



COVID-19 Responses and Establishment of real-time safety Management system of medical waste

08/04/2022

Why do we need special management for medical waste?

Special management of medical waste is needed due to the high risk of human infection



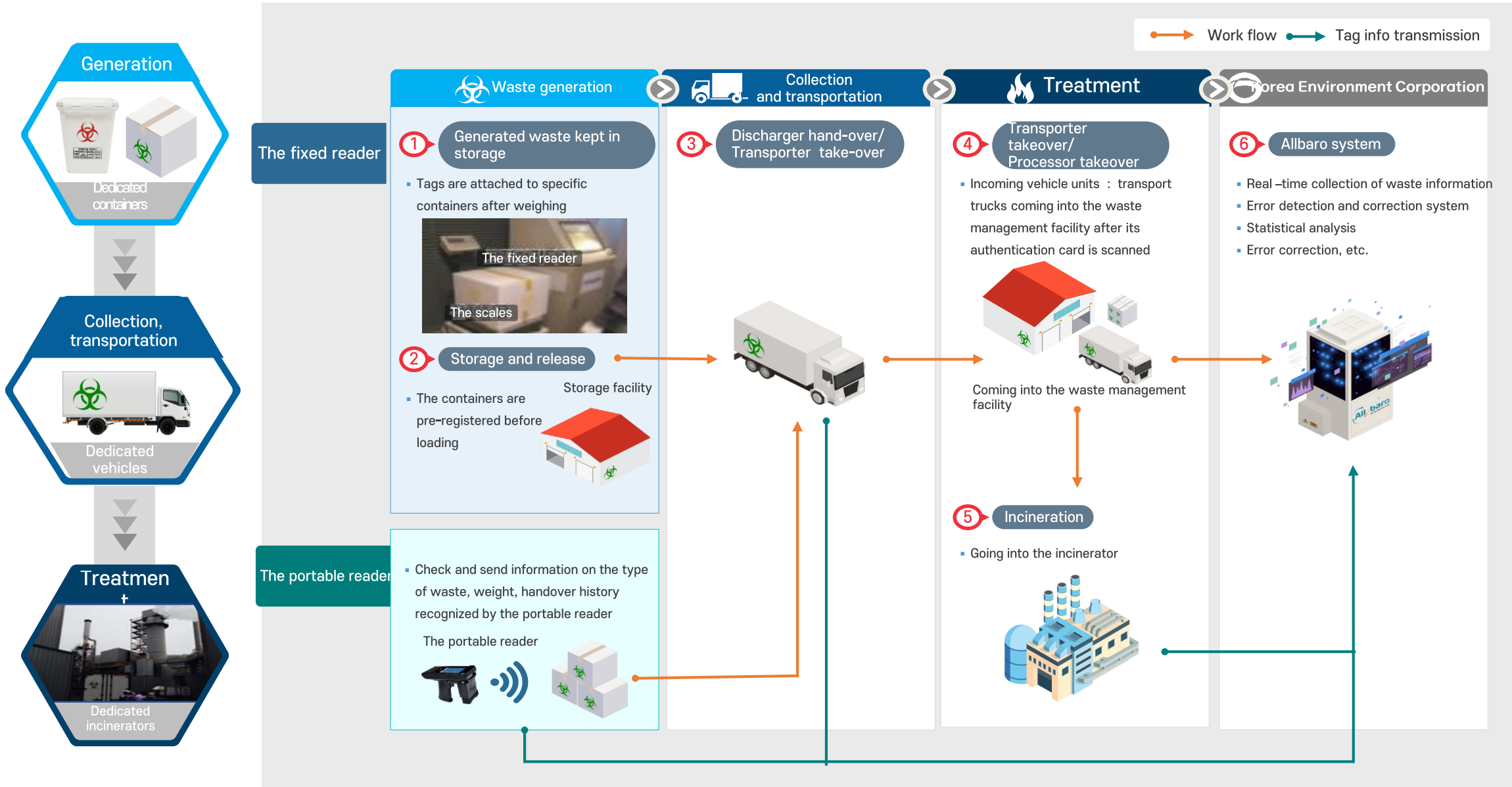
RFID technology brings more safety and transparency during the whole process— **World First!**



Medical waste classification

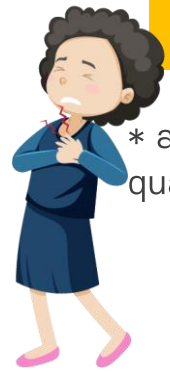
Medical waste for quarantine		<ul style="list-style-type: none"> Waste generated from medical activity during the quarantining of infected people to protect others from them in accordance with article 2-1 of infectious disease control and prevention act
Hazardous medical waste	Tissues	<ul style="list-style-type: none"> Human and animal tissues, organs, parts of the body, animal cadavers, blood, pus, blood product (serum, plasma, blood products)
	Placentas for recycling	<ul style="list-style-type: none"> Placentas recovered for reuse
	Sharps waste	<ul style="list-style-type: none"> Syringe needles, suture needles, surgical blades, oriental needles, dental needles, any damaged glass test instruments
	Pathological	<ul style="list-style-type: none"> Culture medium used for tests and experiments, culture containers, strain in storage, used test tubes, slides, cover glass, used culture medium, used gloves
	Biological/chemical	<ul style="list-style-type: none"> Vaccines, anticancer drugs, chemotherapeutic agents
	Blood contaminated	<ul style="list-style-type: none"> Blood bags, waste generated during hemodialysis and other blood related waste that requires special treatment
General medical waste		<ul style="list-style-type: none"> Cotton wool, bandages, gauze, disposable diapers (diapers used by infectious disease patients, infected infectious disease doctors, or pathogen carriers) containing blood, body fluids, secretions, and excrement, sanitary napkins, disposable syringes, infusion sets

Why does medical waste require special management?



