



ATON safe waste DISINTEGRATION

INNOVATIVE TECHNOLOGY

Dear Partners!

Waste Disposal has a huge impact on the environment and has become, over the years, an issue for our modern society.

It gives us a great pleasure to present a range of technological solutions offered by **ATON-HT S.A.** Our mission is to provide technologically advanced machines and complex solutions within the scope of complicated, dangerous waste neutralization.

The work of our experienced and qualified Research & Development specialists together with skilled Factory Team was the way to implement efficiently advanced pro-ecological programs. We promote modern and innovative solutions for the protection of natural environment.

Our goal is to follow accurately the latest regulations, and even anticipating possible future challenges with regard to materials to be treated, as well as restrictions and limitations on emissions and process control by regulatory bodies.

The ATON machines are extremely versatile and easy to control. The ATON Technological Lines are simple to transport and simple to install. The modular concept is based on the standard intermodal containers. The ATON approach focus on speed and flexibility of implantation, taking advantage of available space and are tailored to the waste that is to be neutralized. Site infrastructure pre-requisites are minimal and would require limited pre-installation work.

Kindest Regards
ATON-HT TEAM

ATON history

ATON-HT S.A. is a Poland-based company, which concentrates its activity on innovative, patented technologies, know-how and machine implementation for waste disintegration and hazardous waste treatment and recovery of valuable materials and energy.

At the time when Poland join European Union, over fifteen years ago, interdisciplinary group of scientists and investors decide to find new solutions to transform the costly way commercial, industrial and medical bi-products are disposed. The goal was new, cheaper, innovative method to neutralize waste by breaking it to simple elements and eventually transforming it into ZERO EMISSION thermal, hydrothermal or electric output.

Initial phase of Research & Development was completed within five years and we manage to gain recognition of Scientific Centers and win Prizes under the EU Waste Framework Directive.

Our patents applications were pending at the same time worldwide - under descriptions: "**MTT**" Microwave Thermal Treatment no. P-337957; "**MOS**" Microwave Oxidation System no. P-384957; **ATONIZATION** under no. P-389497.

The first commercial implementations took place in 2011 and 2012, machines from this period are still used by our esteemed Customers. Work on various scales of Technology Lines and finding algorithms for nearly 150 types of waste were continued. Proof-of Concept ATON Line traveled through several countries including Spain, Baltic area and United States. For UN Climate **COP24** Conference 2018 in Katowice, world presentation of updated ATON HR200 Line was on display and since than this version become flagship of our company.

ATON applied technologies

MTT (Microwave Thermal Treatment)

Innovative and unique method of concentration of the electromagnetic field in the process of thermal treatment of general waste and of hazardous waste. Technology allows a significant reduction of the cost of waste disposal. Thanks to the flexible design of equipment and modern technological solutions, like smooth temperature control and non-pressurized processing ATON "HR" chamber (Heating Reactor) conditions the devices can be used in many diverse areas.

MOS (Microwave Oxidation System)

