WPT

Conversion of Waste into Energy through Molecular Disintegration

WPT
WastePowerTech

From Waste to Energy.
Through Molecular Disintegration.

This brochure presents the technological and operational framework in which Waste Power Tech operates.

In the following pages, you will find the context of hard-to-process waste, the principle of energy conversion through molecular disintegration, and the structure of the infrastructure developed by WPT.

The document is organized around the three dimensions of the process — Waste, Energy, and Technology — to provide a clear understanding of the method and its applicability.

WPT

Waste Power Tech

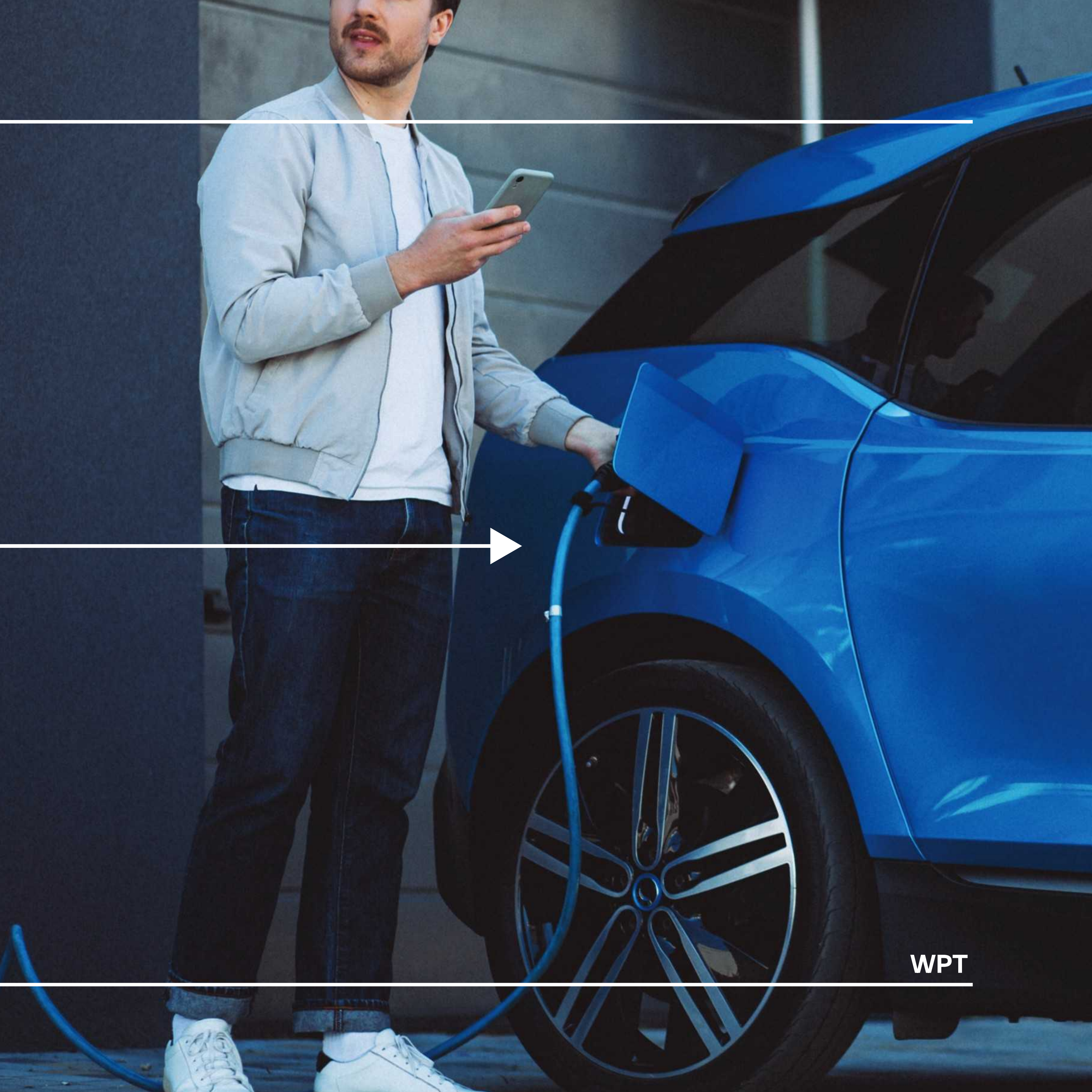
Intro
06

About the company
10

Waste
Integrated management of waste typologies
17

Power
Energy transformation
27

Tech
Molecular disintegration the technological principle
37



WPT

Intro

Waste

In recent years, waste management has become a complex technological challenge, especially for streams contaminated with organic material. Mixed waste resulting from commercial, industrial, or food-related activities cannot be efficiently recycled through conventional methods due to its heterogeneous composition and contamination.

A significant share of these streams still ends up in landfilling or incineration, without fully harnessing the energetic potential contained in the material.

The problem is not just collection. The problem is the processing of non-recyclable materials.

■ more
about waste
pg. 17

■ about energy →

Intro

Energy (Power)

In parallel, energy demand is increasing, and the pressure to identify alternative, stable, and local sources is becoming more evident. Modern energy infrastructure requires solutions that are predictable, scalable, and compatible with existing systems.

Energy recovery from waste is a logical direction, but traditional conversion methods are limited either by efficiency, environmental impact, or operational constraints.

Transforming waste into usable energy requires a different approach, one based on technological control and optimized performance.

■ more
about energy
pg. 27

■ about WPT technology →

Intro

WPT Technology (Tech)

Advances in thermochemical processes and molecular control enable the development of methods capable of treating materials at a structural level, not only mechanically or through combustion.

Within this technological framework emerges controlled molecular disintegration — a process that acts on the bonds between molecules, facilitating the conversion of matter into a stable and usable energy form.

