Introduction to Greentronics and practical experiences with the pilot plant

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Who we are

📍 Founded in August 2007
📍 We are a Romanian limited company
📍 We are authorised by Romanian Environmental Agency as a waste carrier and WEEE treatment facility
What we do

- Re-use and Refurbishment of ICT products and mobile phones (Asset Management)
- Recovery of components (Component re-use)
- Dismantling / Pre-treatment of WEEE
- Materials Recycling
- Collection Logistics
- Reporting and Statistics

Treated products

- Large household appliances (for CFC containing devices only stage 1)
- Small household appliances
- IT and telecommunications equipment
- Consumer equipment
- Electrical and electronic tools
- Toys, leisure and sports equipment
- Medical devices (for CFC containing devices only stage 1)
- Monitoring and control instruments
- Automatic dispensers (for CFC containing devices only stage 1)
Our values

- High quality and great value
- Teamwork
- Reliable partnership
- Leadership in technology
- Innovation
- Continuous growth
- Efficiency
- Employee appreciation
- Corporate Social Responsibility

Greentronics encourage their customer to donate electrical and electronic equipment that is no longer in use, on behalf of below NGOs thus helping some disadvantaged social categories:

**SOS Children’s Villages** in Romania, the project Early Green, take action to educate children and young people in the spirit of protecting the environment.

**Romanian Association of Physically Disabled Children** in Romania, to support finance of the “repair shop equipment and devices and adaptations for people with physical disabilities”.

**HOSPICE Casa Sperantei** was the first medical foundation in the country to specialise in caring for terminally ill patients and their families

The benefits of this activity are transferred by Greentronics to the associations for their social projects.
**European funded projects**

**Modernization and diversification of WEEE recycling production process**

Greentronics was involved in a project funded by EU, through the Regional Development Agency South-Muntenia.

- The project was conceived in order to enhance the capacity of WEEE treatment, taking into consideration that no similar company was present in the area.
- Equipment and facilities acquired:
  - Line dismantling cathode ray tubes (CRT) glass and remediation results
  - Shredder with separate metal fractions
  - Forklift, Tools and Pneumatic devices
  - Extension Warehouse for WEEE

- Status: completed

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**Research projects financed from European funds**

ZeroWIN (Towards Zero Waste in Industrial Networks) - [http://www.zerowin.eu/](http://www.zerowin.eu/)

Objective: based on industrial symbiosis project examines and develops new approaches, innovative and follows the development of effective strategies for preventing and limiting waste generated by various industries; Industrial symbiosis refers to regional collaboration of companies from different traditional sectors, which change the way products, energy, water and materials and the waste of one industry become raw materials for another.

Consortium consists of 30 partners from 11 countries

Our role: Partner

Project Status: Completed

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Greentronics
Research projects financed from European funds

HydroWEEE - http://www.sat-research.at/hydroWEEE/
Objective: To develop a mobile pilot plant for extraction of WEEE through hydrometallurgical processes, precious and rare metals, such as copper (Cu), manganese (Mn), zinc (Zn), Yttrium (Y), Indium (In), etc., at a very high purity (over 95%).

Consortium consists of 9 partners from 4

Our role: Partner

Project Status: Completed

HydroWEEE Project

Role within the project

- Transfer specific know-how to the RTD performers regarding WEEE dismantling
- Mechanical pre-treatment of WEEE samples
- Operating the mobile plant in Romania for optimizations and demonstration
HydroWEEE Project

Expectations from the project

- To make the developed processes applicable for SMEs
- Extraction of rare metals in high purity (95%) so that SMEs can provide directly to end users for electroplating
- To follow a “zero-waste” approach
- To obtain an economical benefit from the results obtained

Research projects financed from European funds

- Demo HydroWEEE http://www.sat-research.at/hydroWEEE/
  Objective: The aim was to build two demonstration plants, industrial (one stationary and one mobile) in order to test the performance and demonstrate the viability of legally integrated processes (technical, economic, operational, social) including the assessment of risks and benefits to society and the environment.
- Greentronics role: Partner
  Project Status: In progress

The Hydrowee Demo project was financed by Greentronics and partners in the consortium, building a mobile systems consisting of two containers.
Description of the mobile plant

Mobile plant has been designed and constructed with the objective to carry on hydrometallurgical processes for the recovery of metals and high value elements from powder of electric and electronic wastes (WEEE).

