



Publishing Pollution Data in China: Ma Jun and the Institute of Public and Environmental Affairs

For decades after Deng Xiaoping's rise to power in 1978, the Chinese government chased GDP growth without regard to environmental impact. The toll was steep. By 2013, desertification had claimed a quarter of the country's area; up to 40 percent of its rivers were polluted (20 percent were unfit for human contact); and fewer than 1 percent of its 500 largest cities met World Health Organization (WHO) clean-air standards.¹ Breakneck growth under successive administrations had left the Chinese people better off economically, but had seriously degraded the natural environment.

Despite the dismal state of China's natural resources, as of 2013 there were signs of progress in at least two areas: government transparency and public participation—particularly by environmental NGOs. One leader was the Beijing-based, nonprofit Institute of Public and Environmental Affairs (IPE), founded in 2006 by Ma Jun, a journalist-turned-environmentalist. Ma and his colleagues at IPE believed that, in the absence of reliable regulation and enforcement, and with an underdeveloped legal system, the best hope of improving China's environment was through citizen and consumer pressure. They also believed that to act, citizens needed reliable information.

By 2013, IPE had built a global reputation for its innovative use of information technology to drive China's environmental movement. It aggregated publicly available—but widely dispersed—pollution data, and embedded the data in online interactive maps. IPE demonstrated how the data could be used to pressure companies into better environmental performance. For example, it tracked emissions violations of Chinese companies supplying international corporations and, using a carrot-and-stick approach, persuaded the multinationals to improve the performance of their suppliers. China's environmental authority seemed to value IPE's role in bolstering its enforcement capabilities.

Perhaps swayed by an IPE petition, central regulators in July 2013 issued new rules that incorporated the nonprofit's recommendation for the real-time release of pollution data. Henceforth, the country's 15,000 largest and most polluting companies—most of them

¹ Elizabeth Economy, "China's environmental future: The power of the people," *McKinsey Quarterly* (June 2013).

state-owned enterprises (SOEs)—would have to report chemical emission levels hourly to the Environmental Protection Bureau (EPB) in their province; the EPBs would publish the data online. The rules were to go into effect January 1, 2014, but many provinces got a head start in 2013.

Just as it had with polluting suppliers of global brands, IPE planned to build an online interactive map and smart phone app using the provincial data. First, however, it prepared to release a report in January 2014 on the progress EPBs had made in implementing the real-time reporting rules. The report, *Blue Sky Roadmap II: Real-Time Disclosure Begins*, would show the public and media how to use the newly available data to reveal violations by individual enterprises. By way of example, it would identify specific SOEs shown to have exceeded pollution emission standards.

As IPE knew well, publishing information about SOEs presented risks. Many were protected by local officials, who relied on the SOEs to create jobs, boost economic growth and propel their own careers. At the national level, powerful ministries, entrenched corruption and conflicts of interest often shielded such enterprises. Furthermore, the information itself was not entirely reliable. IPE had noticed that the SOE emissions data exhibited puzzling spikes and drops, and its report reflected those without being able to fully account for them. Did the spikes reveal illegal dumping or something more benign, such as a glitch in the transfer of data from a factory to an EPB, or from an EPB to IPE? Likewise, did dips signal illegal tampering with monitors, or could they be attributed to a temporary halt to operations or a malfunction in the data transfer?

As IPE prepared to release its report, the mysterious data posed a problem. Ma and his colleagues believed that flawed data was better than no data. But might SOEs contest IPE's information, or even lodge a legal complaint on the grounds that the "incorrect" information was defamatory? Fighting a legal battle would be costly to the small nonprofit. What if SOEs demanded revisions? How should IPE respond—remove contested data from the report (and in future from its website)? Perhaps it could work proactively with EPBs to improve data accuracy, or create a process for handling disputes. As the real-time regulations were implemented, there were bound to be many errors. Ma and his colleagues debated how to minimize risk without jeopardizing the organization's mission.

Becoming an environmentalist

By 2013, Ma Jun was one of the world's most prominent environmentalists. His writings, lectures and innovative online tools for tracking pollution—and polluters—in China had won him international recognition. In 2006, *Time* magazine named Ma "one of the world's most influential people." In 2009, he won the Ramon Magsaysay Award, sometimes referred to as "Asia's Nobel Prize." He was awarded the Goldman Environmental Prize in 2012 and, the same year, was named by *Foreign Policy* magazine one of the "100 top global thinkers."

Born in 1968 in the coastal city of Qingdao, Ma Jun's path to environmentalism led through journalism. He learned about China's dire environmental problems as an investigative reporter with the Hong Kong---based English language newspaper *South China Morning Post* (SCMP), where he worked from 1993 to 2000, eventually becoming Beijing bureau chief for SCMP.com. Ma was among the first mainland Chinese reporters to focus on environmental issues. While traveling on assignment, he was "shocked by the environmental degradation, especially the destruction of the water resources, in our rivers and lakes," he says.² In the north, rivers had become trickling streams, or had completely run dry, as their waters were diverted to agriculture and industry. For a 330---day stretch in 1997, the Yellow River did not reach the sea at all.

In the south, where rainfall was much heavier, rivers escaped overbuilt embankments and dams to flood intensely farmed land. In the summer of 1998, China experienced its worst flooding in 40 years, leaving 14 million homeless, destroying 25 million hectares of farmland and generating over \$20 billion in damages. In urban areas, aquifers were being rapidly depleted. Everywhere, water was becoming too polluted to use even for irrigation. Untreated sewage and industrial discharge flowed directly into rivers, lakes and coastal fishing grounds. Fertilizer runoff caused choking algae growth. The government estimated \$240 million in economic losses due to "red tide" algae blooms between 1997 and 1999.

What he saw convinced Ma to write a book, *China's Water Crisis*, published in 1999 (and translated into English in 2004).³ In it, Ma shared his observations and described the history of government policies—from imperial times, through Mao's reign, to the hyper---growth oriented leadership that followed—that had allowed the wanton destruction of essential resources. *China's Water Crisis* was frequently compared to Rachel Carson's landmark work *Silent Spring* (1962) for focusing public attention on a looming ecological catastrophe. Like Carson, Ma raised the alarm about what unfettered development could do to the environment.

The book marked a turning point in Ma's career. He moved from reporting on environmental problems to trying to solve them. He proposed methods for sustainable management of rivers—for example, reforestation denuded plains, moving farming out of inefficient areas, and raising the price of water to encourage conservation and make sewage treatment a more attractive business.

Obstacles to enforcement

Solutions abounded. But relatively little was being done by government or industry to implement them. The difficulty, Ma realized, was not a lack of technology, but

² Author's telephone interview with Ma Jun, in Beijing, on March 12, 2014. All further quotes from Ma, unless otherwise attributed, are from this interview.

³ Ma Jun, *China's Water Crisis* (Norwalk, CT: Eastbridge, 2004).

of political will. High-tech fixes existed that could make industry cleaner and more efficient. The country could certainly afford the investment; in 2000, China was the sixth-largest country in the world by total GDP (and by 2010, second only to the US).

Moreover, the government was aware of the need to address environmental issues. China was ahead of other developing countries in environmental legislation and monitoring activity. In 1989, it enacted the Environmental Protection Law, giving local government agencies the right and responsibility to inspect polluting enterprises in their jurisdiction, and penalize those exceeding national or local standards.⁴ The law stated that violators would be “warned or fined” if they refused on-site inspections, submitted false reports, failed to pay fees for excessive discharge, imported sub-standard equipment, or transferred a polluting facility to another entity that was unable to curtail its emissions. Intransigent polluters could be shut down. The law put enforcement squarely in the hands of local authorities:

Article 16. The local people’s governments at various levels shall be responsible for the environment [sic] quality of areas under their jurisdiction and take measures to improve the environment quality.

On the world stage, meanwhile, China was a growing power both economically and politically. It took steps to burnish its image as a global citizen, ratifying in 1991 both the Montreal Protocol on protecting the ozone layer and the Basel Convention on the movement of hazardous wastes and, in 2002, the Kyoto Protocol on climate change. To oversee provincial EPBs, the central government in 1998 established the State Environmental Protection Administration (SEPA, upgraded a decade later to ministerial level as the Ministry of Environmental Protection, or MEP).

A framework was in place. Enforcement, however, lagged. Local EPBs were understaffed and underfunded for the enormous task at hand. Fines were too small to function as deterrents; many businesses willingly paid nominal penalties instead of installing expensive pollution controls. As the EPBs got a sizeable portion of their funding from these levies, there was incentive to keep a polluting factory open, paying up regularly, rather than shut it down entirely. Some EPB officials accepted bribes to ignore violations.

A major issue was decentralization, which had underpinned economic growth in China since Deng Xiaoping rose to power in 1978. Ambitious industrialists were encouraged, aided and abetted by provincial, city and township officials, who in turn were rewarded by their superiors for fast economic growth in their jurisdictions. This set up a system of perverse incentives. Local officials often interfered with the EPBs’ work, protecting polluters from

⁴ For the full text of the law, translated into English, see:
<http://www.china.org.cn/english/environment/34356.htm>

scrutiny and stiffer penalties. Some were directly invested in errant enterprises, while others wanted to protect family members or cronies who ran the outfits. Corruption was endemic.