Waste Power Tech develops and applies this method as an integrated technological infrastructure, positioning itself at the intersection of waste management and energy production.

■ more about
WPT technology
pg. 37

From waste to energy through applied technology

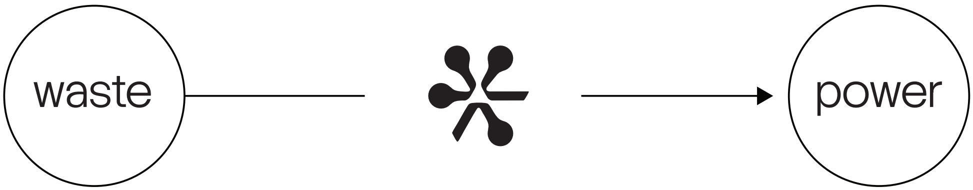
WPT develops and implements a technological system based on controlled molecular disintegration, capable of treating waste streams that are difficult to recycle and converting them into usable energy. The method is designed for stable operation, infrastructural integration, and scalability in municipal and industrial contexts.

about the company

WPT
The company and its operational infrastructure

1.1 General profile

Waste Power Tech (WPT) is a company specialized in developing and implementing technological infrastructures for the energy conversion of hard-to-recycle waste.
The company operates in the field of applied science, developing integrated solutions that connect waste management with energy production.
WPT functions as a technological integrator and infrastructure developer, with a focus on scalability, operational control, and compliance.



1.2 Context and market

The growing volume of contaminated waste, the pressure on landfilling, and increasingly strict requirements for energy recovery create a favorable context for alternative technological solutions.

WPT positions itself at the intersection of:

- municipal and industrial waste management
- energy infrastructure
- efficiency and compliance objectives

The opportunity is defined by the real limitations of existing systems.

1.3 Emission reduction

The system operates in a closed-loop mode, with multiple gas-cleaning stages, preventing uncontrolled emissions and ensuring compliance with the strict standards of the European Union. Through the controlled conversion of waste and efficient energy recovery, the installation significantly reduces the carbon footprint, avoiding approximately 4,175 tons of CO_2 per year compared to conventional scenarios involving landfilling and long-distance transport to incineration.

1.4 Renewable energy generation

The installation produces approximately 9,120 MWh of electricity annually, depending on the composition and calorific value of the treated waste stream. When a significant share of the waste is biogenic, the generated energy is partially eligible as a renewable source, with an additional potential recovery of around 13,200 MWh of thermal energy. The values are estimated for the plant's nominal capacity and an average processed waste mix.