All the units mentioned later are placed, along with the connecting elements and any additional actuator and measurement device, inside two containers. Containers have been realized to safely host plant equipment. Supporting structures (pillars, beams, and plates) have been in particular designed and constructed to ensure structural stability of the container both when it is placed on the ground and when it is lifted by crane. This allows for the transport of the plant to any location where hydrometallurgical recovery of high value elements from powder should be performed. The containers are thermally insulated by means of panels covering the internal walls.

The plant is composed of following main units:

- N.4 agitated chemical reactors
- N.2 filter presses
- N.1 scrubber.
- N.1 Boiler for the generation of hot water.
- N.1 Rotary screw compressor.
- N.1 Centrifugal pump for concentrated sulphuric acid
- N.1 Centrifugal pump for sodium hydroxide
- N.1 Centrifugal pump for hydrogen peroxide
- N.1 Centrifugal pump for sodium sulphide
- N.1 Centrifugal pump for acid liquid solid suspension
Description of the mobile plant

- **Four Chemical reactors** employed to carry on extraction of high value elements from powder, selective precipitation reactions and treatment of wastewaters: \( R1 \) for leaching and \( R2 \) for precipitation; \( R3-1 \) and \( R3-2 \) are used to wastewater treatment.

- **Two Filter presses** allow for the separation of solid from solid-liquid suspensions.

- **Boiler** generates hot water employed for temperature control of jacketed reactors.

- **Rotary screw compressor** supplies the compressed air needed for operation of pneumatic devices (valves, pneumatic pumps) and dewatering of cakes formed by filtration of solid liquid suspensions. **Centrifugal pumps** are employed to drive the circulation of reactants, liquid and solid-liquid suspensions within the plant.

Description of the mobile plant - figure 1

- Lateral (on the top) and top view (bottom) of container 1.

- **Reactor R1**, tank **T1**, boiler, compressor and filter press **FP1** are placed in container-1.
Description of the mobile plant - Figure 2

Lateral (on the top) and top view (bottom) of container 2

- Reactors R2, R3-1, R3-2, scrubber and filter press FP2 are placed in container-2

How it works:

- The plant extracts real precious rare earth from different types of waste: batteries, LCDs, PCBs, fluorescent powder lamps and powder from cathode ray tube.
- Lamps are shred mechanically and the resulting fraction separated. All process is equipped with an aspiration system and different types of filters who allows the fluorescent powder capture.
- TV and monitors are first manually dismantle, then the tube is cut by a dedicated machine and then dust from the front panel is removed from the glass by an aspirator.
- For PCBs, after manual depollution (e.g. capacitors removal), the boards are shred at the required size for hydrometallurgical processes
- Both CRT and lamp powder, are reach in rare earth oxides and are treat with the same process. PCBs shredded particles are rich in precious metals.
**How it works:**

- HydroWee mobile plant works in batches of 420 kg of powder.
- The powder is directed to the reactor R1 where is mixed with the first reagent and water to take the rare earth, metal and solution.

- After the leaching time the solution is lead to a filter press FP1 where the first filtration take place. Solid filter cake take disposal while the leaching liquor is send to the second reactor R2 for precipitation with the second reagent.

- The solid produced by the second filter is our product, a mix of rare earth oxalate with high concentration. We obtain about 200 kg of oxalate per 420Kg batch, per day

- Waste water is send to the third reactor R3-1 and R3-2 for purification with lime, such as clear water will be reused in the next process.

- With the exception of the loading of solids to reactors and the removal of cakes formed during filtration of solid-liquid suspensions, the entire hydrometallurgical process is automatic, controlled by PLC.
HydroWEEE Project

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Work experience:
20 years of experience in IT & Office Automation industry

Thank you for your attention!

www.greentronics.ro