

**Air Pollution:
How Will China Win its Self-Declared War Against it?¹**

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The Chinese government is determined to tackle smog and environmental pollution as a whole [...]. But the progress we have made still falls far short of the expectation of the people. Last year, I said the Chinese government would declare war against environmental pollution. We're determined to carry forward our efforts until we achieve our goal.

Prime Minister Li Keqiang, March 2015 (cited in Wong and Buckley 2015)

Up until 2013, people in Beijing would normally refer to the frequent haze over the capital as fog, *wu* (雾), and few, if any, were able to predict that within a year's time the largely unknown Chinese term for 'smog', *wumai* (雾霾), would be on everybody's lips. Leading up to the 2008 Olympics five years earlier, much international attention was focused on the levels of Beijing's air pollution, and the Chinese government took unprecedented steps to clean the air for the athletes by temporarily shutting down polluting factories and limiting the number of cars on the roads, among other measures (Hsu 2014, p. 160). However, at that time the Chinese term for smog hardly appeared in journal titles even in specialized academic ones, and few researchers were familiar with the term. This, however, changed dramatically in 2013 when no less than 766 journal and newspaper titles from across the country and various disciplines contained the word *wumai* (Svarverud, n.d.). By 2015, even Chinese children knew that PM_{2.5} had to do with air pollution and was a health hazard. 'It is particles in the air that enter the lungs and are smaller than 2.5 micrometres in diameter, or 1/20 the thinness of a human hair' a children's book explains (Hangzhou City Environmental Protection Center 2012, p. 18).

The phenomenon of heavy air pollution in China obviously has a much longer history than is indicated by the popular use of the term *wumai*. The Communist government's

first five-year plan for industrialization, developed in 1953, was based on the country's abundance of coal resources, and later when the Cultural Revolution ended and Deng Xiaoping launched his new reform policies in 1978, a plethora of new small-scale, inefficient industries and coal-fired power plants sprang up across the country.² Within a short period of time, China's rapid industrialization transformed the country's economy and improved most family's standards of living. But by 2009 the country also surpassed the United States as the world's largest emitter of greenhouse gases. The air in China's expanding cities, as well as in rural industrial areas, deteriorated. For millions of families, the price of welcomed economic development was increased health problems caused by ambient pollution and persistent household air pollution – the result of using solid fuels for cooking and heating. A large-scale survey conducted in 2011 showed that in more than 9,000 villages in China solid fuels remained the dominant fuel for cooking in more than 47% of the households (Duan et al. 2014, p. 693).

Air pollution has become the single largest environmental health risk in the world. In 2012 the World Health Organization (WHO) estimated that one in eight of seven million global deaths resulted from either household or ambient air pollution exposure (2014a). Scholars at Berkeley Earth claim that as many as 1.6 million people die prematurely each year in China due to air pollution, and that 38% of the population live in areas with air regarded as unhealthy by American standards (Rohde and Muller 2015, p. 1). The ambient air pollution is first of all caused by coal combustion and the substantial increase of vehicles from 16 million in 2000 to more than 93 million in 2011 (Chen et al. 2013, p. 1959). China accounts for 50% of the world's total coal consumption and produces the largest amount of major air pollutants in the world (Chen et al. 2013, p. 1959). Nevertheless, as pointed out by leading natural scientists, due to the physical and chemical complexity of the atmosphere there are no quick fixes, neither of the problem of high concentrations of PM_{2.5} in many of China's mega cities nor of the level of emissions of greenhouse gases that affect the global climate (Nielsen and Ho 2013; Wang and Hao 2012). Local air pollution reduction is essential to prevent major long-term health problems, and as a cobenefit it helps decrease emissions of greenhouse gases that cause climate change (Aunan et al. 2006, p. 4822). However, scrubbing coal-related pollutants and reducing coal use is not enough in and

of itself to curtail CO₂ emissions and diminish the global rise of temperatures (Karplus 2015, p. 1).

The complexity of the issues of air pollution and climate change not only calls for a strengthening of global cooperation but for coordinated efforts within China nationally. However, it is only in recent years that air pollution has become a matter of *joint* concern on a deep level for government, media, industry, and the general population beyond environmental NGOs. The boom of media coverage, culminating in Chai Jing's documentary 'Under the Dome' that was streamed more than 300 million times within a week in March 2015,³ and the numerous environmental apps and weather forecasts that now provide real-time figures on PM_{2.5},⁴ testify to what we argue in this chapter is a new era in both the Chinese authorities' and the public's engagement in the topic of air pollution. The Chinese government declared a 'war against air pollution' in 2014 and has now vowed to include the population to a greater extent than before in its endeavour to create an environment that allows for both economic growth and sustainability.