Even for those without direct ties to industry, there was a compulsion to favor economic growth over a clean environment. Closing dirty factories would mean laying off workers, creating conditions for civil unrest. Since the Tiananmen Square incident of 1989, the number one job of local government was to prevent unrest that could undermine the Chinese Communist Party's monopoly on power. The way to do that, the Party concluded, was to continually boost living standards. This meant keeping people employed and factories running at full tilt, regardless of the ecological impact. Promotions and favorable transfers were granted to officials with a record of rapid growth and low dissent on their watch. Jonathan Watts, author of *When a Billion Chinese Jump*, argued that the power of local officials had grown beyond what the central government could contain. He wrote in 2010:

China's political system now exhibits the worst elements of dictatorship and democracy: power lies neither at the top nor the bottom, but within a middle class of developers, polluters, and local officials who are difficult to regulate, monitor, and challenge.⁵

A get---rich---at---any---price attitude permeated society, in fact. When Deng Xiaoping took over the country's leadership, he did an about---face on collectivism, urging people to harness their entrepreneurial spirit to make money and modernize the country. Export---oriented factories sprung up, private business thrived, and over subsequent decades, hundreds of millions were lifted out of poverty. Deprived of so much under Mao, people's appetite for TVs, watches, fashionable clothing, a meat---heavy diet—and in time high---tech gadgets, expensive cars and glittering high---rises—was insatiable.

After Tiananmen, when a student---led democracy movement was brutally crushed by government hardliners, young people were taught to focus on gaining personal wealth rather than political freedoms. Most willingly put their energies to the task. Historian Judith Shapiro describes this complicity as resulting from a "crisis in confidence" in a corrupt and disappointing leadership, which caused "people to cling to consumerism as a way to provide meaning to their lives and to be willing to tolerate a government which otherwise had betrayed them."⁶

Thus, through the 1990s and early 2000s, relatively few protested the mounting pollution, seeing it as the price of economic freedom and an improving standard of living. Many reasoned that China was going through the same growing pains that the West had experienced over the previous century, only in a compressed timeframe. For those who objected, there was little recourse anyway. Officials wouldn't help. China's weak legal

⁵ Jonathan Watts, *When a Billion Chinese Jump: Voices from the Frontline of Climate Change* (London: Faber & Faber Ltd., 2010), 348.

⁶ Judith Shapiro, *China's Environmental Challenges* (Cambridge, UK: Polity Press, 2012), 90.

system, with courts and judges susceptible to political pressure, made it nearly impossible to be heard in court. Laws forbade public demonstrations. Those suffering the most from pollution were often the poorest, least educated, and least able to take a stand.

“We must fight with data”

From Ma Jun’s point of view, however, the main obstacle to action was that citizens did not have enough information. People were not aware of the looming dangers of environmental degradation. He believed public participation was the key to pressuring the government to enforce regulations, and to making polluters change their behavior. But citizens would have to perceive that a healthy environment contributed as much to their standard of living as did financial wealth. They would have to be motivated to act. To reach that point, they would need information. “We cannot fight with slogans or poems,” Ma put it to one reporter. “We must fight with data.”⁷ He explains:

All these years I’ve been looking for different ways to solve the problem, and eventually came up with the idea it’s not just a lack of technology or money, it’s about the lack of incentives [due to] gaps in our environmental governance. To change that, we had to engage the public and they needed to be informed before they got involved. So, we started our transparency work.

China’s Water Crisis established Ma as a commanding voice on the environment. In 2004, he was invited to the Yale World Fellows program, which brought together emerging leaders from around the globe for four months to collaborate and network, study international issues and strengthen management skills. While at Yale, he studied comparative environmental management laws and systems. He learned that litigation was essential to environmental achievements in the US, Europe and Japan. But it would take years for China’s legal system to develop into a useable mechanism for environmentalists. “So I think that transparency is the starting point for us to address the problem,” he says.

Ma was particularly interested in the development of Pollutant Release and Transfer Registers (PRTRs) in the West. These public databases were developed after a 1984 disaster in Bhopal, India, in which over 3,700 people died in one night and 500,000 were sickened by a toxic gas leak at a pesticide plant jointly owned by the Indian government and Union Carbide of the US. Bhopal sent shockwaves globally, as the inherent dangers of industrial secrecy became apparent to citizens everywhere.

⁷ Christina Larson, “In China, a New Transparency On Government Pollution Data,” *Yale Environment* 360, 10 December 2010, http://e360.yale.edu/feature/in_china_a_new_transparency_on_government_pollution_data/2352/ (accessed 16 July 2014).

The US was first when, in 1986, it passed a Toxic Release Inventory (TRI) law in response to Bhopal. Under TRI, the US Environmental Protection Agency (EPA) collected, on an annual basis, self-reported information from companies that released or transferred hazardous substances. The companies had to detail specific chemicals and quantities handled, and treatment methods used. EPA inspectors and attorneys ensured compliance with the reporting requirements. TRI information was stored in a publicly accessible database. Eventually, the database was put online, along with search tools and maps, making public access even simpler.

Starting in Europe in the early 2000s, other countries began adopting similar registries modeled on TRI. PRTRs signaled a new approach to environmental protection: the public had a fundamental “right to know” about potentially hazardous chemicals released into the environment, even when the emissions were within regulatory limits. Moreover, it was hoped that transparency would lead companies to improve environmental performance beyond the minimum standards required by the law.

Ma wanted a similar mechanism in China—an accessible and regularly updated database detailing the composition and quantity of toxic emissions, and who was releasing them. But the Chinese government remained protective of industry and wary of its own citizens. It was not likely to adopt a PRTR any time soon.

So Ma decided he would have to create the database himself. The question was, what would it contain? Chinese companies did not have to report their emissions as US companies did under TRI. Still, some company information was in the public domain—for example, “environmental supervision records” that identified enterprises fined for exceeding emission standards. These were published by local EPBs and often reported in official media. While most companies operated under the public radar, violators at least could be identified.

There were also some pollution data available to the public. These included levels of common pollutants in the air and water, and aggregate domestic and industrial emissions of certain chemicals and wastes, as measured periodically by environmental officials. While not linked to specific polluters, the provincial and city-level data could be amassed and made much more useful to citizens through creative use of technology. “This is the information age,” says Ma. “Information has created opportunities for all those who care about the solution of social issues. I think we [should] all tap into the potential created by this explosive growth of information technology.” He began to see how the pieces could fit together.

China Pollution Maps launched

In May 2006, Ma Jun founded the non-profit Institute of Public and Environmental Affairs in Beijing, with just two staffers. (The number would grow to eight by 2010, and

double again by late 2013.) His mission was to do something with his research into water mismanagement that would motivate a public response. First, he had to build a database. IPE used public records, mainly from EPBs, as well as reports published in official media. None was a “state secret.” Three kinds of information, dating back to 2004, went into the database:

Environmental quality indicators—levels of specific greenhouse gases and pollutants in the air and water, by city, province and river basin

Emissions data—aggregate levels of industrial and domestic discharge of specific pollutants, by city, province and river basin

Environmental supervision records—details of incidents in which companies had been fined or cited by environmental authorities

In September 2006, IPE released its first product, the so-called China Water Pollution Map. Fifteen months later, in December 2007, it launched a companion China Air Pollution Map. Though simple in concept and design, these became transformative tools in China’s burgeoning environmental movement. Having the information in one place, in a consistent format and tied to a map made it more useful. With the tool, anyone—citizen, reporter, blogger, activist, regulator, or concerned company—could view pollution levels on national or provincial levels, or across 300 cities or 11 river basins.⁸ Users could compare year-on-year trends and see how industrial and domestic discharge levels were changing.

Using the supervision records to single out individual violators won IPE much attention. Its database included water pollution citations for 2,500 enterprises and air pollution citations for 4,000.⁹ By seeing where the violators were located, people could start to link high pollution levels in those areas to the behavior of individual factories. IPE also added Google Earth images, allowing users to see what the factories looked like from above—how large, how sprawling, how near to waterways—rather than merely as dots on a map.

Approval. The state-run Xinhua News Agency gave the maps approving coverage and noted that IPE had “blacklisted” the violating companies.¹⁰ This suggested that the government saw Ma’s work not as a threat to its authority, but as a potential asset. The maps showcased the EPBs’ efforts to hold polluters accountable, and could help SEPA apply pressure to local officials to deal more severely with polluters. SEPA deputy director Zhou Jian went so far as to laud the burgeoning role of organizations such as IPE in supporting regulators. “NGOs have close ties with people and can mobilize the public to participate in environmental protection activities,” he said in October 2007. “NGOs have become an important

⁸ To explore the interactive pollution maps in their current form, visit:

<http://www.ipe.org.cn/En/pollution/sources.aspx?mode=0>

⁹ By 2013, there were 150,000 supervision records in the database.

