A BRIEF INTRODUCTION TO URBAN RESOURCE RECOVERY FACILITIES IN SEOUL, KOREA

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Introduction

Currently, landfills and incinerators are the two major ways of finally treating the household solid waste in Korea. In Korea, the incinerators are called "Resource Recovery Facilities". The objective of this short article is to briefly introduce how Korea deals with urban solid waste problems with the use of urban resource recovery facilities, using the example of the city of Seoul to aid in explaining the hot issues related to these resource recovery facilities.[1]

General Introduction to Urban Solid Waste Treatment in Korea

In Korea, all the urban household solid waste discharged from each household is classified into four: general waste, food waste, recycling material, and big size waste. General waste is collected in a fixed size garbage bag. If the area where the general waste is discharged has a resource recovery facility, the collected waste goes to the facility and is burned. Otherwise the waste collected goes to nearby landfills and is buried. Food waste collected is delivered to the companies which specialise in transforming them into animal feed or fertilizer. Recycling materials are classified and are sold to recycling companies after collection. In case of big size waste, wooden materials are crushed into pieces and metal materials are recycled after they are dismantled. To discharge the solid waste, each household should buy standard plastic garbage bags or stickers to be attached to the big size waste.

Urban Solid Waste Treatment History of Seoul

Seoul is the capital city of Korea. It has approximately ten million population. Seoul is geographically surrounded by the city of Incheon and the province of Gyounggi as depicted in Figure 1. People call Seoul, Incheon, and Gyounggi altogether the Seoul Metropolitan Area.

Because Seoul is the largest and the most densely populated area in Korea, the need for more systematic solid waste treatment

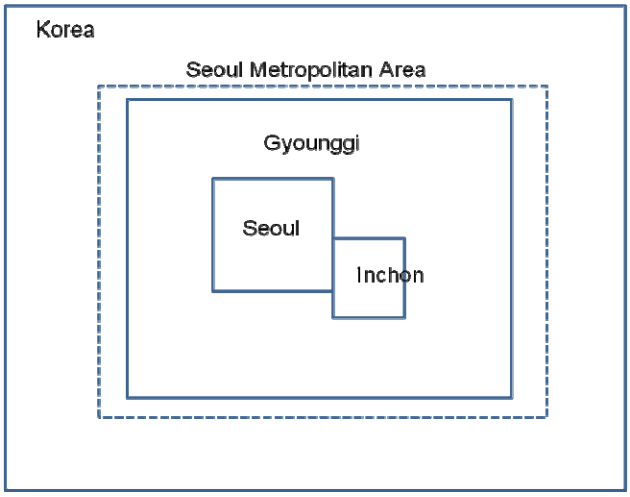


Figure 1 *Seoul Metropolitan Area*

emerged firstly in Seoul. In the early 1960s, the city of Seoul had no specialized landfills. Thus most of the solid waste was buried in swamps. From 1964, the Seoul city government designated several small landfills in suburban areas. Since the late 1970s Seoul's population increased rapidly, therefore, it was almost impossible to treat the solid waste generated from the huge population with a small number of landfills. In this vein, in the late 1970s, the Seoul city government designated the Nanji Island in Han River, which runs across Seoul, as a large scale city wide landfill. Since then and until 1993, all the solid waste discharged from the citizens of Seoul was buried in the Nanji Island landfill. The size of Nanji Island landfill is approximately 2,720,000m^2 and the height of waste layer reached approximately 100 meters above the surface when the Nanji Island landfill was officially closed in 1995. After the closure, the Nanji Island landfill was totally transformed to a big urban park as seen in Figure 2.

Figure 2 *Transformed Nanji Island landfill*
Source: worldcuppark.seoul.go.kr

[1] This article is written to inform readers about resource recovery facilities in Korea. This article's descriptions about resource recovery facilities and Korea's urban solid waste treatment policy and history mainly are based on the contents of the official website of the Seoul's Resource Recovery Facility, rrf.seoul.go.kr. This article summarized and translated the relevant information provided in the web site. For more information, please refer to rrf.seoul.go.kr.