The topic of polluted air can be approached from the perspective of the individual's health, a local community's well-being, a society's general economic development and its future, even national security, and, not least, the perspective of global climate change. It is a complex matter, and governments, as well as scientists and media, face the problem of how to sufficiently understand and explain to the general population how different types of emissions impact each other and what role other factors, such as weather conditions, play in air pollution. Based on our on-going research of the human dimensions of air pollution in China, we suggest that an unprecedented popular engagement in the problem of air pollution is prompting new forms of interfaces between Chinese political authorities, scientists, public organizations, the general population, and industry. In its fight against air pollution the government has to take into consideration the activities, perceptions, fears, and expectations of a wider variety of stakeholders than ever before across divisions of gender, age, class, and rural/urban society. The government must negotiate its environmental policies on the ground in order to maintain the support of the population and gain the upper hand in its war against pollution. In the past, the Communist Party's (CCP) legitimacy has largely been based on its continued ability to provide economic growth and social

stability. To this now has to be added the need to secure a long-term, ecologically sustainable and healthy society without jeopardizing already hard-won economic gains and the population's improved standard of living.

In this chapter, we first provide an overview of the design and dynamics of China's major national policies regarding air quality control and air pollution prevention, hereafter called 'air policy'. We then briefly zoom in on two concrete examples of interfaces related to control of the industry, and consumption habits and life styles, mainly based on data collected in the province of Zhejiang. We present them here as prototypes of interfaces that manifest themselves in local contexts where different stakeholders take action. We deliberately apply the concept of 'social interface' rather than the more frequently used 'interaction' or 'participation'. The notion of interface better captures the relationship between different actors' worldviews, attitudes, and agency related to air pollution and air policies. It leaves open the possibility that these relations are often not a result of conscious or rational choice but just as much imply spontaneous, and sometimes enforced or involuntary, contacts with unequal levels of 'action'. So for example, the relationship between, on the one hand, a government agency implementing policies that restrict vehicle use and, on the other hand, the population targeted in such a campaign, is not necessarily characterized by 'interaction' or even attempts at 'participation'. Nevertheless, the very meeting or encounter—the social interface—of these parties' different and sometimes conflicting values, perceptions, and interests may be crucial for understanding the relevance and outcome of the policy in question.⁵

National policies facing weak local implementation (1980s–2010s)

In what follows, we concentrate on policies and politics related to air pollution (空气污染) as defined in the Chinese context. The type of air pollution that currently receives most attention is *atmospheric particulate pollution*. This is a complex pollution variant in China 'because of the large variations in sources, energy structures, climatic conditions and living habits across the nation'. Atmospheric particulate pollution usually contains 'pollution caused by coal combustion, vehicular

emissions and perhaps biomass burning (altogether called “complex air pollution”), plus regional haze’ (Fang et al. 2009, p. 81). Often climate change (气候变化) policies, such as ‘low carbon cities’ initiatives that target mainly the reduction of carbon dioxide (CO₂) and other greenhouse gas emissions, are treated and approached separately in Chinese central policy making. In general, it seems that atmospheric particulate pollution brings on immediate challenges and effects in terms of visibility and health in the perception of both the Chinese population and the authorities. Arguably, this also has consequences for the current prioritization of dealing with particulate air pollution in the Chinese context rather than climate change on a global scale (see also Karplus 2015).

Although developing a comprehensive air policy has gained steam in China only in recent years, preventing and reducing air pollution is not a new item on the government’s agenda.⁶ The country’s first Air Pollution Prevention and Control Law (大气污染防治法) was ratified in 1987 and was of the ‘first generation of environmental statutes’ that took into account changing political, economic, and social conditions after the launch of ‘reform and opening’ in 1978 (Alford and Liebman 2001, p. 711). Strikingly, this law already had in its purview many of the same pollutants, institutions, and measures that have since been included in all the law’s revisions, as well as in the latest central action plan to save China’s air. The articles of the first version already comprised statements about the protection of human and ecological environments, human health, and the promotion of ‘socialist modernization’. The law transferred the major responsibility for its implementation and for monitoring air quality to the environmental departments at all levels of government administration and called for the establishment of national environmental standards. It suggested environmental impact assessments for construction projects, banned the use of air pollution-prone disposal of certain materials and substances, and granted prosecutors the right to sanction and fine polluters, even allowing involved parties to seek a ruling of the case in court (Alford and Liebman 2001, p. 712).