¹⁰ “Chinese NGO blacklists 4,000 companies for bad air pollution record,” *People’s Daily Online*, December 13, 2007. See: <http://english.people.com.cn/90001/90776/6320616.html> (accessed 16 July 2014).

social force in promoting China's environmental protection and acted as advisers to the government."¹¹ At the time, there were 2,700 registered environmental groups in China.¹²

Without SEPA's support, the NGOs would have been unable to operate. But Ma recalls it took patient effort in IPE's early years to convince officials, especially local environmental authorities, that his organization was not trying to interfere with their work or punish commercial enterprises. "We carry on this transparency work only for environmental protection, for pollution reduction. It's not about any other thing. It's totally nonprofit," he says. "I think it's very important for the EPBs to understand this point."

Taking on supply chains

Even after IPE started publishing the maps, however, enforcement continued to lag. So Ma Jun looked for ways to leverage the power of the consumer. In developed countries, companies tended to respond quickly to petitions, boycotts, name---and---shame campaigns and embarrassing press coverage. But most of the thousands of companies "blacklisted" by IPE were Chinese; only a few dozen were subsidiaries of foreign companies. Chinese companies were unaccustomed to bowing to, or even responding to, public pressure. They did not have PR machines promoting their corporate responsibility plans, or marketing executives (or lawyers) laser---focused on brand protection. Most were not household names. They were unlikely to feel the heat of angry consumers.

Ma saw a chink in the armor, however. While the companies in IPE's database were domestic, many supplied brand---conscious multinational corporations (MNCs). China was, after all, the workshop of the world, where MNCs went for inexpensive labor, lax regulation and the hope of breaking into a market of over a billion people. In effect, Ma reasoned, MNCs were in violation of China's environmental rules, albeit indirectly through their supply chains. This suggested to Ma one way the database could be leveraged to motivate action. People could look up international brands on IPE's website and find out which ones had offending Chinese suppliers. The interactive map would show exactly how the suppliers were operating. The connection between foreign companies and pollution in China would be made explicit. This would be of interest to consumers and media globally.

IPE staff researched companies that had received citations to find out which MNCs they supplied. Matthew Collins, a British researcher who joined IPE in 2010, explains the process:

¹¹ "Chinese Government Praises NGOs' role in Making Environment-Friendly Policies," *People's Daily Online*, 31 October 2007, <http://english.people.com.cn/90001/90776/90882/6293643.html> (accessed 16 July 2014).

¹² Thousands more groups operated unofficially. For a history of environmental NGOs in China, including their evolving tactics and relations with government, refer to: Judith Shapiro, "The Evolving Tactics of China's Green Movement," *Current History* (September 2013).

This is looking at public data, so usually desktop research. Sometimes these companies are very proud of the fact that they supply to a big company, so they'll advertise it on their website [or on] other kinds of websites, like recruitment websites. They often advertise that you'll be working with these brands if you work for this company. So there's various different sources you can see. Obviously, it's not 100 percent sure that this company does supply to this brand, but we have a fair idea.¹³

Green supply chain. The next step was to get the MNCs to acknowledge and take responsibility for supplier violations. Over the course of 2007, IPE teamed up with 21 environmental NGOs around China and formed the Green Choice Alliance (the group would grow to 50 by 2013). In August 2008, the Alliance launched a two---pronged offensive: MNCs were urged to green their supply chains, and consumers were urged to use their buying power to pressure them to do so.¹⁴ The Alliance sent each of the targeted MNCs a letter introducing its mission to reduce pollution in China. The letter informed the company that manufacturers in China had been cited for exceeding discharge limits, and gave links to the supervision records maintained in IPE's database. The letter also contained evidence that one or more of these violators was part of the MNC's own supply chain. The letter then requested a response to a series of questions:

1. Are the above enterprises your company's suppliers?
2. If the enterprises are your suppliers, have you been aware of their environmental violation records?
3. If you have been aware of their violations, what measures have you taken to remedy them? If you have not been aware of the violations, then, after receiving this letter what kind of measures or action will you prepare to take?
4. Do you have any other suppliers that have problems with environmental compliance?
5. Do you have environmental standards for your suppliers? Have you established an environmental management system for your supply chain?¹⁵

The Alliance aimed to be collaborative rather than combative. The MNCs (and their suppliers) were provided space on the IPE website to respond to their "blacklist" status. Some made statements about plans for improving environmental performance. They could also post supporting documents (e.g., newly obtained permits or follow---up monitoring

¹³ Author's interview with Matthew Collins, in Beijing, on March 11, 2014. All further quotes from Collins, unless otherwise attributed, are from this interview.

¹⁴ IPE and World Resources Institute, *Greening Supply Chains in China: Practical Lessons from China-based Suppliers in Achieving Environmental Performance* (October 2010). See: <http://www.ipe.org.cn/Upload/Report-Green-Supply-Chain-In-China-EN.pdf>

¹⁵ IPE et al., *The IT Industry Has a Critical Duty to Prevent Heavy Metal Pollution* (24 April 2010), 12. See: <http://www.ipe.org.cn/Upload/Report-IT-Phase-One-EN.pdf>

data). If a company wanted to be removed from the list after implementing new procedures or controls, it had to agree to a third-party audit, conducted under the supervision of IPE, often with a local NGO in attendance. Each action, from responding to the initial letter, to developing and implementing a strategy for greening its supply chain, to submitting to an independent audit, to pushing its suppliers to be audited, was checked off in the database.

Companies were not always pleased to hear from IPE and its partners. Collins, who handled communication with the foreign companies, says his Chinese colleagues often had a tougher job. “Sometimes [the Chinese suppliers] can be quite angry when they call you up, and say ‘Where did you get this information?’ and ‘How dare you contact one of my customers and tell them about this?’” The researchers had a simple answer, however: the information was publicly available online.

Unfortunately for IPE, the citation records did not always *stay* public. EBPs routinely discarded or overwrote files. Some were persuaded to erase records if a company argued it had been unfairly treated, or if it had subsequently remediated its emissions problem. With public records gone, some of IPE’s blacklisted companies were emboldened to deny they had ever been officially cited and insisted that IPE de-list them. In other cases, managers simply did not know, or wish to believe, their company had received environmental citations, and demanded to see the evidence.

Quick learners, Ma and his colleagues started to take and preserve screenshots of citation records as they appeared on official websites. This proved critical to IPE’s ongoing ability to handle disputes with blacklisted suppliers. According to Ma:

Quite a few of them start with questioning the data. So if we don’t have those records, then we could be in trouble. In quite a few cases, they simply don’t know—senior management doesn’t know. They approach us and many of them feel they have been wronged. And so, what they want is the proof, the evidence that they do have problems.

Gradually, more MNCs targeted by the Alliance took the requested actions. They could no longer refuse to identify their suppliers, nor claim ignorance about their suppliers’ records; the information was available for all to see on IPE’s website. Public access to the site also meant that it was important for the companies to take—and be *seen* to take—corrective action. Consumers and media around the world were watching. The clear steps laid out by the Alliance, and the database of citation records, made it relatively easy for companies to take measures. New records were continually added, and foreign companies that had not been targeted began approaching IPE proactively, to find out how to source responsibly in China. (They were advised to use the IPE database to check whether a potential supplier had received citations.)

Pollution Information Transparency Index

The IPE maps and database opened up a world of possibilities. For example, cities could be ranked by pollution level—a ready-made publicity opportunity. But Ma Jun was more interested in whether local governments were making information *available* than in how polluted each location was, and that’s how he wanted to rank them. IPE would measure transparency. For example, when he launched the China Air Pollution Map in late 2007, Ma scolded Guangdong province, one of China’s most economically advanced, for its lack of candor, saying, “A report by a city government in the province said a total of 1,200 enterprises in six sectors have caused serious pollution—but it did not name even a single factory.”¹⁶

The time seemed right to hammer local governments on transparency because, also in 2007, the central government had adopted new Open Government Information (OGI) regulations.¹⁷ They were to go into effect May 1, 2008, and would apply not only to central agencies, but to every level of government: provinces, municipalities, counties and townships. Officials would have to publicize information about land use, government spending, public health, food and drug safety— anything directly affecting citizens. OGI appeared to signal a shift away from state secrecy toward accountability. The primary motivation was to curb corruption, particularly at the local level. But it also empowered citizens; in introducing OGI, a government official emphasized that OGI would “safeguard the public’s right to know, the right to participate and the right to supervise.”¹⁸ There was a caveat, however. According to the regulations, information disclosure “should not cause social instability and threaten the safety of the state, the public and the economy.”

Environmental activists were eager to see how OGI would affect pollution information. In a promising step SEPA, long hampered by corrupt officials at every level of government and in every department, issued its own “Measures on Open Environmental Information,” to be implemented concurrently with OGI.¹⁹ The measures required EPBs and companies to disclose pollution information and to build IT systems for making such information public. Among the articles:

Article 4. Environmental protection departments [EPBs] shall observe the principles of justice, fairness, convenience to the people and objectivity, and disclose government environmental information promptly and accurately. Enterprises shall disclose enterprise

¹⁶ Shi Jiangtao, “Guangdong ‘Poor’ on Pollution Information,” *SCMP.com*, 13 December 2007. See: <http://www.scmp.com/article/619370/guangdong-poor-pollution-information> (accessed July 16, 2014).

