Investment Requirements and Potential Effects of Implementing China's Air Pollution Prevention and Control Action Plan (2013-2017) **Executive summary**









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China's air pollution situation is dire to the point of threatening public health and social stability, with PM₁₀ and PM_{2.5} being the most severe pollutants. To improve air quality and standards of living, the State Council released the *Air Pollution Prevention and Control Action Plan* (Hereby known as the *Action Plan*). The national Action Plan outlines air quality goals for the entire country and requires regional governments to follow suit with regional action plans. With these plans in place, *Investment Requirements and Potential Effects of Implementing China's Air Pollution Prevention and Control Action Plan (2013-2017) takes a look at how much financial resources would the national, as well as various regional governments would need in order to fully execute and meet air quality targets. Additionally, the Report analyzes what social, economic and public health impacts can result from implementing these action plans. Four areas of focus are covered in this report: China entirely, the Beijing-Tianjin-Hebei region (also called Jingjinji Region), Yangtze River Delta and Pearl River Delta. The <i>Report* is meant to serve as a scientific guide for the abovementioned regions, as well as other regions to comply with the *Action Plan* y 2017.

The *Report* analyzes national and regional Action Plans to estimate the funds that would be needed for the country and the Jingjinji Region, Pearl River Delta and Yangtze River Delta to meet the planned targets. Using input-output analysis to study economic needs, as well as epidemiology studies to examine public health effects, the *Report* found the major conclusions outlined below.

The report estimates that China needs a total of RMB 1.84T to execute the *Action Plan*. Of which, the Jingjinji Region, Yangtze River Delta, and Pearl River Delta would need RMB 249.029Bn, 238.469Bn and 90.358Bn, respectively. These funds can be broken down into the categories below:

- On a national level, improving energy structures, controlling pollution from mobile sources, industrial sources and non-point sources would cost 284.4Bn, 1,406.766Bn, 91.544Bn and 61.572Bn, respectively.
- The Jingjinji Region would need RMB 63.655Bn to improve its energy structure, 76.914Bn to control pollution from mobile sources and 108.460Bn to treat pollution from industrial sources
- The Yangtze River Delta would need RMB 66.759Bn to improve its energy structure, 143.831Bn to control pollution from mobile sources and 27.879Bn to treat pollution from industrial sources.
- The Pearl River Delta would need RMB 24.514Bn to improve its energy structure, 62.043Bn to control pollution from mobile sources and 3.801Bn to treat pollution from industrial sources.







Graph 2: Regional investment requirements to implement regional Action Plans

China is severely lacking funds to treat air pollution and is over-reliant on government sources, making efforts to improve air quality highly vulnerable changes. Unless there is a more stable mechanism to finance air quality action plans, it would be difficult to ensure sufficient financial resources for China, and the three major regions, to meet air quality targets by 2017.

Conservative estimates reveal that RMB 1.84T would be required of China to meet 2017 air quality targets. However, a majority of the provinces and cities that have local air quality action plans have not allocated any financial resources or funding mechanisms to implement these plans. Established financing mechanisms also face a variety of problems, rendering them unsuitable for providing long-term support. Even though the central government could be considered a stable, consistently growing funding source, it is still insufficient to meet national demand. For example, the central government provided 5Bn and 10Bn during 2013 and 2014 for air quality improvement measures, leaving a large deficit between the amount needed and the amount provided.

If China fully implements the Action Plan by 2017, 110,600 deaths can be prevented every year. The Plan is expected to extend average male life expectancy by 0.24-1.48 years and average female life expectancy by 0.34-3.48 years. By 2017, there would be a reduction of 110,600 deaths per year. Among all provinces and cities, Hebei is estimated to have the greatest reduction in annual deaths and incidents of respiratory diseases. Of these diseases, acute bronchitis is expected to be most impacted—by 2017, the *Action Plan* is expected to reduce the number of acute bronchitis cases by 2.1059m.

Analysis also revealed that air pollution has a noticeable negative effect on life expectancy. That said, successfully implementing the *Action Plan* could extend life expectancy by an average of 0.24-1.48 years for males and 0.34-3.48 years for females. The Jingjinji Region—especially Beijing—is calculated to have the greatest improvements in overall life span out of all regions in China. Beijing is ranked first in life expectancy improvement due to a variety of factors, one of which is attributed to high initial levels of PM_{2.5}, and moreover to pollution reduction policies that are stricter than that of surrounding areas. Those aged 65 and under will experience greater health improvements than those who are over 65, with average expected improvements ranging from 0.37-3.77 years and 0.2-1.19 years, respectively.

Implementing the *Control Action Plan* is expected to increase China's GDP by 2.04T and create 2.9113m jobs over the course of five years.

New environmental industries are expected to increase China's GDP by 2.82T, adding 3.8031m jobs, while eliminating outdated industries will result in a negative GDP growth of 776.257Bn and cut 891,800 jobs. This makes a net GDP increase of RMB 2.04T with 2.9m additional jobs, proving that investing in cleaner air can ultimately support sustained economic growth and increase employment on a relatively short timeline. Those that will see the greatest changes will most likely be working in the transportation equipment manufacturing industry, general and specialized manufacturing industries, and agriculture, forestry, livestock and aquaculture industries. Metal smelting and processing, chemicals, metal products, financial services, education, wholesale and retail, and transportation and logistics sectors will likely benefit from the Plan.

