

China's War on Air Pollution: Can Existing Governance Structures Support New Ambitions?

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Abstract

Unprecedented and highly visible degraded air quality in China's urban centres has prompted a step change in central government control efforts in recent years. This "War on Air Pollution" has included a mixture of administrative controls, regulatory clampdowns, economic incentives and public education campaigns. A critical constraint on how policies are designed and implemented is the central government's capacity to access accurate cost information, and monitor, evaluate and enforce the policies at subordinate levels of government. We examine in detail the directives and arrangements that underpin China's "War on Air Pollution" at the provincial level, taking Hebei province as a case study. Located upwind of Beijing, Hebei's heavy industries have been a particular focus of the environmental policies. The current approach, which requires highly specific and costly local actions, yet allocates funds centrally, suffers from misaligned incentives and does not address longstanding weaknesses in local policy monitoring, evaluation and enforcement.

Keywords: Beijing; Hebei province; air pollution; environmental governance; central–local relations; fiscal system

China's attention to environmental protection has evolved along with its development model. Over the past ten years, the government has emphasized a shift away from previous reliance on heavy industry, investment-driven growth towards a service sector-oriented, consumption-driven growth model, although only recently has this shift begun in earnest. Especially after an acute episode of bad air quality over Beijing in January 2013,¹ the government has shown increasing resolve to tackle the problem of air pollution, issuing a series of State Council

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1 On 13 January 2013, the concentration of fine particulate matter (PM_{2.5}) reached an average of 755 per cubic metres in Beijing, more than 30 times the World Health Organization's upper limit for safe air, and double the average for bad days in Beijing. In fact, the pollution episode covered one sixth of China's territory, and demonstrated that the pollutants from China's soaring energy consumption are

edicts that call for sharp curbs on polluting industries.² These changes came largely in response to recognition that past policies were not doing enough to curb activities contributing to air pollution, especially the formation of PM_{2.5}, which carries the most severe health effects. These changes have attracted international attention and praise, both for their impact on air pollution as well as their potential to reduce China's sizeable contribution to global greenhouse gas emissions, largely by displacing coal.³ But these shifts beg an important question: are patterns of governance – which are in many respects highly decentralized – also evolving in ways that support implementation of these policies?

Conventional wisdom holds that when it comes to environmental protection, broadly speaking, Beijing sets the rules and the localities are expected to implement them with limited support from central authorities.⁴ While in the past this system has succeeded in curbing pollution in some areas, results were highly variable and enforcement was plagued by discord between local growth and environmental objectives.⁵ Rhetoric suggests that this time the central government is more committed to ensuring results on the ground, given the magnitude of the challenge and perceived consequences of inaction. In comparison to his predecessors, President Xi Jinping has emphasized environmental progress as a central component of his overall policy platform. His government has embedded environmental sustainability within a broader portfolio of policy priorities announced in the Third Plenum of the 18th Party Congress in November 2013. Indeed, in late February of 2014, President Xi went so far as to declare “war” on air pollution.⁶ Typical of the Xi government, targets for air pollution are ambitious and time frames for implementation are short, requiring, by the end of 2017, a 15–33 per cent reduction in PM_{2.5} (particulate matter) concentrations in the areas most affected. Air pollution mitigation plans, which target coal, have played an important role in the formulation of China's recent international commitment to reverse its rising CO₂ emissions trajectory by 2030. The incorporation of environmental policy as an important element of the country's broader foreign policy agenda was cemented with the US–China Joint Announcement on Climate Change and Clean Energy Cooperation in the Asia-Pacific Economic Cooperation (APEC) summit with President Obama in November 2014.

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increasing, and neither the laws nor the governmental actions taken so far have been effective to reduce air pollution (CNEMC (China National Environmental Monitoring Center) 2013).

2 These edicts include the Twelfth Five-Year Plan on Air Pollution Prevention and Control in Key Regions (Dec. 2012), the Action Plan for Air Pollution Prevention and Control (Sept. 2013), and the Provisional Measures to Inspect the Actual Implementation of the Action Plan on Air Pollution Prevention and Control (May 2014).

3 For examples, see Garnaut 2014 and Green and Stern 2015.

4 Wong and Bird 2008; Wong 1991.

5 Economy 2010.

6 Tatlow 2014.

In addition to considering central–local dynamics in the design and implementation of policies and plans, we examine how a specific dimension of the Chinese institutional setting – fiscal relationships between central and local authorities – can enable or constrain progress in China’s “war” on air pollution. We focus specifically on implementation of policies in the region comprised of Beijing, Tianjin and Hebei, referred to as *Jing-Jin-Ji* (京津冀) or JJJ.⁷ We focus on Hebei province as a case study, given its large size and contribution to pollution within and beyond its borders. As a major centre of iron and steel production among other industrial activities, and given its close proximity to Beijing, Hebei province has quickly responded to – or even pre-empted with more aggressive actions – national initiatives aimed at addressing air pollution.⁸

This article is organized as follows. The second section provides a brief review of the evolution and roll-out of policies, placing in historical context the magnitude and significance of China’s presently proposed effort. The constituent policies are discussed – the industries and geographies they target, implementation timelines, and the mechanisms that will be used to enforce them. The third section assesses how systems of governance, including the fiscal system, are being called upon to support policy implementation. The fourth concludes by asking whether or not systems of governance are capable of implementing the new policy directions.

