Part I Snapshot of China's Waste Challenge

Refusing to Waste Away: China's Tale of Trash Cities and the Incinerator Boom

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By Tara Sun Vanacore

The more Leonia expels goods, the more it accumulates them; the scales of its past are soldered into a cuirass that cannot be removed. As the city is renewed each day, it preserves all of itself in its only definitive form: yesterday's sweepings piled up on the sweepings of the day before yesterday and of all its days and years and decades.

–Italo Calvino, *Invisible Cities*

In Italo Calvino's 1972 novel *Invisible Cities*, the Venetian traveler Marco Polo charms emperor Kublai Khan with tales of his travels through magical cities. Octavia, the spider-web city; Andria, the city in which every street follows a planet's orbit—by the end of the book, the reader intimates that each story describes Polo's own city, Venice.

The wonder of Calvino's work is that the imaginary cities reflect contemporary life, most strikingly in Calvino's Leonia, which "refashions itself everyday" (Calvino, 1972, 114). The people of Leonia "wake between fresh sheets, wash with just-unwrapped cakes of soap, wear brand-new clothing, take from the latest model refrigerator still unopened tins, listening to the last-minute jingles from the most up-to-date radio," while on the street the "remains of yesterday's Leonia," neatly bagged, await the garbage trucks (Calvino, 1972, 114).

The people of Leonia revere garbage collectors, who leave their city spotless, but never consider the morass beyond the city's walls. Hemmed in by refuse, the people feverishly consume and dispose while a fortress of indestructible leftovers grows around the city "like a chain of mountains" (Calvino, 1972, 115). Calvino's tale is prescient and increasingly relevant in a world dominated by wasteful consumption. There is a parallel between countless cities around the world today and the fictional Leonia. Western countries have long wrestled with the municipal waste challenge and today many Chinese cities are struggling to manage this boom in solid waste, and incineration is increasingly becoming the preferred quick fix.

Sizing Up the Problem

The image of Leonia is evocative of China's oppressive waste situation today: according to Elizabeth Balkan of Emergence Advisors, China generates 250 million tons of municipal solid waste (MSW), or one quarter of the world's total waste, annually—enough to fill the Great Pyramid (Balkan, 2012b). Besides organic wastes, the 2010 UN-Habitat *Solid*

Waste Management in the World's Cities report notes that MSW includes considerable hazardous household wastes, such as pesticides, paints, batteries, light bulbs and medicines. The report notes that, though separate waste streams exist in many cities for hazardous waste such as end-of-life vehicles, electronics, and agricultural and mining waste, "there are few cities in which this works completely and most MSW streams include some of these hazardous materials when they reach disposal" (UN Habitat, 2010, 36).

China's trash is mounting as its people's lifestyles rapidly modernize. In her new book, *China's Environmental Challenges*, American University Professor Judith Shapiro observes that the Western lifestyle to which middle class Chinese aspire, characterized by automobiles, meat-based diets, and gated communities, is having deleterious effects on the environment (Shapiro, 2012). China's staggering increase in waste production is inarguably a part of this larger trend.

However, China is not alone in generating massive quantities of trash; waste is a global concern as behemoth debris piles grow higher. According to journalist and author Edward Humes, American astronauts observed two man-made structures "clearly visible and identifiable from earth orbit": the Great Wall of China and Fresh Kills, the world's largest landfill, home to New York City garbage from 1947-2009 (Humes, 2012, 12). In China, where the scale of cities grows exponentially each year, the problem is particularly severe. Since 2004, China has outpaced the United States, becoming the world's largest waste generator; the World Bank estimates that China will produce twice as much municipal solid waste as the United States by 2030 (World Bank, 2012, 1).

Like many issues in the country, China's solid waste problem is a black box due to the lack of government data and research on the public health and social impact of landfills and incinerators. There is also weak government oversight on MSW issues.

Like in Leonia, Chinese municipal authorities try to bury, burn, and reuse waste, but the quantity is increasingly difficult for the cities to handle. The Chinese central government acknowledges that urban waste is growing at a rate of 8-10 percent annually. This figure does not account for industrial waste, which is estimated to be five times the amount of MSW. Beijing set what has become the national trend for dealing with such wastes by building incineration plants that release toxic fly ash, lethal dioxins, and overpowering odors that threaten residents' health and safety.

