

# Addressing Solid Waste Management through the 3R Approach

Tokyo  
Development  
Learning  
Center

The case of Yokohama City

Japan Project Brief

## Background and Objectives

The City of Yokohama is the second largest city in Japan, with a population of approximately 3.7 million. Rapid urbanization during the late 20th century has caused various environment issues. While the rate of population growth declined in the 1990s to 0.5 – 1 % per year, the amount of waste has been increasing due to economic growth and a lifestyle of mass consumption. As a result, the City of Yokohama faced a shortage of landfill capacity and an overflow of the capacity of incinerators. In order to tackle these issues, a long-term plan called “Yokohama G30 Plan” was proposed in January 2003 to address these solid waste issues. The aim of the plan was to reduce waste by 30% by fiscal year 2010, compared to a baseline amount in 2001, which was 1.6 million tons of waste. Additionally, a subsequent plan, called “3R Dream Plan”, was developed in 2010. This profile discusses successful attempts of Yokohama City to implement waste management through the proposed two plans, eventually becoming an “eco-friendly city” at a global scale

## Project Overview

### G30 Plan

G30 Plan aimed to reduce waste based on the principles of “polluter pays” and “extended producer responsibility (EPR).” Polluter pays principle is a practice whereby those who produce pollution should bear the costs of managing the impacts of pollution to prevent damage to the environment. The EPR principle makes manufacturers responsible for the entire lifecycle of the products and packaging they produce. The principle is applied into practices with shared responsibilities among different stakeholders, such as citizens, companies, and the local government. The plan required residents to play an active role. Before the G30 plan, there was a waste separation scheme comprised of seven items under five categories. The G30 plan introduced source separation for 15 items under ten categories, which required residents to properly separate waste into these 15

categories and properly dispose of them at designated collection places and times. The collection system was strict in a sense that it required the residents to use designated transparent bags for disposal so that collectors could easily identify unsorted waste. As an enforcement of these strict rules, the city government conducted environmental education to raise public awareness of waste management. More than 1,000 seminars on how to reduce and segregate waste were organized for residents. Moreover, about 600 campaigns were held at railway stations while over 3,300 awareness campaigns were organized at local waste collection sites. Citizen volunteers, called “garbage guardians,” also helped the enforcement of the rule by promoting proper sorting measures (Photo 1). The G30 plan promoted a proper separation of garbage and recyclables. The G30 plan succeeded in reducing the amount of garbage by 30% in 2005, five years prior to the target of the G30 plan, as well as in reducing the amount of garbage by 42.2 % (Table 1).

# Addressing Solid Waste Management through the 3R Approach



Photo 1: Citizen volunteers

Source: [http://www3.tvk-yokohama.com/hamanavi/2014/07/712\\_1.html](http://www3.tvk-yokohama.com/hamanavi/2014/07/712_1.html)

## 3R Dream Plan

The success of the G30 Plan led to the development of the 3R Dream Plan, which was created in 2011. The 3R Dream Plan, which was planned to be in effect for 16 years from 2010 consists of four-term plans every four years. The 3R Dream Plan aspires to further reduce and recycle garbage to improve the environment and thus the future of the city. The plan promotes not only 3R, but also proper disposal management by ensuring safe and secure processing and disposal of garbage. It also aims to promote further cooperation between companies, citizens, and administration for the realization of a sustainable city, which could transfer its experiences outside of Japan to achieve effective management and utilization of resources. The plan also aims to tackle the issue of global warming. The 3R Dream plan sets clear goals (Table 2) emphasizing the reduction of the total amount of waste generated.

## Project Impacts

### Economic Impact:

By reducing waste, Yokohama City could save USD 1.1 billion in capital expenditure since it became unnecessary to rebuild two incineration plants and about USD 30 million in

Table 1: G30 Plan's achievements

Items	Achievements
Awareness campaigns	<ul style="list-style-type: none"> <li>• More than 1,000 seminars.</li> <li>• 600 campaigns at railway stations.</li> <li>• Over 3,300 awareness campaigns at local waste disposal sites.</li> </ul>
Reduction of number of incineration plants	<ul style="list-style-type: none"> <li>• Abolishing 3 incineration plants out of the city's 7 incineration plants due to the reduction of waste amount</li> </ul>
Garbage reduction	<ul style="list-style-type: none"> <li>• Achieved the goal five years prior to the target year of the G30 plan (30% reduction in 2005)</li> <li>• Reduction of the waste amount by 42.2 %.</li> </ul>
GHGs emission reduction	<ul style="list-style-type: none"> <li>• Reduction of waste between FY2000 and FY2009 contributes reducing reduction of 280,000 tons of CO2 emissions.</li> </ul>