Air Pollution on China’s Environmental Policy Agenda

Recent developments in China’s energy, climate and air quality policies

While China has long had environmental policies on the books, implementation challenges have limited progress.⁹ The Eleventh Five-Year Plan (FYP) (2006–2010) represented a step change in the attention paid to both environmental policy and its enforcement. The Eleventh FYP included a legally binding national energy intensity reduction goal for the first time, targeting a 20 per cent reduction over the five-year period.¹⁰ In parallel, the emergence of China as the world’s largest energy user and CO₂ emitter drew attention to China’s impact on global climate change, and prompted the first countermeasures: in 2007, a National Leading Group on Climate Change was created, and China became the first developing country to publish a National Climate Change programme calling for the use of non-fossil fuels to be raised to 15 per cent of primary energy by 2020.¹¹ In November 2009, leading up to international negotiations in Copenhagen over global action to mitigate climate change the State Council

7 Jing-Jin-Ji is the transliteration of the three character abbreviation referring to the regional unit comprised of Beijing, Tianjin and Hebei.

8 TCBH 2015.

9 Ma and Ortolano 2000.

10 Naughton 2005.

11 Zhang 2015.

announced the target to lower the economy's carbon intensity by 40–45 per cent by 2020 (from the 2005 level), and called for the goal to be integrated into medium- and long-term domestic policy plans.

The Twelfth FYP largely built on this momentum, continuing the energy and climate change policy directions set out in the Eleventh FYP. Broadly, the plan included more language on *jienerg jianpai* 节能减排 (“energy saving and emissions reduction”) and *ditan* 低碳 (“low-carbon”). The plan also included a binding target to reduce CO₂ intensity by 17 per cent during the plan period of 2011–2015, which was supported by an energy intensity reduction target of 16 per cent and a non-fossil primary energy target of 11.4 per cent. A redoubled focus on air pollution control entered the policy mix after a series of very polluted days in January of 2013 (the “airpocalypse”) prompted widespread outcry. The outcry has persisted, stoked by increasingly prolific media attention to air pollution's causes and consequences. A prominent example is the *Under the Dome* documentary by journalist Chai Jing that blended facts about the effects of degraded air with personal stories and concerns that resonated with many urban Chinese, prompting over one hundred million views in the days following its release.¹²

More than ever before, air pollution has shared, even monopolized, the policy spotlight in recent years. Much of China's energy and climate policy agenda has been recast in terms of the co-benefits for energy security and CO₂ emissions mitigation that will accrue to air pollution control efforts. Intentions have been codified in a series of government documents released since 2012. Starting with the *Twelfth Five-Year Plan on Air Pollution Prevention and Control in Key Regions* in October 2012, a series of State Council edicts followed: the *Action Plan on Air Pollution Prevention and Control* (September 2013) and the *Provisional Measures to Inspect the Actual Implementation of the Action Plan on Air Pollution Prevention and Control* (May 2014). Indeed, this redoubled policy effort to improve air quality has helped to inform China's climate policy agenda which targets a peak in CO₂ emissions, a major greenhouse gas, by 2030 or earlier.¹³

The Twelfth Five-Year Plan on Air Pollution Prevention and Control in Key Regions

In October 2012, on behalf of the Ministry of Environmental Protection, the National Development and Reform Commission and the Ministry of Finance, the State Council released the *Twelfth Five-Year Plan on Air Pollution Prevention and Control in Key Regions* (APPC), which targets air-quality improvement in 13 regions, and in particular, PM_{2.5} reduction.¹⁴ Among the

¹² Buckley 2015.

¹³ NDRC 2015.

¹⁴ The 13 regions include: the Beijing-Tianjin-Hebei area, the Yangtze River Delta, the Pearl River Delta, central Liaoning, Shandong province, Wuhan and its surrounding area, Changsha-Zhuzhou-Xiangtan, Chengdu, Fujian province, north-central Shanxi, central Shaanxi, Gansu province and Ningxia Autonomous Region, and Urumqi. As described by this document, the 13 regions have a high concentration of both economic activity and associated environmental pollution. Together, the regions account for 14% of the national territory, 48% of the national population, 71% of the economy, 52% of coal

regions, the Beijing–Tianjin–Hebei area (JJJ), the Yangtze River Delta (YRD) and the Pearl River Delta (PRD) were assigned PM_{2.5} reduction targets of 6 per cent by 2015, compared to 5 per cent for the other regions. To facilitate target achievement, the plan identified 13,369 enterprises for the installation of sulfur dioxide (SO₂) and nitrogen oxide (NO_x) removal equipment, representing a sum total of 350 billion yuan in investments. Following the APPC, the Ministry of Environmental Protection (MEP) issued the *Notice on Emission Limits for Special Atmospheric Pollutants* (MEP Notice) in February 2013.¹⁵ The MEP Notice specifies “three regions and ten clusters” for special measures – aside from the JJJ region, the YRD, the PRD, the ten urban “clusters” include 47 prefectural cities in 19 provinces. The emission limits target enterprises in six industries: thermal power, steel, petrochemical, cement, non-ferrous metals and chemicals. All new thermal power plants and steel mills coming on stream from 1 April 2013 are subject to the new emissions limits, and existing operations are to be brought into compliance.

The State Council Action Plan for Air Pollution Prevention and Control

Released eight months after the severe air pollution episode in January 2013, the *State Council Action Plan for Air Pollution Prevention and Control* (APAP) set the road map for national air pollution control for the next five years and beyond. The plan aimed to improve air quality in China through a comprehensive reduction of emissions of a range of pollutants. It depends heavily on reducing, displacing, relocating, or scrubbing emissions from the use of coal. Superseding the Twelfth FYP targets, the APAP calls for a 10 per cent reduction in inhalable particulate matter (PM₁₀) levels by 2017 relative to 2012 across all regions, with tougher targets for reductions in PM_{2.5} concentrations in many cities located in JJJ (25 per cent is the regional reduction target, see [Table 1](#) for the full list). Beijing was further assigned a specific target to keep the annual average concentration of PM_{2.5} at or below 60 µg/cubic metre.¹⁶ The APAP was designed to be consistent with existing efforts to reduce energy intensity, as the plan calls for a 20 per cent reduction in energy intensity between 2012 and 2017, limits coal to 65 per cent of primary energy used, and prohibits any increase in coal use in the three regions of JJJ, YRD and PRD.¹⁷

In addition to these targets, the ten-point action plan includes specific measures for limiting emissions by mandating a shift to larger-scale facilities, eliminating outdated and sub-standard furnaces and installing pollution control equipment.