Emergence of the first new infectious disease in 5 years **stronger viruses!**

A new **infectious disease crisis** following the emergence of MERS in 2015



The first COVID-19 case was confirmed by Korea Disease Control and Prevention Agency during the airport screening (Jan 20, 2020)

Contagious disease alert level elevated to **“Caution”**

* a 35 year-old Chinese national, transported to a state-designated quarantine facility for isolation treatment.

The second confirmed case (Jan 24, 2020)

- On January 22nd, a Korean man arriving from China Confirmed during the screening at Gimpo airport

*25 individuals with symptoms tested but confirmed **“Negative”**



The fourth confirmed case (Jan 27, 2020)

- infectious disease alert level elevated to **“Warning”**

* Central Disaster Management headquarters for COVID-19 response launched

- 288 medical clinics designated as screening centers, guidelines for citizen response made public (Jan 28)





환경부



수신 수신자 참조
(경유)

제목 신종 코로나바이러스감염증 관련 폐기물 안전관리 특별대책 알림

1. 보건복지부 질병정책과-455호(2020.1.27.) 관련입니다.
 2. 최근 신종코로나바이러스감염증이 급속히 확산될 우려가 염려됨에 따라, 격리의료폐기물에 대한 안전하고 신속한 처리를 위하여 불임과 같이 특별대책을 수립하여 알려드리니, 각 기관에서는 특별대책 이행에 만전을 기하여 주시기 바랍니다.
 3. 유역(지방)환경청과 한국환경공단. 지자체에서는 상황 종료시까지 상황실을 운영하고, **상황실 운영계획 및 비상연락망을 1월 29일(수)까지 회신**하여 주시기 바라며, **일일 상황보고를 아래와 같이 [붙임2] 서식에 따라 매일 18시까지 회신**하여 주시기 바랍니다.
 - 가. 유역(지방)환경청 : 온나라시스템 메모보고 실시
 - * 수신자 : 폐자원관리과 김유경 사무관, 문세흠 사무관, 오영균 주무관
 - 나. 지자체 : 전자우편 제출
 - * 수신자 : ifanger@korea.kr, enveng@korea.kr, skyran704@korea.kr
 4. 또한, 유역(지방) 환경청에서는 자가격리자에게 제공할 의료폐기물 전용봉투, 소독제를 사전에 구비하여 제공될 수 있도록 협조하여 주시기바랍니다.
 - * 자가격리자 현황 별도 알림 예정
 5. 아울러, 질병관리본부 및 해당 지자체(지역 보건소)에서는 자가격리자에 대한 마스크 등 개인보호장구 제공 시 '의료폐기물 전용봉투, 소독제, 폐기물 처리 관련 매뉴얼'을 함께 전달하여 자가격리자에게서 발생하는 폐기물이 안전처리 될 수 있도록 안내하여 주시기 바랍니다.
 - * 자가격리자 폐기물 처리 매뉴얼 [붙임3] 참고
- 붙임 1. 신종 코로나바이러스 관련 격리의료폐기물 안전관리 특별대책 1부.
2. 상황실 운영계획 및 일일상황보고 양식 각 1부.
3. 자가격리자 폐기물 처리 매뉴얼 1부. 끝.



Special measures for COVID-19 quarantine waste

Special safety measures for COVID-19 quarantine waste

- The 2nd edition -

Special safety measures for COVID-19 quarantine waste

- The 6th edition -

Comparison of the current measures with the special measures

Category	Storage by the discharger	Transportation	Disposal
The current guidelines for quarantine waste	<ul style="list-style-type: none"> Keep waste for 7days Synthetic resin dedicated containers Keep waste in the fridge Disinfect the storage facility 	<ul style="list-style-type: none"> Transport waste while keeping it frozen Temporarily store waste for 2 days 	<ul style="list-style-type: none"> Treat waste within 2 days Use dedicated storage refrigerated facilities(only for tissues)
Special guidelines for quarantine waste	<ul style="list-style-type: none"> Same day consignment processing (stored for 1-2 days) Refrigerated storage principle Disinfect before and after putting waste in the dedicated container 	<ul style="list-style-type: none"> Prohibits temporary storage, transporting within the day Disinfect the vehicle after each use 	<ul style="list-style-type: none"> Incinerate waste on the same day

Up to 11 days

Up to 2 days

1. Special management system for COVID-19 quarantine waste

Preemptively start from what we can do!

Now

Quarantine waste	10-11-00
Tissues	10-12-01
Pathological	10-12-02
Sharps	10-12-03
Biochemical	10-12-04
Blood contaminated	10-12-05
Placentas for recycling	10-12-06
General	10-13-00

After

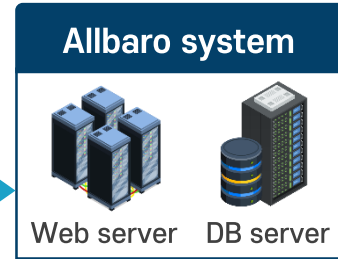
① **Special management codes added**

Covid-19 10-11-02



② **Tag issuance test(01/29/2020)**

③ **System improvement**



④ **Send info on the situation**

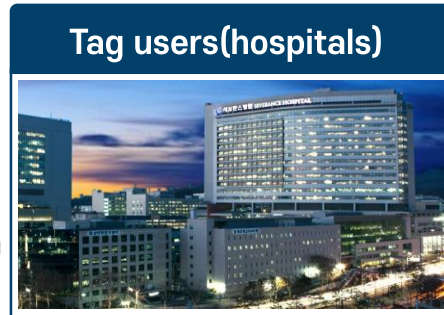
Related organizations

Ministry of Environment, environmental agencies
Korean Hospital association and Korean Medical Association.
Medical waste mutual aid association, etc.

