

# Korea Environmental Policy Bulletin

## Allbaro (Online Waste Disposal Verification System)

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### Summary

In 1999, the Korean Ministry of Environment (MOE) introduced a waste disposal verification system to prevent illegal waste disposal. When the system was first introduced, paper vouchers were used. The system allowed establishing the basis of pursuing legal action against illegal waste management businesses by tracking the disposal process and methods using paper vouchers. However, there were many problems shown in the process. It was inconvenient for waste generators, transporters, and disposers to process them at the site and ended up being overly time consuming because the vouchers were written by hand and mailed. In addition, there were limitations for administrative bodies to prevent illegal treatment, since they were not able to track them during the entire process, and it was also difficult to confirm the 26 million vouchers issued every year.

In response to the abovementioned problems, MOE began devising new techniques and systems to solve the problems and keep track of the waste disposal process in real time. As a result, Allbaro, an online waste disposal verification system was developed.

Allbaro is composed mainly of three parts including waste handover system; waste approval and licensing system; and an analytical processing system. Under the waste handover system, waste generators, transporters, and disposers input information on waste handover (type, amount, and date) on the Internet and are able to monitor the online process in real time. During the early stages of the system implementation, Allbaro faced difficulties due to a low participation rate and the incompatibility of existing systems (e.g. ERP) used by individual waste businesses. In an effort to increase participation, MOE applied various incentives and public relations strategies.

In addition, MOE made the system more compatible with other systems.

Since its adoption in 2001, Allbaro has become widely accepted. While waste generators were recently still able to take advantage of the paper voucher system, the convenience of Allbaro made it more and more popular; resulting in an amendment to the Waste Control Act in 2007 to make the use of the electronic handover statement mandatory. According to MOE's predictions, Allbaro will reduce illegal treatment and abandoned waste by 99% through its efficient management.

## I. Introduction of Allbaro

### 1. Waste disposal verification system using paper vouchers

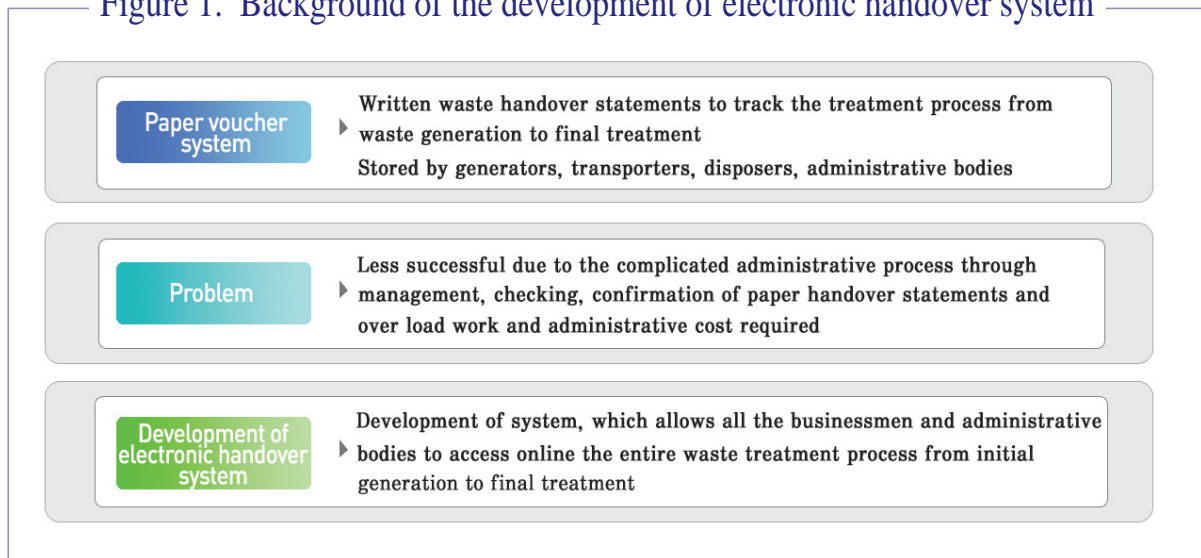
Landfills are not suitable for Korea due to its small territory (2,072 m<sup>2</sup> per person). In addition, landfills cause problems such as environmental damage, loss of usable land, high post-treatment costs, and leachate contaminating the groundwater. Because of these factors, Korean government planned to increase the number of incineration facilities but their construction was delayed due to public fears that the emissions would be hazardous to people's health. Under these circumstances, the cost of waste treatment had risen and concerns regarding illegal waste treatment dramatically increased.