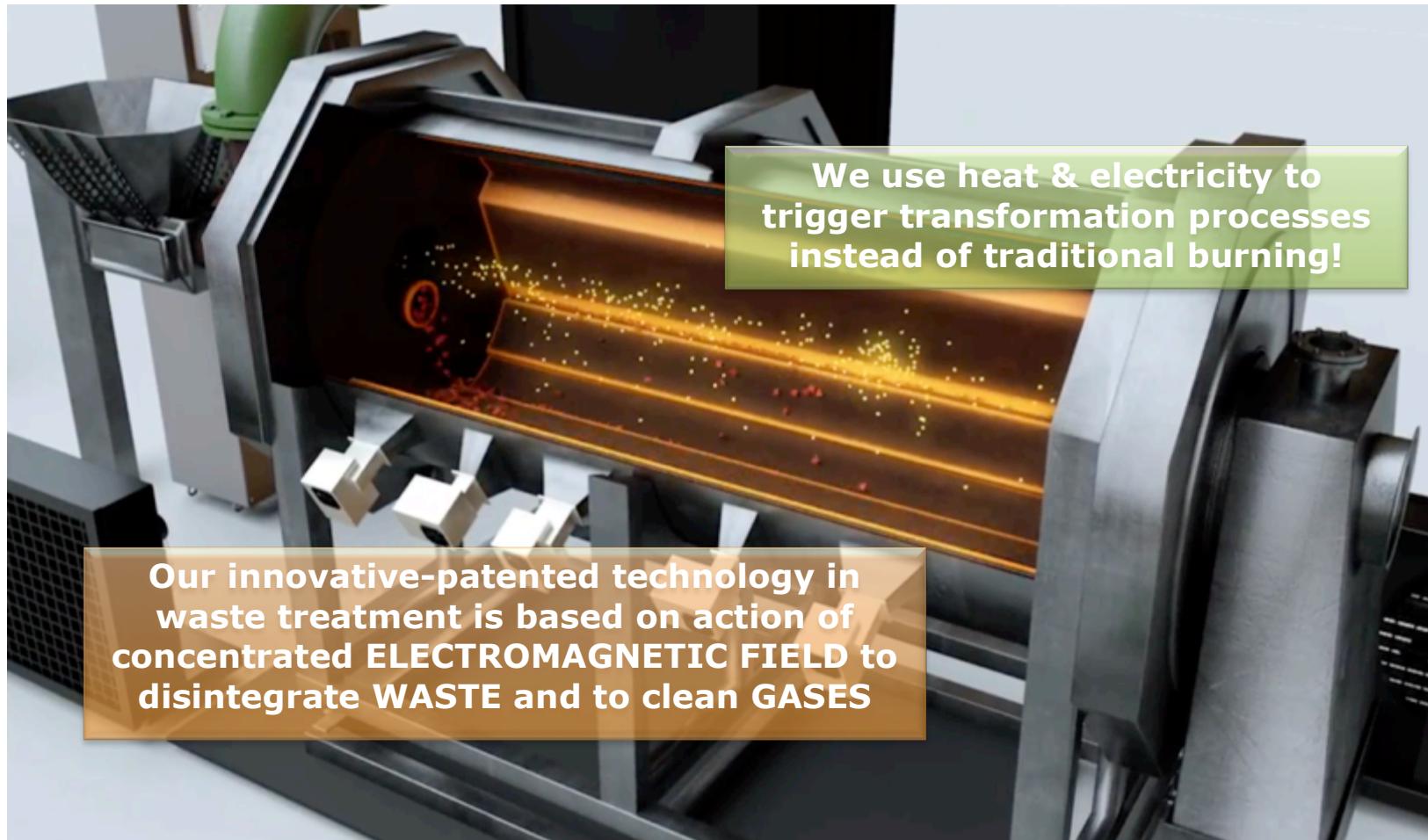
The invention relates to devices for afterburning of pollutants in exhaust gases of own ATON HRs. MOS is also used for afterburning of exhaust gases from given furnaces, incinerators, thermal processing equipment for certain substances, petro-industry, from paint shops, arduous odour-emitting plants and other sources that emit polluted exhaust gases.

ZERO EMISSIONS (when used with renewable sources of energy)

No fossil fuels used, no emission of harmful volatile substances into the atmosphere. For solids treated in ATON processes mass reduction of 90%-98% is achieved. Inert rests in most cases carbonites with C¹² are used as raw material for several applications, valuable compounds, like metals could be retrieved from the rest also. Modular concept makes work and service easy.

ATON technology

The original investors of the technology manage company; engineers by education and profession they are responsible for the established theory and its practical implementation.