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consumption, 48% of SO₂ emissions, 51% of NO_x emissions, 42% of total smoke and dust, and 50% of volatile organic compounds. MEP 2012.

15 MEP 2013a.

16 State Council 2013.

17 Ibid.

Table 1: Reduction Targets for PM_{2.5} and Net Coal Consumption by the End of 2017

	Targeted reduction in PM _{2.5} concentrations (from 2012 level)	Net reduction of coal consumption (million tons)
Beijing	25%, annual average concentration of PM _{2.5} < 60 µg/m ³	13
Tianjin	25%	10
Hebei	25%	40
Shanxi	20%	20
Shandong	20%	–
Inner Mongolia	10%	–

Source:
MEP 2013b.

Centralized district heating systems are targeted for retrofits to use cleaner fuels such as electricity or natural gas. Installation and operation of desulfurization, denitrification and dust removal equipment is required for industrial boilers and furnaces.

Much of the Action Plan is a reworking of measures earlier introduced in the Twelfth FYP APPC, but there are new elements. The APAP calls for creating a new air pollution prevention and control mechanism in which the government takes the leading role but invites participation from enterprises and the public, and incorporates market incentives. This mechanism also calls for regional collaboration, and establishes monitoring, alert, and emergency response systems for air pollution episodes.¹⁸ The APAP also targets pollution from vehicles, calling for an increase in the share of public transportation, mandating phase out of older automobiles not meeting pollution standards (“yellow label” vehicles), and other measures.¹⁹

Details of how the APAP was to be implemented in some regions came thick and fast. A week after it was released, on 17 September 2013, the *Detailed Rules for the Implementation of the Action Plan for Preventing and Controlling Air Pollution in Beijing, Tianjin, Hebei and the Surrounding Regions*²⁰ (*Rules*) were issued jointly by the MEP, the National Development and Reform Commission (NDRC) the Ministry of Finance (MOF), as well as by other agencies, to emphasize the urgency of controlling air pollution in the JJJ area and to spell out the tasks facing local governments. The *Rules* set targets – in many cases, highly-specific technology-related targets – for reducing PM_{2.5} concentrations, eliminating and upgrading generators, boilers and equipment in the major polluting industries, and switching to cleaner energy. The *Rules* also provided a road map for industrial

¹⁸ Ibid.

¹⁹ All “yellow label” vehicles registered before the end of 2005 are to be phased out in the three key regions by 2015, and nationwide by 2017.

²⁰ MEP 2013b.

restructuring in the region, including the elimination of excess capacity in several polluting industries and raising energy efficiency in existing installations in the covered industries.

While some of the targets apply universally to all six provinces and municipalities, Hebei was given significantly more stringent targets for cutting coal consumption and eliminating obsolete production capacity. Tables 1 and 2 show the specific targets for the six provinces and municipalities. Hebei's target of 40 million tons is nearly half of the total net coal reduction assigned to the JJJ region. Excess capacity cuts in Hebei's targeted industries are also significantly larger than those assigned to neighbouring provinces. Part of the reason for the focus on Hebei is its proximity to Beijing, and the resulting impact on air quality in the capital.

To ensure implementation, the central government made clear that senior provincial officials would be held accountable for meeting the targets. Lest there be doubt, in April 2014, the State Council issued *Measures to Evaluate the Implementation of the Action Plan on Air Pollution Prevention and Control* ("the Measures").²¹ The Measures introduce a scoring system to evaluate local government performance in the key areas of work listed in the *Action Plan*. In addition, achievement in reducing particulate matter will be included in performance evaluations of senior and mid-level officials, with the possibility that senior provincial officials could be summoned by the central government to explain any failure to deliver progress. Provincial Party secretaries and governors of all the provinces and municipalities covered by this document have been asked to sign letters of target responsibility for curbing air pollution in their localities. While this effort broadly follows previous hold-to-account practices in China's environmental governance, such as personnel management,²² cadre evaluation,²³ and overriding or "mandatory punishment-based" (*yipiao foujue* 一票否决) targets²⁴ noted in Shin,²⁵ it is noteworthy for its urgency and prioritization.

So far, the central government's pattern of setting new air pollution policy and taking steps to ensure its implementation seems to be a more intensive version of past practices. Its contours largely reflect the campaign model of advancing environmental goals²⁶ – that is, announcing a new policy direction and repeatedly emphasizing its importance, until a new priority displaces it. Under this model, compliance measures are laid out – and in this, the Action Plan is particularly detailed – and handed down to the respective levels of government, which are obliged to implement them. In the case of air pollution control, large changes to the energy system may be needed – installation and operation of pollution removal equipment at plants is often costly, and in some cases a full rework or rebuild of plant systems is required. As a last resort, plants are shut down.

21 State Council 2014.

22 Li and Zhou 2005; Edin 2003.

23 Whiting 2004.

24 Birney 2013; Heberer and Trappel 2013.

25 Shin 2017.

26 van Rooij 2006.