However, in the years following the law’s ratification, discussions between central government agencies, instigated by the National Environmental Protection Agency (NEPA),⁷ took place, and fierce disagreements arose at all governmental levels over

the lack of implementation and consequently the law's effectiveness. The main causes for complaint were the ever soaring air pollution levels in metropolises, the increasingly grave acid rainfalls throughout China, and the law's inability to address the rapid economic development in China seen, for instance, in the rise of private industry (Alford and Liebman 2001; Fang et al. 2009, p. 81). The law's amendment in 1995—not considered fully successful either by its proponents or by environmental experts and activists—tightened the regulations on coal washing, toughened the requirements for desulfurization technologies and unleaded gasoline, enforced control of vehicle exhaust and elimination of substandard automobiles, and called for stricter monitoring of emissions. Further revisions in 2000 called for emission fees and pollution permits, the promotion of renewable energy sources and natural gas, the disclosure of pollution information to the public, and new handles for fining and prosecuting polluters (Alford and Liebman 2001, pp. 734–735; Central Government of the PRC 2000).

All this demonstrates how PRC had established a legal basis for air pollution prevention and control decades before the explosion of popular interest in the 2010s. However, in spite of laws and regulations, the skies over China were far from clearing up. To the contrary, the problem became more and more critical and, not least, increasingly visible (Chan & Yao 2008; Fang et al. 2009). What was lacking was an adequate political prioritization, a robust consensus among relevant actors, and effective coordination and implementation of available measures. The earlier air protection legislation met with problems well-known in China's environmental politics. Firstly, legislative procedures at the national level were obstructed and watered-down by stakeholders with conflicting interests. In the case of air pollution, these were the coal, steel, and cement industries, the car industry, gasoline producers, energy companies, and those Chinese provinces that relied heavily on these industries. Secondly, although national environmental laws and regulations generally seemed to be increasingly comprehensive and adequate responses to serious problems, statutory formulation was rather weak (Beyer 2006, pp. 205–207), and the ultimate and necessary implementation on the ground was conducted half-heartedly and ineffectively (Ran 2015, pp. 39–54). For the sake of steering local economic growth and development, local governments, just as they are today, were highly dependent on, and often entwined with, energy-intensive local industries. Collusion between the two

led to lax control and frequently resulted in manufactured pollution-monitoring data, the bottom line being that up to this point the post-Mao fixation on economic growth usually outplayed environmentalism (Kostka 2015). Even when air pollution reduction targets in governmental performance evaluations existed, they usually ranked in priority well below other indicators related to economic development, and even birth control. Consequently they have rarely, if ever, had a significant impact on air quality protection.

In the early 2000s, the Hu Jintao and Wen Jiabao administration's new ideology of 'a harmonious society' (和谐社会) also brought about a new emphasis on the problems of air and water pollution. Thus, both goals and financial resources for air quality control were significantly boosted with the government's 11th Five-Year Plan (2006–2010). Nevertheless, tangible results still failed to materialize, and in 2008 international inquiries about the safety of athletes competing in the Beijing Olympic Games accelerated (China Daily 2007). This coincided with increased public pressure on the government to release more information about air pollution after the American Embassy in Beijing publicized on its webpage the results of its own air quality tests (Roberts 2015). Worries culminated in the winter of 2012/13 when the pollution readings in Beijing and other Northern Chinese cities 'went, quite literally, off the charts' (The Economist 2013), and the country's smog problem was finally doomed an 'airpocalypse' in international media (Wong 2013). The Chinese internet was flooded with angry and concerned posts from citizens all over the country. The severity of the problem and the population's unprecedented reaction left the Chinese authorities with little breathing space. They had to respond—and show that they had responded—more firmly than ever before.