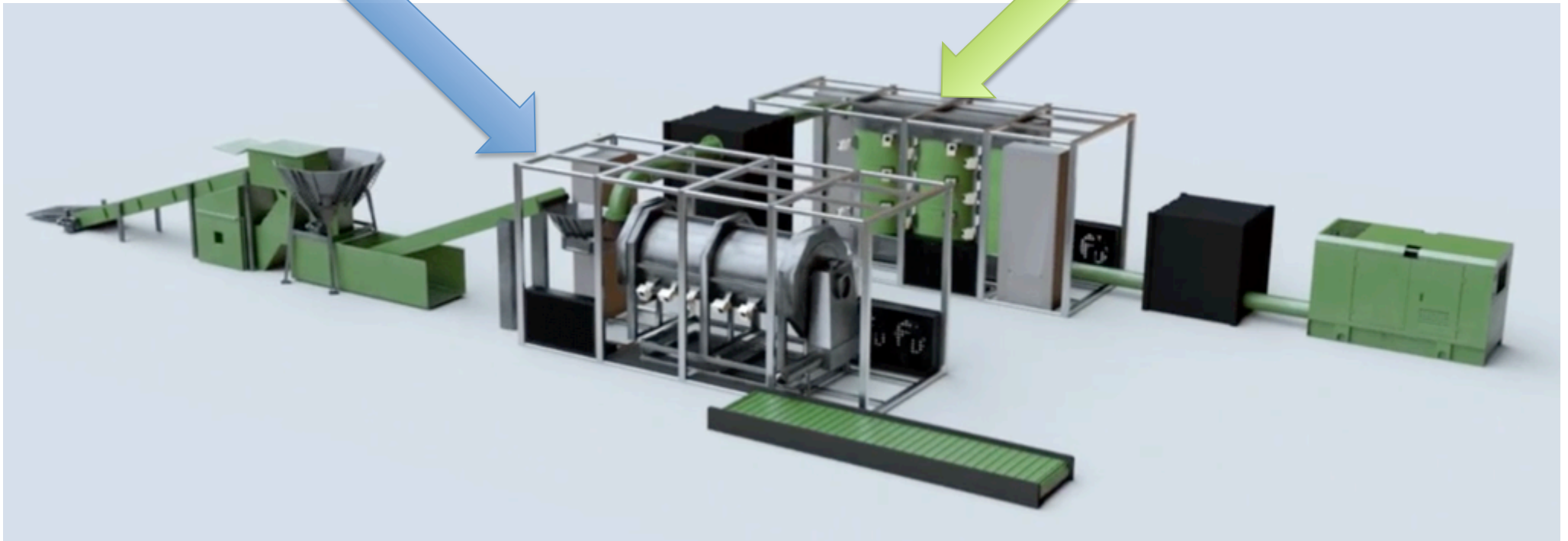


ATON - INNOVATIVE TECHNOLOGY - safe waste DISINTEGRATION

THE ATON PROCESSES ARE DIVIDED IN TWO MAIN PHASES:

SOLID WASTE "DISAPPEARS"
– changed into gases in HR200 unit

**ODORS and NOXIOUS GASES are
CLEANED** – changed into clean,
harmless gases in MOS



(simplified ATON Line, based on units: HR200 and MOS)