ANOTHER MAN'S TREASURE: WASTE'S POTENTIAL VALUE

Opportunity colors the world's response to waste management. Zhang Yin, China's first woman billionaire, made her fortune importing America's garbage to China. In 2010, America's two highest volume exports to China were "paper waste and scrap metal, a little more than $8 billion worth of bundled old newspaper, crushed cardboard, rusty steel and mashed beverage cans sold at rock-bottom prices" (Humes, 2012, 11). Detritus, sold cheaply, feeds the packaging and infrastructure needs of a voracious economy; Zhang Yin entered and exploited this manufacturing sector. Her resourceful enterprise illustrates the immensely lucrative potential of the waste business.

The value of waste extends to energy production as well, an area of keen interest to the Chinese government. While 50 percent of China's municipal waste is disposed of in landfills, composting is on the decline, and the Chinese government avidly promotes incineration to accommodate increased land scarcity and prohibitive landfilling costs (Balkan, 2012a). According to Balkan's calculations, 155 incineration facilities currently operate in China, with an expected

300 facilities to be online by 2015. However, these plants vary drastically in their ability to control pollution and toxic waste from China's incinerators is occasionally dumped into ponds or landfilled, belying the clean and renewable image the government attributes to this waste-to-energy process.

Additionally, government regulation is weakly enforced and there is little financial incentive to improve plant safety. According to *Forbes* contributor David Ferris, "Energy from waste is a lucrative business in China because a plant's electrical output is considered renewable energy and is awarded with a feed-in tariff of about four cents per kilowatt hour" (Ferris, 2012).

Recycling in China is predominantly a private-sector initiative. This photo captures a seller at a huge and lively recycled waste market outside Beijing. Photo Credit: Chen Liwen

Tipping fees for landfills and incinerators are generally set high in the United States and Europe to encourage recycling and waste reduction policies. However, the tipping fees paid by Chinese cities to incineration plants average $8 per ton compared with $70-$100 in the United States and up to $150 in Europe (Balkan, 2012). Sometimes incineration plants waive the fees.

According to China's Twelfth Five-Year Plan, 30 percent of municipal solid waste will be incinerated by 2020 (Balkan, 2012). When burned at a high enough temperature and with the proper equipment—as employed by land-constrained Japan and Germany, models of efficient and safe waste-to-energy systems—incineration can reduce the volume of waste by 90 percent while generating power. According to Hume (2012), Germany landfills none of its waste, instead composting and recycling 66 percent, and incinerating the remaining 34 percent. Additionally, both countries strictly limit the amount of wet waste that can be incinerated.

Chinese cities, in stark contrast, rarely remove wet organic waste before incineration and thus must use coal and/or oil to burn the waste. Moreover, according to Chen Liwen, former staff member of Beijing-based NGO Green Beagle, the health risks created by incineration are due in part to municipalities neglecting to separate hazardous wastes from the solid wastes incinerated, so dioxins, heavy metal emissions, and atmospheric pollutants such as polycyclic aromatic hydrocarbons are inevitable by-products. In a June 2012 interview with the author, Chen argued that the central government's plan for municipal solid waste management is shortsighted because it neglects crucial elements such as advocating waste sorting.

Burning waste is an attractive option in places where trash is burying towns and inundating whole sections of cities, as *Christian Science Monitor* journalist Chi-Chi Zhang's 2010 description of the village of Zhanglidong illustrates. According to a resident of Zhanglidong, a rural village in southwest China plagued with foul odors from imported mounds of refuse, "life here went from heaven to hell in an instant" when the Zhengzhou Comprehensive Waste Treatment Landfill and its 100 tons of garbage per day "invaded" the village (Zhang, 2010). Zhang paints a grim picture: "Peaches and cherries rot on trees, infested with insect life drawn by the smell. Fields lie unharvested, contaminated by toxic muck" (Zhang, 2010).

Villagers' complaints to officials of stomach ulcers and skin problems from contaminated water from the landfill have fallen on deaf ears. When regulations permit 10 times the amount of dioxins to be released from incinerators than in the United States, it is not surprising that cancer, ulcers, and other health risks abound in impacted communities (Zhang, 2010).

INCINERATION LEAST OPTIMAL STRATEGY

Examining incineration through a life-cycle lens reveals that its environmental and social costs are higher than efficient waste management practices that promote source reduction, recycling, efficient separation, and composting. Even in space-constrained Europe, most countries favor recycling over incineration in terms of energy saving.