Taking new action: Policy shifts in the 2010s

Building on the initiative of its precursor, in 2011 the 12th Five-Year Plan (2011–2015) fortified pledges for a restructured and sustainable growth pattern in China, paying special attention to environmental issues, in particular the challenge of climate change and air pollution (State Council 2011). The recently announced 13th Five-Year Plan

(2016-2020) further underlines the ambition to shift emphasis from heavily-polluting industry towards stronger third sector development and more green energy production. It follows up on China's commitment to carbon intensity reduction made in Paris in 2015, and, for the first time ever, includes in particular the binding target to reduce the accumulated annual PM_{2.5} concentration in bigger cities by 18% until 2020 (State Council 2016). In sum, successive five-year plans have increasingly prioritized issues related to pollution, the safeguarding of natural resources, ecological protection, and the rehabilitation or conservation of a healthy living environment. This testifies to the fact that these topics have finally become major goals on the Chinese political agenda.

However, it was mainly with the Ten Measures for Prevention and Control of Air Pollution (大气污染防治十措施) (Xinhua 2013) and the following Action Plan on Prevention and Control of Air Pollution (大气污染防治行动计划; hereafter APAP) (Central Government of the PRC 2013) that the central government sought to reframe air quality protection as a project *involving all members* of Chinese society. The plans placed special emphasis on particulate matter identified as the major culprit in creating urban smog and constituting the most immediate threat to human health (see Fig. 1). Within a few years the terms for particulate matter, PM_{2.5} and PM₁₀, had become household terms, and everybody was now expected to unite in a nationally coordinated attack on pollutants: 'Since we breathe together, we must fight together' (既然同呼吸、就要共奋), the Minister of Environment pleaded (Luo et al. 2013). The APAP explicitly refers to the Beijing-Tianjin-Hebei (*jing-jin-ji* 京津冀) area, the Yangzi River Delta and the Pearl River Delta, the three most industrialized and urbanized regions of China, as key areas for implementation. For the Jing-Jin-Ji area, detailed implementation measures even include radical industrial restructurings, such as a 25% cut in steel production and a 68% cut of cement production in Hebei province by 2017 (Ministry of Environmental Protection 2013a).

Fig. 1: Main APAP goals to be achieved by 2017 (Central Government of the PRC 2013)

Targets	Key measures
Cutting inhalable particulate matter by at least 10% from 2012 level in cities above prefecture level	<p><i>Reducing emissions</i></p> <ul style="list-style-type: none"> •eliminate small coal-fired boilers from urban areas •install desulphurization, de-nitration, and dust removal equipment in key sectors •control dust from construction sites and transportation •scrap heavily polluting vehicles •restrict driving and the number of license plates issued •promote public transportation •increase petroleum quality
Cutting fine particulate matter by 25% in the Beijing-Tianjin-Hebei region, 20% in the Yangtze River Delta, and 15% in the Pearl River Delta	<p><i>Structural adjustments</i></p> <ul style="list-style-type: none"> •foster technological innovation •increase supply of renewable energy, nuclear energy, and clean coal •set up a special fund to combat air pollution •explore new finance models •increase bank credits •mobilize incentive-based market mechanisms
Keeping the annual average fine particulate level in Beijing at 60 μ g/m ³	<p><i>Policy and law</i></p> <ul style="list-style-type: none"> •improve policies for energy pricing, subsidies, and export tax rebates for industries with high pollution and high energy consumption •fast-track the revised APPCL •amend the Environmental Protection Law •draft an Environmental Tax Law
Reducing coal consumption to less than 65% of total energy consumption	<p><i>Regional measures</i></p> <ul style="list-style-type: none"> •establish regional coordination mechanisms with special focus on the Beijing-Tianjin-Hebei region and the Yangtze River Delta •strictly limit high pollution and high energy consumption projects in sensitive and ecologically fragile areas

Cutting emissions from key industries by 30% from the 2012 level	
Cutting energy consumption per unit of industrial added value creation by 20% from the 2012 level	

In 2014, the State Council once again passed a revised draft law for air pollution prevention and control, now specifying penalties for ‘discharging pollutants without a certificate, over-discharging pollutants and fabricating monitoring data’, and, most importantly, providing for a ‘coordinated control of pollutants’ and ‘coordinated regional actions in key areas’ (Xinhua 2014b). It also included new and much more specific measures to control industrial emission and vehicle exhaust (National People’s Congress 2014). The law was ratified in August 2015 and took effect from January 2016.