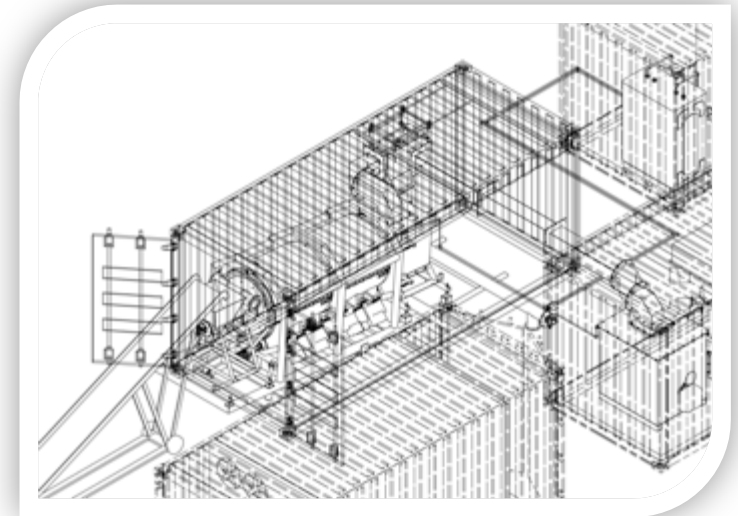
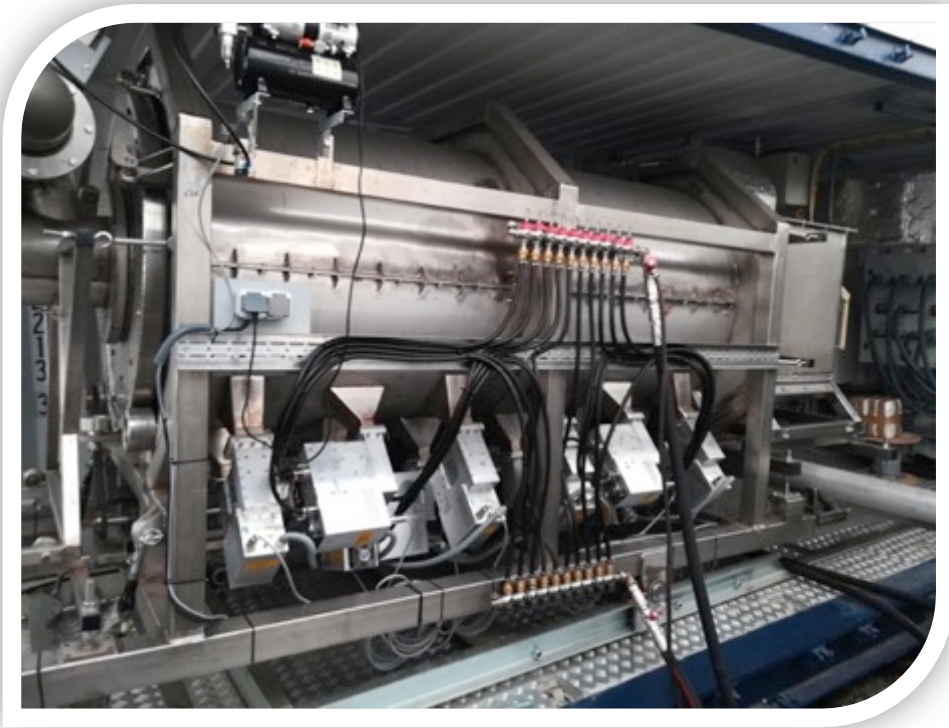
ATON technology

STEP by STEP

- ✓ Accordingly to the type of Waste, processed materials are prepared to feed the ATON System (dry - if needed, shredded, sterilize, pre-heated, e.t.c.);
 - ✓ With use of electric current electro-magnetic waves, from several installed generators/heaters, are created and kept within Processing Chamber;
- ✓ Then the ATON Line reaches its required (pre-determined by waste type) temperature and is ready to trigger waste disintegration in constant flow process;
- ✓ Unique, ceramic revolving chamber in Single HR in First Phase with daily capacity of 3-8 Tons of waste, constantly receives the waste stream. The ATON Line then automatically processes and changes waste into some inert solid, useful materials or dispensable carbonite;
 - ✓ Obtained gases are then cleaned in Second Phase (option of Syn-Gas with high Hydrogen). The Gases turn to be a valuable source of energy, recovered as clean thermal output at the same time when dangerous gases are processed. Most of the processes are auto thermal, therefore minimal added energy or none is required in this phase.
- ✓ The ATON System has an average 70% energetic efficiency of waste stream heating, it can work all year round with only few maintenance days.