1.5 Job creation and skills development

Each operational unit creates direct jobs for qualified personnel involved in operating and monitoring advanced technology. These roles are supported by specialized training programs that contribute to the development of local technical skills.
In parallel, the projects indirectly stimulate employment through related activities such as construction, logistics, maintenance, and services linked to waste management, thereby strengthening the economic impact at a regional level.

1.6 Field of activity

WPT's activity includes:

- the development and optimization of controlled molecular disintegration technology
- the design and implementation of conversion stations
- the operation, monitoring, and maintenance of the installations
- integration into the local energy infrastructure
- partnerships with public authorities and industrial operators

The company's model is oriented toward implementation, research, and equipment commercialization.

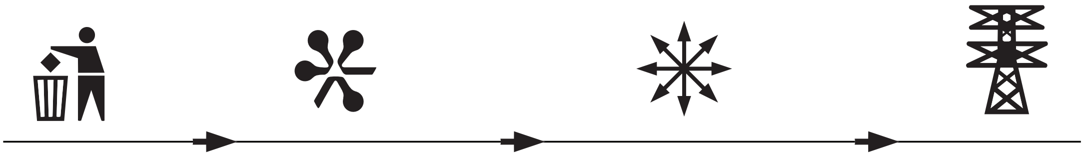
1.7 Business model

The WPT model is built on:

- the implementation of molecular conversion stations
- integration into local waste-management systems
- the generation of usable energy
- predictable and replicable operation

1.8 Operational flow

The WPT technological process is structured into clearly defined stages:



Material intake and preparation

Treatment through controlled molecular disintegration

Conversion into usable energy

Integration into the energy system

Each stage is designed for control, efficiency, and operational stability.

1.9 ROI

The company's investment model is built on energy infrastructure with dual impact: waste management and energy production. Depending on the installation's capacity, the waste-stream typology, and local market conditions, projects typically achieve an estimated ROI between 4 and 6 years.

The financial structure is tailored individually for each site, integrating variables such as raw material cost (waste), energy tariffs, support mechanisms, and local partnerships. The result is a scalable, predictable model grounded in the real economy of each project.

1.10 History of Waste Powertech

The history of Waste Powertech begins in 2009, with the initiation of the technological concept that today forms the foundation of the molecular disintegration method. In the following years, the direction strengthened through successive stages of research, testing, prototyping, and operational validation, leading to the implementation of applied infrastructure at an industrial scale.
The evolution of WPT reflects a structured progress — from idea to a functional solution integrated into the energy system.
For complete details regarding development stages, partnerships, and implementations, scan the QR code.

1.11 Projects and implementations

A relevant example is the “Cluj Molecular Disintegration Station” project, which serves as a reference point for the application of the technology in an operational context.

This type of project demonstrates the feasibility of the method and provides a foundation for replication in other locations.

1.12 Compliance and certifications

The company operates in full compliance with environmental regulations in Romania and the European Union, supported by certifications and independent technical evaluations. The implemented standards — including quality and environmental management systems (ISO 9001 and ISO 14001) — validate internal processes, operational traceability, and environmental impact control. Additionally, technical compliance is verified through public procurement procedures and equipment certification documentation, ensuring institutional partners and investors a high level of transparency, rigor, and alignment with European norms applicable to industrial and energy installations.


CEPROM S.A.
CERTIFICAT DE CONFORMITATE
Nr. 2480-CT-32022
S.C. WASTE POWERTECH S.R.L.
INSTALAȚIE DE DEZINTEGRARE MOLECULARĂ ȘI VALORIFICARE ENERGETICĂ A DEȘEURILOR
WP 500
CE


SYSTEMA
CERTIFICĂM PERFORMANȚA
Certificat de înregistrare
WASTE POWERTECH SRL
ISO 9001:2015
Proiectare și producție instalații de dezintegrare moleculară și valorificare energetică a deșeurilor
IAF IAS


