SmartERS

Smart Eco-Friendly
Resource Recycling Solution

ECO Resource Recycling Solution

Innobase

Smart ERS Business Overview

SmartERS ECO Resource Recycling Solution

Smart Eco-friendly
Resource Recycling Solution

**With the introduction and operation
of an efficient sludge resource system
It's a project to improve ESG management efficiency.**

Smart ERS

Since the London Convention, which regulates the dumping of waste at sea in 2012, most sewage debris has been incinerated or reclaimed on land, landfill costs have risen vertically as landfill capacity has reached its limit.

Wet sludge waste | Closed multistage drying unit | Livestock (pork) manure dry matter

Inovase's smart eco-friendly resource recycling equipment, Smart ERS technology applies a patent technology that captures and burns all of the generated odors and gases and recycles them as dry energy.

It improves efficiency and economic efficiency by treating sludge waste treated by simple external consignment, landfill, incineration, and composting with Smart ERS with new methods, while maximizing ESG management efficiency in line with eco-friendly policies.

- Compact Lightweight Modular Product
- Affordable Facility and Operating Costs
- Safe working environment
- Repollution-free construction
- Broad scalability and responsiveness
- Quick drying/drying quality control
- Driving convenience
- Reduction of environmental hazardous emissions

Industrial sector

Sludges, so-called sludge, refer to mud-like substances left over from sewage treatment, wastewater treatment, and water purification processes, or, in other words, dirty sediment separated from water. Domestic sewage and industrial wastewater are discharged from residential areas and various industrial facilities. If sludge is left unattended during the process of treating it, it can decompose and cause odors, gas generation, harmful bacteria, and pest reproduction, which can cause secondary environmental pollution and public health problems. Therefore, it is important to prepare measures to treat sludge stably and safely.

Sewage treatment facilities

Sludge generated in the sewage treatment process is a mixture of solids and water and has a high concentration of organic substances.

Livestock farm

Livestock manure is fixed in a structure that is difficult for harmful substances such as heavy metals to decompose.

Fruit farmhouse

Fruits should be discarded because they cause environmental pollution such as odors and leachate over time.

Smart Eco-friendly **Resource Recycling Solution**

Process sludge generating company

Wastewater sludge has been blamed for environmental pollution, as most of it has been incinerated or landfilled due to odor.

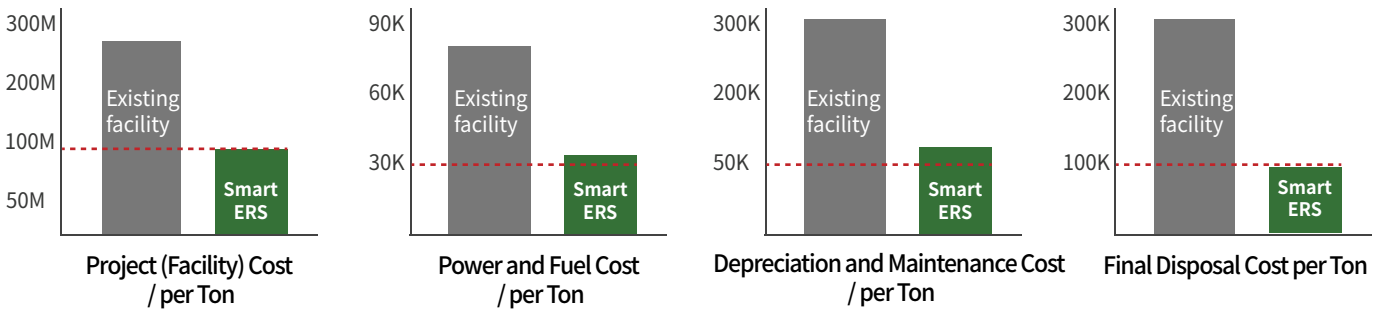
Food processor

It occurs in various processing companies such as kimchi factories, agricultural products companies, and fish sauce processing plants.