ATON technology

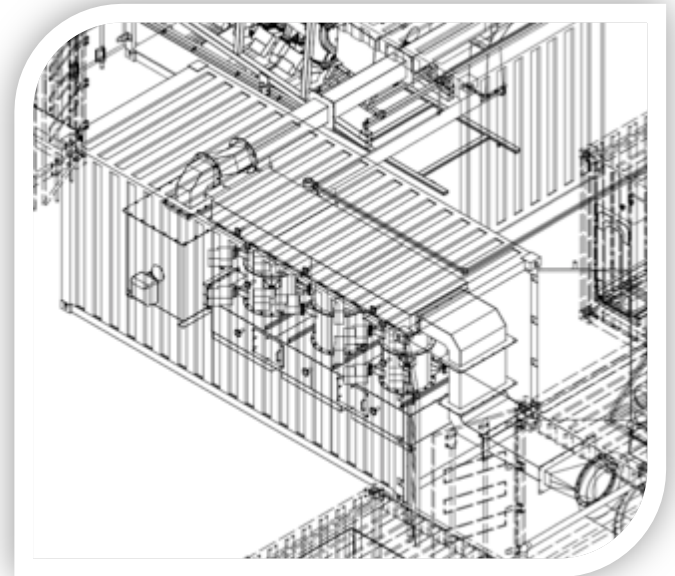
Using an ATON HR-type rotary high efficiency thermal reactor for reducing the majority of materials back to their base, mostly gases and some solids (carbon/metals)



the HR200 Reactor is based on unique and exclusive MTT technology (Microwave Thermal Treatment). Important advantage of the technology is the ability to waste disintegration at the place of occurrence, even those contaminated by toxic substances

ATON technology

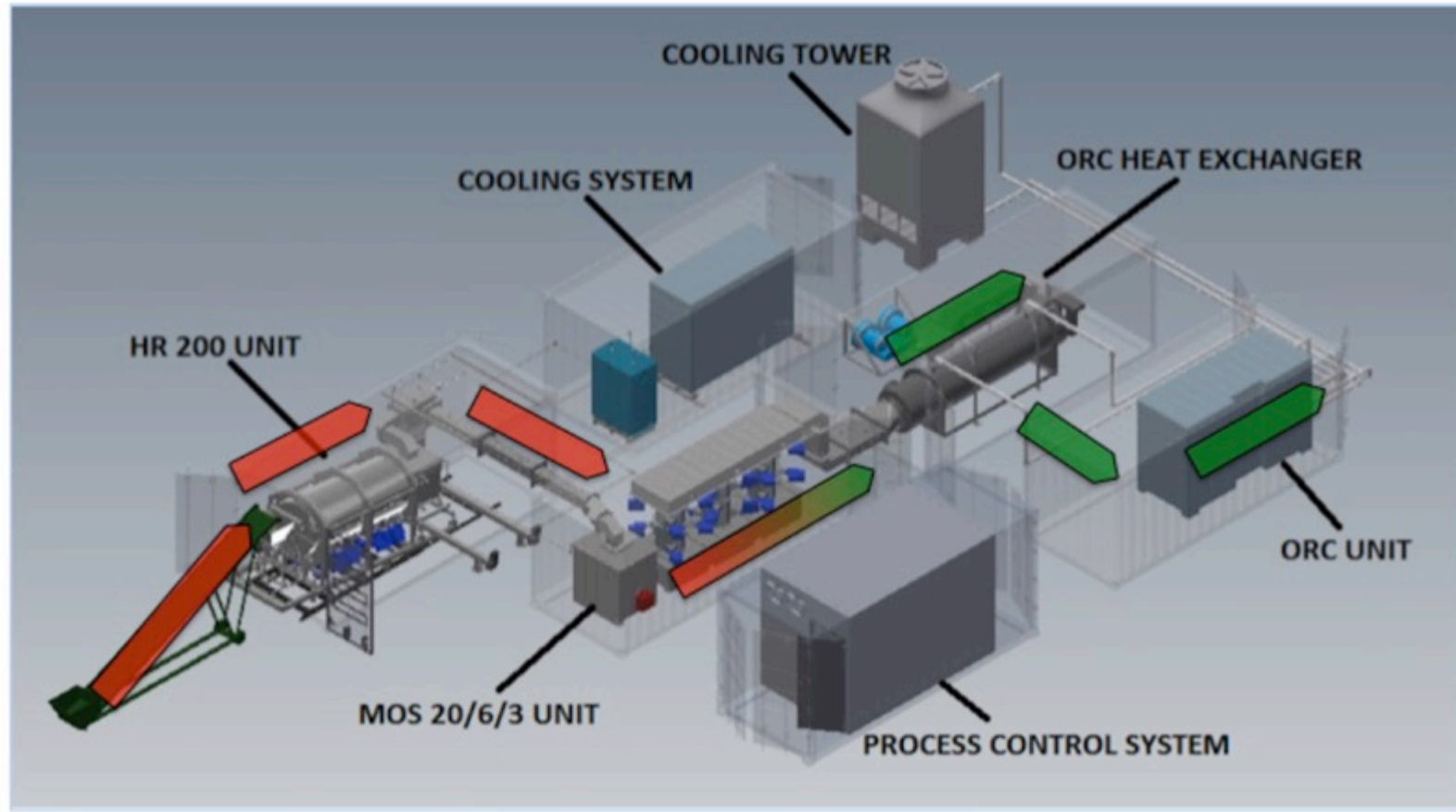
MOS reactors are exclusive patented MTT technology devices for post-disintegration of gases & odours (volatile) pollutants in exhaust gases from ATON HR200 units and any given industrial installations also. The device is filled with bed in the form of hot ceramic profiles, with the temperature of 1000-1500°C.