④ **Send info to the site, recommendation(01/30/2020)**



Tag provision (01/30/2020)



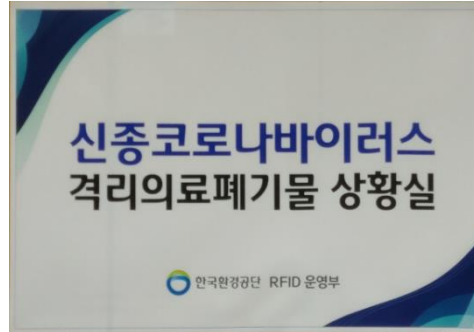
⑤ **Registration of COVID-19 tag and takeover history(01/31/2020)**

2. Operating a situation room for COVID-19 quarantine waste management

Establishing a organic cooperation system to monitor from generation to disposal of waste in real-time.

Now Access central DB, search for history of takeovers (only for those with DB access)

After The Searching function added in the admin menu
Real time monitoring system established (anyone in the situation room allowed to search other than those with DB access)

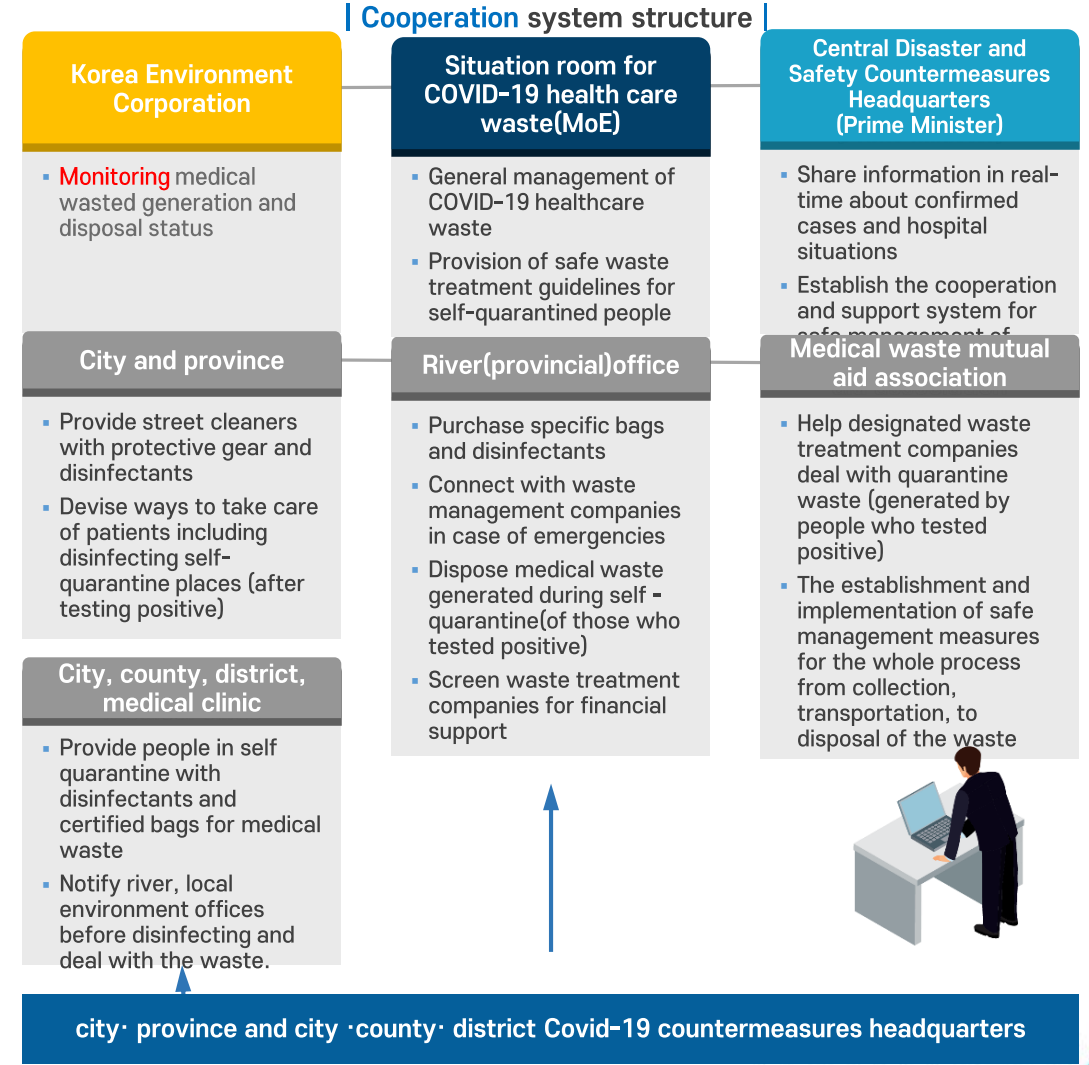


Period : 01/29/2020 - until the situation settles

members **General management** : The head of resource circulation center, the head of waste management office, 8 managers including managers in charge of medical waste from the waste information management division.



- ✓ Real-time monitoring and data analysis of COVID-19 medical waste through the Allbaro system
Real-time situation report and information sharing with the Ministry of Environment, environment agencies, local governments, related organizations, etc.
- ✓ Swift registration of generators, collectors, carriers, treatment facilities, and response to complaints, staging education and promotion campaigns
- ✓ The government task force helps temporary residential facilities for incoming travelers with their work.