Three aspects of the Air Pollution Action Plan are worth paying special attention to. First, by way of a central government action plan and all of its associated rhetoric, the management of air quality becomes a crucial political issue that signals binding relevance for implementers at all levels of government. This is perhaps one of the most remarkable qualitative differences that distinguishes the new initiative from the previous merely legal basis for air quality protection. In China, formulating a national political initiative as a campaign, or as an action plan like APAP, testifies to its utmost importance. The APAP sets grand targets for air quality preservation across the country and subscribes key measures for achieving them. It is up to all levels of the political administration to work out detailed implementation plans, taking into account local circumstances. In this way the APAP is not solely a rigorous top-down plan but one that requires local adjustment and action. Leaders of local governments can make a name for themselves if they prove to be especially vigorous in executing national top-priority policies or add innovative features to enhance their local effectiveness. The authorities of Zhejiang Province’s capital Hangzhou, for instance, take pride in the fact that their emission control indicators and evaluation targets are stricter than those required by central level guidelines, a claim that is backed by observers and local researchers.⁸

Such measures also enhance the careers of local cadres because environmental indicators are increasingly included in the local governments’ target responsibility

contracts (Heberer and Senz 2011) and were recently given more weight in the leading cadre evaluation system (Ministry of Environmental Protection 2013b). Since 2012, largely following international criteria, an air quality index (AQI) (环境空气质量指数) combining measurements of major ambient air pollutants has been used to standardize the monitoring of air pollution in China. Annual target evaluations now use the number of days with an AQI level of 1 ('excellent' 优) or 2 ('good' 良) as a performance indicator.⁹ Hangzhou City, for example, in its evaluation of subordinate government levels, allocates full points if 70% of days during a year are classified as excellent or good. Achieving less than 45% means obtaining zero points in this target category.¹⁰ A good showing of economic growth, birth control, and social stability are no longer sufficient to secure credits from higher level authorities, and it is therefore not surprising that a substantial drop in total PM_{2.5} measures in 2014 led to overt gasps of relief in Hangzhou's environmental bureaucracy.

Second, when a topic of national concern is elevated to the status of a campaign the power balance between different governmental institutions may be affected. This is now happening as a result of the announcement of APAP. The environmental protection bureaus (EPB) that used to hold a notoriously weak position in the departmental hierarchy are gradually being given more steering and coordination powers. In interviews and informal conversations in Zhejiang Province with municipal and county government officials in 2014–15, representatives of EPBs univocally described how their coordinating capacities and authority were being strengthened by the new national initiative. The fact that environmental performance can now make or break a leading cadre's career helps the EPBs when, for example, they have to organize the implementation of complex air pollution regulation that involves different government agencies and stakeholders.

Third, the inflation of central government air protection plans and programs represents to some extent a shift from treating 'the people' as passive bystanders to regarding them as responsible stakeholders. This means that all collective public actors, such as companies, schools, NGOs, and even ordinary residents, are encouraged to join the battle against air pollution. It also means that all sectors of state and society are subjected to a stricter and more authoritative regulation of

activity that directly contributes to air pollution. The political turn that now both allows for and requires unprecedented action—even participation—of people in the fight against air pollution results in changing interfaces between key actors.

In the following, we briefly outline two concrete examples of how such interfaces of local administration, science, industry, and the general population evolved in two areas that are top priority in the government's current air policy: the regulation of polluting industries and the campaign to change people's behaviour and attitudes.

Allying against air polluting industries

Until recently, the arguments against a regime of tight environmental control have focused on the country's need for rapid economic growth and the concomitant need for cheap energy (mainly coal) and low costs in the industry (Alford and Liebman 2001, p. 723). In China's new war against air pollution, one of the weapons entails taking firmer steps against air pollution caused by local industries, state-owned enterprises (SOE), as well as private ones. Tools range from the traditional enforcement of emission controls and monitored facility upgrading (higher chimneys, new fume filters, etc.) to the much more radical shutting down of whole factories and power plants in or near residential areas. Needless to say, implementing such action is very complex—local areas may depend on income from industry, industry provides employment for residents, and cadres need to do well in performance evaluations.

Hangzhou City, the capital of China's richest province, features a well-developed economy with a strong service sector largely based on tourism. It appears to be a good example of a locality that can 'afford'—and even has a special reason—to clean up industrial polluters, and it is attempting to be at the national frontline as a 'low-carbon' and 'green' city (Delman 2014). While Hangzhou may therefore not be particularly representative, many other cities and regions now faced with the binding task of 'expelling' polluting industry from their cores can be expected to implement developments similar to those discussed below.