Post-process gases are purified during the turbulent flow through especially developed ceramic bed. Gases are heated to high temperatures in the oxidizing environment. Strongly heated ceramic is an additional catalyst in the MOS process.



ATON technological Line



Example of FULL ATON LINE (waste flow) with peripheral ORC Unit for clean Electric Energy creation. Specific custom made solutions may apply (i.e. bigger Heat Exchanger, Syn-Gas creation, Hydrogen recuperations, e.t.c.)

ATON applications

ATON technology is flexible and comprehensive. It can change to deal with challenges in the waste disposal processes as they arise.

The ATON Line can treat a broad spectrum of waste. Waste Codes treated includes: municipal, industrial and agricultural waste, hospital & veterinary waste, industrial gases and hazardous materials, contaminated media, ASR, vehicle tires, tetra-packs, cables and electronic waste (optional recovery of rare metals), material or soil pollutants (i.e. bituminous, nitrates, oils).

Types of waste for which ATON-HT SA find technological solutions

No.	Hazardous waste	WASTE EU CODE
1.	Wastes containing asbestos	06 07 01*
2.	Wastes from asbestos processing	06 13 04*
3.	Wastes containing asbestos	10 11 81*
4.	Brake pads containing asbestos	16 01 11*
5.	Insulation materials containing asbestos	17 06 01*
6.	Construction materials containing asbestos	17 06 05*
7.	Asbestos-containing waste from the manufacture of asbestos-cement	10 13 09*
8.	Waste mineral wool and basalt	17 06 03* 17 06 04
9.	Land contaminated with organic compounds of petroleum origin	17 05 03* 17 05 05*
10.	Sand contaminated with used oil motor	17 05 03* 17 05 04*