Table 2: **Elimination of Obsolete Production Capacity by the End of 2017**

Area	Targets and responsibility to eliminate obsolete production capacity
Beijing	Upgrade or relocate 1,200 high-emitting enterprises
Tianjin	Limit production capacity to: <ul style="list-style-type: none"> • 20 million tons in iron and steel • 5 million tons of cement clinker • 14 million kwh in coal-fired generators
Hebei	Eliminate: <ul style="list-style-type: none"> • 60 million tons of iron and steel capacity • all non-combined heat and power (CHP) coal-fired generators below 100,000 kWh; and gradually eliminate all non-combined heat and power (CHP) coal-fired generators below 200,000 kWh • 61 million tons of cement production capacity • 36 million weight cases of plate glass production capacity Relocate or upgrade polluting industries (iron and steel, cement, plate glass, chemical, petrochemical and non-ferrous metal industries) Relocate Shijiazhuang Steel Company Limited and the Tangshan Fengnan Bohai Steel Group
Shanxi	Eliminate: <ul style="list-style-type: none"> • 6.7 million tons of iron and steel capacity • 18 million tons of coke production capacity Relocate or upgrade polluting industries
Shandong	By 2015 eliminate: <ul style="list-style-type: none"> • 21.1 million tons of steel production capacity • 22.6 million tons of iron production capacity By 2017: <ul style="list-style-type: none"> • Limit coke production capacity to 40 million tons • Relocate or upgrade polluting industries • Relocate Qingdao Iron and Steel Group
Inner Mongolia	Eliminate 4.6 million tons of obsolete cement production capacity

Source:
MEP 2013b.

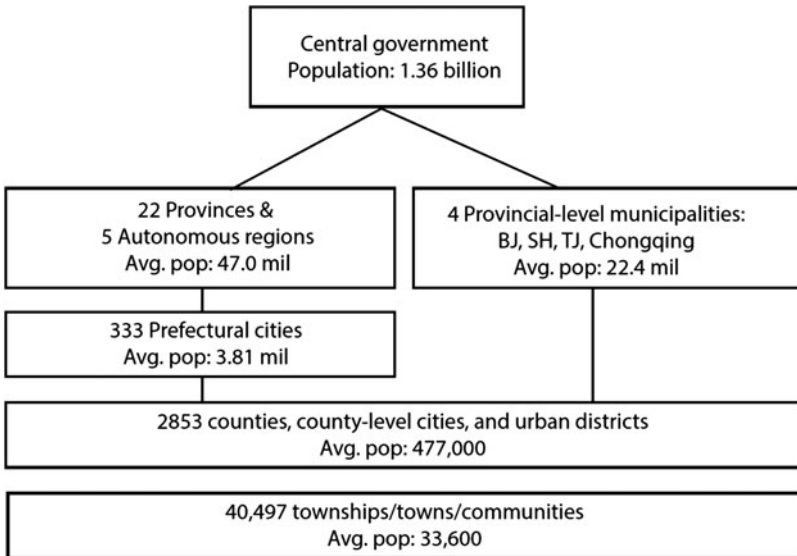
Table 2 shows each province's mandated compliance strategy, which for each province includes a mixture of upgrades and relocations for firms in pollution-intensive industries.

Policy Implementation: Governance Structures

Administrative divisions and staffing

Although China is a unitary country, the central government is small, and the administration is highly decentralized. Staffing at the central level accounts for less than 5 per cent of the total civilian administration, both for core government positions (59,000 out of 12.4 million) and for the broader public sector, which includes public service providers such as schools, hospitals and clinics (around 1.9 million out of 41 million). Under the central government, there are 43,000 sub-national (or local) governments distributed over four levels – the provincial, prefectural/municipal, county, and township levels (Figure 1).

Figure 1: **The Five Levels of Government in China and the Size of the Population Governed at Each Level**



China's central government implements policies through an extensive system of delegation. The process begins with the delegation of authority to provinces and depends on each of them to carry out their responsibilities within their territory. The provinces in turn delegate to their municipalities and rely on them to deliver on their assigned responsibilities, and so on down through the hierarchy. At each step, the relationship is bilateral, and each level manages only the next layer of subordinate units and holds them accountable for performance. The resulting structure is a nested, hierarchical pyramid, where policies and resources are transmitted downward level by level, to where the services are delivered. The Chinese Communist Party plays a vital role in bolstering the central government's capacity to hold lower levels accountable, mostly through controlling the system of personnel appointment and promotion. While some studies have found these systems effective, others have shown that in practice cadres are evaluated on multiple metrics, diluting attention and accountability. This system relies on the ability of local leaders to persuade local actors to comply, for example, by bundling energy efficiency objectives with the objectives of politically-influential groups.²⁷

In this bottom-heavy administrative structure, almost all public services are delivered by local governments at the third and fourth levels – by municipalities/

27 Kostka and Hobbs 2012.

prefectures and by counties and urban districts.²⁸ This is reflected in the distribution of budgetary expenditures across the levels of government. By far the largest share is spent by counties and districts, which has grown to account for nearly half of total spending nationwide. Prefectures and municipalities spend about one quarter, and the remainder is split between the central and provincial governments, with the central government's share falling just short of 15 per cent.²⁹

The degree of decentralization in China has varied over time, and the fiscal system is no exception. Historically, revenues were collected locally. Revenue collection was centralized in the 1994 fiscal reforms but expenditures remained highly concentrated at the lower levels. As a result, a significant share of revenues collected at the central level is returned to the provinces as transfers.³⁰ In addition to funding local government budgets, these transfers have strengthened – at least nominally – central control over expenditures. This control is attenuated, however, by the fact that each level of government can only enforce policy at the level directly below it. To strengthen central government control, in the late 1990s and early 2000s, an attempt was made to recentralize the management of some functions of sub-provincial governments to the provincial level – for example, the local tax bureaus and agricultural extension bureaus were placed under “vertical management” by their provincial counterparts.³¹ This process has been referred to as “soft recentralization.”³²

In more recent years, with the rapid growth of central transfers, the Ministry of Finance has called for provinces to play a bigger role in overseeing the implementation of policies, including redistributive policies. Since the turn of the century, a number of administrative reforms have been introduced, including the Province-Managing-County (省管县 *shen guan xian*) reforms that give provinces direct management of the counties, bypassing the prefectural level and reducing the “long chain of accountability” by one link.