¹⁷ “New Rules Issued to Require Government Transparency,” *ChinaDaily.com*, April 24 2007. See: http://www.chinadaily.com.cn/china/2007-04/24/content_858745.htm (accessed July 16, 2014).

¹⁸ *Ibid.*

¹⁹ For the full text of the measures, translated into English, see: <http://www.cecc.gov/resources/legalprovisions/measures-on-open-environmental-information-trial-cecc-full-translation>

environmental information promptly and accurately under the principle of combining voluntary disclosure with mandatory disclosure.

Article 5. Citizens, legal persons and other organizations may request environmental protection departments to obtain government environmental information.

Article 6. Environmental protection departments should establish and perfect open environmental information systems.

Less promising to proponents of transparency, the measures also stated that EPBs “may not disclose government environmental information that involves state secrets, commercial secrets or individual privacy,” leaving a potential loophole for polluters. Within a year of rollout, companies were making use of the commercial secrets privilege. BASF refused to divulge to Greenpeace some of the chemicals it would use at a new plant in Chongqing, situated along the Yangtze River; the Ministry of Environmental Protection (SEPA was upgraded to ministerial level in 2008) sided with BASF. There was also great variation in how fully the regulations were implemented. Some local governments were proactive, while others did little.²⁰

PITI. Ma could see that implementation of the new rules would be highly variable. So in partnership with the Beijing office of the international environmental group Natural Resources Defense Council (NRDC), IPE began developing in 2009 the methodology for an annual ranking of cities by their level of environmental information disclosure (see Appendix 1 for criteria). Each city was scored on a scale of 0---100 and evaluation results were sent to local EPBs, whose feedback then went into a final revision of the scores. IPE and NRDC hoped the scores would draw favorable attention to cities that were being proactive—and publicly shame the dawdlers. The first ranking of 113 cities was released in 2010 (the mean score that year was 36).²¹

The Pollution Information Transparency Index (PITI) was designed to spur competition between cities, and this goal appeared to be met. City officials started to communicate directly with IPE and NRDC to explore ways to improve their ranking. This led to sustained interaction between local governments, especially EPBs, and the two NGOs. The partners fostered dialogue by holding workshops for officials to share best practices, and events to recognize cities taking the greatest steps toward transparency.

²⁰ Tod Kaiser and Rongkun Liu, “Taking the Pulse: The One-Year Anniversary of China’s Open Government Information Measures,” Woodrow Wilson Center (August 2009). See:

http://www.wilsoncenter.org/sites/default/files/ogi_final21.pdf

²¹ IPE and NRDC, *Breaking the ice on environmental open information: The 2008 Pollution Information Transparency Index (PITI): First Annual Assessment of Environmental Transparency in 113 Chinese Cities*, September 17, 2010).

See: <http://www.ipe.org.cn/Upload/Report-PITI-2008-EN.pdf>

Yan Wang a project director at NRDC in Beijing, notes that this was “the first time for a third party or an NGO to assess government performance.”²² When they released the inaugural PITI report, she says, “we were a bit concerned and worried how the government would see us, two NGOs, doing this kind of report.” But surprisingly, there was little blowback. Indeed, healthy competition arose between governments. “Some of the cities that are not doing well, as shown in the report, come to us and say ‘How we can do better?’” notes Yan.

The first annual PITI report also explained why transparency was the goal. Drawing on the example of PRTRs, it said environmental information disclosure had been shown over the previous decades to be an indispensable tool globally:

Information disclosure has spurred companies to take proactive measures to reduce pollution in their own facilities. It can raise public awareness of environmental issues, and give the public the tools it needs to identify and handle environmental risks. Information disclosure can empower other stakeholders, such as banks, shareholders, consumers and others, to monitor the environmental performance of companies, and work to reduce pollution. Furthermore, it can help governments to clarify enforcement priorities.²³

Collins at IPE emphasizes the point. “It’s to do with how much information they’re providing, rather than how clean or how good the environment is in the area. Because for us, the first step was to get hold of this information,” he says. “Then how we use that information is the next step.”

Tainted milk, heavy metals—and more

Despite the gaps in China’s environmental protection, by 2008 there was reason to feel more optimistic. The IPE database was having an impact, forcing some companies, especially those supplying MNCs, to improve their environmental performance. The OGI regulations offered the promise of increased government transparency and accountability.

But the overall state of China’s environment was grimmer than ever. A 2007 report from China’s environmental authorities and the World Bank concluded that 350,000----400,000 people died prematurely each year due to outdoor air pollution in China; the findings were redacted for the Chinese public.²⁴ In 2008, faith in the government’s ability to protect citizens

²² Author’s interview with Yan Wang, in Beijing, on March 13, 2014. All further quotes from Yan, unless otherwise attributed, are from this interview.

²³ IPE and NRDC, p. 8.

²⁴ The State Environmental Protection Administration and the World Bank, *The Cost of Pollution in China: Economic Estimates of Physical Damages* (February 2007). See: http://siteresources.worldbank.org/INTEAPREGTOPENVIRONMENT/Resources/China_Cost_of_Pollution.pdf

was dealt two sharp blows. In May, an earthquake in Sichuan killed thousands of children when their shoddily constructed (and improperly inspected) schools collapsed. Later in the year, it was discovered that 22 domestic producers of milk and infant formula had been adulterating their products with melamine, a chemical mimicking the protein content of milk. Some 54,000 babies were hospitalized and six died of kidney damage.

After shutting down factories and limiting traffic in Beijing in an effort to clear the air for the 2008 Summer Olympics, heavy smog returned once the Games ended. Many factories had been moved outside the city, but pollution wafted back. Another development focused attention on air quality. Starting in April 2008, the US Embassy in Beijing tweeted hourly readings from an air quality monitor on its roof. The readings were a shock. They showed much higher levels of particulate matter than the Chinese government had previously conceded. Most of the “blue---sky days” in official records were deemed by the Americans to be well below WHO standards. The discrepancy arose because the Chinese government measured larger particulate matter (PM10) while the embassy measured smaller, more dangerous particulate matter (PM2.5) that could more easily lodge in the lungs and enter the blood stream.

The embassy readings, re---tweeted and re---posted on popular Chinese blogs, spread like wildfire. The Chinese government clearly felt unnerved: in July 2009, a Chinese Foreign Ministry official asked American diplomats to stop the Twitter feed, saying that the data “is not only confusing but also insulting” and could lead to “social consequences,” according to a State Department cable obtained by Wikileaks.²⁵ The embassy continued the feed.

The news got worse. In 2009, a series of heavy metal pollution incidents jarred the nation. Thousands of people, including many children, were found to have elevated blood levels of lead, nickel and cadmium. The 12 reported incidents of mass poisoning in five provinces were seen as the tip of the iceberg. Smelters, mines and battery manufacturers were among the suspected culprits. When provincial authorities ordered the closure of non---compliant operations, city and township officials quietly allowed them to continue operating after dark. Other factories that had regularly passed inspection were accused of discharging more heavily at night and between inspections. Fury over the mass poisonings sparked dozens of protests, some violent, as affected residents demanded violators be shut down for good.

People had begun to fear the most basic components of life—the water they drank, the air they breathed, the soil they farmed and the food they ate. As Ma Jun had predicted, information fuelled public action, which in turn jolted the central government. It tightened

²⁵ See: <http://wikileaks.org/cable/2009/07/09BEIJING1945.html> (accessed July 16, 2014)

restrictions on heavy metal emissions and announced that the MEP was conducting a thorough study of heavy metal contamination across the country.²⁶

Poison Apple

With the slew of 2009 heavy metal incidents spurring both the public and government into action, Ma Jun considered how IPE could contribute to the momentum. Much of the heavy metal pollution came from mines and smelters, state-owned operations that would be hard to crack. But another major source—IT manufacturers—appeared to be an easier target.

Like many people, Ma had once thought of the IT industry as “clean.” He learned it was anything but. Battery and circuit board-makers dumped wastewater containing nickel, copper, chromium and lead into China’s waterways. In Guangdong province, where much of the industry was concentrated, environmental authorities calculated that more than 12,000 tons of heavy metals and arsenic flowed into the Pearl River Delta in 2008 alone. Dozens of IT facilities inspected that year were found to be breaking environmental regulations.

Nearly 50 percent of the world’s computers, cell phones and digital cameras were manufactured in China. The largest tech brands, including BT, Siemens, Samsung, Sony and Apple, sourced their parts from Chinese original equipment manufacturers (OEMs). While the MNCs had public commitments to environmental and social responsibility, they relied on suppliers with laxer policies. Indeed, because the MNCs tended to choose OEMs based solely on price and quality, the suppliers had an incentive to short-cut environmental controls in order to offer the lowest prices possible. The OEMs in turn sourced from third-tier suppliers that were even further removed from the MNCs.

Ma and his colleagues wanted to expand the MNCs’ sphere of responsibility to include second- and third-tier suppliers. Using the database of citation records, and researching the violators to find out who their largest buyers were, IPE was able to link hundreds of delinquent Chinese OEMs to over 30 international brands. As it had done for the earlier (and ongoing) green supply-chain initiative, IPE approached MNCs and local companies with its findings. But starting in April 2010, it also published industry-specific rankings of the IT, telecoms and battery sectors and released media-ready reports. It gave the same treatment to the textiles and garments sector, another emitter of heavy metals and toxic chemicals. Comparing MNCs within a sector gave people greater context, and placed more pressure on the biggest polluters. No one wanted to be ranked below the competition (see Appendix 2).