SYSTEMA
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ISO 14001:2015
Proiectare și producție instalații de dezintegrare moleculară și valorificare energetică a deșeurilor
IAF IAS


ANEXĂ
IDENTIFICARE PRODUS
INSTALAȚIE DE DEZINTEGRARE MOLECULARĂ ȘI VALORIFICARE ENERGETICĂ A DEȘEURILOR
Manager CEPROM-CERT

■ about waste →

Waste


KOMATSU

Romania faces a structural challenge in waste management, caused both by underdeveloped infrastructure and by the fragmentation of responsibilities among local authorities, operators, and waste generators. The recycling rate remains below the European average, and a significant share of municipal waste still ends up in landfilling. In parallel, pressure from European regulations on circular economy and landfill reduction is steadily increasing, creating a gap between the commitments made and the real operational capacity.

Recycling, although essential, is difficult to implement efficiently without coherent separate collection and a well-integrated logistical infrastructure. Municipal waste is often contaminated, mixed, or high in moisture, which reduces recycling efficiency and increases processing costs. In the case of industrial waste, the variability of composition and the lack of consistent streams make material recovery even more complex.

In this context, technological solutions capable of treating non-recyclable or hard-to-recycle fractions become essential. The issue is not only waste collection, but transforming it into a manageable, predictable, and energy-recoverable stream. Modern waste management requires integrating recycling with complementary technologies that can reduce landfilling, recover energy, and close the material loop in a sustainable manner aligned with European standards.

Integrated management of waste typologies

Waste is not uniform. It differs in composition, moisture, density, calorific value, and behavior during processing. Effective management begins with understanding these differences and integrating them into a technological system capable of treating varied streams without compromising operational stability.

WPT develops solutions adapted to multiple waste typologies — municipal, industrial, organic, plastic, or mixed — through a controlled, parametric, and predictable process. Material diversity is not a limitation, but a technologically managed variable.

Integrating multiple typologies into a single operational framework enables efficiency, scalability, and adaptation to the local realities of each project.

Municipal Solid Waste (MSW)

Municipal waste originating from households and urban commercial activities. It contains mixed fractions: organic materials, plastics, paper, textiles, and other residual components.

The main characteristic is compositional variability, which requires a technological system capable of handling heterogeneous streams with different moisture levels and calorific values. Efficient MSW treatment reduces pressure on landfills and enables controlled energy recovery.

Industrial Waste

Residues originating from industrial processes, generally more homogeneous than MSW, but with variable density and chemical properties. They may include materials with high energetic value (rubber, plastic) or fibrous and wood-based fractions.

Their management requires adapted parameterization to optimize energy yield and control emissions.

Integrated management
of waste typologies

Biomass

Agricultural residues, plant matter, or processed organic waste. Integrating biomass contributes to the valorization of local resources and reduces dependence on conventional fuels.

Hydrocarbons

Industrial or municipal sludges and petroleum residues with high moisture content and complex organic compounds, industrial oils, refining residues.

Plastic

Polymeric fractions originating from municipal or industrial streams, including packaging, films, technical plastics, or composite materials. They are characterized by stable molecular structure, high energy content, and variations in density or contamination.

Textiles

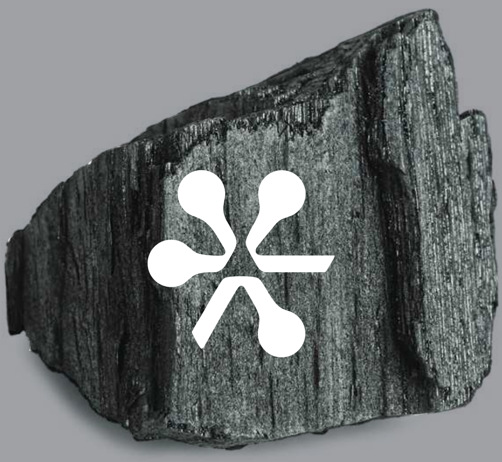
Textile waste includes natural and synthetic fibers originating from industrial processes, post-consumer use, or commercial streams. These are complex mixtures of materials (cotton, polyester, nylon, elastane), chemical treatments, dyes, or finishes that make them difficult to recycle through conventional methods.