From 1985, the Seoul city government began to realize that the remaining capacity of the Nanji Island was not enough and to think about new landfills. As a result, the city government of Seoul, the city government of Incheon, and the Provincial government of Gyounggi agreed to build jointly a new metropolitan area wide landfill and actually opened a large scale landfill in the Gyounggi region in 1992. Also to cope with rapidly increasing amount of the urban solid waste, the city government of Seoul decided to build several incinerators in addition to the metropolitan area wide landfill. This is because the city government of Seoul considered the fact that if incinerators can take care of some amount of the solid waste, then the new landfill can be used for a longer period.

Resource Recovery Facility vs Incinerator

Currently, Seoul has four resource recovery facilities. Resource recovery facilities are basically incinerators which burn the solid urban waste to reduce the amount of the waste and to recover the heat in the process of trash burning. The heat recovered is provided to nearby households in the form of hot water and used for house heating. Even though the resource recovery facilities are theoretically incinerators, the term, incinerator, is not officially used. This is because this term has negative connotations associated with air pollution and, in fact, these facilities conversely actually conserve and reuse the heat produced.

A typical resource recovery facility consists of following several components.

- Waste Classification and Preprocessing Module: The collected household solid waste is classified and transported to an incinerator.
- Incinerator: The waste is completely burned and the hot gas generated from the burning is transported to a steam generator.
- Steam Generator: The heat from the incinerator is used to generate hot steam.
- Hazardous Gas Treatment Facility: The hazardous gas from the incinerator is collected using electronic gas collector.
- Ash Treatment Facility: The ashes and variety of airborne particulates from the incinerator are collected and transported to landfills.
- Hot Water and Electricity Generation Facility: The hot steam gained from the incinerator is used to generate hot water and electricity in this facility.
- Waste Water Treatment Module: In this facility, all the waste water generated from the resource recovery facility is cleaned by chemical and biological methods and are discharged to nearby rivers.
- Recreation Centre and Park: The recreation centre includes the facilities for sports and child education. The park includes multipurpose open space and playground for kids.[2]

Land Use Patterns of Resource Recovery Facilities' Neighbouring Areas in Seoul

As mentioned before, there are four resource recovery facilities in the Seoul area. Those are Nowon, Yangchon, Gangnam and Mapo resource recovery facilities as in Figure 3. All the resource recovery facilities in Seoul are located closely to residential areas as shown in Figure 4 because the major function of the facilities is to provide the hot water to the nearby houses. The hot water then is used for house heating system. If the distance between the facilities and houses is long, the loss of the heat is substantial in the course of delivery. This is the major reason why the facilities are usually surrounded by residential areas.

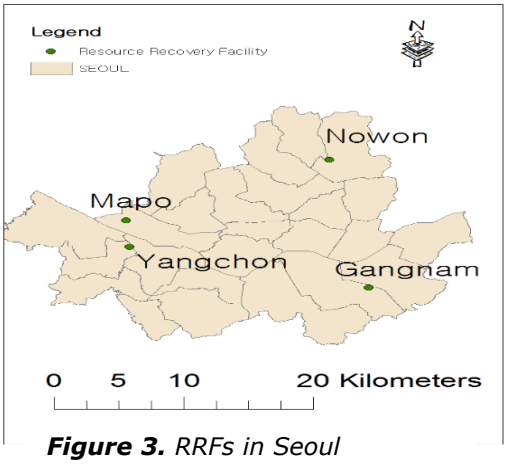


Figure 3. *RRFs in Seoul*

However, even though it is admitted that a need exists to establish facilities in residential areas, the fact that waste incinerators are located close to such areas causes severe opposition from the residents who own properties close to the facilities. What the residents are most concerned about is dioxin, a chemical discharged from the process of burning the solid waste. Dioxin is known to be linked to many cancer and skin diseases. Even though several scientific investigations conducted by environmental specialists clearly show that those facilities do not discharge dioxin beyond the level allowed by Korean environmental standard, the concerns of nearby residents has not decreased..[3]

[2] It is interesting to see that the recreation centre is the typical component of a resource recovery facility in Korea. The residents who live close to the facility can use the recreation centre with substantially lowered user charge.