3. Action First principle shortens the time from six days to just one

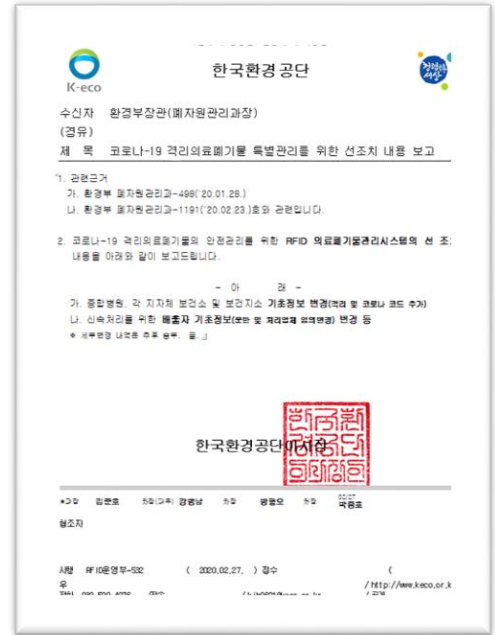
In a national disaster situation, all we need is **speed! accuracy! transparency!**

NO
W

Designated waste treatment plan confirmed (the relevant authorities, 5 days)

System basic information revised (industrial corporation, 1 day)

Up to
6 days



After

Transition to **preemptive action and action first administration**, while leaving out the confirmation process of management plans.

Manage
Within
the day

Preemptive measures to control COVID-19



(7/17)



Emergency registration as a temporary discharger (01.30.2020-)



Adjustments for short distances (02.2020 -)



- Additional COVID-19 codes for hospitals and medical clinics (total: **1,865**)
- Registration for residential treatment centers, temporary residential centers, exam rooms for KSAT as temporary dischargers. (**203 designated places**)
- The revision of basic information and adjustments with waste-managing companies for short-distance quarantine waste

4. Efforts to control COVID-19 with internal and external cooperation

The government joint task force actively participates in the anti-epidemic campaign to fulfill its social responsibilities.

External issues

- The spread of COVID-19 and the prolonged COVID-19 pandemic
- The increasing number of imported cases requires more temporary residential facilities
- Labor shortage in temporary residential facilities to take care of medical waste
- Hard to keep to the 52 hour workweek once dispatched

Internal issues

- How do we choose workers for secondment?
- Are there any ways to make up for all the work done by dispatched workers?
- Do they return to work right after their job is completed?
- Shouldn't they be put in self quarantine with their family after the work?

- 01/30/2020-, Special assistants dispatched at 12 locations
- Including temporary residential facilities.
 - * Resident work for 8 months(204 days), emergency work from September
- 38 workers dispatched in total (24th, take turn every 2 weeks)
 - * Comprised of staff members from 27 divisions
 - * Workers dispatched to up to 5 facilities at once
- Safe management of medical waste generated in the facilities

Solutions

(Externally) Consultations with local labor agencies to maintain the 52 hour workweek
For the workers exceptional (authorization for special extended work to respond to COVID-19)

(Externally) Setting up temporary quarantine facilities after the agreement with The Ministry of Environment at (at Sobaeksan National Park Nature Center)

- Waste Management Office : Generally managing the government joint task force's secondment, establishing the cooperation system.
- Safe Management Office: Creating a companywide talent pool for secondment
- Human Resources Management Office: Paying dispatched workers for overtime work (exceeding 30 hours of overtime work allowed) Guidelines after secondment (2 weeks of official vacation + remote working ,etc.)
- Management Support Office: Granting dispatched workers with social contribution hours.
- Management Innovation Office: Providing the division of dispatched workers with incentives for performance review.



Increased medical waste during the pandemic



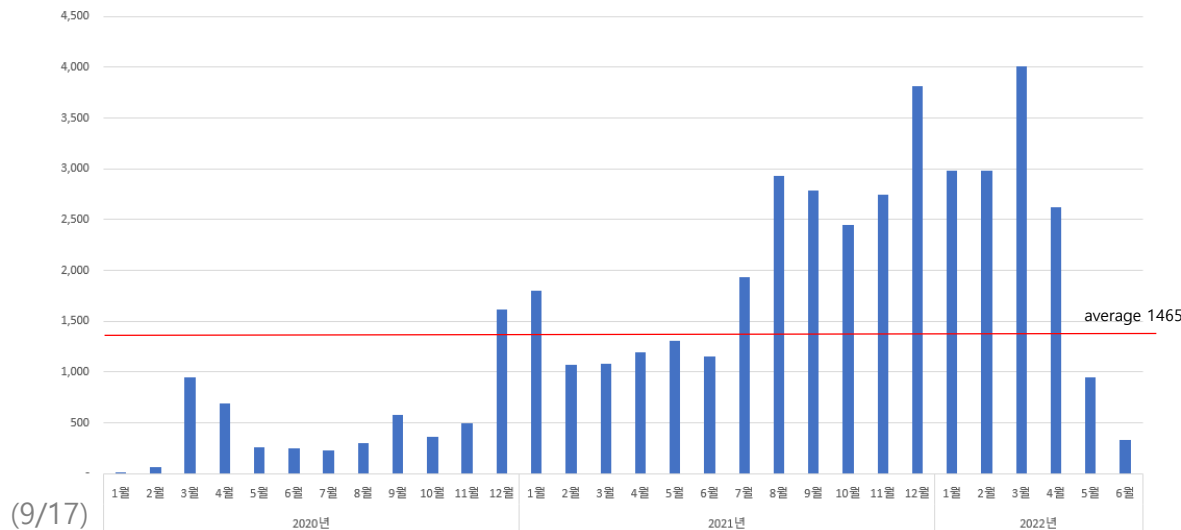
The amount of COVID-19 quarantine waste generated

(unit: ton)

Type of Medical waste	2018	2019	2020	2021	-22.06.
Total	224,557	233,824	191,401	215,806	110,578
Quarantine	3,944	5,320	8,617	11,005	6,211
Quarantine (Covid19)	-	-	5,788	24,291	13,873
Hazardous	45,789	47,279	47,103	51,238	25,513
General	174,823	181,226	129,893	129,271	64,981

* Covid19 medical waste generated monthly (average 1,465ton/month)

