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Σύστημα Αποκονίωσης και Βιοφίλτρο Απόσμησης αερίων Μηχανικής Διαλογής
Δεξαμενή Συγκέντρωσης Στραγγισμάτων Χ.Υ.Τ.Υ.
Μονάδα Μηχανικής Διαλογής και Ανάκτησης Υλικών
Μονάδα Τεμαχισμού Ελαστικών και Ευμεγεθών Αντικειμένων
Μονάδα Υποδοχής Δημοτικών Στερεών Αποβλήτων
Υποσταθμός Συλλογής Βιοαερίου Χ.Υ.Τ.Υ No. 1
Υποσταθμός Συλλογής Βιοαερίου Χ.Υ.Τ.Υ No. 2
Χώρος Υγειονομικής Ταφής Υπολειμμάτων (Χ.Υ.Τ.Υ)
Υποσταθμός Συλλογής Βιοαερίου Χ.Υ.Τ.Υ No. 3
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Πυρσός Καύσης Βιοαερίου
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INTERGRATED INSTALLATION FOR THE MANAGEMENT OF SOLID DOMESTIC WASTE REGIONS OF LARNACA-FAMAGUSTA

Brief Description of Project

HELECTOR SA, a member of ELLAKTOR SA, is a producer of electricity from renewable sources and a company that designs, builds and operates projects for environmental protection.
In Larnaca, Cyprus operates from April 2010 one of the most important technological projects in Europe in the field of Waste Management.

Positive environmental impact

1. Almost 50% of the input domestic mixed waste is diverted from landfilling (landfill space saving and significant reduction of CH_4 emissions)
2. Approximately 15% of recyclables is recovered that would otherwise be dumped in the landfill
3. The CH4 emissions of the final residue are significantly lower
4. The organic fraction of the waste (appr.45% of the input) is stabilized through the aerobic composting process
5. The Plant's operation contributes significantly to the country's fullfilment of the relevant EU legislations

The Integrated Installations of Larnaca - Famagusta has an annually average management capacity of 160.000 tons of Municipal Solid Waste, 20.000 tons of pre-sorted waste (from collection programs at the source), 16.000 tons of green waste and 8.000 tons of bulky waste.

From 160.000 tons of mixed waste annually, the following quantities of materials and products are produced :

- 21.300 to 25.200 Tons of Recyclable Materials which are:

- 4.800 – 5.200 tn plastic bags (films)