Local governments have started to adopt strategies of public communication used by NGOs (Xu 2014), most notably seen in their increasing interest in employing new technologies for regulated information disclosure and in seeking public collaboration in identifying pollution sources. In Hangzhou and throughout Zhejiang Province, hotlines to EPBs, which have existed for many years, have recently been upgraded. Local authorities must now respond to inquiries and complaints received via telephone or new e-government platforms, although evasive feedback such as ‘the case is in progress’ is often adequate to meet the new political requirements. Furthermore, as an experiment with new forms of communication and information, the provincial government launched a web-based environmental protection communication project in 2014. In close cooperation with a local information technology SOE and Zhejiang’s largest environmental NGO (ENGO) Green Zhejiang (绿色浙江), and seeking the advice of local environmental researchers, the provincial government developed an online platform and an app for smart phones called Love Environmental Protection (爱环保). At much the same time, the same SOE supported Green Zhejiang in developing its own version of an environmental app called Environmental Watch (环境观察). Both apps use data from official measuring stations, and include, to different degrees, options for air quality information, including recommendations regarding health, outdoor and indoor activities, and suggestions for how individuals can contribute to improving air quality. Interestingly, they also feature a ‘report forum’, emphasizing their second function as a kind of monitoring tool. Users can upload information about environmental pollution they witness and support it with photos and geographic coordinates. Users’ reports are channelled to Green Zhejiang for follow-up investigation, to check, for instance, that the report has not been fabricated and that the reporter has a known ID, after which Green Zhejiang decides whether or not to forward the case to the relevant local authorities. Developing new technologies for communicating with citizens is not confined to the matter of air quality, but air pollution does seem to inform a major part of the activities connected to the apps.

Another trait of this new interface occurs when conflicts arise due to plans to remove coal power plants or other heavily polluting production facilities from residential areas. To some extent, these interfaces are alliances between government, ENGOs,

and local inhabitants. SOEs horizontally aligned with the local government and private enterprises are easier to deal with than SOEs managed by a higher level of government, such as a province-managed steel plant within a city. In order to gain leverage and bargaining power vis-à-vis superior authorities and their powerful business interests, local governments sometimes mobilize residents' support in their struggle. They make use of the fact that perceived airborne health risks are one of the factors that trigger massive local NIMBY opposition. Project feasibility assessments are increasingly forced to take this human factor into account, according to local environmental scholars involved in assessment processes in Hangzhou and beyond.

Local governments are evaluated partly on their ability to maintain social stability, and for this reason they increasingly seek to avoid 'importing' new pollution problems into their jurisdictions.¹¹ They rather seem to prefer a new role of facilitating agent, mediating conflicts between polluting industrial companies and affected residents. In a form of consultation mechanism called Enterprise and Residents' Dialogue (厂群对话), the local EPB in Hangzhou stages regular meetings between enterprises and local residents with the aim to achieve a code of conduct for how to deal with environmental problems, for example, how to diminish pollution, eliminate its source or upgrade filters, but also how to draw a time plan for shutting down entire plants. By discussing the matter publicly, EPBs seek to enhance popular understanding of the complexity of issues at stake and to contain the situation. At the same time, they may manage to play the conflicting parties' demands against each other, thereby creating breathing space for themselves.

Further research is needed to study the consequences of these 'triangular dialogues' in cities that have ambitions to become green. What actually happens after a 'successful' shutdown of an air polluting company? It is a well-known fact that rural inhabitants, including those in rich Zhejiang, complain that many of the more polluting and low-tech industries move out of urban areas into less regulated rural areas as a result of new policies and pressure from the growing urban middle class. The result may be a 'double dose' of air pollution for poorer rural inhabitants: heavy household air pollution due to the burning of solid fuels, and increased ambient air pollution coming from new industrial parks or factories. While city governments seem to express a

strong urge to mobilize the power of pollution-affected residents for the sake of bolstering local political performance, our research in rural areas suggests a widespread sense of powerlessness vis-à-vis the local establishment of polluting industries.

Cleaning the air by changing habits and consumption

Our second example of a new interface between local administration, science, industry and the general population relates to APAP's call for all members of society to play their part in the national battle for better air. The plan also requires local governments to address, through direct interventions and education, people's lifestyle and consumption habits.

