

**IN THIS EDITION**

The question of how to deal with fast-growing volumes of urban waste is one that large cities all around the world face, as their populations expand and get wealthier. Some like the city of Seoul face additional challenges such as limited available land for landfill, and public resistance to widespread incineration facilities. In response, Seoul has turned to waste reduction and recycling to deal with its waste challenges. Over the years, Seoul has successfully reduced daily domestic waste generation per capita from 1.05 kg in 2000 to 0.86 kg in 2015, and increased its domestic recycling rate from 39.5% in 1993 to 68% in 2015<sup>1</sup>.



South Koreans are taught from a young age the importance of recycling. Over time it has become normal citizen behaviour to recycle and minimise waste.  
*Image Source: Lauren Sung*

## A Softer Approach To Managing Domestic Waste: The Importance of Stakeholder Engagement in Seoul’s Waste Management Strategy

What was critical in Seoul’s success in improving its domestic recycling rate was not simply technical solutions, but also the “softer” aspect of engaging and managing different stakeholder groups with varying interests. An integrated, coherent, long-term policy design helped align the whole of society towards a common cause. This process involved constantly innovating and finding different means to balance and create positive outcomes and benefits for society, for what was initially an unpopular policy of mandatory recycling. Seoul’s recycling success story involved public education and the passing of relevant legislation, coupled with “softer” approaches such as engaging

the community and ensuring that various stakeholder groups saw value in this national effort. All of this eventually led to a transformation in the mindset, attitude and behaviour of Seoul’s residents towards waste, creating a culture of recycling and upcycling.

This article looks at how Seoul has engaged and worked with different stakeholders to transform its waste management system. It explores possible learning points for Singapore as we work towards the goal of achieving Resource Sustainability, one of the targets under the Sustainable Singapore Blueprint 2015.

Year	Waste Generation per Capita	Waste Generation (kg)	Population
2000	1.05	10 376 651	9 895 217
2005	1.03	10 133 434	9 820 171
2010	0.93	9 090 353	9 794 304
2015	0.86	8 562 644	9 904 312

*Source: Seoul Metropolitan Government; Graphics by Centre for Liveable Cities.*

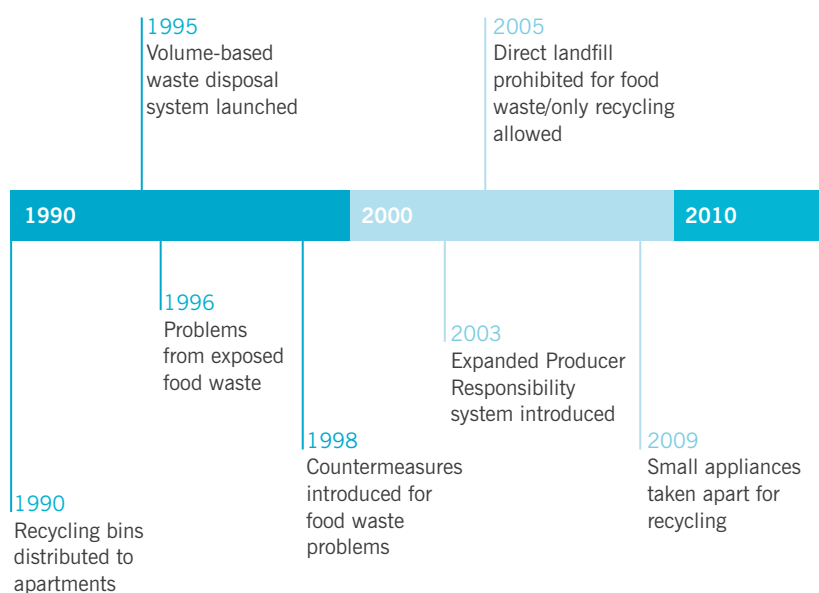
## To reduce reliance on landfill and incineration, the Seoul Metropolitan Government adopted an aggressive waste reduction and recycling strategy.