코로나 폐기물 발생 현황



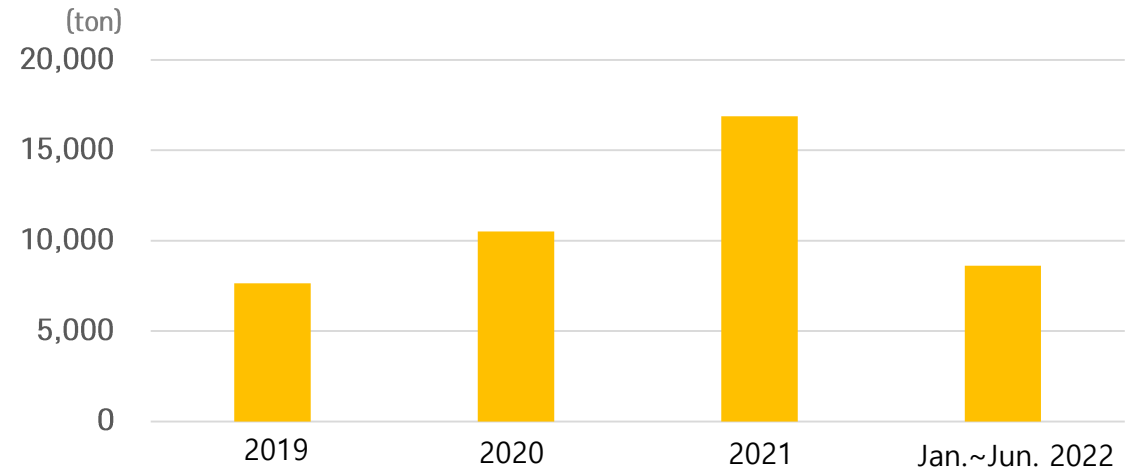
(9/17)

Increased use of dedicated containers according to the increase in medical waste

The estimated amount of synthetic resins used to create specific containers

Type	2019	2020	2021	2022. 1-6
Box-shaped(No.)	6,758,661	9,438,149	15,306,157	7,811,229
Bag-like(No.)	29,184,457	26,196,285	27,941,713	14,422,836
Synthetic resins(ton)	7,641	10,510	16,884	8,618

□ quarantine waste, sharps, fluids: box-shaped containers made of synthetic resins (polypropylene or polyethylene)
 □ others: bag-like synthetic resins containers(polyethylene) or box-shaped corrugated cardboard containers
 * Average weight of synthetic resins box-shaped containers(1.08kg) and bag-like containers(10g)



Background for the revision

Increased medical waste, lack of facilities to handle the waste

Secure facilities to deal with the waste safely and swiftly
(desperate need to reduce medical waste)

Disposable diapers were excluded from the list of medical waste due to its lower risk of infection,

Minimize medical waste that are unnecessarily generated

Diapers used at home and nursing homes are classified as general waste

The noteworthy content in the revision

Limit the types of disposable diapers considered to be medical waste

- ① Diapers used for infected patients, infected doctors and carriers of pathogens
- ② Diapers that have blood on them
- ③ Diapers that are mixed or in contact with the previous two types of diapers

Disposable diapers used in medical facilities:

Disposable diapers excluded from the list of medical waste

Diapers that do not fall into categories of the aforementioned 3 above.

We pack diapers airtight separately and put them in specific bags for diapers and take out the waste labeling it as industrial general waste. The waste will be carried by certified refrigerated vehicles and incinerated in general industrial waste incinerators.

The amount of diaper waste generated at nursing homes

About 20,000 tons taking up 10% of the total medical waste

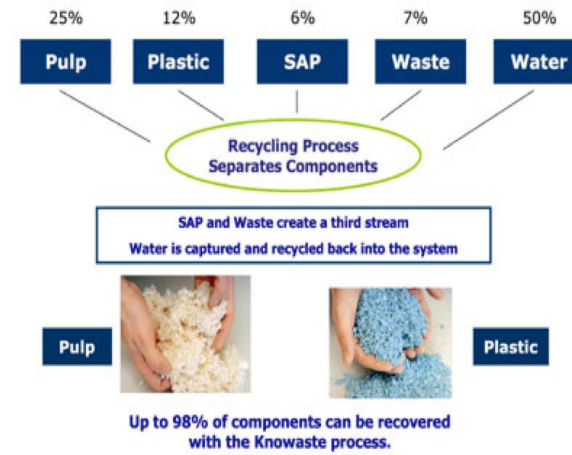
Total number of people hospitalized in nursing homes ;360,000 (64 million hospitalized days in total) * the average amount of waste generated per person ; 0.3kg



Overseas cases of reusing used diapers (Netherlands' company: Knowwaste)

Used diapers turned into pulp (wall paper, inner soles) and Plastic (building materials, waterproofing finishing materials)

Diapers Are Composed Of



<source: Knowwaste website >

Given the cost (or it being uneconomical) and other factors in Korea

This has never been the case in here

Safety management system to monitor COVID-19 medical waste



Real-time monitoring system for COVID-19 medical waste

Before active action

- Taking up to 11 days to process quarantine waste (from discharge to disposal).
- Taking at least 6 days to revise disposal schedules and get a discharger status.

After active action

- COVID-19 codes and RFID issuance, system improvements in 11 systems, "Action first principle" and close inspection of the whole process enable us to handle the waste within only 2 days.
- 95% of the waste is handled within the day.
- Using our own technology saved us up to 37million won.

Major cooperation bodies

External cooperation
RFID tag manufacturers,
System maintenance companies,
Waste management companies



Swift decision-making with accurate information

- Manually collecting data on the amount of waste and the throughput.
- Only those in charge could collect and share data.

- Operating a COVID-19 situation room that enables swift cooperation among related organizations.
- Using new statistical programs (2 types) that can shorten the time spent on reporting the situation by 1/4.
- Easy access for anyone in the situation room to statistical data (extracting and sharing data are allowed as well).