Table 2: 3R Dream plan's target

Items	Targets
Total generation of garbage and recyclables	More than 10% reduction by FY2025 (more than 3% reduction by FY2013)
Reduction of GHG emissions from garbage processing	More than 50% by FY2025 (more than 10% by FY2013) 282,000 tons of GHG emissions in FY2009 → 242,000 tons of GHG emissions in FY2025
Amount treated at incinerations	920,000 tons in FY2009 → 700,000 tons in FY2025
Amount of Recycling	350,000 tons in FY2009 → 440,000 tons in FY2025

annual operational expenditures, while the costs due to the expansion of separate collection, sorting and recycling were increased by about USD 24 million annually. Therefore, the G30 Plan generated economic benefits<sup>1</sup>.

## Social Impact:

Since effective waste management requires collaboration among neighbors, community members started to collaborate more, which led to the development of communities (Photo 2).

## Environmental Impact:

The G30 and 3R Dream Plans have been very effective in reducing the amount of waste as well as easing environmental burdens. Yokohama City achieved its target of 30%

reduction of waste in FY2005 and reduced waste by 43.2% by FY2010. These percentages are remarkable, considering that the population grew by 170,000 people during the same period. Consequently, Yokohama achieved both economic and environmental benefits. The current two landfill sites still have remaining capacity, which postponed the development of new landfill sites. In addition, the city closed two incinerators in 2010, and as a result, five incinerators are in operation. The waste that was reduced between FY2000 and FY2009 was equivalent to a reduction of 280,000 tons of CO<sub>2</sub> emissions.



Photo 2: Various 3R activities by citizens

Source: <http://www.fujishigyoku.co.jp/images/center.jpg>

## Lessons Learned

### 3Rs as an Effective Measure for Waste Management:

The experience of Yokohama is appealing in the sense that it does not require huge investment or new technologies to reduce the amount of waste. The efforts produced new business opportunities in the recycling industry. In addition, based on this successful experience, the city is acknowledged as an eco-friendly city.

### Involvement of Citizens and Companies:

People tend to believe that a large amount of investment is necessary to create new technologies to address waste issues. However, the experience of Yokohama City shows that the involvement of citizens and companies is critical for effective waste management, even without the deployment of new technology or investment. In this context, education plays an important role to ensure that citizens are involved in waste management activities. Yokohama City succeeded in achieving these goals by defining the roles of stakeholders. The

# Addressing Solid Waste Management through the 3R Approach

role of the citizen is to change their lifestyle to be environmentally-friendly and sort garbage properly. The business sector is expected to create products that would generate less waste and is also required to collect and recycle their discarded products under the concept of EPR. Finally, the government's role is to create systems for 3Rs, raise the awareness of citizens, and provide information on the 3Rs.

<sup>1</sup> Resources & Waste Recycling Bureau, City of Yokohama. 2006. Verification and future development (in Japanese). Yokohama G30 plan (Yokohama-shi wastes processing basic plan). <http://www.city.yokohama.lg.jp/shigen/sub-keikaku/keikaku/g30/pdf/060509-all.pdf>

The Tokyo Development Learning Center (TDLC) program is a partnership of Japan and the World Bank. TDLC supports and facilitates strategic WBG and client country collaboration with select Japanese cities, agencies and partners for joint research, knowledge exchange, capacity building and other activities that develop opportunities to link Japanese and global expertise with specific project-level engagements in developing countries to maximize development impact.

## **Contact:**

World Bank Group  
Social, Urban, Rural and Resilience Global Practice  
Tokyo Development Learning Center (TDLC) Program  
Fukoku Seimei Bldg. 10F,  
2-2-2 Uchisaiwai-cho, Chiyoda-ku,  
Tokyo **100-0011** Japan  
Phone: +81 (3) 3597-1333  
Fax: +81 (3) 3597-1311  
Web: <http://www.jointokyo.org>