An interesting question is whether these attempts at recentralization – both hard and “soft” – have made localities more responsive to central environmental policy via the role of the provincial government as an intermediary. Taking Hebei province as a case study, we compare what the province has been asked to do with the fiscal resources that have been allocated to implement air pollution controls.

Spending on environmental protection and clean-up

While the central government sets environmental policy, its direct expenditure in the broad category of “energy saving and environmental protection” (*jienerg*

28 Townships used to deliver most of the services in the rural sector, but these have been moved upward to the county level in most provinces since the early 2000s. Fock and Wong 2008.

29 Calculated from MOF 2014.

30 Wong and Bird 2008; Wong 2012.

31 Fock and Wong 2008.

32 Mertha 2005.

huanbao 节能环保) was only 2.4 per cent of the national total in the 2013 budget (Table 3). In the sub-category of pollution prevention, the central government input was only 0.6 per cent (see Table 3). On the face of it, this looks much like the past pattern in which policy pressure comes from above, while the resources to implement the new directives are largely expected to be supplied by local governments. The reality, however, is far more complex after the growth and expansion of transfer programmes over the past 15 years. As shown in Table 3, earmarked transfers to local governments for energy saving and environmental protection were 170 billion yuan, equal to 50 per cent of total national budgetary expenditure in that category. In other words, even though its own direct expenditures account for only a tiny share of the expenditure in energy saving and environmental protection, the central government is financing half of the total through transfers. The expansion of the transfer programme will be further discussed below for the case of Hebei.

National estimates of the costs of the APAP are substantial. The vice minister of MEP, Wu Xiaoqing, announced at a press conference in March 2014 that 5 trillion yuan may be spent on the “War on Pollution” during the Twelfth FYP period. The cost of the APAP alone is estimated to be more than 1.7 trillion yuan during 2013–2017, with more than one third of it used for retrofitting industrial enterprises (see Table 7).³³

These estimates appear to include only the engineering costs of implementing the seven actions called for in the APAP (Table 4). In addition, Wang Jinnan, the Deputy Director and Chief Engineer of the Chinese Academy for Environmental Planning (CAEP), a research institution affiliated with the Ministry of Environmental Protection, explained that there will be indirect costs in the form of a reduction of GDP and employment levels, estimated at 115 billion yuan and 140,000 jobs over the duration of the APAP. At the same time, he argued that the rise of new industries to deliver environmental protection measures will create an additional GDP of 2 trillion yuan and 2.6 million new jobs, which it is argued will more than make up for the losses.³⁴ A People’s Bank of China report in spring 2015 estimated that 2 trillion yuan would be needed over the five years to meet pollution reduction targets, with government budgets covering about 15 per cent of the total.³⁵

How these costs will be divided up between public coffers, industries and households is not fully clear, but a few observations are worth noting. The central government is very rich; in 2014 it had revenues of 6.4 trillion yuan, expenditures of 2.2 trillion yuan, and a “surplus” of 4.2 trillion yuan. Local governments also have far greater fiscal resources than in the past – on average, a county/district had expenditures of 100 million yuan in 1998. This had grown to 1.8 billion yuan by 2012. Even using deflated values, they had grown 14-fold. However, more than half of these expenditures were

33 *People’s Daily* 2014.

34 *Ibid.*

35 Hornby 2015.

Table 3: **Budgetary Expenditures in Energy Saving and Environmental Protection (2013)**

Expenditure category	National expenditure (billion yuan)	Central government share	Transfers (billion yuan)	Transfers (share)
Budgetary expenditure on energy saving and environmental protection	343.5	2.9%	170.4	49.6%
Environmental protection administration	16.6	2.4%	31.5	34.8%
Environmental monitoring and supervision	4.4	9.5%		
Pollution prevention	90.5	0.6%		
Air	6.9	0.1%		
Water	42.1	0.9%		
Solid waste and chemicals	7.6	1.6%		
Expenditure on sewage fee receipts	19.8	0.1%		
Other pollution control expenditures	14.1	0.1%		
Energy conservation and utilization	68.2	2.6%	44.7	65.5%
Pollution reduction	32.7	2.2%	17	51.9%
Environmental monitoring and information	3.6	9.9%		
Environmental law enforcement supervision	1.5	4.2%		
Earmarked expenditure for pollution reduction	23.8	1.0%		
Renewable energy sources	19.7	3.6%	13.4	67.9%
Comprehensive utilization of resources	8.8	0.5%	8.2	93.7%
Other energy-saving and environmental protection expenditures	27.2	12.3%		
	Share of budgetary expenditures		Share of transfers	
Budgetary expenditure on energy saving and environmental protection	2.4%		4.0%	

Source:
MOF 2013.

Table 4: **Estimated Costs of Action Plan for Air Pollution Prevention and Control to 2017**

Actions	Investment (billion yuan)	Share of total (%)
Industrial pollution control	640.8	36.7
Clean energy deployment	493	28.2
Motor vehicles pollution control	210	12.0
Central heating improvement	207.5	11.9
Area and pollution source control	60.5	3.5
Environmental capacity-building	27	1.5
Clean coal utilization	23.6	1.4
Operational cost	85	4.9
Total	1747.4	100

Source:
MEP 2013a.

financed by transfers.³⁶ The reality, then, is that localities have limited bandwidth to increase environmental spending without additional support from the centre.

The Case of Hebei

Hebei allows a deeper look at how funding sources are combined in support of recent redoubled air pollution control efforts. Based on this case study, we argue that the central government has provided both direction – in many cases, highly detailed and technology-specific requirements – and significant funds. Yet this top-down approach is not supported by an alignment of personnel allocations and incentives across levels of governments to realize the central government’s ambitions. So far at least, it appears that while the centre has put funding (in the form of transfers) behind its environmental ambitions, it has not yet strengthened staffing or accountability in ways that would ensure implementation. The fact that many of the detailed measures will reduce the size of Hebei’s industrial sector and carry a hefty and localized price tag will make measures tough for localities to swallow. The question essentially boils down to whether or not local authorities will carry out their delegated environmental responsibilities, especially when they prove to be at odds with short-term growth and economic stability.