Region	GDP (Billions RMB)	Employment (10,000 new jobs)
China	2,040.301	291.13
Jingjinji	3.566	4.08
Pearl River Delta	85.285	7.48
Yantze River Delta	278.203	23.83

Table 1: GDP and employment benefits from implementing the Action Plan

Graph 3: Top 10 industries impacted by the Action Plan







Graph 4: Top 10 industries with the greatest changes in residential income due to the Action Plan



Graph 5: Top 10 industries with the greatest employment growth due to the Action Plan

Policy recommendations

Increase financial support to treat pollution from transportation sources, to ensure successful policy implementation.

Private financial support for pollution abatement should be increased, following the "polluter pays" principle to push green, sustainable industries. Investments policies should be strengthened to compliment air quality policies. The transportation sector should be especially targeted to eliminate outdated, yellow-label vehicles and accelerate the development of new energy vehicles. In terms of environmental enforcement, in addition to setting proper incentives with pricing mechanisms, China's national government should create a standardized system to address major polluters and exclusively allocate, utilize and manage funds to distribute rewards in place of subsidies. The central government should also fund infrastructure that aligns with air pollution goals, while increasing the national budget to encourage more private investment into energy efficiency, emissions reduction and pollution control industries.

Governments should clarify responsibilities around investment and finance channels.

First, the government should establish an official mechanism to budget for the *Action Plan* to secure continued funding. Additionally, private sectors should be held more responsible, financial penalties for environmental violations should be increased, while costs to meet environmental standards should be reduced. We should also work to improve China's environmental tax, emissions trading and other policies, promote internalizing environmental costs and build effective pricings mechanisms for natural resources. Finally, we should clearly define boundaries between the market and the government, to fully leverage the effects of policy as well as market mechanisms. Government powers and responsibilities should be explicitly outlined, and projects such as eliminating yellow-label vehicles that require government actions and financial support should be addressed and as soon as possible with a large amount of funding to ensure their completion. For projects that require government guidance as well as market forces, the private sector should be encouraged through mechanisms such as emissions trading to reduce overall pollution amounts. Government should refrain from intervening excessively or micro-managing, but rather focus on larger macro-economic goals to guide infrastructure developments and increase funding efficiency.

Expand and improve financing channels to implement the Action Plan.

China has been gradually increasing investments to improve air quality, but relying on only national funding and existing funding channels will make filling financial requirements difficult. To expand and improve clean air funding channels, the following strategies can be considered:

- 1. Distribute local government's bonds to gather idle financial resources to treat air pollution
- 2. Quicken transactions that reduce air pollution; provide multiple options and increase flexibility for private entities to prevent and control pollution.
- 3. Steadily push for environmental asset securitization, increase the liquidity of such assets to highlight the financial appeal of environmental protection.
- 4. Create a dedicated fund for the exclusive purpose of air pollution prevention and control. The fund can be first 'seeded' by the government to encourage additional investments, and additional support can be provided through subsidies and low interest loans.

Implement policies to encourage the growth of environmental protection companies

Implementing the *Action Plan* will bring huge investment amounts to help quickly grow the environmental industry, giving companies an unprecedented opportunity to grow. However, the industry is still facing challenges, despite having increased investment over the past few years. It is still lacking competitiveness and consistent standards, which calls for the *Action Plan* to help drive innovation and development.

Strengthen the research on technical methodologies for calculating the effects of implementing the *Action Plan*

Although this report fully examined the financial requirements and effects of the *Action Plan*, there are still some technical methodologies that need to be explored and improved:

- In this research, the calculation guide was proposed to evaluate the investment requirements for implementing local Action Plan. The technical and economic parameters used in this report are based on national average data, which can provide guidance through a preliminary unified framework. However, to better focus on major regions such as the Jingjinji Region, Pearl River Delta, Yangtze River Delta and other local regions, more industrial research is needed to determine technical and economic parameters that better fit the local environment.
- 2. Accelerate the process to determine national investment plans for the Action Plan, and strive to begin financial assessment efforts for Jingjinji, Pearl River Delta and Yangtze River Delta by the end of 2015. Investment gaps for these areas should be clearly defined and addressed to remove any future investment roadblocks. We also propose to begin planning for investment performance evaluations by 2017 to further solidify foundations for a robust investment system.
- 3. Strengthen basic research studying the effects of pollution on human health. With health effects being a major area of focus for the public, the country should quickly expand clinical epidemiology studies on air pollution exposure and reactions to understand health effects of implementing the *Action Plan*.
- 4. Expand methodologies to study the contributions of pollution control on society's overall social and economic well-being. This will help to understand the effects of the *Action Plan* on society as a whole.
- 5. Improve quantitative evaluations on emission reduction and clean energy technologies. Increased investments will foster innovation in these industries, and better assessment systems will help support and guide these developments.
- 6. Increase research to analyze effects of implementing the *Action Plan* on industries, to better understand how related investments have impacted market's scale and quality.

7. Devote more attention to VOC and ozone emissions. While controlling PM_{2.5} concentrations is a priority of the *Action Plan*, recent air pollution analysis reveals growing emissions of ozone and volatile organic compounds, which deserves increased attention.