### INTRODUCTION

Until the early 1990s, landfilling had been Seoul's main method of dealing with solid waste. A culture of recycling did not exist. Domestic recycling rates in 1993 hovered around just 39.5%. This has improved drastically through the adoption of an integrated and constantly innovative waste management strategy to promote waste reduction and recycling, where legislative measures were established alongside the engagement, cooperation with and managing of trade-offs between different stakeholder groups. One key step taken was extending the responsibility for waste management to consumers and producers, creating shared value between the public, private and people sectors. In 2013<sup>2</sup>, Seoul was reported to have the second highest domestic recycling rate (59%) among the Organisation for Economic Co-operation and Development (OECD) countries. This has continued to rise, hitting 68% in 2015. Moving forward, Seoul aims to stop direct landfilling of waste by 2017, with all waste being recycled, upcycled or incinerated. The city aims to further improve its domestic recycling rate to 75% by 2030<sup>3</sup>, alongside its goal to foster a culture of resource reuse and recycling, and upcycling.

### HISTORY AND CHALLENGES

In the 1960s and 1970s, Seoul disposed of its solid waste in localised landfills<sup>4</sup>. To deal with the increasing amount of waste generated as the city grew, the Nanji Landfill (Seoul's first official landfill) was opened in 1978. Over a period of 15 years, the landfill grew into a mountain of refuse reaching almost 100 metres high<sup>5</sup>, containing 92 million cubic tonnes of solid waste. This caused a slew of severe environmental problems such as toxic gas leaks, leachates and groundwater contamination<sup>6</sup>.



Timeline of Seoul's waste management policies. Source: Seoul Metropolitan Government.

To deal with the city's waste situation, the Sudokwon landfill was constructed in the 1990s in Gimpo, a 40-minute drive from Seoul. The development and use of Sudokwon landfill, however, proved to be difficult with plans to expand its capacity facing much resistance from the local community. At the same time, plans to build new incineration plants were hampered due to strong resistance by civic groups who were concerned about negative impacts such as air pollution and diminished property values. In light of the need to reduce reliance on landfills, and the difficulties faced in expanding incineration capacity, the Seoul Metropolitan Government (SMG) saw the urgent need to pursue alternatives. These included a more aggressive waste reduction and recycling strategy.

### MANDATORY RECYCLING

In 1992, the Act on Promotion of Saving and Recycling of Resources came into effect, making domestic recycling mandatory. Recyclables such as plastic, styrofoam, glass and cardboard had to

be disposed of at designated recycling stations. Recycling stations were regularly monitored to prevent dumping of domestic waste along with recyclables. Random checks were conducted, and information outlining the proper disposal of recyclables was regularly distributed to the public. However, legislation in itself was no magic bullet, and the recycling rate did not improve overnight. Despite monitoring, mixing of domestic waste with recyclables remained a common occurrence in the early 1990s. The situation gradually began to improve when the Volume Based Waste Management (VBWM) fee system was introduced in 1995, making the purchase of standardised bags for domestic waste mandatory.

To promote and facilitate recycling at the residential level, both high-rise and low-rise housing complexes put in place systems and processes that relied heavily on the cooperation of residents and community members. Revenue from the sale of recyclables was channelled back into the community via apartment management offices and neighbourhood



The process of promoting recycling in Seoul involved constantly innovating and finding different means to balance and create positive outcomes and benefits for society, for what was initially an unpopular policy of mandatory recycling.

committees. High-rise apartment complexes would designate a weekly “recycling day”, when existing spaces such as car park lots would be made available for recycling trucks. For low-rise apartments, the SMG launched the Recycling Station Project to boost their recycling rate. More than 100 designated recycling stations for residential clusters were piloted by the SMG in 2010, and this was expanded to all neighbourhoods in 2014. As of 2016, more than 2000 recycling stations were operational, situated at places such as public parking lots and playgrounds. Recyclables were picked up at least twice a week. These stations were typically installed 50-100 metres away from residents’ homes, and catered to approximately 150 households. Between 15 to 30 senior residents were employed as “resource managers” to take care of the recycling stations. They worked two to three times a week, for three hours each day, earning a monthly income of about KRW 350,000 (S\$420)<sup>7</sup>.