For companies that did not respond to its communications, IPE published contact details in its reports, and urged consumers to appeal directly to the MNCs’ corporate

²⁶ In December 2013, MEP concluded the study, conceding that 20 percent of China’s arable land, including much of its wheat and rice cropland, was contaminated—daunting, given that food security in China was already a serious challenge.

responsibility officers. One after another, the big brands moved from being silent to responsive to proactive. Some became industry leaders in using the data to monitor and clean up their supply chains.

Apple. The last holdout was Apple. Chinese manufacturers that claimed to supply Apple had been issued environmental citations. Yet Apple would not acknowledge that the companies were indeed suppliers, citing a policy of keeping supplier information secret. Apple would not divulge whether it was following up on the information provided by IPE. When an NGO tweeted at Apple CEO Steve Jobs about a rash of suicides at Foxconn, a major Chinese supplier to Apple, Jobs responded by directing him to Apple's corporate social responsibility website, saying "You should educate yourself. We do more than any other company on the planet."²⁷ In Ma's view, there was a mismatch between Apple's international image of responsibility and its secretiveness about operations in China. He was determined to make Apple open up.

In January 2011, a year after it began contacting the tech MNCs, IPE published *The Other Side of Apple*, a report that delved deep into the company's supply chain. When this still elicited no response, IPE in August 2011 published a second report that listed additional suppliers in violation of Chinese environmental standards.²⁸ IPE and its partners went further, launching a media campaign, dubbed "Poison Apple," urging consumers to pressure the company. "We're not trying to single out any company," Ma said in an interview on the *PBS Newshour*. "Apple singled out itself through the process by shutting down the door of communication entirely."²⁹

Apple was of particular concern to Ma and IPE not only because it was one of the largest IT companies in the world, but because it had already been publicly accused by Chinese workers of sickening them with toxic chemicals. In January 2010, employees at a Chinese subsidiary of Wintek, a company headquartered in Taiwan that made LCD displays for Apple, went public with claims that they had sickened from *n*-hexane, a chemical made from crude oil used to clean touch screens.

The Wintek plant in Suzhou had switched from alcohol to *n*-hexane because it dried faster. But without proper ventilation in the dust-free "clean rooms," workers were breathing toxic fumes. They reported symptoms common to *n*-hexane exposure: dizziness, weakness, falling over and, in extreme cases, paralysis. After only a few months on the job, dozens were hospitalized. Fearing long-term disability, workers staged a walkout of several hours, which received media attention. In May 2010, Wintek announced that it had stopped using *n*-

²⁷ IPE et al., *IT Investigative Report Phase IV: The Other Side of Apple* (January 2011), 4. See:

<http://www.ipe.org.cn/Upload/Report-IT-V-Apple-I-EN.pdf>

²⁸ IPE et al., *The Other Side of Apple II: Pollution Spreads through Apple's Supply Chain*, August 2011. See:

<http://www.ipe.org.cn/Upload/Report-IT-V-Apple-II-EN.pdf>

²⁹ *PBS Newshour*, April 12, 2011. See transcript: http://www.pbs.org/newshour/bb/world-jan-june11-china_04-13/

-hexane and had compensated the stricken workers. But Apple would not confirm any of this—or even that Wintek was its supplier.

But the IPE reports and associated consumer campaign finally had an impact. In September 2011, Apple approached IPE and its NGO partners and began a drive to clean up its supply chain. To Collins, the episode epitomized two aspects of Ma Jun’s personality: “very diplomatic” and “very determined.” He explains:

He’s very good at talking to different people. So he’s able to talk to Chinese government and foreign government people, and business, other NGOs. I think that his approach of being able to communicate with different organizations, and being able to communicate with foreign organizations as well, has been quite important to IPE’s development.

For example, says Collins, after the first report “it seemed to me like we were coming to the point where you just hit a brick wall. There was complete silence from them, and they weren’t going to respond.” Yet Ma pushed ahead with a second report. Recalls Collins:

And I was thinking maybe we’re never going to get anywhere with them. But it paid off, definitely. Because the morning of the release of the second report, they finally decided that they would start talking to us.

Green investment

Foreign companies and their Chinese suppliers were taking steps in the right direction. But the impact on pollution levels was bound to be small: most emissions came from sectors dominated by large state---owned enterprises or recently privatized SOEs, including power generation, mining, steel, petrochemicals, cement, agriculture and animal husbandry. Some 15,000 SOEs accounted for 65 percent of all pollution in China. How could these massive enterprises be pressured to clean up? They enjoyed the support not only of local officials, but of powerful national ministries. Many senior officials in central government were invested in the sectors they regulated. Moreover, the SOEs were not vulnerable to consumer pressure in the way MNCs with global brands were. Starting in 2011, Ma Jun and his colleagues began looking into another approach. Says Collins:

There’s a whole raft of industries that are not susceptible to that kind of consumer pressure. We try to look at how can we influence these industries. So we started looking at it from an investor’s perspective. People invest in these companies—foreign investors, Chinese investors and corporate investors.

Many of the powerful domestic corporations were listed on the Hong Kong, Shanghai and Shenzhen stock markets. If investors were aware that some had received environmental

citations, would that affect their investment decisions? Ma believed it was worth a try. If institutional funds began to rely on the IPE database in making investment judgments, then steel, energy, mining and electric power companies might become more environmentally responsible. IPE led the Green Choice Alliance members in launching a new initiative, Green Stocks.

Green stocks. On June 18, 2013, after two years of development, IPE introduced, in partnership with several other NGOs, Phase I of its Green Stocks initiative. As with the supply-chain initiative, IPE hoped to link Chinese companies that had violated environmental rules to their largest (often foreign) customers—only this time the customers were institutional investors, rather than big consumer brands. Collins explains: “I think what we’re seeing changing is some of the pension funds, particularly, are more susceptible to public pressure, because they’re investing public money in these kind of schemes.”

Green Stocks focused first on the cement industry; IPE’s experience with IT and textiles had shown that highlighting a single industry was effective. China was the world’s largest producer and consumer of cement. The country produced half the world’s annual cement supply, and in the preceding three years it had used more cement than the US had during the entire 20th century. Cement production was an energy-intensive and dirty industry. It created 30 percent of the country’s dust emissions, as well as a good proportion of its greenhouse gases, contributing to the choking levels of smog and fine particulate matter. As a major coal-burner, the cement industry accounted for 14 percent of mercury released into the air.

The IPE database, and a report coinciding with the Green Stocks launch, identified 17 listed cement companies (or their subsidiaries) that were frequent violators of discharge regulations.³⁰ IPE researchers contacted the 17 companies and followed up with non-respondents. Only one company put forth a plan of action. The response from China National Building Materials Group Corporation was more typical: “If you have not received a reply to your letter it is probably because the company felt the contents of the letter were of no interest.”

IPE and its NGO partners then contacted domestic and foreign institutional investors with holdings in the 17 companies. Overall, the response was disappointing. While some foreign funds said they would conduct follow-up investigations, most investors, like the violating companies themselves, offered no response at all. A large Chinese mutual fund replied, “The investment services provided by the fund to its client has only one goal and that is to make a profit for the client.”

But Ma and his colleagues were not deterred; they expected the process to take time. After all, the green supply-chain initiative had started slowly in 2007, with a discouraging initial response from companies. Yet by mid-2013, when IPE launched Green

³⁰ IPE et al., Green Stocks Phase I Report: Responsible Investment in the Cement Industry: Still a Long Way to Go (18 June 2013), 4. See: <http://www.ipe.org.cn/Upload/IPE-Reports/Report-Cement-Phase-I-EN.pdf>

Stocks, over 950 MNCs and their suppliers had explained their environmental violations and described corrective actions taken. The Alliance partners would have to keep pushing. Meanwhile, IPE started gearing up for another stab at the financial industry. In an initiative it called Green Banking, it would aim to influence banks to stop giving credit to companies with environmental violations.

What else could be done to pressure the biggest polluters? Ma and his colleagues had already started to pursue yet another angle. They had launched an initiative that took advantage of the public's blossoming interest in real-time data, sparked by the US Embassy Twitter feed, and the growing demand for government transparency.

Blueprint for blue skies

The Chinese government couldn't contain the demand for real-time data. In this format, air quality information seemed more credible to the public than daily averages did, and certainly more useful than annual averages. From 2008 on, hourly readings from the US Embassy were reposted on Sino Weibo, a microblogging and social media site with hundreds of millions of registered users, and programmers developed corresponding apps for smart phones. The US consulates in Shanghai and Guangzhou began posting their own air quality readings. Urban residents used the information like a weather forecast. Depending on the reading, they might avoid exercise, keep their children indoors or wear a facemask. Long stretches of hazardous readings convinced many that the smog was causing lasting harm to their health. The wealthy bought air purifiers, took "clean air vacations" in more pristine places, or bought second homes outside the city. In Beijing, where pollution was particularly heavy, expatriates started to turn down postings or demanded hardship pay.