Elastomers

Elastomeric materials originating mainly from used tires and industrial applications. They are composed of synthetic polymers, carbon black, and technical additives, featuring high density and elevated calorific value.

Cellulosics

Lignocellulosic materials include paper, cardboard, wood, and their derivatives, originating from municipal or industrial streams. They are composed primarily of cellulose, hemicellulose, and lignin — organic structures with significant energetic potential.



Carbon resources

Lignite and other high-carbon materials represent conventional energy resources historically used in energy production. From a chemical perspective, these are fossilized organic materials, characterized by stable energy content and relevant caloric density.

Each waste typology analyzed above is evaluated in terms of chemical composition, energy content, and behavior in the conversion process.

Through technical characterization — moisture, organic fraction, carbon content, thermal stability — materials are integrated into a predictable technological flow.

WPT's approach does not treat waste as a volume to be disposed of, but as raw material for controlled energy conversion.

Power →

Power

Romania is undergoing an accelerated energy transition, driven both by recent geopolitical pressures and by the commitments made at the European level regarding emission reduction and the increase of renewable-energy share. The national energy system remains dependent on conventional sources, and the volatility of energy prices has highlighted structural vulnerabilities related to supply security and grid stability.

The development of renewable capacities is essential, but their integration into the grid requires significant investment in infrastructure, balancing, and operational flexibility. Intermittent sources such as wind and solar require complementary solutions capable of delivering predictable and constant energy. In parallel, the growth of industrial and urban energy consumption adds additional pressure on existing capacities.

In this context, diversifying the energy mix becomes a strategic priority. Decentralized production, the use of local resources, and the integration of technologies capable of transforming residual streams into energy contribute to strengthening energy security and reducing dependence on imports. An integrated approach combining energy efficiency, local production, and the responsible use of resources is essential for a stable, competitive, and sustainable long-term energy system.

Energy transformation

The WPT system processes heterogeneous waste through molecular disintegration, generating a synthesis gas (Syngas) used for producing electricity. The process also allows, optionally, the recovery of resulting thermal energy, increasing the overall efficiency of the installation.

The result is a direct conversion of residual material into usable energy, within a closed, automated, and real-time monitored system.

Main output

Syngas → electric energy

- Deliverable electric energy to the grid
- Recoverable thermal energy (optional)
- Inert solid fraction (Stabilized solid residue)

Depending on the waste composition, the system can generate up to

1.1–1.15 MWh of electric energy per ton processed,

with the possibility of additional thermal-energy recovery.

This performance positions WPT technology as a high-efficiency energy-conversion solution, applicable both in municipal infrastructure and in complex industrial streams.

Energy conversion technical parameters

WPT technology uses a molecular-disintegration process in a controlled environment, in which the organic fraction and hydrocarbons in the waste are converted into a synthesis gas (Syngas). The process occurs **without direct combustion**, reducing the formation of pollutant compounds typical of conventional incineration.

The resulting Syngas is filtered and conditioned, then used to power gas engines connected to electric generators. The system allows continuous operation with PLC/SCADA monitoring and automatic control of critical parameters (temperature, pressure, gas composition).

Technology	Electric energy/ton
WPT	1.1–1.15 MWh
Incineration	0.6–0.8 MWh
Biogas	0.3–0.5 MWh

Grid delivery

The electric energy produced is compatible with the standards for injection into the national grid.

The installation can operate:

in on-grid mode (direct delivery to the grid)

in dedicated industrial mode (direct supply to a consumer)

in hybrid mode

Automated PLC/SCADA control ensures operational stability and adaptation to grid requirements (load balancing).

Cogeneration (CHP – Combined Heat and Power)

The WPT system operates in cogeneration mode, utilizing the energy contained in Syngas both as electricity and as recoverable thermal energy.

The Syngas resulting from the molecular-disintegration process powers gas engines or turbines, generating electric energy suitable for grid injection. Residual heat from the process is recovered through heat exchangers and can be used for:

- urban heating
- industrial processes
- material drying
- local thermal applications

This approach increases the overall energy efficiency of the system and enables economic optimization of the installation depending on the local context. By recovering thermal energy, the system's total efficiency can significantly exceed simple electrical output, reaching levels typical of modern cogeneration systems.