Hebei as a centre of pollution-intensive industry

Major urban centres in Hebei grew rapidly over the first decade of the 2000s, with the average annual growth in industrial output for Hebei prefectural-level cities averaging between 14 and 23 per cent in real terms.³⁷ In the lead up to the Beijing Olympics, which involved the relocation of many firms outside of the capital, the composition of industry in many Hebei cities became increasingly energy

36 Wong (2012), and updated calculations based on Ministry of Finance data.

37 CEIC Data Base, ISI Emerging Markets 2016.

intensive. Hebei is now a centre of China's steel and iron, cement and chemical industries. At year-end 2012, there were 148 enterprises in the iron and steel industry, with registered assets of 957 billion yuan directly employing 610,000 people, while value-added at 386.5 billion yuan accounted for 13.9 per cent of Hebei's GDP.

The concentration of these highly polluting industries explains why Hebei's ambient pollution levels are three times higher than the national average. PM_{2.5} levels in Hebei cities are consistently above 100 µg/m³, well above the standard of 35 µg/m³. According to the Ministry of Environmental Protection, seven of the ten cities with the worst air quality in 2013 were located in Hebei (Xingtai, Shijiazhuang, Handan, Tangshan, Baoding, Hengshui and Langfang).³⁸

Given its high concentration of pollution-intensive industry, as well as its proximity to Beijing, it is no surprise that Hebei is a major target of national air pollution prevention and control efforts. Tangshan, for example, is slated for significant cuts in pollution-intensive sectors – its reduction in steel production capacity of 40 million tons will reduce national steel capacity by around 27 per cent, accounting for 67 per cent of the capacity cut in Hebei.

Assigning target responsibility to Hebei municipalities

The case of Hebei illustrates how air pollution reduction targets were handed down from the top. Given the short timelines for meeting the targets, Hebei did not wait for the official release of the APAP by the State Council before rushing to issue its own documents to implement the national policies on curbing air pollution. On 6 September 2013, the provincial government issued the Hebei 50-point Action Plan, outlining 50 areas of work for air pollution prevention and control within the province.³⁹ The plan set specified targets for cutting coal consumption by 40 million tons and reducing iron and steel capacity by 60 million tons by 2017, with targets differentiated by locality and by industrial sector. The Hebei 50-Point Plan set a schedule for a mid-term assessment to be made in 2015, and a final assessment in 2017, with rewards and punishments for performance. It called for target responsibility contracts to be signed between the provincial government and municipal governments. Finally, in accordance with the spirit of the central government's Action Plan, Point 50 of the Hebei 50-Point Plan calls for "... encouraging public participation, for environmental management is everyone's responsibility." In practice, however, many of the largest polluters in the region are industrial firms, not individuals. The main sub-provincial targets set out in the plan are presented in [Tables 5 and 6](#). It is notable

38 The MEP began to report air quality for 74 Chinese cities on a monthly basis starting in February 2013. As part of the first phase of the government's air-quality monitoring effort, 74 cities became the first to implement the government's new air-quality standard and are required to report air-quality data to the MEP. See [Xinhuanet 2014](#).

39 MEP [2013b](#).

Table 5: Reduction Targets for PM_{2.5} in Hebei Municipalities by End of 2017

Municipality (– followed by county level city if any)	Reduction from 2012 level
Shijiazhuang	33%
Xinji	33%
Tangshan	33%
Langfang	33%
Baoding	33%
Dingzhou	33%
Xingtai	30%
Handan	30%
Qinhuangdao	25% or more
Cangzhou	25% or more
Hengshui	25% or more
Chengde	20% or more
Zhangjiakou	20% or more

Source:

Hebei Provincial Party Committee and People's Government 2013.

that targets are stated as ambient air pollution limits, complementing limits on direct emissions of industrial air pollutants, and for the first time targeting concentrations of PM_{2.5}.

By 18 September 2013, the “Letter of Target Responsibility for Air Pollution Prevention and Control for Hebei” between the MEP and the province was signed in Beijing and published. The Letter is laid out in four parts. Part 1 states that the provincial government has overall responsibility for achieving the goals of the programme: to improve air quality in Hebei by reducing the number of “bad pollution” days and increasing the number of good days, and reducing the concentration of PM_{2.5} by 25 per cent over the five years to 2017. Part 2 breaks down the key tasks: eliminating small coal-fired furnaces, accelerating the programme to install pollution abatement equipment in the key industries, strengthening procedures for comprehensive dust control, strengthening control of motor vehicle pollution, and reducing total coal consumption. Part 3 of the *Letter* calls on “... the provincial government to establish the implementation details before the end of 2013, by devolving step-by-step the State targets for improving fine particulate concentrations and other key tasks to cities and counties, as well as to departments and key enterprises. This is to ensure a clear assignment of responsibilities for meeting the annual targets for the reduction of PM_{2.5} concentrations and other key tasks, and to lay out clear lines of accountability to ensure the year-by-year decline of PM_{2.5} concentrations.” Part 4 states that the MEP will undertake an annual assessment of progress and report to the State Council, and the results will be announced to the public after State Council approval.⁴⁰

40 HPG 2013b.

Table 6: Targets for Reduction of Excess Capacity in Iron and Steel Production and of Coal Consumption

Municipality (– district level city)	Iron production (million tons)	Steel production (million tons)	Coal consumption (net in million tons)
Shijiazhuang	3.74	4.82	15
– Xinji	1.17	0.6	1
Chengde	0.43	0.4	1.2
Zhangjiakou	4.16	3.4	3.8
Qinhuangdao	8.7	5.2	6
Tangshan	28	40	25.6
Langfang	4.12	1.7	4.5
Baoding	2.58	0.96	2.5
– Dingzhou	–	–	0.1
Hengshui	–	–	1
Xingtai	2.32	2.64	2.5
Handan	16.14	12.04	16.7

Source:

Hebei Provincial Party Committee and People's Government 2013.