In 1999, to prevent environmental contamination,

MOE launched a waste disposal verification system which was intended for waste generators, transporters, and disposers to report waste treatment status to administrators by preparing and delivering paper handover statements. The process was as follows: First, a waste generator delivered a handover statement to a transporter. After transporting the waste to a waste disposal site, the transporter delivered another handover statement to the disposer. The disposer would then deliver the completed handover statement to an administrator and the waste generator.

The waste disposal verification system allowed establishing the basis of pursuing legal action against illegal waste management by tracking the whole process of waste generation,

Figure 1. Background of the development of electronic handover system



transportation, and disposal using paper vouchers. However, this system faced some problems during its operation. At first, it was time consuming and also expensive because the vouchers were written by hand and mailed. Every year 26 million vouchers (83 tons of mail) were used and it is estimated that they cost 1 billion dollars. Furthermore, it was inconvenient to fill out the handover statements at the site of waste transportation and treatment. Secondly, the handover statements were not the perfect solution to prevent illegal waste treatment, since the administrative body was unable to track the handover statements until the waste treatment process had completed, thereby only post control was possible. Thirdly, there was a lack of manpower to manage, check, and confirm the validity of the handover statements. It was impossible for one or two public officers at each environmental office to check and confirm all the handover statements. Also, there was no place to store the handover statements produced.

Searching the handover statement by hand was also problematic and hampered abilities to confirm whether the treatment had been legally done.

In this regard, MOE started to devise new techniques and systems to solve the limitations of the paper voucher system. As a result, Allbaro was developed. Allbaro is a combination of the words all and barometer, which means the barometer for all wastes. In Korean, it also means that all wastes are treated correctly.

## 2. Allbaro, online waste disposal verification system

MOE introduced Allbaro to replace the hand written paper voucher system. In contrast to the paper voucher system, Allbaro allows for the entire waste disposal process to be accessed online and in real time. The system streamlined the treatment verification process and made it more efficient and less costly.

In 1995, the Korean government began

promoting IT (Information Technology) businesses and the expansion of the electronic government. Even before Allbaro had been designed, MOE was already performing efficient administration practices based on IT. With success in other areas, MOE was interested in constructing an electronic waste management system to prevent the illegal treatment of industrial and abandoned waste. In 2000, MOE organized a team responsible for the system and planned to look for ways to digitize the paper voucher system. At first, a roadmap to build a waste total management system was prepared and analysis of the business, budget, operating personnel, and

status of the users were investigated. According to the basic plan, large waste generating companies, which produce specific waste<sup>1)</sup> in large quantities, were firstly allowed to use the system, with the number of users expanded step by step over five years. In addition, 20 conferences concerning the core issues were conducted and a business plan was drawn up with the help of large, medium, and small businesses, as well as environmental regional offices, resulting in the final development of Allbaro in September 2001. Once developed, the Korea Environment and Resources Corporation (ENVICO), which is an affiliate under MOE, was tasked with operating the system.

## II. Overview of Allbaro

### 1. Structure and functions

Allbaro is an electronic system which helps monitor the entire process of waste disposal, from waste generation to the final treatment process in real time. The system was designed based on the followings:

- Monitoring the waste management in real time should prevent illegal treatment and disposal.
- The reduction of personnel and costs by digitization should boost competitiveness.
- Public awareness, trust, and transparency

regarding waste management should be improved.

- Electronic waste handover statements should be able to check and confirm the process in real time. The electronic waste handover statements show electronic information from the waste generators, transporters, and managers through the waste information system. Preparation of the handover statement is now mandatory by the law.

Allbaro is composed of three parts; a waste handover system with electronic handover statements, waste approval and licensing, and

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<sup>1)</sup>In Korea, type of waste is divided into residential and industrial waste. “Residential waste” includes all household waste. “Industrial waste” includes the waste generated by businesses and industries. Industrial waste is further categorized into general industrial waste, designated waste, infectious waste, and construction waste. Specific waste includes hazardous waste, such as solvents, catalysts, and chemicals.

analytical processing. (Figure 2)

- **Waste handover system** : Waste generators, transporters, and disposers input information regarding the type of waste, amount, and date through the entire process, thereby ensuring that the entire process can be monitored online. When an error is made, they can be confirmed by administrators. When waste is treated in an inappropriate way, administrators can monitor the situation in real time.
- **Waste approval and licensing** : Waste related

approval and licensing can be applied for and provided online. The majority of users are industrial waste generating businesses such as general industrial waste businesses, infectious waste generating businesses (hospitals) and construction waste generating businesses, as well as waste transportation businesses.