Economic comparison

Comparison of Facilities and Operating Expenses by Public Law

By minimizing the size of the facility, Smart ERS can operate economically by reducing facility and operation costs. In addition, there is no restriction on sludge (waste), so it can be converted into integrated resources in individual treatment structures of many waste sources. The application of the eco-friendly method results in the lowest secondary pollution, and after reducing more than 80% of sludge (waste), the remaining 20% can be discharged as bio-char and renewable fuel coal to increase the upcycling effect.



currency unit : KRW

Source: Disclosure of budget/settlement of sewage sludge drying facilities by each local government and clean eyes

Smart ERS business effectiveness

Sludge waste treated by simple external consignment, landfill, incineration, or composting is a resource recycling process with new construction methods to enhance environmental performance and maximize ESG management efficiency in line with environmental policies.

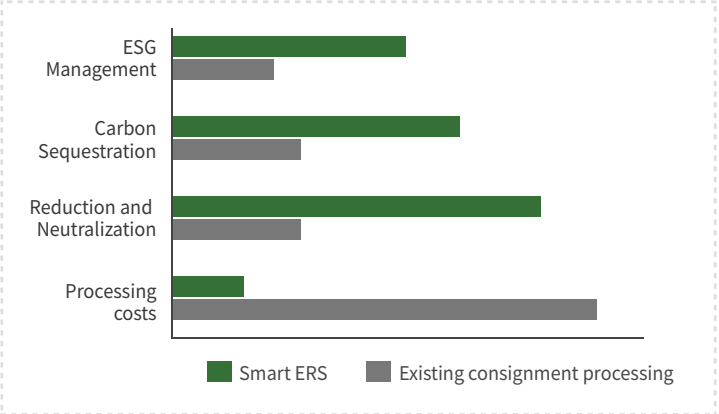
Consignment of existing external processing companies		SmartERS
No weight loss No harm done	**Reduction and Detoxification**	About 75-80 & weight loss Pyrolysis drying harmless (intermediate workpiece)
Not applicable	**CBAM**	International recognition of CO_2 capture effect of biochar 1.95 - 2.85t CO_2eq per ton of biochar (carbon dioxide conversion)
Not applicable	**RE100**	3,500 - 4,200 kcal per ton of biochar
Low Effect	**ESG management**	Achieving waste reduction and harmlessness/ Fixing carbon dioxide and applying emission rights RE100 applicable (now recognizes direct development)
The average consignment processing fee per ton is about 140,000 won	**Economics**	Operating cost per ton (electricity and energy cost) average about 40,000 won Reduce by approximately 70%

Reduction and Detoxification

Smart ERS uses a low-temperature pyrolysis system at the sludge discharge stage to achieve approximately 80% waste reduction.

The other 20% of the final product is produced as biochar or renewable fuel coal, which can increase the value of resource circulation and at the same time increase the economic feasibility.

Up-Cycling and ESG management



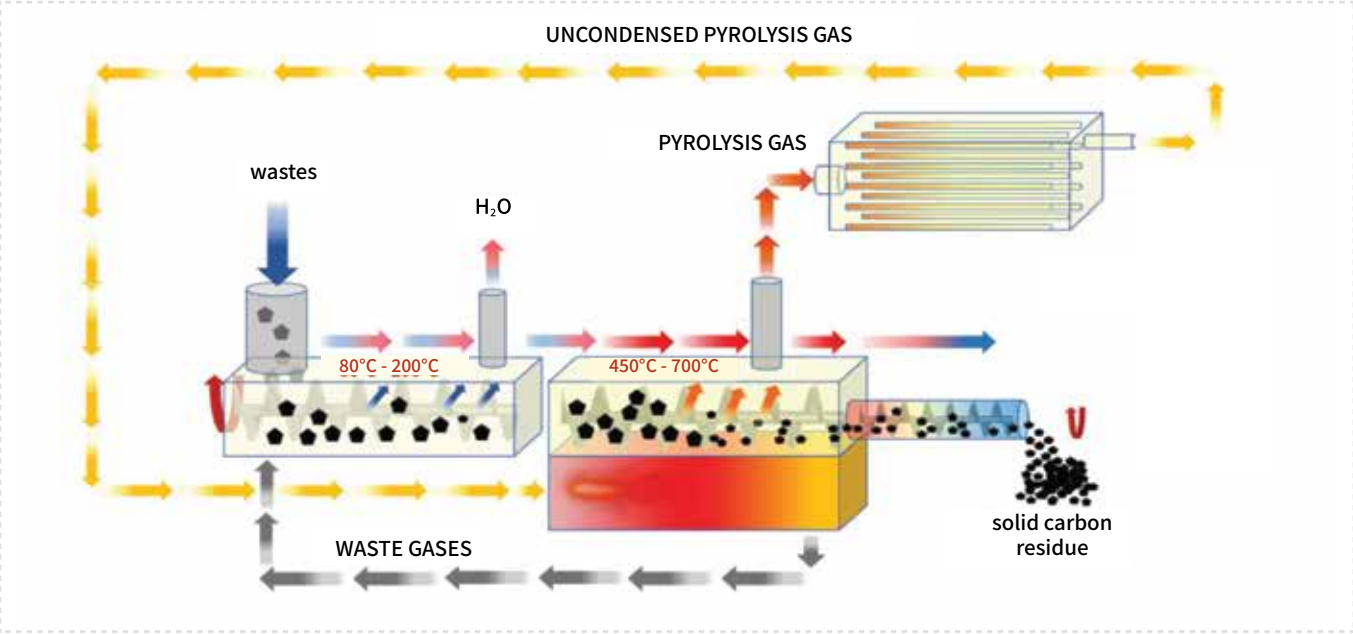
Biochar produced through Smart ERS fixes 65-89% of organic carbon with carbon-utilized storage (CCUS) technology, reducing 1.95-2.85t CO_2 eq (carbon dioxide conversion) based on 1t of biochar for livestock.