- 2.000 tn
  PET packages

- 1.600 tn
  PE/PP packages

- 8.500 – 12.000 tn mixed paper-cardboard

- 2.600 tn ferrous metals

- 800 tn
  Non ferrous metals

- 1.000 tn glass

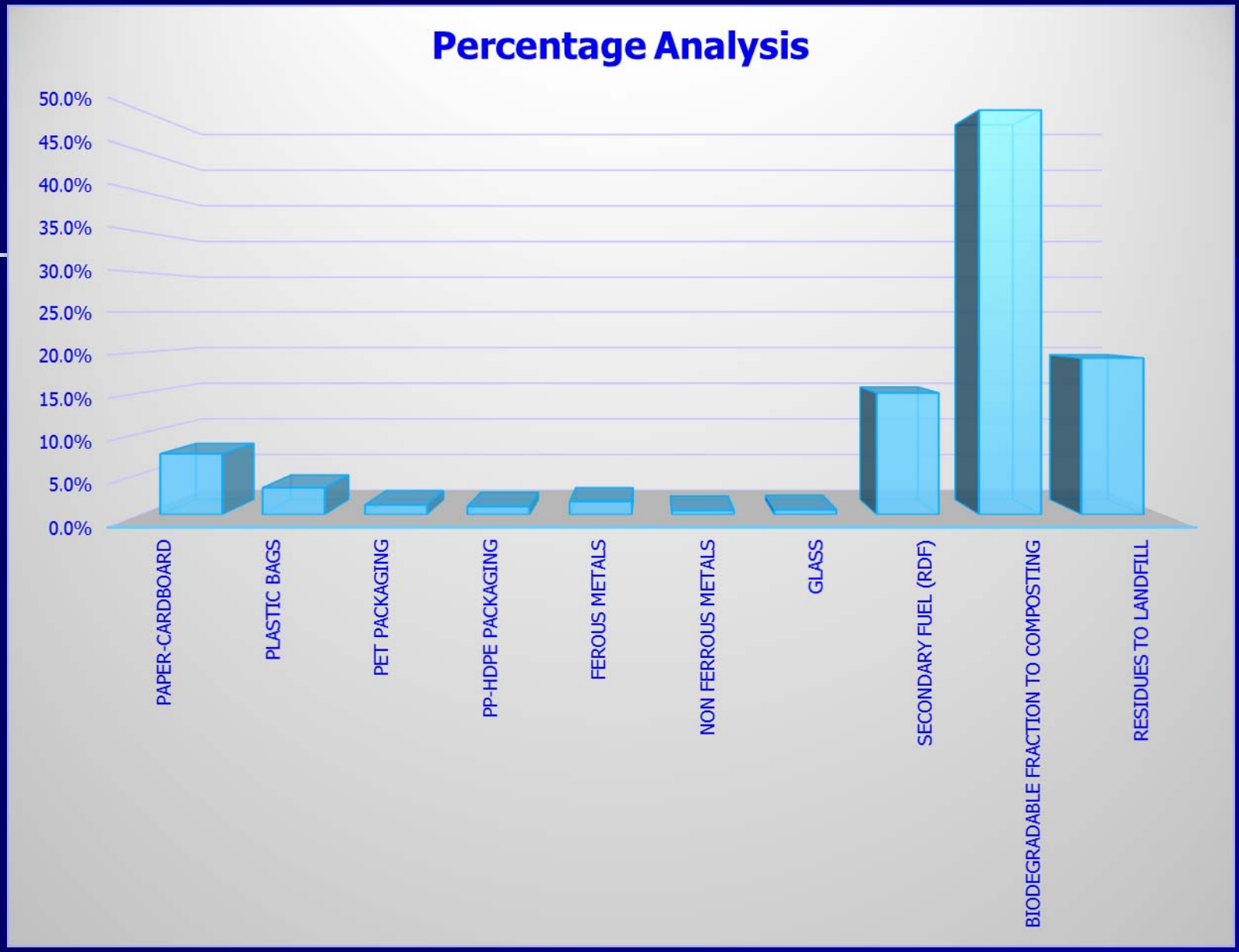
- 24.000 tn Secondary Fuel
  (RDF – Refuse Derived Fuel)

- 80.000 tn Biodegradable Fraction (<70mm) for Composting

- and finally, 30.900 – 34.900 tn residual waste to landfill.

- In a percentage breakdown:

1. 13.2 - 15.7% Recyclable Materials
    a) 3-3.3% Plastic bags (films)
    b) 1.2% PET Packages
    c) 1% PE / PP Packages
    d) 5.3-7.5% Paper / Cardboard
    e) 1.6% Ferrous metals
    f) 0.5% Non ferrous metals
    g) 0.6% Glass
2. 15% secondary fuel (RDF)
3. 50% Biodegradable fraction <70mm to Composting
4. 19.3-21.8% Residues to landfill


Percentage Analysis
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
PAPER-CARDBOARD
PLASTIC BAGS
PET PACKAGING
PP-HDPE PACKAGING
FEROUS METALS
NON FERROUS METALS
GLASS
SECONDARY FUEL (RDF)
BIODEGRADABLE FRACTION TO COMPOSTING
RESIDUES TO LANDFILL

- Reception Hall of mixed household waste.

- All garbage trucks are directed to the weighing station, where they are automatically recorded, weighed and subsequently directed to the Reception Hall. The Reception facility is capable of accomodating the simultaneous unloading of 8 trucks. All 8 unloading positions (doors) are equipped with a automatization which supports the complete unloading process (truck approaching, unloading and departure).
- The recording of the data concerning the input waste (type, amount, origin, date and time of entrance, truck's number, transporter's data etc.) is fully automated and all data is stored in a local database.
- The complete enclosed area of the Reception Hall is constantly kept in under pressure (through dedusting filters) so that no odours are emitted during the unloading process.
- Subsequently, the waste is fed, by means of manually operated crane, to dosing systems-moving floors. The complete process is developed in two parallel lines, each line with a nominal throughput capacity of 20 tons/hour.
- Next to the feeding-dosing process is the bag opening procedure which is acchieved by specific devices (Bag Openers).

- Feeding of dosing system-moving floor by a crane-grab system

- The Bag Openers are devices especially designed to open plastic garbage bags so that waste is spread on the downstream conveyor belts and process line throughput is smoothed.

- Mechanical Separation Facility.

- After bag openers the waste stream is transported through conveyor belts inside the Mechanical Separation Hall where all sorting-recovering processes take place.

- The Mechanical Separation Facility can treat either mixed household waste or pre-sorted waste from collection programs to the source.

- The different waste streams after the separation processes and the mechanical treatment of the input waste are:

  A) The fines stream, which occurs after secondary screening, then driven to intensive composting.