In order to walk the talk, the SMG subsequently implemented a zero waste policy in the 2000s for its own public office buildings. Individual trash bins were removed and replaced with centralised recycling bins for paper, packaging, plastics, bottles, and various other materials. Meanwhile, general waste bags distributed to each government office were tagged with serial numbers that corresponded to the respective departments. This allowed for closer scrutiny as specific departments could be identified during random checks, should they have improperly disposed of solid waste together with recyclables. This policy in turn brought about substantial financial benefits for the SMG. The number of general waste disposal bags used by



Neighbourhood recycling stations catering to nearby residents and business owners.  
Source: Seoul Metropolitan Government Source: Michael Baek

public offices daily plunged by 80%, saving the SMG KRW 47,000,000 (S\$57,000) annually. Non-taxable revenue also increased, owing to the monthly sale of 13 tonnes of recyclables<sup>8</sup>.

### VOLUME-BASED WASTE MANAGEMENT (VBWM) FEE SYSTEM

In 1996, the year after VBWM was introduced, domestic waste generation volumes dropped by 11%. Prior to the

VBWM, there was not much incentive to reduce waste or recycle, as every household paid the same flat fee for waste<sup>9</sup> collection regardless of the amount disposed. VBWM fees were subsequently extended to food waste in 2011. Before this, residents were able to dispose of as much food waste as they wanted for a flat fee.

The VBWM system is based on a “pay as you throw” principle. Households and offices are charged according to how much



Both high-rise and low-rise housing complexes put in place systems and processes that relied heavily on the cooperation of residents and community members.



Illegal waste dumping in Seoul's suburbs (left). In order to counter the problem of illegal dumping, the SMG adopted a design method, and turned common illegal dumping spots into flower beds (right). Source: Korea Zero Waste Movement Network Source: Seoul Metropolitan Government

waste they dispose of, through the use of mandatory standard waste bags<sup>10</sup>. The more waste a firm generates, the more waste bags they would have to purchase, imposing on them additional waste generation costs.

The introduction of the VBWM policy was, however, not an easy task. In its initial stages, problems such as illegal dumping, use of unauthorised bags, and illegal incineration were widespread. Some dumped their domestic waste in unauthorised bags; others in public waste baskets and secluded areas. In order to combat such behaviour, local authorities turned common illegal disposal spots into flower beds and installed signage. Waste bags must also be labelled with household or company details, making anonymity impossible. Monitoring of illegal dumping was also made easier by the prior closure of high-rise waste chutes in the 1980s due to health and sanitation issues.<sup>11</sup>

The SMG also enlisted the assistance of the community to conduct random spot checks. "Honorary citizen monitors" were hired<sup>12</sup> to not only carry out these random checks, but to also educate and guide fellow citizens in the new method of waste disposal.



Honorary citizen monitoring agents conducting random checks on waste bags to ensure the proper disposal of waste Source: Seoul Metropolitan Government

### ENGAGING THE BUSINESSES

The Extended Producer Responsibility (EPR) approach, launched in 2003, extended the responsibility of recycling to producers, not only consumers. One component of the EPR was the mandatory recycling rates set for products, packaging and electrical appliances. For example, producers of metal

cans were required from 2010 to achieve a recycling rate of at least 75.6%<sup>13</sup>. In order to meet these targets, producers collect recyclables by incentivising customers to bring them back, by exchanging the returned recyclables for free VBWM waste bags or other household products. Mandatory recycling rate targets have been gradually raised over the years, and should

Seoul's success in improving its domestic recycling rate can be attributed to its innovative use of both hard-nosed policy, enforcement, technology, as well as its willingness to engage consumers and manufacturers.

producers fail to meet these targets, a fine of up to 130% of typical recycling costs is imposed.

By mandating and facilitating recycling, Seoul has succeeded in creating a viable recycling industry to support recycling efforts. As recycling gradually became a norm, the recycling industry has flourished because of the stable supply of recyclable materials. A fledging ecosystem has developed, where VBWM, recycling efforts, and the recycling industry all sustain each other—each justifying the other's existence.