This is based on the 30-year-old pine tree's CO_2 absorption of 12.3kg per day, and it has a planting effect of about 232 trees.

Comparison of construction methods

Smart ERS closed multi-stage drying unit

Inovase's Smart ERS uses a closed multi-stage drying device. It is a device that can be inputted and dried without any restrictions on the properties of sludge, and is a system that has obtained patent and green technology certification through the recycling method without re-pollution.



Disk, Paddle, and Drum Type Dryer

Water and Air Heating > Steam and Hot Air > Contact Drying Method, with a Market Share of Approximately 90% or More

Capacity Response Method (Plant Type)
: Low Facility Stability

Air Pollution Control Facility: The Largest Scale Process

- A method of contact drying by injecting steam or hot air, which requires a large amount of energy.
- The air pollution control facility required for processing the injected steam, hot air, and drying gases is the largest in scale.
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- Gases and moisture are reduced into condensate, and liquid waste is outsourced to treatment facilities (triple operation).
- It has the largest plant type structure in terms of facility size, maintenance, and operational costs.
- With a high-pressure, complex plant structure, the risk of accidents is high, and a malfunction in some parts can stop the entire line operation.

High-Speed Fermentation (Drying) Type Dryer

Air Heating > Hot Air > Contact Drying (Fermentation) > Odor Dispersion Method, with the Highest Market Share in the Livestock Manure Sector

- To match the drying conditions, sawdust is purchased in a 4:6 ratio and mixed for input (double operation).
- The limits of the processing target are clear, but the boundary between fermentation and drying is unclear depending on the operating conditions.
- It is a method where it is difficult to uniformly control the final moisture content of the dried material, and the moisture content of the dried material is very high.
- Using a mixing structure during suspension and injecting hot air from an electric hot air blower at the bottom, drying occurs gradually over about a week.
  This method has the longest odor dispersion distance and the highest odor concentration.

Features of sealed multi-stage drying unit

The most efficient and economical construction method

- Reduce labor by simplifying treatment processes such as sewage and wastewater sludge and livestock manure sludge
- Recyclable evaporation gas generated during operation
- Module type for easy maintenancec
- It is possible to directly input without adjusting the moisture content, reducing the purchase cost of final structures such as sawdust
- Significantly reduce the cost of auxiliary equipment such as air pollution prevention facilities, etc

The best system for resolving current issues

- Solving related problems such as salpoji because no liquid cost is generated
- The generation of odors and the resulting civil complaints are reduced by airtightly collecting odors (including dry gas) generated in the process and re-burning them
- A device with no associated odor scattering due to the absence of an unboiling process

Patent and Certification Acquisition System

It is a convergence technology between a drying furnace and an air pollution prevention facility (combustion method), and it is a device that can be input and dried without restrictions on the properties of sludge.

Patent certificate

Patent certificate

Lab certificate

Confirmation of venture business

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