External cooperation
Ministry of Environment,
Environment agency, Seoul
Metropolitan Government, Health
Insurance Review and Assessment
Service, etc.



The government TF actively takes part in the anti-epidemic campaign to fulfill its social responsibilities

- Resource Circulation Headquarters are faced with a vacuum created by their workers being dispatched to other divisions.
- Workers avoid being dispatched to temporary facilities highly vulnerable to COVID-19 infection.

- Creating a company-wide talent pool to fill the vacuum.
- Encouraging workers to be dispatched in such facilities by providing them with various compensation.
- Establishing standards for medical waste generated from temporary residential facilities → contracting out more of the work.

External cooperation The government joint task force,
Internal cooperation Ministry of Environment
Safe Management Office, Human
Resources Management Office,
etc.



Sharing how to manage COVID-19 medical waste and its excellence internationally

- Limited external exchange and PR due to the spread of the virus.

- Sharing Korea's experience and strategies to handle COVID-19 with other countries through webinars and video conferences, etc.
→ The manager from the waste information management department participating in the webinars and video conferences in the capacity of an expert and sharing the knowhow.

External cooperation UNDP, KOICA, Paraguay, KEI, etc.

Internal cooperation Global Cooperation Office



Real-time safety management system with advanced technology



Improved ways of certifying medical waste when handing it over from dischargers to carriers.

Now

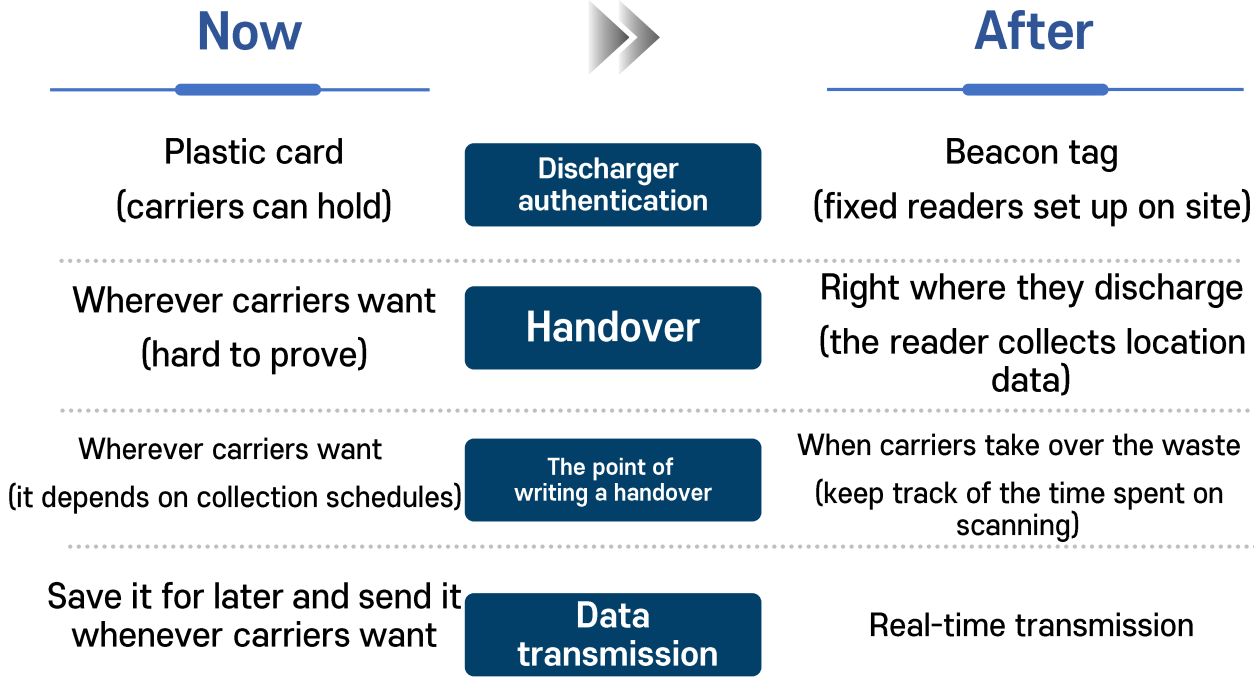
Portable readers can recognize authentication cards of dischargers (or they can put in their serial numbers)

Problems

Carriers possess the dischargers' authentication cards and fake the authentication process.



