseases from coal mining and health problems caused by exposure to air pollution from coal combustion, including hospitalization, respiratory and circulatory illnesses, cancer, and mortality data. Researchers will evaluate the public health losses from coal production and consumption and quantitatively assess the co-benefits and avoided costs of a coal consumption cap policy on public health in China.

### Institute for Urban and Environmental Studies, Chinese Academy of Social Sciences

Combining an input-output model and field surveys, the Institute for Urban and Environmental Studies will conduct an integrated dynamic assessment of the effects on employment of a total coal consumption cap policy and energy system restructuring. A coal consumption cap policy will reduce employment in the coal industry and will also affect related industries, such as the power, iron and steel, and cement industries. However, it will also stimulate green job growth in renewable energy, energy efficiency, clean coal, and carbon capture, utilization and storage technology (CCUS).

### China Coal Research Institute

This project will evaluate the adverse impacts and costs of the coal mining industry on the environment, public health, and PM<sub>2.5</sub>, as well as the overall impact of a coal consumption cap on the coal industry. The research will propose targets and corresponding pathways for more environmentally friendly development and restructuring of the coal industry using clean coal and CCUS.

## Sectoral Coal Consumption Cap Analysis

Working Group 3's analysis will focus on coal consumption in key coal-consuming sectors, including the power, cement, iron and steel, coal chemicals, and building sectors. Through an analysis of each sector's energy-saving potential (through improved management, technology, product quality, etc.), fuel substitution, elimination of high-polluting factories, excess capacity resolution, and waste energy use, this research will set up a sectoral coal consumption cap target (including an electricity consumption cap target) to ensure more efficient and cleaner use of coal and coal-fired power.

### Beijing Energy Efficiency Center, Energy Research Institute, National Development and Reform Commission (Working Group Head)

The Beijing Energy Efficiency Center will forecast the medium and long-term coal and power needs of key industrial sectors to determine when and at what level each sector can peak its coal consumption. Research will focus on developing a consistent sectoral scenario analysis methodology, structural change and transition within sectors, cross-sectoral and emerging sector analysis, industrial relocation and re-planning, cross-sectoral energy efficiency technologies, and improvements in industrial productivity.

### China Electricity Council and North China Electric Power University

The China Electricity Council and North China Electric Power University will forecast China's medium and long-term growth in electricity demand and analyze the potential for capping electricity generation from coal-fired power plants through increased use of renewable energy and other cleaner electricity sources. Researchers will calculate the power sector's coal consumption peak value and timing under a baseline scenario and conduct an in-depth review of the economic efficiency, competitiveness, technological potential, and grid feasibility of various alternative energy technologies.

### China Iron and Steel Industry Association & China Cement Association

The China Iron and Steel Association and China Cement Association will forecast the demand for iron, steel, and cement, and analyze the potential for industrial coal-saving and coal-replacement technologies, changes in product structure/mix, and utilization of secondary waste heat and energy. They will also determine the future coal consumption peak value and timing for the iron and steel, and cement industries under different coal cap scenarios.

### China Coal Processing and Utilization Association

This project will analyze the role of the coal chemical industry in China's overall energy strategy, including future development paths for the coal chemical industry that consider the environmental impacts and system energy efficiency of the coal chemical production process (especially coal-to-oil and coal-to-gas). Researchers will determine the coal chemical industry's coal and power consumption cap targets and develop market mechanisms and price signals to control the unreasonable expansion of certain coal chemical products.

### Center of Science and Technology of Construction, Ministry of Housing and Urban-Rural Development

Based on a new model of urbanization and sustainable development, the Ministry of Housing's Science and Technology Promotion Center will forecast the amount of residential buildings and analyze the construction industry's coal consumption and energy-saving potential. Researchers will determine different coal consumption targets and formulate clean technology roadmaps for mega, large, medium, and small-scale cities.



## Regional Coal Consumption Cap Analysis

Working Group 4 is responsible for determining the subnational allocation of national coal consumption cap targets. Based on regional air quality conditions and goals, administrative jurisdictions, regional economic differences, municipal air quality deterioration and other factors, the Working Group will allocate the national coal consumption cap target and develop recommendations for a target responsibility management system at the regional, provincial, and city levels.

### Chinese Academy for Environmental Planning (Working Group Head)

Using the WRF-CMAQ model to analyze coal consumption and air pollutant emissions control scenarios in key regions, the Chinese Academy of Environmental Planning will determine the constraints that subnational air quality improvement goals place on coal consumption, and propose regional, provincial, and city coal consumption control targets based on local environmental goals.

### Energy Economy and Development Strategy Research Center, Energy Research Institute, National Development and Reform Commission

The Energy Research Institute will use the LEAP (Long-range Energy Alternative Planning System) model to predict each province's future coal consumption demand, based on current coal consumption, regional development needs, regional environmental constraints, greenhouse gas emissions, and coal consumption control costs and potential. Based on regional air quality goals, they will then recommend coal caps targets and peaking times and levels for each province.

### National Center for Climate Change Strategy and International Cooperation

The National Center for Climate Change Strategy Research and International Cooperation will analyze how provincial carbon intensity targets have been incorporated into provincial Five-Year Plans, forecast each province's carbon emissions peak value and timing, and determine regional carbon emissions control targets for different time periods. This research will investigate the relationship between provincial carbon intensity targets and coal consumption cap targets to provide the basis for setting provincial coal cap targets from a carbon emission control perspective.

### Energy System Analysis Research Center, Energy Research Institute, National Development and Reform Commission and Renmin University

The Energy Research Institute and Renmin University have classified China's 293 prefecture-level cities into different categories based on population size and coal consumption level, and will establish models for forecasting energy and coal demand for each category of cities. This project will use scenario analysis to determine each city category's coal consumption peak timing and value, incorporating environmental, health, and carbon emissions targets. This project will also establish a regional-provincial-city coal consumption control target decomposition methodology, and carry out case studies for different categories of cities. From this analysis, the co-benefits of city coal consumption caps will be calculated and analytical tools to conduct municipal coal consumption reduction research will be developed.