The *Letter* commits the province to cutting coal consumption by 40 million tons, reducing excess capacity in steel production by 60 million tons, and limiting cement production capacity by 61 million tons, and 36 million tons of plate glass production. Taken together, these tasks are referred to as the “6643 project.” It makes clear that even though the province was assigned the overall responsibility for meeting air pollution targets, the real work of reducing pollution is to be done by lower-level governments and enterprises. The province convened the Hebei Air Pollution Prevention and Control Mobilization Conference (Hebei sheng zhao-kai daqiwan fangzhi xingdong dongyuan dahui 河北省召开大气污染防治行动动员大会) on 27 September 2013, at which city governors were asked to sign Letters of Target Responsibility for Air Pollution Prevention and Control. On the same day, it issued the “Plan on Dividing up the Targets of Reducing Coal Consumption and Iron and Steel Production Capacity in Hebei,” setting out the tasks and responsibilities for the 11 municipal governments.⁴¹ While the substance and ambition of the targets was different, in many respects the implementation processes showed few signs of departing from the target responsibility system that has long faced implementation challenges.

Distribution of the costs of the Hebei Action Plan

It is difficult to get a clear reading of what is needed and what is being spent on air pollution prevention and control in Hebei. For Hebei, it appears that the

41 HPG 2013a.

central transfers have in recent years funded the vast majority of budgetary expenditures on environmental protection. For example, in 2013, the total public spending on air pollution was 2.8 billion yuan, of which 2.62 billion was financed by the central government. Officials in the Hebei government's finance department reported that the province would spend 7.02 billion yuan on air pollution control for 2014, of which 800 million was from the local budget and 6.22 billion came from the central government's earmarked funds for air pollution prevention.⁴² This arrangement suggests that indeed central funds made available through transfers are filling the gap.

In addition to these direct expenditures on pollution control, Hebei has set up special funds to support industrial restructuring and upgrading. The Hebei government will allocate 4.38 billion yuan and 1.6 billion to set up a key industries development fund and a priority industries development fund, respectively.⁴³ Recently, the provincial government has committed to spend 90 billion yuan to curb air pollution through 2017, accounting for 20 per cent of the total budget for curbing pollution in the province. The fiscal commitment of Hebei in curbing air pollution is significant, compared to other provinces, given the anticipated magnitude of the task (see [Table 7](#)).

Indeed, beyond iron and steel, energy-intensive industries across the board in Hebei will come under increasing pressure – as shown in [Table 8](#), Hebei represents a large share of the nation's cement, plate glass and crude steel production, as well as more than half of the nation's coal consumption. Nearly half of Hebei's cement capacity is scheduled to be phased out, while cuts in plate glass and crude steel hover just above 25 per cent. These cuts will impose a huge burden on the work force and local economy. Hebei officials worry that the reduction in production capacity in these industries would lead to job losses that, if not handled properly, could affect social stability. Job placement and retraining will be policy priorities. The Hebei Party secretary estimated that social insurance and pension pay-outs will increase by 13 billion yuan per annum.⁴⁴

Some localities will be hit very hard. In Tangshan, currently one of Hebei's economic engines, every ton of steel produced employs 17 workers and yields 142 yuan in fiscal revenues.⁴⁵ These coefficients would translate the target cut of 40 million tons into a loss of 5.68 billion yuan in tax revenues, against a tax base of 32 billion. They would cut 68,000 jobs directly and affect another 340,000 indirectly, against a non-farm employment of 965,000 in the prefectural city in 2013.⁴⁶

42 New Capital Daily Online 2014.

43 *Xingjing News* 2014.

44 *People's Daily* 2013.

45 These estimates are from the "Proposal on establishing pilot cities for resolving the problem of overcapacity" that was submitted to the Second Session of the CPPCC National Committee meeting in 2014 by CPPCC member and vice-chairman of the CPPCC Tangshan City, Shen Jin. Reported in Ding 2014.

46 *Ibid.* and *Hebei Statistical Yearbook* 2014.

Table 7: Financing for Curbing Air Pollution: Hebei and Selected Provinces (in yuan)

Hebei:

- 2.8 billion spent on curbing air pollution in 2013, of which 2.6 billion given by the central government.
- Allocated 800 million on air pollution in 2014.
- Arranged 4.38 billion and 1.6 billion to set up a key industries development fund and a priority industries development fund, respectively, in 2014.
- Committed to spend 90 billion to curb air pollution through 2017, accounting for 20 per cent of the budget for curbing all forms of pollution in the province.

Beijing:

- 2.8 billion special fund for energy conservation and air pollution set up in 2013.
- Allocated 3 billion in the special fund for energy conservation and air pollution in 2014.
- Allocated 2 billion to support the Beijing Clean Air Action Plan initiative
- Diverted 1.24 billion from the special fund for technology, culture and tourism to use on Beijing's campaign for curbing air pollution in Beijing.
- Committed to spend a total of 760 billion to reduce PM_{2.5} pollution through 2017.

Shandong:

- Set up a 1.2 billion special fund for environmental protection and curbing air pollution.

Shenzhen:

- Allocated 1.3 billion to curbing air pollution.

Source:

Xingjing News 2014.