Monitoring transparency. Ma Jun looked for ways to leverage the growing public outrage over air pollution and its desire for real-time data. He started, as before, by laying a foundation of information. In collaboration with the Law School at People's University, a top-ranked public university in Beijing, IPE in January 2011 published a report assessing the transparency of air quality monitoring in 20 Chinese cities as compared to 10 international cities. The report found China sorely lagging.³¹ It concluded with a series of recommendations to the government (see Appendix 3), in brief:

- * Include PM2.5 and other pollutants in air quality monitoring—not just PM10 readings
- * Make the readings available to the public
- * Increase the number of monitoring sites in each city, for a more accurate representation

³¹ IPE and Renmin University of China Law School, A Threat To Public Health: China's Urban Air Quality Disclosure Needs Urgent Improvement: 2010 Annual Urban Air Quality Transparency Index (AQTI) Results and Comparative Study of 20 Domestic and 10 International Cities, January 19, 2011, p.32. See: <http://www.ipe.org.cn/Upload/Report-AQTI-EN.pdf>

- * Release the data in real time
- * Link data to a map
- * Provide daily, hourly and historical readings
- * Revise air quality standards periodically, as more is learned about the impact on human and environmental health
 - * Develop an early warning system to alert the public to hazardous conditions, and advise on protection measures (e.g., staying indoors)
 - * Encourage communities to develop emergency measures to quickly reduce air pollution (e.g., temporarily shutting down factories and limiting traffic)

If taken, these measures would give people across China, in cities large and small, a clearer understanding of their immediate environment. The more they knew, the more they would care, Ma and his team believed. While information transparency was essential, however, the researchers' ultimate goal was a return of blue skies, healthy water and safe soil. To focus public attention on the longer-term challenges of environmental remediation, IPE developed and published in December 2011 a "blue skies roadmap."³² The plan emphasized that the government should monitor and publish not only *aggregate* levels of pollution (e.g., by city or river basin), but also *individual* sources of pollution. There were four parts to the roadmap:

- Step I. Monitor pollutants and make data available
- Step II. Implement health alerts and emergency measures for mitigating pollution
- Step III. Investigate the sources of pollution
- Step IV. Formulate a plan and schedule for reducing emissions at those sources

The government was in the process of implementing steps I and II, the report affirmed. Now it needed to identify the country's largest industrial polluters and monitor their emissions. IPE was convinced that the emissions data should be made public as a way to strengthen enforcement. The report conveyed IPE's logic:

To resolve the problem of atmospheric pollution, pollutant discharge must be controlled. In order to control the discharge of pollutants, the first step is to start with the identification of pollutant sources. Owing to the complexity of atmosphere pollution sourcing and in view of China's lax environmental supervision and the low cost associated with violating, the public must be allowed to understand the sources of pollutants so that they can then take part in the supervision and management of atmospheric pollution.³³

³² *A Roadmap to Blue Skies: China's Atmospheric Pollution Source Positioning Report* (December 2011). See: <http://www.ipe.org.cn/Upload/Report-Positioning-EN.pdf>

³³ *Ibid*, 2.

In the *Roadmap* report, IPE urged the government to focus on the key state---monitored enterprises—the 15,000 heaviest emitters identified and published by the MEP every year. These SOEs already had pollution monitors installed, but emissions data were kept under wraps by EPBs. IPE suggested that the government publish the company information in real time and link the data to an interactive online map. It also recommended that the government track a greater number of chemicals (not just nitrogen dioxide and sulfur dioxide, as was common). IPE proposed in its report that the real---time information disclosure provide a basis for implementing economic initiatives (such as green credits, green stocks and bonds, and green lending) that would encourage large emitters to reduce emissions and clean up their supply chains.

In February 2012, IPE followed up with a petition delivered directly to the central government during the annual meeting of the National People’s Congress. The petition asked the government to create a centralized (i.e., national or provincial---level) platform and begin release, with real---time updates, of the SOEs’ emissions data. It asked the government to require companies to report annually the total amounts of chemicals disposed of, transported, or transferred, as PRTRs required in other countries. It also demanded that environmental impact assessments be released in their entirety (traditionally, the public received only abbreviated assessments). IPE was demanding a lot, but many of the measures were already in the late stages of consideration by the government. At times, IPE researchers felt they were pushing on an open door.

Whether in response to IPE’s recommendations or to popular demand, a string of policy changes soon followed. On March 2, 2012, MEP Vice Minister Wu Xiaoping introduced revisions to China’s Ambient Air Quality Standards. For the first time, they would take into account PM2.5 and ground---level ozone. Maximum allowable levels of pollutants were lowered, and hourly limits were added (previous standards included only annual limits), bringing the guidelines closer to WHO standards.³⁴ Additionally, 74 cities, including Beijing, would provide hourly PM2.5 readings to the public by the end of the year.

There were other signs that the government was taking the problem of pollution seriously. The Party’s 12th Five---Year Plan (2011---2015) emphasized climate change and the environment as never before, setting targets for pollution reduction, energy efficiency, and GDP growth based on more sustainable development. In June 2013, the MEP announced a Clean Air Action Plan to reduce PM2.5 concentrations 25 percent over 2012 levels, to which the central government would commit \$277 billion over five years.

IPE could cite considerable progress on air pollution transparency, noting in a report that Chinese cities had established more monitoring sites within their boundaries, were taking more frequent readings and were disclosing the concentration of more types of chemicals.

³⁴ For a comparison of China’s New Ambient Air Quality Standards to WHO standards, see: <http://cleanairinitiative.org/portal/node/8163>

Some cities were publishing the data on digital maps and Weibo.³⁵ But real-time point-of-emissions disclosure was still an aspiration.

Real-time data begins

IPE had spent years building up credibility with China's environmental authorities. Finally, its efforts to influence government policy—from the recommendations on air quality monitoring that urged real-time disclosure, to the blue skies roadmap and petition that called for the release of pollution source information—appeared to come to full fruition. On July 30, 2013, the MEP announced it would require the country's 15,000 key state-monitored enterprises to disclose emission levels of common pollutants in real time (hourly for gas emissions and every two hours for wastewater emissions) to their provincial EPB. The EPBs would disseminate the data digitally to the public. Each bureau would develop and perfect its own online platform for the purpose. The rules were to go into effect January 1, 2014, but many provinces started rollout in 2013.

The rules were closely aligned with the IPE petition. But even Ma was surprised by the scope of the initiative. “Way beyond our expectations, the government actually said yes,” he told a reporter. “I am quite amazed.”³⁶ Linda Green, an NRDC director in Washington, DC, referred to it as the “biggest thing” the Chinese government had done to date to tackle pollution.

The real-time data rules brought China much closer to the PRTR system Ma had envisioned. Instead of information only on violators, as was the case when he launched the China Pollution Maps in 2006, the public would now have access to information on all the largest polluters, even those operating within guidelines. The information would be much richer, as well, specifying chemicals and quantities and, most importantly, identifying who was releasing what.

It could become the basis for stricter monitoring of enterprises, and a gradual reduction in allowable emissions. Gu Beibei, a researcher who joined IPE from the chemical industry in 2012, notes that emissions limits varied greatly by province. “In Beijing, they have implemented the most stringent emissions standard in this region,” she says. Neighboring Hebei province had limits set 10 times higher. She continues:

Even if heavy industry, for example, a power plant, discharges within the standard, it could release 10 times more pollutants in Hebei than the same

³⁵ IPE et al., Small Particles, Big Breakthrough 2012 Urban Air Quality Information Transparency Index (October 2012). See: <http://www.ipe.org.cn/Upload/Report-AQTI-2012-EN.pdf>

³⁶ Simon Denyer, “In China’s War on Bad Air, Government Decision to Release Data Gives Fresh Hope,” WashingtonPost.com, 2 February 2014), http://www.washingtonpost.com/world/in-chinas-war-on-bad-air-government-decision-to-release-data-gives-fresh-hope/2014/02/02/5e50c872-8745-11e3-a5bd844629433ba3_story.html (accessed 16 July 2014).

size plant in Beijing. So, the first step is to really standardize emission limits.³⁷

The new real-time source data would help by allowing people to see, first of all, whether SOEs were operating within established parameters and, secondly, whether the parameters were restrictive enough to protect people and natural resources.

By reporting data in real time, moreover, it would be much harder for companies—or local officials—to hide illegal emissions. Enterprises could not dump at night or between inspections without such maneuvers being recorded. Other common ruses, such as temporarily placing the monitor probe into a secondary effluent pipe or diluting emissions with water when an inspector was due, could be detected by examining trends in the data flows. EBPs could manage their resources more effectively, assigning inspectors to the likeliest violators.

NGOs and citizens could get involved, too, if they noticed excessively high (or suspiciously low) reported emissions. They could alert local authorities, or even go to an errant factory to protest, or to collect photographic evidence of covert dumping. City and provincial regulators would be better able to ensure that, if required, factories suspended production during periods of extreme pollution. If pollution limits were lowered in the future, authorities could verify that factories were ramping down accordingly. Once implemented, the real-time data rules would offer limitless possibilities for bolstering enforcement and pressuring polluters.