### SHARING MARKETS (2004 – PRESENT) AND SEOUL REUSE PLAZA (2017)

As part of the SMG's effort to promote a resource recirculation society, it has also supported community activities, such as sharing markets that deal with and trade upcycled goods. Two examples of highly successful flea markets are the Ttukseom Flea Market, started in 2004 and the Gwanghwamun Flea Market, started in 2014. Both sharing markets are held weekly, and since 2004 have seen a total of five million citizens<sup>15</sup> participating and trading a diverse variety of goods, most of which have been recycled or upcycled. In support of these flea markets, the SMG pedestrianises the roads surrounding the markets, and hires full-time vendors who set up stalls on a regular basis.

The selling of recycled and upcycled goods does not only help in reducing waste generation. It also benefits lower income and vulnerable groups, as market traders pledge 10% of their profits to provide food services to vulnerable groups in society. Such engagement

Item		2005	2006	2007	2008	2009	2010
Metal Cans	Steel	70.0%	71.0%	72.0%	73.0%	74.0%	75.6%
	Aluminium	70.0%	71.2%	71.7%	73.0%	74.0%	75.6%
Glass Bottles		67.2%	68.4%	70.8%	72.6%	73.7%	75.1%
Paper Packaging		27.8%	26.6%	28.0%	29.1%	30.5%	32.7%
Plastic Packaging Materials	PET Bottles	69.5%	70.4%	71.7%	73.7%	74.9%	76.4%
	Styrofoam	61.3%	62.9%	69.0%	74.8%	74.8%	76.0%
	PVC	48.0%	48.4%	55.6%	58.3%	59.8%	60.0%
Fluorescent Light Bulbs		20.9%	20.7%	22.5%	23.1%	24.0%	26.1%

Mandatory Recycling Rates of Products and Packages.  
Source: Ministry of Environment, South Korea<sup>14</sup>

of various stakeholder and community groups helps to change mindsets about waste, aiding the SMG's overall drive towards achieving a resource recirculation society.

The SMG's latest bid to nurture an upcycling culture is its construction of the Seoul Reuse Plaza. Set to be completed in 2017, it will serve as a hub for the recycling industry, as well as a platform to educate citizens about upcycling. Recycling workshops, and facilities such as a recyclable materials bank and a recycling museum, aim to empower stakeholders to take ownership of waste reduction. Instead of disposing of what they would typically consider as waste, visitors are encouraged to give these materials a new life by recycling or upcycling them.

### LESSONS LEARNT

Despite facing rigid mind-sets against recycling, and with landfills fast filling up, Seoul has managed to alleviate its waste management issues. The city's remarkable success can be attributed to its innovative use of both hard-nosed policy, enforcement, technology, as well as its willingness to engage consumers and manufacturers. This approach has proven to be relatively effective, with the lifespan of Seoul's landfills being extended to 2040. The change in mindsets and behaviours did not happen overnight. Various stakeholders in Seoul had to adjust their behaviour and practices over time. To make this work, it was crucial that the SMG constantly engaged and consulted with the different stakeholder groups. This helped to

It is important to couple and complement policies and legislations with softer approaches such as community engagement and participation efforts, and making recycling part and parcel of everyday life.

change mindsets and behaviours in the long run, transforming the waste management landscape. Engagement not only moulded each policy according to stakeholders' feedback, it educated them about Seoul's pressing waste situation at the same time. Over this twenty-year period, the SMG has reviewed—and continues to do so—its waste policies and to engage stakeholders, strengthening the recycling and waste reduction culture in Seoul.

Shifting the focus back home, Singapore has done well over the years to develop its integrated urban waste management system. Singapore's national recycling rate in 2015 was 61%, with 77% of non-domestic waste being recycled. In fact, an impressive 99% of Singapore's construction waste is recycled. In the area of waste treatment, Singapore has adopted innovative and efficient engineering solutions, such as incinerating and minimising waste volume in waste-to-energy plants. Under the Sustainable Singapore Blueprint 2015, targets have been set to increase the overall recycling rate to 70% by 2030, by increasing the non-domestic recycling rate from 77% to 81%, and the domestic recycling rate from 19% to 30%<sup>16</sup>.