- **Analytical processing** : The management of the electronic handover statements and approval and licensing systems can be analyzed using statistical analysis for the drafting of new policies and processes.

Figure 2. Structure of Allbaro



## 2. Waste handover system

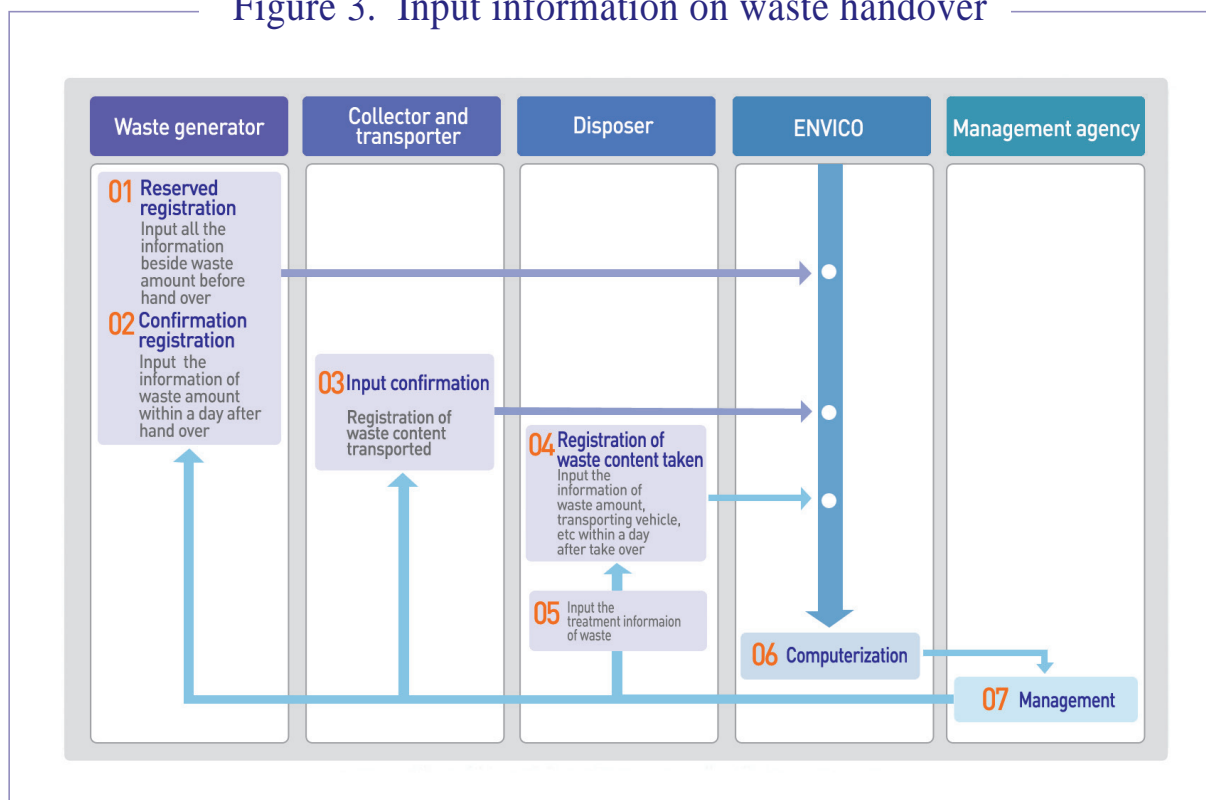
As shown in Figure 3, the preparation of the electronic handover statements is comprised of the following seven steps:

- **1<sup>st</sup> step** : When a waste generator does not have a scale for waste measurement and has to be weighed outside, the waste generator should take a handover-number in advance and input all the estimated information of the waste on the system before transferring it to a waste transporter. Later on, when handing over the waste to the transporter, the generator should check the information on the system and confirm the information. If the reserved information is not confirmed

within a day, it is considered an accidental handover and treated specially.

- **2<sup>nd</sup> step** : A waste generator who does not need to go through the first step can skip the reserved registration step and make a registration at the same time the waste is handed over to the transporter.
- **3<sup>rd</sup> step** : The transporter should register the waste information within a day after takeover from the generator as well as within a day after handover to a disposer. If the transporter does not register within the period, the information is sent as accidental handover information and treated specially.