Authentication card for dischargers



Beacon tag

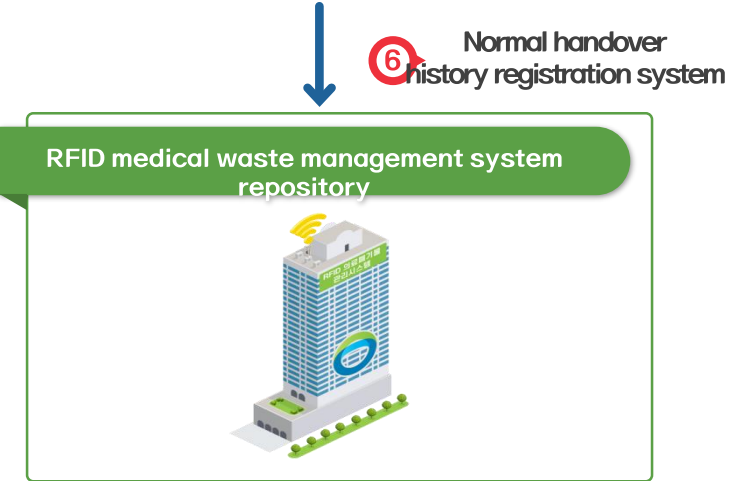
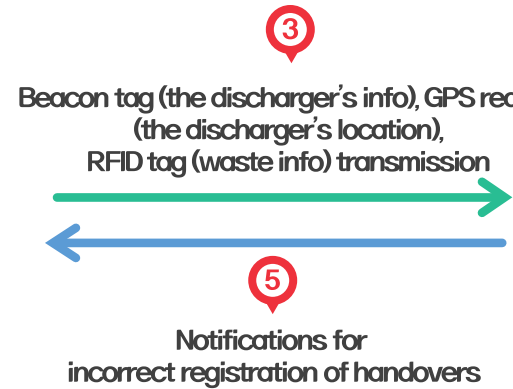
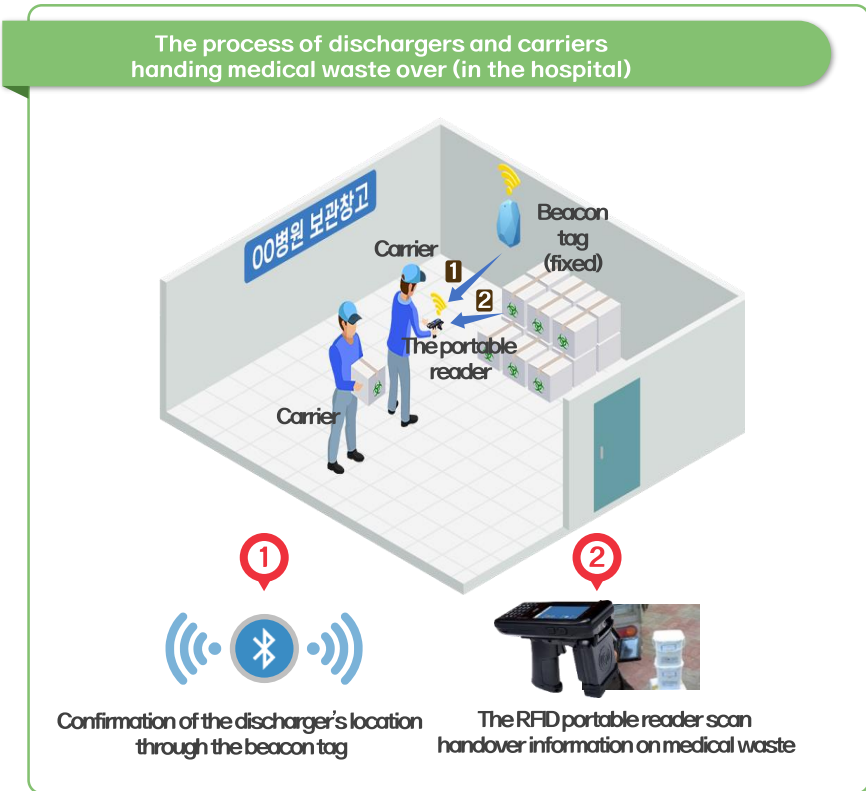
Real-time safety management system with advanced technology



Improved ways of inspecting during the handover of medical waste between dischargers to carriers.

Improvement

The portable reader automatically detects the beacon tag (starting from 10/01/2022)



Real-time safety management system with advanced technology

Improved ways of inspecting during the handover of medical waste between dischargers to carriers.

Now Each transport vehicle scans its authentication card on the fixed reader in treatment facilities.

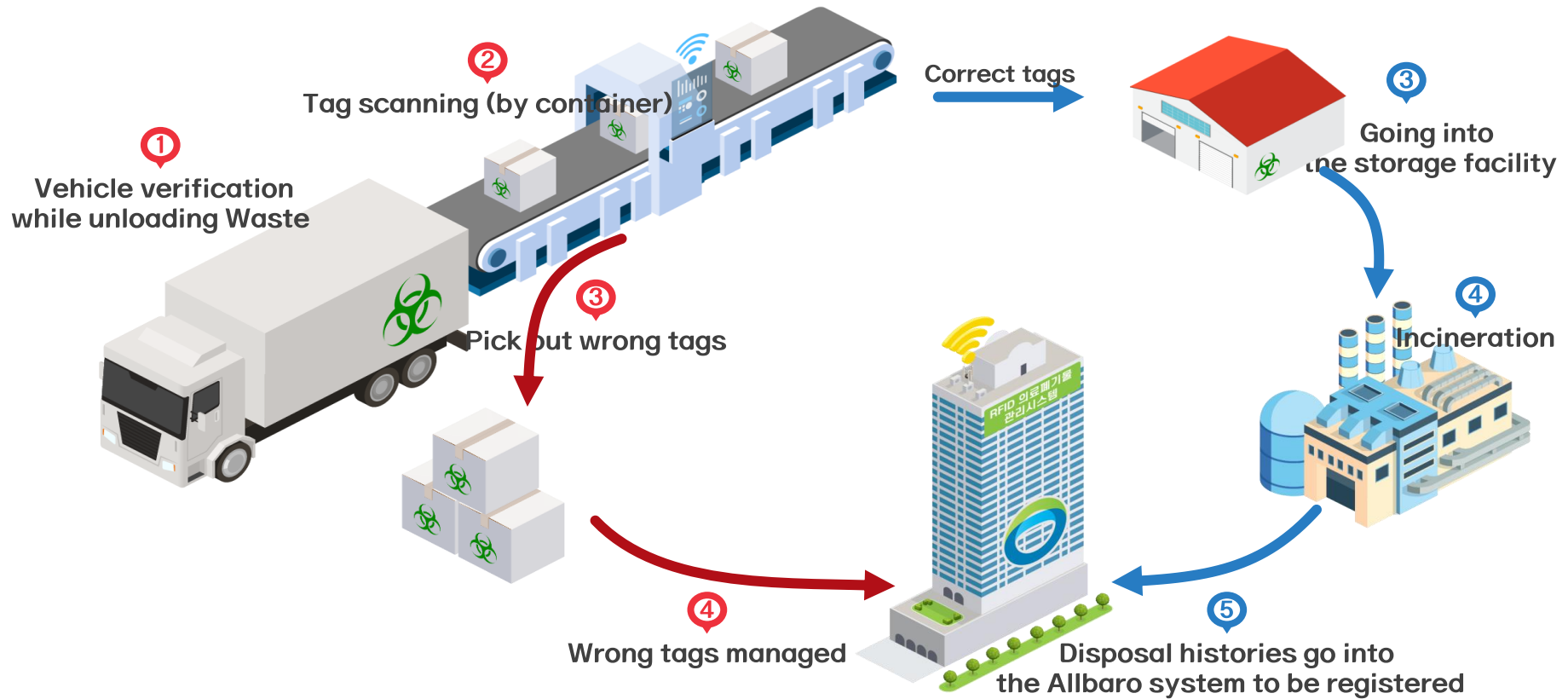
Issues **Hitches:** vehicles with no tags attached, with no handover forms, and corresponding operation delays.