However, for Singapore to achieve its vision of becoming a Zero Waste Nation, the domestic recycling rate can be further improved, given that it has stagnated at 20% in recent years<sup>17</sup>. Already in place are more than 20 years of education and programmes to promote more sustainable approaches to waste management. Since Singapore's first Clean and Green Week in 1990, there have been many flagship programmes

Seoul and Singapore's Waste Statistics (2015)		
Metric	Seoul	Singapore
Population	9 904 312	5 535 002
Daily Domestic Waste Generation Per Capita	0.86kg	0.86kg
Overall Recycling Rate	85%	61%
Non-Domestic Recycling Rate	90%	77%
Domestic Recycling Rate	68%	20%
Recycling Rate Goal	87% (2020)	70% (2030)

Source: Seoul Metropolitan Government; Ministry of Environment and Water Resources, Singapore.

that highlight Singapore's efforts to promote recycling. For example, the National Recycling Programme (NRP), launched in 2001, was an integrated approach targeting both households and Public Waste Collectors (PWCs) to make it more convenient to recycle. There have also been many more enhancements to the NRP that strengthened the recycling movement in households in Singapore, such as the Quality of Service (QOS) standards for Public Waste Collectors (PWCs) introduced in 2002, requiring PWCs to collect a standard list of recyclables and to respond promptly to calls for recovery services. More recently, it was announced that as of April 2018, it will be mandatory for all high-rise housing complexes, be it public or private, to install recycling chutes.

Drawing from Seoul's experience, it is evident that boosting domestic recycling rates is not an easy task, and does not happen overnight. What is important is to establish an integrated approach: developing suitable infrastructure and space; engaging relevant stakeholders

and building their sense of ownership by sharing information and involving them in the process; and developing a culture of recycling and upcycling. While there is scope to revisit the possibility of a volume-based waste fee system and legislation for recycling, it is equally important to couple and complement that with softer approaches such as community engagement and participation efforts, and making recycling part and parcel of everyday life.

## Contributor



### **Tessa Kwek Wei Ling**

Tessa is Manager at the Centre for Liveable Cities, where she is interested in environmental, social and urban planning issues. She is also on the organising team for the World Cities Summit.



### **Lim Wei Da**

Wei Da is Assistant Director at the Centre for Liveable Cities (CLC), and deals with research and knowledge development on urban environmental and resilience related issues.

## Acknowledgements

The authors would like to thank Ms A Mi Koo from the Seoul Metropolitan Government for her assistance in providing insights and information in developing this piece. The authors would also like to thank Mr Khoo Teng Chye, Mr Loh Ah Tuan, Ms Sophianne Araib, Mr Dinesh Naidu, Ms Joanna Tan for their inputs, Mr David Ee for editing and Mr Yong Yi for laying it out.