Bottlenecks and challenges

The case of Hebei reveals a misalignment of incentives and resources. The central government – which exercises direct control only at the provincial level – has outlined a programme of actions unprecedented in the extent of cuts, restructuring, or retrofits required. Ultimately, these actions will need to be accepted and implemented by officials at the lower levels of government. A critical question, therefore, is whether any form of “soft recentralization” of authority at the provincial level is bridging the central–local gap and is capable of eliciting cooperation from local cadres and economic elites in the enforcement of action plan targets. Evidence of how local and central incentives diverge is widespread – for instance, directives by Beijing to shut down plants were enforced through the withdrawal of the equivalent of US\$177 million in loans, only to be reopened following a merger arranged by the city government.⁴⁷ Indeed, the Xi government has indicated it will penalize polluters dearly – even by ruining their careers – as part of a “strike hard” campaign, but this deterrent also seems to be one-size-fits-all, and without attention to the limited options many of these polluters face.

Many of the actions require significant capacity shutdowns within a few years – a move that creates high localized costs in service of accelerating the delivery of air-quality benefits. Given the urgency of the task from Beijing's perspective,

47 Wei and Davis 2014.

Table 8: **Effects of the Air Pollution Action Plan (APAP) on the Hebei Economy**

units: million tons	Coal**	Cement	Plate Glass	Crude Steel
Output/consumption (2013)*	300.0	126.8	118.4	220.0
As share of national total	62.6%	5.2%	15.2%	28.2%
Target for cuts by 2017	40.0	60.0	30.0	60.0
As share of output/consumption	13.3%	47.3%	25.3%	27.3%
As share of national cuts	50%			75%

Notes:

*Only includes enterprises above designated NBS scale.

**Consumption.

slower implementation does not seem to be an option. However, there seems to be little attention paid to identifying the “low-hanging fruit” – in other words, low cost but high impact measures that could help to improve local air quality. While a market-based mechanism could help these opportunities to surface, for instance, by pricing pollution, it is not clear that such a system would be compatible with China’s broader institutional structure, which seems to be leaning even more heavily on detailed command-and-control style interventions that clearly assign responsibility for pollution control.

Finally, the economic costs of cleanup actions and capacity phase-out will have concentrated impacts on local fiscal budgets, curbing an important source of local government revenue that could be used to fund the clean-up effort, among other government functions. Indeed, 45 per cent of total fiscal expenditures occur at the county level and 22 per cent at the prefectural level. Twelfth FYP and APAP actions will impact the local sources of these revenue streams, potentially making localities more dependent on transfers. Whether or not the central government, which has significant financial resources at its disposal, will help to fill the void is not clear from the plans. In fact, numbers presented above suggest exactly the opposite – that sub-national governments will be expected to pick up most of the tab.

Will it be different this time? Prospects for winning China’s “war on air pollution”

Getting the incentives right – through deployment of resources and design of enforcement mechanisms – will be critical to gaining ground in China’s war on air pollution. While the level of central ambition exceeds that of the past, and the volume of transfers provided to offset costs is substantial, it is not clear that implementation processes have changed. It is ultimately the latter that will determine results on the ground. Specifically, will the resources, fiscal or otherwise, be made available and applied at the county and prefecture levels to make lasting changes in the local economy, against the wishes of incumbent enterprises and industries that have previously relied on the state to foot the bill – or at least to help out – with energy saving and environmental protection?

Here we document how policy directives, fiscal arrangements, and enforcement mechanisms are expected to work in support of the energy saving and environmental protection goals in China's Twelfth FYP and APAP. There are cautious signs that the link between the central government and the provinces is being strengthened and more transfer income is being allocated at the provincial level to support pollution prevention and control efforts in localities. However, several potential gaps remain: real implementation will have to be done at the municipal and enterprise level, so emphasis on provincial authority will not directly address this gap. Beijing may be less efficient in deploying funds where they are needed, relative to governments at the provincial and lower levels. Also, it does not solve the fundamental problem that the government is broadly expected to foot a large share of the bill for a highly scripted transition. In other countries, enterprises have typically had to pay the costs of complying with environmental laws, while the government set the standards and provided guidance.

Current policies will make it more difficult to move towards market-based instruments, since the policy shift is largely a retrenchment towards command-and-control and micro-management, which in many ways is at odds with establishing functional markets for pollution control. It is worth noting that the type of horizontal community-based governance structures, which Shin⁴⁸ describes as an emerging alternative to central-local conceptions of environmental governance dynamics, do not seem to play a strong role here or have perhaps been overruled by the strong and urgent directives issued by Beijing.

The new environmental policies have all the hallmarks of reform under Xi Jinping. They are a component of the ambitious, comprehensive programme mapped out in the Decisions of the Third Plenum of the 18th Party Congress in November 2013, aimed to achieve the Chinese Dream that will provide citizens with clean air, along with good schools, reliable health care, and a strong social safety net. These environmental policies are also part of Xi's programme to claim a global leadership role for China on environmental issues, as the country's pledge in the Paris Climate Agreement suggests. However, moving from ambition to results will require changes that ensure incentive compatibility at the local levels through a reworking of political, fiscal and organizational mechanisms that support implementation.

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48 Shin 2017.

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摘要: 近年来, 中国中心城区的空气污染空前严重, 促使中央政府改变其防控措施。这场反空气污染战涵盖了行政控制、加强监管、经济激励以及公众教育动员等各类措施。设计并执行这些措施面临着一个重要约束, 也即中央政府是否有能力获取准确的减排成本信息, 推动下级政府落实政策, 并对政策落实情况进行监控和评估。我们以河北省为例, 详细分析了省级层面支持“反空气污染战”的政策安排。河北省的重工业企业位于北京市的上风方向, 因此是中国环保政策的一个重中之重。现行政策虽然需要地方层面采取成本高昂的具体行动, 但资金的分配仍然由中央控制, 因而导致激励机制失调, 难以解决地方层面长期存在的政策监控、评估和落实问题。

关键词: 关键词; 北京; 河北省; 空气污染; 环境治理; 央地关系; 财政体系

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