[3] The city government of Seoul is conducting periodic environmental and health impact assessments on the operation of the facilities. The results from this assessment are open to the public through the web site, rrf.seoul.go.kr.

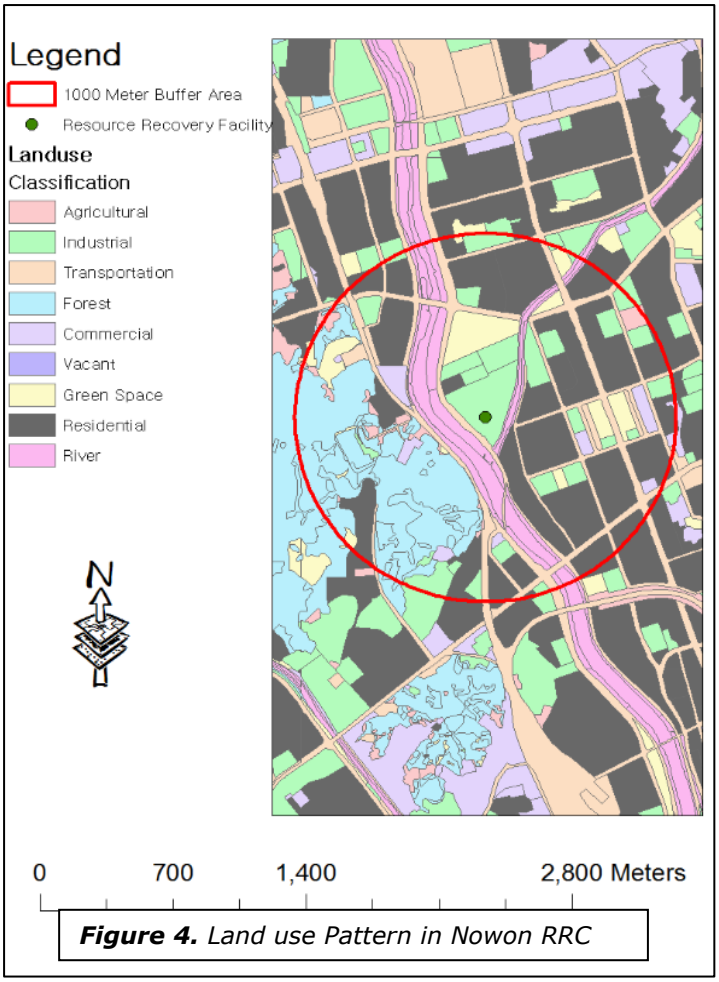


Figure 4. *Land use Pattern in Nowon RRC*

Compensation for the Residents in the Area of Influence

The first resource recovery facility in Seoul opened in 1996. Since then concerns about the negative effects from the facility have grown including aesthetics of the plants themselves, possible health effects from dioxin, and resulting housing price reduction cause severe civil oppositions to the operation of the facilities (Sohn and Shin, 2007). To deal with this opposition, The Seoul City Government designated the area within 300 meters from the parcel boundary where the resource recovery facilities are located as the area of influence. Also the city government allows the residents in the area to build a Special Citizen Council of the Area of Influence. This council consists of the residents of the area, members of ward council, and specialists in environmental sciences. This council has the right to review the results from the environmental and health impact assessments regarding the operations of the facilities and oversee whether the facilities are operated in an environmentally healthy manner.

In addition to the right to build the council, the residents receive the following direct economic benefits from the city government of Seoul.

- The residents in the area of influence can get 70% discount of their payment for using heated water.
- The residents can use the recreation facility run by the resource recovery facility with substantially lowered costs.