## References

- <sup>1</sup> Seoul Metropolitan Government. "Volume of General Waste and Disposal Situation." Seoul Statistical Information System. <[http://stat.seoul.go.kr/octagonweb/jsp/WWS7/WWSDS7100.jsp?re\\_stc\\_cd=370&re\\_lang=eng](http://stat.seoul.go.kr/octagonweb/jsp/WWS7/WWSDS7100.jsp?re_stc_cd=370&re_lang=eng)>
- <sup>2</sup> McCarthy, Niall. "The Countries Winning The Recycling Race." *Forbes*. 4 March 2016. <<https://www.forbes.com/sites/niallmccarthy/2016/03/04/the-countries-winning-the-recycling-race-infographic/#205436172b3d>>
- <sup>3</sup> Email answer from Koo A Mi, Seoul Metropolitan Government.
- <sup>4</sup> Kee, Young You. "Joint Use of the Municipal Waste Incineration Infrastructure in Seoul". Seoul Solution. 31 March 2017. <<https://seoulsolution.kr/en/content/joint-use-municipal-waste-incineration-infrastructure-seoul>>
- <sup>5</sup> Sohn, Chul. "A Brief Introduction to Urban Resource Recovery Facilities in Seoul, Korea." Lincoln University Planning Review. Volume 1, Issue 2. July 2009. <<https://journals.lincoln.ac.nz/index.php/LPR/article/viewFile/368/224>>
- <sup>6</sup> Seoul Solution. "Recycling (Smart Waste Management in Seoul)" 1 November 2011. <<https://seoulsolution.kr/en/node/2691>>
- <sup>7</sup> Seoul Metropolitan Government. "Recycling Station Project: Bringing Innovation to Recyclable Waste Separation and Disposal to Residential Area." Seoul Solution. 31 March 2017. <<https://www.seoulsolution.kr/en/node/3413>>
- <sup>8</sup> Seoul Metropolitan Government. "Zero Waste Policy for Public Office Buildings as Active Recyclers." Seoul Solution. 23 December 2016. <https://www.seoulsolution.kr/en/node/3415>
- <sup>9</sup> Although the SMG incurred substantial financial cost building public facilities to recycle food waste, spending KRW185.1 billion (S\$222 million) in 2013<sup>18</sup>, the overall benefits have nudged policy makers toward strongly supporting VBWF for food waste disposal. A 20% reduction in food waste can help to reduce food waste disposal costs by KRW 5 billion (S\$6 million), reducing greenhouse gas emissions by four million tonnes. Aside from waste disposal cost savings, food waste is also a rich resource for the agriculture sector.
- <sup>10</sup> The standard waste bags vary in colour according to the waste type, and are priced according to local ordinances.
- <sup>11</sup> The SMG's motivations for closing off high-rise waste chutes are still largely unclear. SMG officials have speculated that sanitation issues and the disposal of large items clogging the chutes were among the reasons.
- <sup>12</sup> The SMG pays Honorary Citizen Monitors an average of KRW 18,000 (S\$210) per month for these services.
- <sup>13</sup> Ng, Tiffany. "South Korea's waste management policies." Legislative Council Secretariat. 26 March 2013. <<http://www.legco.gov.hk/yr12-13/english/sec/library/1213inc04-e.pdf>>
- <sup>14</sup> Ministry of Environment. "Korea Environmental Policy Bulletin: Extended Producer Responsibility (EPR)". 2010. <[http://wedocs.unep.org/bitstream/handle/20.500.11822/9031/-/Korea%20Environmental%20Policy%20Bulletin%20-%20Extended%20Producer%20Responsibility%20%28EPR%29-2010Extended%20Producer%20Responsibility\\_KEPB2010.pdf?sequence=3&isAllowed=y](http://wedocs.unep.org/bitstream/handle/20.500.11822/9031/-/Korea%20Environmental%20Policy%20Bulletin%20-%20Extended%20Producer%20Responsibility%20%28EPR%29-2010Extended%20Producer%20Responsibility_KEPB2010.pdf?sequence=3&isAllowed=y)>
- <sup>15</sup> Seoul Metropolitan Government. "Sharing Market: Sharing Market, a Center for Reuse and Sharing Culture" Seoul Solution. 31 October 2016. <<https://www.seoulsolution.kr/en/node/3416>>
- <sup>16</sup> Ministry of the Environment and Natural Resources & Ministry of National Development. "Singapore Sustainability Blueprint 2015." 2014. <<http://www.mewr.gov.sg/ssb/>>
- <sup>17</sup> National Environmental Agency. "News Releases: New Non-Landed Private Residential Developments To Have Improved Recycling & Waste Collection Infrastructure". 8 March 2017. <[www.nea.gov.sg/corporate-functions/newsroom/news-releases/Improved-recycling-waste-collection-infrastructure](http://www.nea.gov.sg/corporate-functions/newsroom/news-releases/Improved-recycling-waste-collection-infrastructure)>
- <sup>18</sup> Chang, May Choon. "South Korea cuts food waste with pay as you 'trash'". *The Straits Times*. 24 April 2016. <<http://www.straitstimes.com/asia/east-asia/south-korea-cuts-food-waste-with-pay-as-you-trash>>