In sharp contrast to earlier attempts to slowly develop environmental consciousness (环保意识) in future generations the government now tries to prescribe what we would term as 'shock therapy environmentalism' in order to get quicker results. An example of this are China's new vehicle policies. Vehicular emission is a major, and maybe even the fastest growing, source of atmospheric particulates in Chinese cities (Fang et al. 2009, p. 83). Therefore, curbing vehicle use in larger cities is one of the top priorities of the APAP (Central Government of the PRC 2013; esp. 1.2 and 1.3). According to Hangzhou city-level officials interviewed in spring 2015 one third of urban particulate pollution countrywide is caused by vehicular exhaust. Local environmental experts estimated that around 40% of PM_{2.5}-relevant emissions in Hangzhou were caused by vehicular emissions. Already in 1993, SEPA began regulating vehicle use and emissions, but measures under the new APAP framework are considerably more stringent. The central government now encourages outright command-and-control mechanisms: strictly controlling the number of license plates issued (限行, 限量; 限牌), restricting vehicle use through a rotating ban of certain license plate numbers each day (限号), and removing old and heavy-polluting vehicles from circulation (黄标车). Hangzhou City, for example, introduced a lottery/auction system for license plates in May 2014 to limit the number of newly licensed cars, has implemented a plate number-based, driving-permit system to

control traffic in downtown areas during the week, and restricts vehicular access to sightseeing and ecological conservation areas such as the West Lake depending on an odd/even license plate number system. Official figures report that the number of small passenger cars registered in Hangzhou within the first year of the new policy was reduced by 44%, with positive effects on traffic congestion and air pollution (Zhejiang News 2015).¹²

But what appear to be simple political measures have become a complex interface upon closer scrutiny. For city leadership and local EPBs, creating vehicle-related policies is risky and has unpredictable effects. They need to be coordinated across numerous agencies, such as the transportation department and the police. The acceptance of these policies by the general public is low or even nonexistent. Moreover, when any policy restricting vehicle use is implemented, the public expects improved public transportation and the facilitation of alternative or greener modes of individual motorized transportation, such as e-car rental or car pooling/sharing.

The risk for the government lies in the fact that urban residents may sometimes respond in unpredicted ways when confronted, often over night, with significant restrictions to their lifestyle choices, mobility, and convenience. According to our preliminary observations in Hangzhou, supported by studies in other localities (e.g. Chen and Zhao 2013), the measures themselves are generally accepted because of a widely shared preference for air quality improvement and congestion control. Nevertheless, public disgruntlement prevails when it comes to how these policies are implemented and the inconveniences they bring (Horizon Key 2015). Questions of fairness, social inclusion, and trust in the licensing system arise: Are the policies transparent enough? What are the chances of success in auctions and lotteries to get a license plate?¹³ What is the substantial revenue generated used for? Moreover, a part of the population will develop counterstrategies to get around the restrictions, and this results in new tensions. To complicate the matter, significant economic interests are obviously at stake. At a moment's notice, local and regional car dealers in Hangzhou had to adapt to a slight decrease in sales resulting from the new measures and prepare for changing customer behaviour and demands. The domestic and international car industry had to deal with setbacks, but also new opportunities arose for them, for instance, developing cars with air-filtering technologies, receiving subsidies for

upgrading electronic car technology, etc. Bicycle and e-car rental companies, despite previous scepticism about them, now flourish in the city of Hangzhou, and the models tested there are now emulated in other Chinese cities (Rogowsky 2013).

The Chinese central government would like to see similar vehicle-related policies implemented beyond the handful of cities where they are already in place. At the same time, the population's often strong reactions towards new car use policies might help to explain why the 2015 revision of the air pollution law does not include a national legislation for car use restrictions. The revised law therefore continues to encourage 'reasonable' individual solutions according to local conditions (Central Government of the PRC 2015). It remains to be seen—and further studied—how an authoritative approach to restructuring mobility for the sake of air quality preservation plays out on the ground, and with what effects for the environment and for the relationships between governments, the general population, and industry.