Additionally, incineration is costly—economically, environmentally, and medically. The average cost of incineration worldwide is approximately $150 per ton, while landfilling costs $30 per ton (World Bank, 2005). Organic matter makes up around 50 percent of China's municipal solid waste and thus requires additional fuel such as coal or gas to be mixed in to the feedstock in order for it to burn efficiently (Chen interview; Zhao & Mao, 2011; Balkan presentation). An additional concern is the lack of reliable data and transparency that surrounds the incineration industry in China. While public awareness of the dangers of incineration has amplified since 2006, many residents in impacted areas lack information about how the plants will impact their lives until it is too late.

SORTING IT ALL OUT

Waste sorting is a crucial aspect of China's trash management planning, a point that Chen and Balkan both emphasize. However, cultivating the habit of sorting waste in every household has proven a difficult task when implemented as a top-down policy.

In the city of Guangzhou, where 18,000 tons of waste are produced daily, city officials have implemented a fee-for-service program to encourage residents to separate waste. According to journalist Wang Haotong, Wang Qingliang—the city's Party secretary—underscores the importance of civic participation by arguing that "efforts to sort and reduce waste will fail unless all of the city's residents take part" (Wang, 2012). Under the new program, residents are banned from placing household waste in public bins. Wang explains that the program "includes 'to-the-truck' disposal, where residents must place their rubbish bags on the street at a certain time each day to be collected by sanitation workers, as well as special bags for kitchen waste and per-bag charges for household waste" (Wang, 2012). Serial numbers and anti-counterfeiting marks on the bags link them to households; if it is discovered that waste has not been properly sorted, "enforcers can track down the culprit" (Wang, 2012). Each household must collect its allotted 60 bags per month from a distribution site, and pay .5 RMB (approximately 7 cents) for each additional bag.

Guangzhou's new system is inspired by Taipei's compulsory sorting program, which reduced its daily waste generation by 864 tons between 2000 and 2008; a period which saw the recycling rate increase from 9.7 to 42.3 percent (Wang, 2012). However, Taipei's success relied on cooperation across government departments, involvement of researchers and environmental groups, widespread public education campaigns, television monitoring, and police cooperation. Attitudes of residents must be similarly recalibrated in Guangzhou and elsewhere in China if the tide of waste is to be stemmed. A senior environment official in Taipei argues that "sorting and recycling waste needs to be 'humane' and a system that relies too heavily on penalties won't work" (Wang, 2012). Thus, as NGOs generally have strong community ties and are better able to influence home

waste management practices than the government or policymakers, such community-based organizations will prove invaluable to the government as it develops new strategies for dealing with the waste problem in China.

As the World Bank points out, "[municipal solid waste]…requires a strong social contract between the municipality and community" (World Bank, 2012). Increasing "Not In My Backyard" (NIMBY) protests and calls for greater transparency around the siting and operation of incineration plants, catalyzed by the efforts of Chinese NGOs, reveals a need for local governments to commit greater efforts to waste management practices. These commitments will help the Chinese government ensure social stability and increase residents' confidence in the government's ability to perform the "enormous task" of dealing with MSW in an economically, socially, and environmentally acceptable manner (World Bank, 2012).

According to *Christian Science Monitor* journalist Violet Law, it is indeed this lack of confidence in municipal officials to properly treat the separated trash that has led to the failure of current efforts to encourage residents to separate food waste and recyclables from other household waste. Law cites Zhang Boju, a researcher with China's oldest environmental group, Friends of Nature, as saying: "There's a trust gap between the citizens and the government. This gap is the big challenge for the solid waste sorting in Beijing" (Law, 2011). Government officials would do well to draw from local knowledge and networks and collaborate with NGOs as they work to educate residents, elsewise the business-as-usual model will bury city after city in waste, and China will risk turning into a real life Leonia

Part II Snapshot of China's Waste Challenge—Wasting No Time: A Chinese NGO's Campaign for Waste Management Activism under Publications on the CEF website (www.wilsoncenter.org/cef)

Tara Sun Vanacore is a graduate student in the Ethics, Peace, and Global Affairs program at American University's School of International Service. She majored in Chinese language and literature at Middlebury College. She worked as a summer intern for the Wilson Center's China Environment Forum in 2012. She thanks Abi Barnes, Elizabeth Balkan, and the CEF staff for help in editing this brief. She can be reached at: tara.vanacore@gmail.com.

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