Figure 3. Input information on waste handover



- **4<sup>th</sup> step** : The disposer should register disposal information within a day after takeover. If that requirement is not met, it is also considered accidental and treated specially.
- **5<sup>th</sup> step** : After treatment, the disposer should register the information of treatment within two days after disposal. If the disposer does not register the information within thirty days after taking general waste (five days for infectious waste), it is considered an accidental handover of information. However, if infectious waste treatment businesses are licensed recyclers and have waste facilities covering large areas, they can register their information within seven days after treatment. On the other hand, if general waste disposers recycle the waste, the disposers can register the information within sixty days.
- **6<sup>th</sup> step** : ENVICO provides the information gathered in steps one through five to MOE.
- **7<sup>th</sup> step** : MOE processes all gathered information including the accidental handover information.

### III. Progress of Allbaro

#### 1. Development

The development of the Allbaro system can be divided into six phases (Figure 4): a. Demonstrative operation; b. Initial operation; c. Establishment of the approval/licensing system and data analysis system; d. Establishment of disaster recovery center and statistical analysis processing system; e. Establishment of the digitized management system for construction and infectious waste; f. the establishment of the ARS (Automated Response System) for compatibility between Allbaro and large waste generating companies, disability management, and SMS (Short Message Service through mobile phones). The six development phases are as follows:

- **Phase One (2000-2001)** : The system, as a

demonstrative operation, was used by a limited number of waste generators, such as large generators and general hospitals.

- **Phase Two (2001-2002)** : The system was applied and enforced. Roughly 1,500 businesses handling waste, including hazardous waste, were encouraged to use the system.
- **Phase Three (2003)** : The system was expanded and used by 8,000 waste related businesses. To provide better service for the increased number of users, the approval and licensing system was developed.
- **Phase Four (2004)** : Approximately 20,000 waste related businesses were encouraged to use the system. During this period,

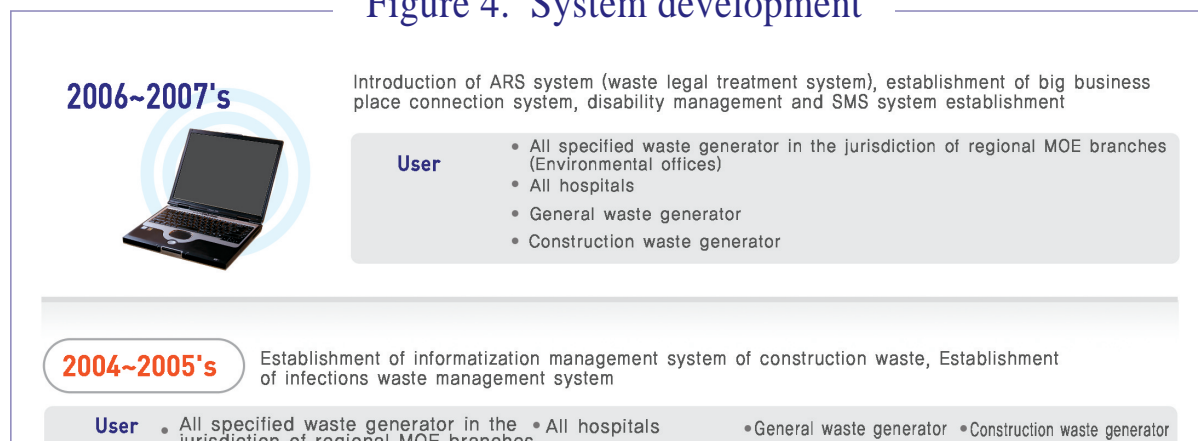
concentrated training courses for new users and personnel in charge of waste management at the local government level were provided. A disaster recovery system was established to ensure uninterrupted service. As well as the approval/licensing system, the data analysis system was also developed.

- **Phase Five (2005)** : 45,000 businesses began using the system. During this phase, the use of Radio Frequency Identification (RFID) technology was developed and operated for the treatment of hospital wastes. The system resulted in higher performance and reliability. The use of RFID tags and readers made the practice of illegal treatment

almost impossible.

- **Phase Six (2006-2007)** : For the users' convenience, the ARS system was introduced so that people could use the telephone and SMS instead of the internet. In addition, the connection system with big business places running their own system like ERP (Enterprise Resource Program) was introduced and this resulted in the improvement of system efficiency and compatibility by eliminating the overlapping of two systems. When the Waste Control Act was amended, the use of electronic handover statements became mandatory for most businesses resulting in a total of 84,000 waste related businesses using the system.

Figure 4. System development



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