Contribution to EU targets

The WPT model supports the European objectives regarding: reducing waste landfilling, increasing the rate of energy recovery, generating renewable energy, and reducing uncontrolled emissions from landfills.

By diverting up to 90–95% of the input stream from landfilling, the system contributes to achieving the targets set by the Waste Framework Directive, the Circular Economy Package, and decarbonization strategies.

Energy resilience framework

By locally integrating waste-to-energy conversion, WPT contributes to strengthening an energy-resilience framework at municipal or industrial level. Distributed production of electricity and thermal energy reduces dependence on external sources, shortens energy-supply chains, and increases the ability of communities to autonomously manage both waste streams and energy demand in contexts of volatility or crisis.

Tech →


Tech

Modern waste management and energy production can no longer be approached through one-dimensional solutions. Technology plays a crucial role in creating integrated systems capable of addressing material efficiency, environmental impact, and economic viability simultaneously. Without robust technological solutions, waste remains a logistical problem, and energy becomes a pressure point on existing infrastructure.

Classical treatment technologies — whether landfilling, incineration, or anaerobic digestion — have clear limitations regarding energy efficiency, emission control, or the types of materials they can process. Especially for mixed, contaminated, or hard-to-recycle fractions, an approach that intervenes at the chemical level is required, not just mechanical or biological.

Molecular disintegration addresses this need through a controlled thermochemical process that converts the organic fraction of waste into energy-usable synthesis gas. The approach does not aim for simple volumetric reduction, but for the controlled conversion of the chemical energy contained in the material. Through automation, continuous monitoring, and modular architecture, the technology enables integration into an existing energy system, providing operational predictability and adaptability to variable material streams.

Molecular disintegration – the technological principle

WPT technology is based on a controlled thermochemical process of molecular disintegration of organic materials. The process takes place in a controlled environment, without direct combustion and in the absence of oxygen, avoiding the classical incineration mechanism.

Why molecular disintegration?

Because the waste problem can no longer be solved only at the mechanical level.
Traditional recycling works through sorting, shredding, and physical reuse. But a large portion of today's waste — mixed, contaminated, composite — can no longer be efficiently recovered through classical methods. It ends up in landfills or is incinerated.

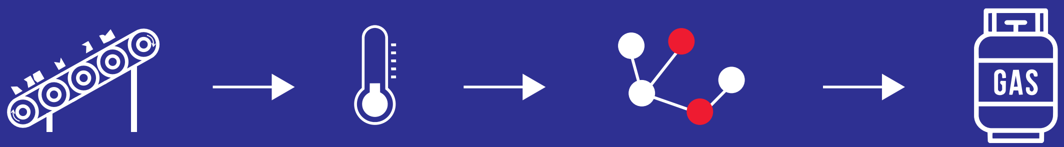
Molecular disintegration goes to the fundamental level of matter.
Instead of trying to reuse the object, the process breaks down the chemical structure of the material into elemental components (synthetic gases, energetic fractions, reusable compounds). Practically, we no longer treat the form of the waste, but its composition.

It is a conversion approach, not a disposal method.
Through the controlled breaking of molecular bonds, waste becomes an energy resource or a secondary raw material. This way we: reduce the volume sent to landfills, avoid direct burning, recover energy in a controlled way, and reduce dependence on primary fossil resources.

What is molecular disintegration?

A controlled technological process through which the complex organic structures in waste are broken down into simpler compounds, without direct combustion.

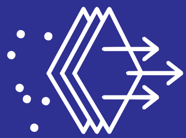
What happens, essentially?



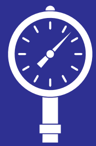
1. The material is introduced into a controlled environment
2. Thermal parameters are stabilized
3. Molecular bonds are fragmented
4. A combustible gas (Syngas) is produced

What happens to the resulting gas?