Ultimately, Ma saw global implications for collecting and publishing corporate-level pollution data. “In this era of globalization,” he says, “we need to have environmental protection also globalized.” He continues:

The best way, and probably the only way, is to use information technology as a tool. So, I do hope that eventually other countries in the world, especially the developing countries, could build up their own pollution maps. And eventually we piece them together, and come up with a global pollution map, so that we track the performance of corporations wherever they move in the world.

Real-time dilemma

In late 2013, Ma and his colleagues were eager to start leveraging real-time point-of-emissions data in China to prompt regulatory and civic action. IPE was developing a web-based platform on which it would re-publish the provincial EPB data streams. Having the data in one place would make it easier to compare the quality of information

³⁷ Author’s interview with Gu Beibei, in Beijing, on March 11, 2014. All further quotes from Gu, unless otherwise attributed, are from this interview.

released by local governments, see where the most polluting enterprises were concentrated, and identify cities and provinces where enterprises were routinely over the limit. Moreover, by collecting and storing the data over time, IPE would enable researchers to conduct longitudinal studies. For example, it would become easier to find correlations between cancer rates and levels of chemicals in a given location.

IPE had plenty of experience building databases and online maps. But the task at hand was more complicated than anything it had done before, and difficulties arose. For one thing, the real-time data came day and night from over 30 EPBs; it was a technical challenge to manage the constant streams of data. Each EPB had its own publishing format, and some were churning out more information than others. A small technical team at IPE looked into ways to make the data consistent for the IPE site, and to translate the information into a user-friendly smart phone app.

Those were technical challenges; the political challenges were even trickier. The real-time data came from state-owned companies with a long history of being protected by both local and central officials. Ministries that regulated power generation, mining, manufacturing and China's other huge industries were, in general, far more powerful than the MEP, and guarded their interests. Furthermore, SOE bosses were not susceptible to consumer pressure, like their counterparts at MNCs. They already resented having to report what they considered proprietary information. They would not be pleased when IPE made the data even more accessible to the public and media through its website and app.

Antagonizing an SOE or its government backers could yield negative consequences for an NGO, even when the law was on its side (and rules always held ambiguities, such as the "commercial secrets" exception in OGI). An NGO might have its registration revoked, its operations disrupted or its people harassed. If IPE published information showing that an SOE was grossly exceeding allowable emissions limits, the SOE might lodge a legal complaint, accusing IPE of spreading false reports and defaming the company. Even if the SOE's case were flimsy, IPE's resources could easily be consumed in preparing its defense, putting its other programs at risk. Its partner NGOs—most small, local operations—would be at even greater risk.

In the past, IPE had found it critical to keep screenshots of environmental citation records. When a "blacklisted" Chinese supplier questioned IPE's information, the researchers could retrieve a screenshot as evidence. This was especially important when public records disappeared or were altered without explanation. But with real-time data flowing from 15,000 enterprises to 33 EPBs every hour and every day of the year, it would be impossible for IPE's staff of 16 to take a screenshot each time an enterprise exceeded emissions limits. "Some of the companies break the rules almost every day," says Ma. IPE could not capture every incident.

Making matters worse, SOEs might be correct, at least occasionally, in disputing the accuracy of the data. As they started collecting emissions data from the EPB websites to assess quality and develop the online tool, researchers noticed an SOE's emissions would sometimes spike suddenly—well above legal limits—then revert to normal. Did this mean it had dumped illegally? Other times emissions would zero out. Had the factory halted operations briefly? Tampering was a possibility. Benign explanations were also feasible: a malfunction in the point-of-emissions monitoring equipment, or a glitch in the transfer of data from the SOE to the EPB, or from the EPB to IPE. By the time the researchers caught a blip in the data stream, it was often too late to double check, because the EBPs refreshed the figures hourly and many did not provide an archive of historical data. IPE recognized that errors were likely, particularly in the early days of monitoring.

Yet Ma felt that flawed data was better than no data, and that publishing the information would force all parties to concentrate on making it more accurate. He cites the example of urban air quality data. Before the government started real-time monitoring of PM2.5, people had only the US Embassy data, and therefore focused on the high levels of pollution in the capital city. Once monitoring was implemented across the country, however, it became apparent that many other cities were even worse off. “Beijing usually cannot get into the top 10 most polluting cities in China,” notes Ma. He continues:

Before, Beijing was under more scrutiny. Now, the real-time disclosure has leveled the playing field. I think on the monitoring data of major polluters, we need to make sure that it's also under the same public scrutiny. I think it has a huge potential to help improve the quality of the monitoring data, which has long been the problem, actually.

Still, without screenshot evidence, and given that inaccuracies were likely, IPE expected SOEs to contest IPE's information, and demand that unflattering numbers be scrubbed from its website. The researchers considered how to respond. Should IPE remove contested data? Or issue a caveat along with the data?

One option was to lower the bar for revising information on the IPE website. Previously, with the environmental citations, companies had to go through a third-party audit to have their records on IPE's site changed. With the real-time data, the requirements could be simpler. For example, if an SOE were to get a document from an EBP stating that the original data were faulty, then IPE would change the information on its own site. But how could IPE be sure that an EBP was correcting the record only in cases where a technical error had occurred, and not due to political pressure?

Even if erroneous numbers were caught, it would be nearly impossible to completely retract them. IPE's app, when developed, would send hourly data directly to people's smart phones. Based on the treatment of US Embassy readings, it was safe to assume

that exceptionally high emission figures would be re-tweeted far and wide. IPE would not be able to retract numbers once they entered the ether.

While they considered how best to develop the online tool, Ma and his colleagues also prepared for the release of a new IPE report, *Blue Sky Roadmap II: Real-Time Disclosure Begins*, slated for early January. The report assessed the progress EPBs had made in implementing the real-time reporting rules. It lauded Shandong Province, for example, for establishing a user-friendly platform that color-coded data to indicate whether an SOE's hourly emissions were within (blue) or above (red) the limit—and if above, by how many times. The report also showed that pollution was really a regional, not city- or province-level, problem. Beijing's air remained smoggy, despite the exodus of heavy industry, because its neighbors were polluting. Says Gu Beibei:

In our report, we actually made a quick, simple analysis by taking the top eight emitters in three provinces: Hebei, Shandong and Beijing. And we found the gap is huge. In Hebei and Shandong, the top eight release 30 times and 37 times more than the top eight in Beijing.

But IPE also wanted to demonstrate to the public and media how to use the data: to reveal the misdeeds of individual enterprises. As examples, the report named specific SOEs that exceeded pollution emission standards, using the real-time data as evidence.

The *Roadmap II* report raised some of the same concerns as re-publishing the real-time emissions data. Would the SOEs cited in the report dispute the accuracy of the data? If so, how should IPE respond? Should IPE delay publication, in order to first contact each SOE mentioned in the report to get its side of the story? Should IPE postpone re-publishing any emissions data until kinks in the system were worked out? As the publication date drew near, the researchers considered the options. Clearly, there was a risk in naming SOEs—a risk that Ma and his colleagues wanted to minimize. On the other hand, the real-time data rules rewarded years of methodical effort on the part of IPE to force transparency and accountability in China. Ma and his team did not want to lessen the pressure now.

APPENDIX 1³⁸

PITI Evaluation Criteria

Each city was evaluated on disclosure performance for eight metrics, which all directly or indirectly relate to the environmental performance of polluting enterprises:

Records of Enterprise Violations (28 pts): As required by the Ministry of Environmental Protection (MEP) Measures on Open Environmental Information (MEP Measures), disclosure of records for various types of facility violations, including administrative penalties and enforcement actions taken.

Results of “Enforcement Campaigns” Against Polluting Facilities (8 pts): Disclosure of the results of environmental protection bureau enforcement campaigns, such as campaigns targeting specific sectors, regions, or facilities, or ordering cessation of violations by designated deadlines.

Clean Production Audit Information (8 pts): As required by the MEP Measures, disclosure of two types of information: (i) lists of enterprises for which the government has enforced clean production audits; (ii) emissions data from enterprises selected to undergo clean production audits, which by law must be released one month after the clean production audit. This is China’s only legal requirement for disclosure of facility-level pollutant emissions/discharge data.

Enterprise Environmental Performance Ratings (8 pts): Disclosure of enterprise environmental performance ratings in accordance with MEP guidelines, which set forth a color-coded system representing levels of environmental performance: very good (green), good (blue), average (yellow), poor (red), and very poor (black). This system does not require disclosure of factory-level emissions data.

Disposition of Verified Petitions and Complaints (18 pts): As required by the MEP Measures, disclosure of information on petitions and complaints, as well as their handling, including the content, target, and result of complaints and petitions, as well as general statistics on petition acceptances, investigations, and handling results.

Environmental Impact Assessment (EIA) Reports and Project Completion Approvals (8 pts): As required by the MEP Measures, disclosure of: (i) the public comment draft of EIA reports; (ii) project completion reports, which typically include useful information about allowable enterprise emission levels.