Co-utilisation Issue

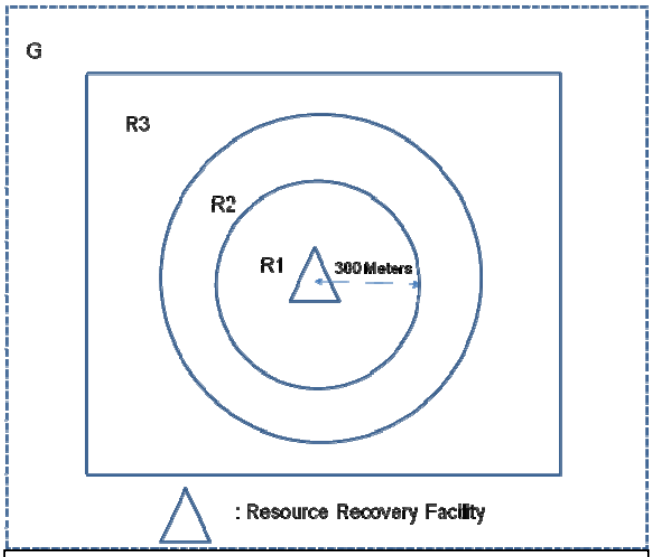
Seoul consists of 27 smaller administrative wards called "Gu". Because there are only four resource recovery facilities in Seoul, this means that only four wards have their own resource recovery facilities. In 2005, the Seoul city government decided to process the solid waste from the other wards where there is no resource recovery facility in the existing facilities. This decision is called "Co-Utilization of Resource Recovery Facilities". Consequently, this decision brought severe oppositions from the residents of the area of influence. However, in the early 2009, all of the Seoul's resource recovery facilities began to process the waste from other wards, after arrangements were made to increase the financial support of affected areas by the local government.

When the issue of Co-Utilization emerged by the city government of Seoul firstly, the stakeholders related with this issue show diverse attitudes according to their interests. We can identify the four major stakeholders related with Co-Utilization issues. Those are as shown in Figure 5.

It is quite useful to examine each stakeholder group's key attitude about the Co-Utilization issue in detail for the deep understanding of the conflicts related with resource recovery facilities in Seoul. Those can be summarised as follows.[4]

- City Government of Seoul: To deal with the rapidly increasing household solid waste in Seoul, the city government wants to build more resource recovery facility. However, this is not easy job because most of citizens don't want the facility in their backyard. Thus the city government wants to increase the amount of the waste processed in the existing facilities.

[4] The classification of stakeholder groups and the description about their attitudes are based on the author's personal readings on the Korean newspaper articles about this issue. Please refer to the reference section to see the list of the news paper articles.



G(Seoul City Government), R1(Residents of the Area of Influence), R2(Residents who live just outside of the Area of Influence), R3(Residents who live in the wards where there is no resource recovery facility)

Figure 5. *Major Stakeholders in Co-Utilisation Issue*

- Residents of the Area of Influence: The residents who live within 300 metre buffer area from the facilities receive some economic benefits such as reduced bill for the house heating and lowered user charge for the use of recreation facilities as rewards for living closer to the facilities. They are against the city government's policy which increases the amount of the waste processed in the existing facilities. However they are ready to accept the policy if the city government provides more economic benefits.

- Residents who live just outside of the Area of Influence: The residents who live beyond the 300 metre buffer area from the facilities receive no economic benefits from the city government. They are thinking that they should get some economic benefits because they suspect that some negative impacts from the facilities may reach beyond the 300 metres from the facilities. They are severely against the policy that increases the amount of the waste processed in the existing facilities because there will be no chance of receiving any economics benefits even though they are thinking that they become more exposed to potential negative impacts due to the more intensive use of the facilities.

- Residents who live in the wards where there is no resource recovery facility: The residents who live in the wards where there is no resource recovery facility are happy with status quo. They are simply against the new facilities in their backyards.

Conclusion

Thus far, I have briefly introduced how Korea deals with urban solid waste problems with the use of urban resource recovery facilities as an example of the city of Seoul. Because Seoul's resource recovery facilities are located in the residential area, they cause severe conflicts among the stakeholders involved. The Korean central and local governments have developed various strategies to cope with these conflicts as shortly explained above. Because New Zealand has a plenty of vacant lands to be used as landfills, it can be assumed that New Zealand can deal with the urban solid waste problems like Korea without relying on incinerators. However, I hope that the information I summarized here can be used by the environmental planners of New Zealand to design smart urban solid waste treatment policy in case they have to rely on incinerators to deal with urban solid waste treatment.

References

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Web Sites

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