Plans	Stage	Implementation period	Details
	Stage 1	April. 2022-September. 2022	<ul style="list-style-type: none"> - Equipment installation and testing completed - Analyzing on-site opinions and expected problems and reflecting it in system improvement
	Stage 2	From the end of September 2022	<ul style="list-style-type: none"> - Interim tag by tag inspection of installation and operation status of warehousing systems. - Re-checking companies where facilities are not installed and their hand-over load on the site.
	Stage 3	October.2022-December .2022	<ul style="list-style-type: none"> - Distributing operation manuals and providing on-site education. - Monitoring the actual operation and sending feedback.
	Stage 4	March.2023-	<ul style="list-style-type: none"> - Mandating the implementation of the tag by tag warehousing system.

Improved ways of inspecting during the handover of medical waste between dischargers to carriers.

Improvements

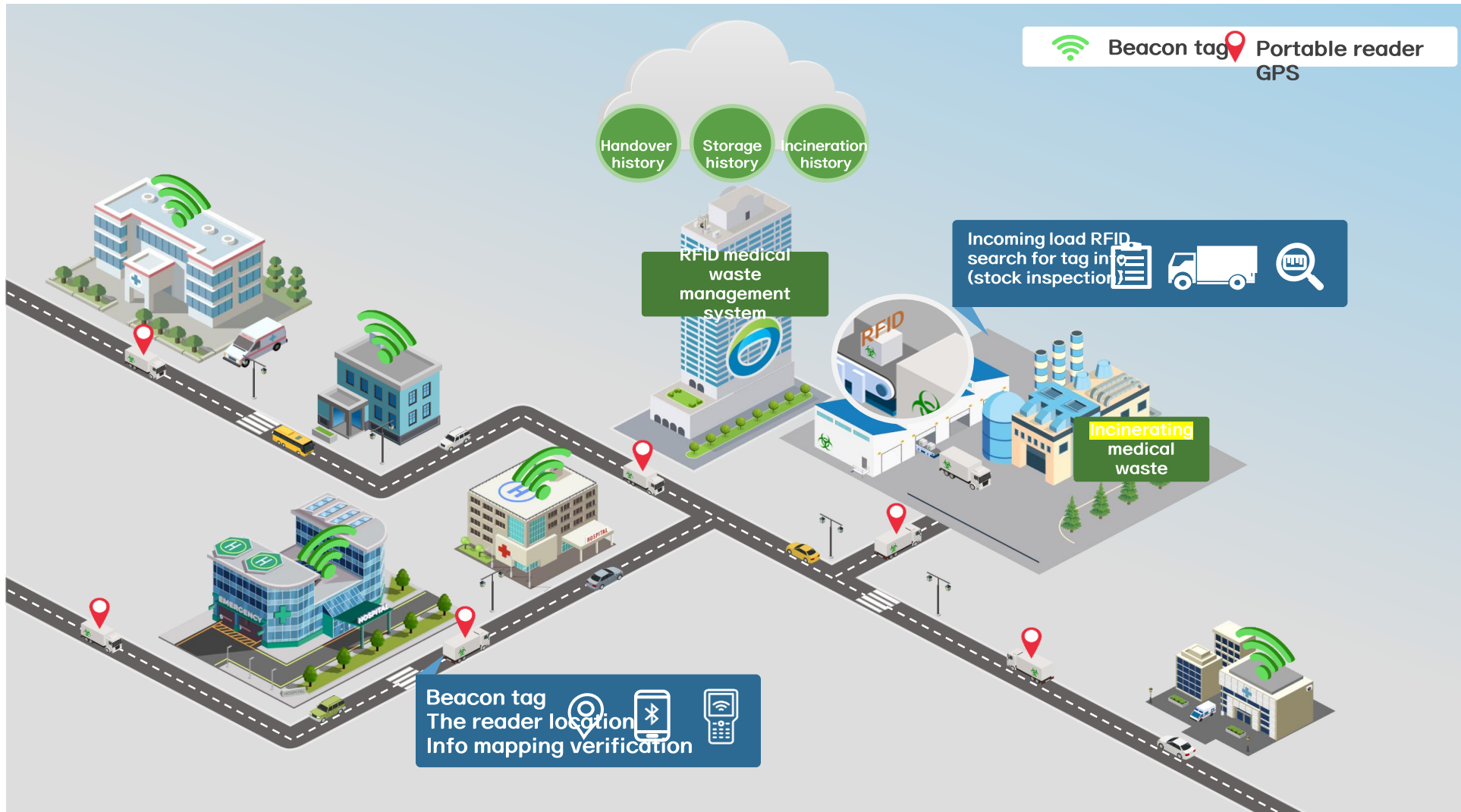
Each tag-attached container goes into the storage facility after being tag-scanned (set to start from March 1st, 2023)



Real-time safety management system with advanced technology



The key map of smart and safe medical-waste management



We will do our best to manage medical waste

RFID기반 의료폐기물 관리



Thank you