Conclusion

In mid-June 2015, at the time of writing this article, Beijing had experienced more than a week of unusually good air quality (ranging from 35 to 52 on the PM_{2.5} scale; indicated green) and visibly blue skies. The city was not hosting any major international event like the Olympic Games (2008) or APEC (2014), when special measures were taken to halt production in factories and reduce the number of vehicles on the streets in order to keep the skies blue. So this time Beijing residents could be heard saying: 'Yes, incredibly good air. That's because Xi Jinping has his birthday this week!' A joke to be sure, but it can be interpreted as an indication of the popular perception of air pollution and the measures taken to improve air quality. Is there at least a certain degree of trust in the ability of Chinese authorities to make a difference, albeit coloured with some scepticism that their efforts are arbitrary and not necessarily undertaken for the common good? Although Beijingers seem not to believe in a break-through improvement, they are nonetheless happy for the chance to enjoy a few days of easier breathing without worrying too much about the reasons for the reprieve. Similar responses were seen during the APEC meeting when the term 'APEC blue' became popular, suggesting that the population trusted the government

to create blue skies for at least a short period of time. Beijingers can also be sure that the government will do its best to clear the local skies well ahead of all other upcoming major international events hosted by the city.

However, China's air pollution hazard is a complex problem. Multiple factors influence air quality, and finding one linear causation chain for even a single pollutant within this mix of particulates and haze is often difficult—solutions too need to be complex. It is of course much too early to draw conclusions if and when the battle against air pollution can be won, or about the effectiveness of the new government action plans and other activities concerned with air quality protection in China. A reason for some optimism is Greenpeace's (2015) report that found that Beijing and other cities, especially in the coastal regions, saw a slight improvement in air quality over the course of 2014. The report attributed this change to the harsh measures taken in the new initiative, and China can now claim to be doing somewhat better than India. Seeing China's air pollution problem in all its complexity, however, it is difficult to draw a positive conclusion at this stage. Not only do China's cities need bluer skies and the poorest rural areas cleaner energy for cooking and heating, the country also needs to reduce its emissions of greenhouse gases in order to assist the entire world in slowing the acceleration of climate change.

In this process, as we have tried to demonstrate in this chapter, a larger number of stakeholders than ever before in the PRC's history is being drawn into, or actively getting involved in, political action. Triggered by collective experiences of visible air pollution and its implied health risks, Chinese society as a whole is becoming much more conscious of the possible downsides of keeping economic growth cheap. Since the beginning of the decade, some newly configured interfaces between different members and groups of Chinese society are evolving around the outlets of the APAP. It remains to be seen to what extent increased consciousness and willingness to adopt more stringent political measures will translate into new forms of local action that will bring about the necessary long-term change.

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Endnotes

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² See Wright 2013 about China's coal industry.

³ The film was removed from most of China's popular websites within a week of its release when the government seemingly got anxious about its popularity. It remained on Caixin.com.

⁴ See, for instance, popular apps such as Moji Weather (www.mojichina.com), AQICN (www.aqicn.com), Bluesky Map <http://www.weibo.com/u/5042247906> (previous Pollution Map).

⁵ This use of 'interface' borrows from Norman Long's analytical use of 'social interfaces' in the field of development studies (2001).

⁶ For a comprehensive overview of laws and policies, see Lin and Elder (2013).

⁷ NEPA was the predecessor of SEPA and ultimately the MEP.

⁸ Interviews with government officials and environmental/climate researchers in Hangzhou City, January and March 2015.

⁹ An AQI is based on a complicated calculation of the health effects of different air pollutants according to their concentration in either an hourly, 24-hour intervals or as an annual mean exposure. See e.g. Andrews (2014) for a comparison between the AQIs in use in the United States, Europe, and China, and a particular comparison of PM_{2.5} values. China orients its latest AQI to the U.S. indicator system, but is much more lenient on many of the crucial thresholds. While an AQI of 50-100 points is labelled 'moderate' in U.S. terms, in China it is still 'good'. PM_{2.5} levels up till 35.5 mg/m³ are called 'excellent' in China, while even 12.5 mg/m³ in U.S. terms is only 'moderate'. WHO air quality guidelines are even stricter (WHO 2014b).

¹⁰ Interview with the director of Hangzhou's Evaluation Bureau, March 11, 2015.

¹¹ Interviews with government officials and environmental/climate researchers in Hangzhou City, January and March 2015.

¹² It is questionable, however, whether, after just one year of implementation, there is any reliable data that corroborates these statements.

¹³ In the first year of Hangzhou's new car policy, from May 1, 2014 to April 30, 2015, the gratis lottery had an estimated success rate of 0.81–2.20%. Bidding for a license plate costs as much as 47,785 CNY (Zhejiang News 2015), or about one third of the price of a 2014 FAW Volkswagen Golf in China.