No.	Hazardous waste	WASTE EU CODE
11.	Recovery of copper and aluminum from waste telecommunication (power cables)	17 04 10* 17 04 11
12.	Blood bags and preservatives used to store	18 01 02*
13.	Other wastes that contain live pathogens or their toxins, and other forms capable of delivering genetic material, which are known or for which there are credible grounds to prosecute that cause disease in humans and animals (eg, infected diapers, sanitary towels, sleepers)	18 01 03*
14.	Chemicals, including chemicals containing dangerous substances	18 01 06*
15.	Cytotoxic and cytostatic medicines - waste pharmacological	18 01 08*
16.	Amalgam waste from dental care	18 01 10*
17.	Spent baths biologically active properties of infectious	18 01 80*
18.	Residues of feeding patients of infectious diseases	18 01 82*
19.	Chemicals, including chemicals containing dangerous substances	18 02 05*
20.	Cytotoxic and cytostatic medicines - waste pharmacological	18 02 07*
21.	Cytotoxic and cytostatic medicines - waste pharmacological	20 01 31*
22.	Tar Refinery	05 01 07*
23.	Oils containing PCBs	13 01 01*
24.	Oils and liquids containing PCBs	13 03 01*
25.	Worn components containing PCBs	16 01 09*
26.	Discarded electrical equipment containing PCBs	16 02 10*
27.	Waste containing PCBs	17 09 02*
28.	Waste containing pesticides	02 01 08*
29.	Inorganic plant protection products	06 13 01*
30.	Overdue pesticides	07 04 80*
31.	Packages containing dangerous substances	15 01 10*
32.	Discarded hazardous components of electrical and electronic equipment	16 02 15*
33.	Wastes from the manufacture of paints and varnishes	08 01 11*
34.		08 01 15*
35.	Wastes from paint or varnish containing organic solvents or other dangerous substances	08 01 17*
36.	Power cables containing oil, coal tar and other dangerous substances	17 04 10*
37.	Other organic solvents, washing liquids and mother liquors	07 01 04*
		07 02 04*
		07 06 04*
38.	Other still bottoms and reaction residues	07 02 08*
39.	Aqueous sludges containing adhesives or sealants containing organic solvents or other dangerous substances	08 04 13*

Types of waste for which ATON-HT SA find technological solutions

No.	Non-Hazardous Waste	WASTE EU CODES
40.	Plastics	07 02 13
41.		15 01 02
42.		17 02 03
43.		16 01 19
44.	Blood, feathers, fur	02 01 02 02 02 02
45.	Dead chickens	02 01 81 02 01 82
46.	Waste of meat and bone	02 02 81
47.	Poultry droppings	02 01 06
48.	and other waste	02 01 99 02 02 99
49.	The fraction of waste to biogas	subgroup 19 06
50.	Primers with growing mushrooms and shunts	02 01 03 02 01 07
51.	Sludge and screenings	19 08 05 19 08 02
52.	Blankets and other waste in the tanning industry	04 01 08
53.	Used tires	16 01 03
54.	Recovery of aluminum from packaging multimaterial	15 01 05
55.	Surgical instruments and surgical and scrap (excluding 18 01 03)	18 01 01
56.	Other waste than those mentioned in 18 01 03	18 01 04
57.	Chemicals, including chemicals, other than those mentioned in 18 01 06	18 01 07
58.	Drugs other than those mentioned in 18 01 08 - wastes pharmacological	18 01 09
59.	Spent baths biologically active other than those mentioned in 18 01 80	18 01 81

Types of waste for which ATON-HT SA find technological solutions

No.	Non-Hazardous Waste	WASTE EU CODES
60.	Surgical instruments and surgical, and their remains (except 18 02 02)	18 02 01
61.	Other wastes that contain live pathogens or their toxins, and other forms capable of delivering genetic material, which are known or for which there are credible grounds to prosecute that cause disease in humans and animals	18 02 02
62.	Other waste than those mentioned in 18 02 02	18 02 03
63.	Chemicals, including chemicals, other than those mentioned in 18 02 05	18 02 06
64.	Drugs other than those mentioned in 18 02 07 - wastes pharmacological	18 02 08
65.	Drugs other than those mentioned in 20 01 31	20 01 32
66.	Biodegradable waste	20 02 01
67.	Plant tissue waste	02 01 03
68.	Wastes from forestry	02 01 07
69.	Waste bark and cork	03 01 01
70.	Waste bark and wood	03 03 01
71.		subgroup 20 01
72.	Municipal Waste	subgroup 20 02
73.		subgroup 20 03
74.	Foundry Sands	
75.		08 01 12
76.	Wastes from the manufacture of paints and varnishes	08 01 14
77.	Animal tissue waste	02 02 02
78.	The sludge from processing plants of animal products	02 02 04
79.	Raw materials and products from processing plants of animal products are not fit for human consumption	02 02 03
80.	Other cables and wires	17 04 11
81.	Waste paint and varnish other than those mentioned in 08 01 11	08 01 12
82.	Waste adhesives and sealants other than those mentioned in 08 04 09	08 04 10