Discharge Fee Data (4 pts): Disclosure of discharge fee data, including the basis for such fees, standards and procedures for fees levied, fees owed compared with actual fees collected, and any waivers or discounts granted to facilities.

Response to Public Information Requests (18 pts): Response to public information requests and whether the local environmental protection bureau has established a standard and comprehensive system for responding to public information requests, including disclosure of information regarding request procedures, provision of accurate contact information, the establishment of special offices or personnel for handling public information requests, standard and timely response to requests, and efforts to improve public convenience in making information requests.

³⁸ IPE and NRDC, Breaking the ice on environmental open information: The 2008 Pollution Information Transparency Index (PITI): First Annual Assessment of Environmental Transparency in 113 Chinese Cities (17 September 2010). See: <http://www.ipe.org.cn/Upload/Report-PITI-2008-EN.pdf>

APPENDIX 2³⁹

Company Name	Replied to NGO Letter	Checked the Purpose of the Study	Conducted Checks on Supplier Violation Cases		Use Public Information to Enhance Supply Chain Management	
			Initial Checks	In-depth Checks	Consider Establishing a Search Mechanism	Decided to Establish a Search Mechanism
Samsung	√	√	√	√	√	×
HP	√	√	√	√	√	×
Panasonic	√	√	√	√	√	×
Toshiba	√	√	√	×	√	×
Siemens	√	√	√	×	√	×
Sanyo	√	√	√	×	×	×
Haier	√	√	√	×	×	×
Lenovo	√	√	√	×	×	×
TCL	√	√	√	×	×	×
Intel	√	√	√	×	×	×
Hitachi	√	√	√	×	×	×
Sony	√	×	√	×	×	×
Alcatel-Lucent	√	×	√	×	×	×
Cisco	√	×	√	×	×	×
Seiko Epson	√	×	√	×	×	×
Nokia	√	×	√	×	×	×
British Telecom	√	×	√	×	×	×
Sharp	√	×	√	×	×	×
Sing Tel	√	√	×	×	×	×
Motorola	√	×	×	×	×	×
Foxconn	√	×	×	×	×	×
Apple	×	×	×	×	×	×
Philips	×	×	×	×	×	×
Ericsson	×	×	×	×	×	×
Vodafone	×	×	×	×	×	×
IBM	×	×	×	×	×	×
Canon	×	×	×	×	×	×
LG	×	×	×	×	×	×
BYD	×	×	×	×	×	×

³⁹ IPE et al., *Study of Heavy Metal Pollution by IT Brand Supply Chain Phase II* (June 2010), 3. See: <http://www.ipe.org.cn/Upload/Report-IT-Phase-Two-EN.pdf>

APPENDIX 3⁴⁰

Section 2. Suggestions for Improving Urban Air Quality Information Disclosure in China

After comparing the domestic and international AQTI evaluation results, we propose the following suggestions for improving urban air quality information disclosure in China:

- **Make up for deficiencies in domestic urban air pollutant monitoring and publish the results for the missing pollutants**
- * As the region of the world that suffers from the worst fine particulate matter pollution, China should begin monitoring and disclosing PM_{2.5} as soon as possible.
- * Monitor and disclose O₃, CO and VOCs.
- * Launch airborne heavy metal pollutants monitoring and disclose the monitoring results.
- **Increase comprehensiveness of information disclosure**
- * In addition to publishing API values, detailed information for pollutant concentration values should also be published so that the general public can be fully and accurately informed about specifically monitored pollutant levels.
- **Increase comprehensiveness of information disclosure**
- * Add monitoring sites to expand the coverage areas. The positioning of the sites should be considered for better evaluation of the health effects from pollutant exposure in key regions.
- * In order to protect people living around specific pollution sources like roads, power plants and large-scale fixed pollution sources, the sites should be located where they can measure the concentrations of air pollutants where they will be representative of the exposure levels that people will experience. For urban monitoring sites an “industrial area station” could be built to reflect the effect that industrial emission levels have on the area, a “downtown and commercial area station” could be built to reflect the effects of transportation and a “residential area station” could be built to reflect the levels of exposure to residents.
- * Disclose air quality information by monitoring site.
- **Increase timeliness of information disclosure**
- * Disclose real-time air pollutant monitoring data.

- **Increase user-friendliness of information disclosure**

- * Publish air quality information in conjunction with maps so that the general public can have a more visual understanding of an area’s air quality information, thus showing the public how to better protect their health.
- * In addition to publishing daily reports at a set time each day, a website or database should be created to provide real-time monitoring data and historical data.

In addition, based on what came to light during the research, we would like to put forward these other suggestions:

- **Air quality standards should be periodically revised and re-examined based on the results of the latest research on environment and health.**
- **In addition to monitoring air quality data, emissions data for key pollutants should also be methodically monitored and published in a timely manner.**
- **An early warning system should be established so as to give the public a timely warning about atmospheric pollution that could have serious effects on public health.**
- An early warning system would allow the public to swiftly adopt safeguarding measures and reduce the harm air pollution can have on health. In addition, this would mobilize communities to adopt safeguarding and emergency measures,⁸⁵ limit atmospheric pollutant emissions and prevent air pollution incidents from occurring.
- To ensure the effectiveness of the early warning system, the positioning of the monitoring sites need to be more representative and targeted. Forecasts and reports need to be disclosed more promptly. The comprehensiveness of information published needs to be increased and there also needs to be a more user-friendly and accessible type of disclosure.
 - **Spread knowledge of the detrimental health effects of atmospheric air pollution to the public.**

⁴⁰ IPE and Renmin University of China Law School, *A Threat To Public Health: China’s Urban Air Quality Disclosure Needs Urgent Improvement: 2010 Annual Urban Air Quality Transparency Index (AQTI) Results and Comparative Study of 20 Domestic and 10 International Cities* (19 January 2011), 32. See: <http://www.ipe.org.cn/Upload/Report-AQTI-EN.pdf>

APPENDIX 4
Case timeline: key events

1968 Ma Jun born in Qingdao

1978 Deng Xiaoping rises to power

1984 Union Carbide disaster in Bhopal, India

1986 Toxic Release Inventory, the world's first Pollutant Release and Transfer Register (PRTR), created in US

1989 Tiananmen Square massacre

Environmental Protection Law enacted

1991 China ratifies the Montreal Protocol on protecting the ozone layer and the Basel Convention on the movement of hazardous wastes

1998 Worst flooding in China in 40 years

State Environmental Protection Administration (SEPA) created

1999 Ma Jun publishes *China's Water Crisis* (English translation released in 2004)

2000 Ma Jun leaves *South China Morning Post*, where he has worked since 1993

2002 China ratifies the Kyoto Protocol on climate change

2004 Ma attends Yale World Fellows program

2006 Ma founds IPE in Beijing

Ma named "one of the world's most influential people" by *Time* magazine

IPE launches its first product, the China Water Pollution Map

2007 World Bank and SEPA report concludes that 350,000-400,000 people die prematurely each year due to outdoor air pollution in China

Central government announces Open Government Information (OGI) regulations, to go into effect May 2008

SEPA announces Measures on Open Environmental Information rules

IPE launches its China Air Pollution Map

2008 SEPA upgraded to ministerial level (MEP)

US Embassy in Beijing starts tweeting hourly air quality readings

Earthquake hits Sichuan

Melamine milk scandal breaks

Beijing hosts Summer Olympics

Green Choice Alliance, led by IPE, launches its supply---chain initiative aimed at MNCs and their Chinese suppliers

2009 China's Foreign Ministry asks US Embassy in Beijing to stop tweeting air quality readings

Public learns of heavy metal mass poisoning incidents

Ma Jun wins Ramon Magsaysay Award

2010 China becomes second largest economy in the world, after US, by total GDP

Employees at an Apple supplier in Suzhou stage a protest, after being sickened by *n*-hexane IPE releases its first industry---specific pollution transparency rankings, focusing on IT sector IPE and NRDC release the first Pollution Information Transparency Index (PITI) report and ranking

2011 IPE publishes *The Other Side of Apple*

IPE and the Law School at People's University release an assessment of air quality monitoring transparency in 20 Chinese cities, compared to 10 international cities

12th Five Year Plan (2011-2015) is adopted, addressing climate change and emphasizing sustainable growth

IPE publishes a second report on Apple

Apple agrees to work with IPE and its partners

IPE publishes *A Roadmap to Blue Skies: China's Atmospheric Pollution Source Positioning Report*

2012 IPE delivers a petition to the central government, demanding that point-of-source emissions data be released to the public in real time

The MEP introduces revisions to China's Ambient Air Quality Standards, to take into account PM2.5 and ground-level ozone

Ma wins Goldman Environmental Prize and is named by *Foreign Policy* magazine one of the "100 top global thinkers"

US consulates in Shanghai and Guangzhou begin tweeting hourly air quality readings

2013 IPE launches Green Stocks initiative; its first report focuses on the cement industry

The MEP announces a Clean Air Action Plan to reduce PM2.5 concentrations 25 percent over five years

The MEP announces real-time data monitoring rules, to go into effect January 2014

2014 IPE's *Blue Sky Roadmap II: Real-Time Disclosure Begins* report is scheduled for release in early January