It is collected from the reactor and cooled



Filtered from particles



Stabilized in flow and pressure

Used in an engine that produces electric energy

After the molecular disintegration process, the resulting gas is collected from the reactor, cooled, and filtered to remove residual particles, then stabilized in terms of flow and pressure. In this controlled form, it is used to power a cogeneration engine that converts the combustible gases into electric energy.
The electricity produced is injected into the national grid and distributed to consumers — whether cities, public infrastructure, or industrial operators — thus integrating the treated waste into the real energy circuit.

What remains after the process?

The process reduces the organic fraction to synthesis gas and stabilizes the mineral component of the waste. The result is an inert material with potential for reuse in industrial and infrastructure applications, significantly reducing the amount sent to landfilling.

WASTE

80–90%
energy

5–10%
reusable mineral aggregate

recovered
metals

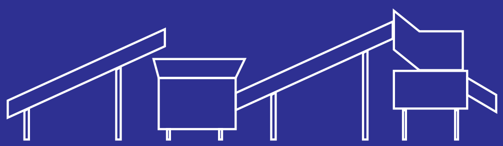
What is the physical configuration of the installation?

The WPT installation is built in a modular configuration and includes the reception and storage area, the molecular-disintegration reactor, the gas cooling and conditioning systems, the cogeneration unit, and the mineral-residue handling line.
For a detailed presentation of the installation's configuration, scan the QR code and access the explanatory video material.

How much space is required?

The size depends on the configuration (number of modules).
A standard unit includes: reception and pretreatment area, reactor, gas-filtration and conditioning system, generator, and technical & control space.

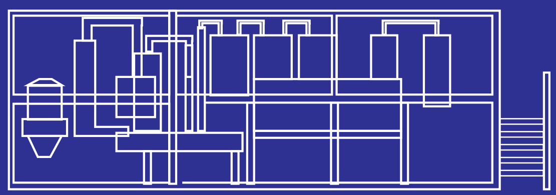
Upstream processing line



- primary shredder
- secondary shredder
- belt conveyor
- optional dryer

Estimated footprint: 500 m²

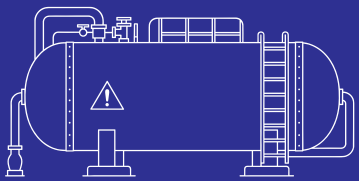
Molecular-disintegration module



- molecular-disintegration reactor
- tar filter
- gas filters
- venturi scrubber
- buffer tank
- piping assembly
- metal support structure

Estimated footprint: ~700 m²
Height: ~4–4.5 m

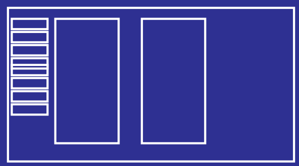
Gas conditioning and storage system



- gas tanks (buffer)
- pressure-control system
- composition-monitoring system
- safety valves
- pressurized piping

Estimated footprint: 700 m²
(depending on capacity and redundancy)

Cogeneration unit (power module)



- Syngas-fueled engine
- electric generator (alternator)
- control and protection panel
- heat-recovery system (optional)
- electrical switchboards

Estimated footprint: 250 m²

The configuration presented reflects the core of the installation and the main functional modules of the WPT system. A complete operational site occupies approximately 2,000 m² and may include areas dedicated to material reception and pretreatment, controlled storage, logistic access, and technical spaces for monitoring and integration into the energy grid.

The final structure is adapted to each project according to capacity, material flow, and local infrastructure and regulatory conditions, allowing modular sizing and phased integration into existing industrial or municipal platforms.

What conditions are required for installation?

Installing a WPT unit requires a constant and predictable material stream, access to electrical infrastructure for integrating the produced energy, and an industrial platform suitable from a logistical and operational standpoint. In addition, the project must align with the applicable regulatory framework, including environmental permitting and integration into the local infrastructure.
The modular configuration allows the installation to be adapted to the specific conditions of each site, ensuring technical and operational compatibility with the existing context.

1
Access to a constant waste

2
Connection to the electrical grid

3
Suitable industrial surface

4
Environmental permits and integration into local infrastructure

From waste to energy through molecular disintegration

Waste Powertech transforms waste into energy through
a controlled molecular-disintegration process,
converting residual material into a real energy resource.