Types of waste for which ATON-HT SA find technological solutions

No.	Additional Waste Types safe Processing	no classified
83.	Thermal regeneration of alumina Al ₂ O ₃	-
84.	Production of active carbon from corn and other materials	-
85.	Slack production of polyolefins	-
86.	Reducing the leaching of harmful substances from phosphogypsum	-
87.	Drying of zinc sulphate	-
88.	Purification of sand from brown coal	-
89.	Purification of zinc oxide	-
90.	Purification of silicon carbide	-
91.	Ceramics alundowa Petroleum contaminated substances	-
92.	Mining slurries	-
93.	Post-process gas treatment	-
94.	Remove odors	-

The range of applications of the technology can be divided into the following groups:

1. Disposal: wastes containing hazardous compounds (resins, PCB example), medical waste (atonization); laboratory waste (pathogens, blood samples, waste from dental surgeries, etc.); biological waste (atonization); municipal waste sewage sludge, etc...

2. Purifying: soil and sand of organic pollutants (post-industrial grounds, petro-industry, military fields, etc.); gases & odors by their burning (oxidation) in auto-catalytic atmosphere.

3. Recycling: valuable components of industrial waste (Zn, Cu, Al, Au); waste telecommunication (power cables); cheap Hydrogen generation form some of waste types.

ATON return of investment

Significant reduced costs of waste disposal

ATON's represents a significant return on investment through reduced waste disposal costs and income from energy production that can be fed back into the system.

The AMC (The ATON MODULAR CONCEPT) machinery has a short construction and implementation cycle, which translates into a limited period of cost without benefit.

The AMC will quickly transform waste, removing the unsightly and often noxious smelling bi-product of manufacturing or other industries, into clean energy and improved process that meet the demands of CSR and can make a contribution to a better Earth to live on.

Exemplified ROI observed for range of waste - depending on commercial waste costs:

Group A.: highly hazardous waste - ROI estimated = **from 1 year to 2 years**

Group B.: complex non-hazardous waste - ROI estimated = **from 2 years to 4 years**

Group C.: gases & odors waste - ROI estimated = **from 1,5 year to 3 years**

ATON ready to go Lines



HR200 device

Unit MOS Grate and Column Afterburner

Heat exchanger

ORC system - generating electricity in a completely emission-free process

All devices installation in a "sea" container 6.1m x 2.4m

ATON technology - requirement specification

Implementation Plot: **flat, rugged or paved industrial terrain with an area between 400m² and 600m² - depending on the type of waste and peripheral devices**

Capacity/Efficiency (for one HR module)	Depending on the type of waste, approx. 200kg/1hour
Size (5 to6 installation in a "sea" 20' container + cooling tower)	6008mm x 2440mm x 2570mm each / av. 600m² plot
Passive weight of the complete ATON HR200 Unit	approx. 32.000kg
One shift staff	2 operators
Power Supply	Three-phase current 400V, 50Hz (safety 2x 400A)
Maximum consumption at start-up	450kW
Consumption during the executions of processes	35kW – 150kW (depending on the type of waste and its real caloric value)
Installed microwave power	132kW (f=2450MHz)
Generators Cooling System	Water (closed system with energy recovery)
Exhaust gas cooling	Water recuperator in an open or closed system with the possibility of energy recovery

ATON pre-assessment list

Before we could be able to give a price we kindly ask you to share more details with us for the purpose of your application:

Here some initial questions:

- General Codes of Waste to be processed;
- Waste material granulometry / medium bulk density / average calorific value;
- Final destination of the Unit;
- Expected initial daily processing capacity in Mg;
- Expected daily optimal processing capacity in Mg;
- Electric Grid capacities in place of installation (start form grid or from generators).

With base on those data we can prepare a draft of Initial Proposal.

ATON Team thank you!

**we are honored to invite
YOU to the New World
without waste problems**

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