B) The stream of the light fraction (2D fraction) which is produced after screening and ballistic separation of the waste and mainly consists of paper, cardboard, textiles, plastic film (plastic bags). This stream goes through a cascade of optical classifiers for the recovery of paper, cardboard and plastic film. The non recovered residues of this stream are the raw materials for the produced RDF.

C) The stream of the heavy and rolling fraction (3D fraction) which is produced after screening and ballistic separation of the waste and includes all the PET, HDPE and PP packages to be recovered by means of optical classifiers.

D) The stream of ferrous metals collected by magnetization.

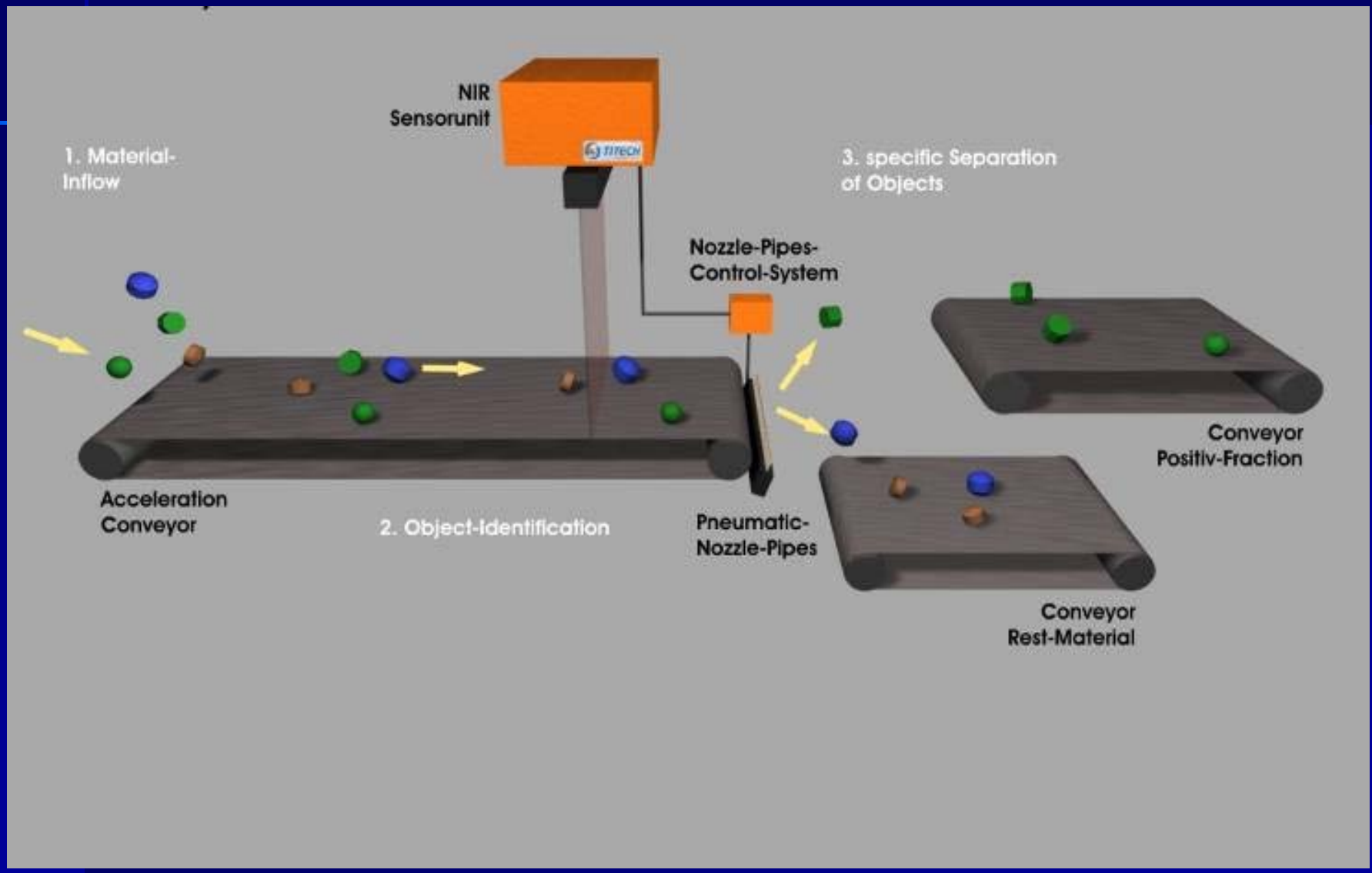
E) The stream of non ferrous metals separated by eddy current separators.

- Primary and Secondary rotating drum screens.

- Optical Classifiers

Characteristics of optical classification technology

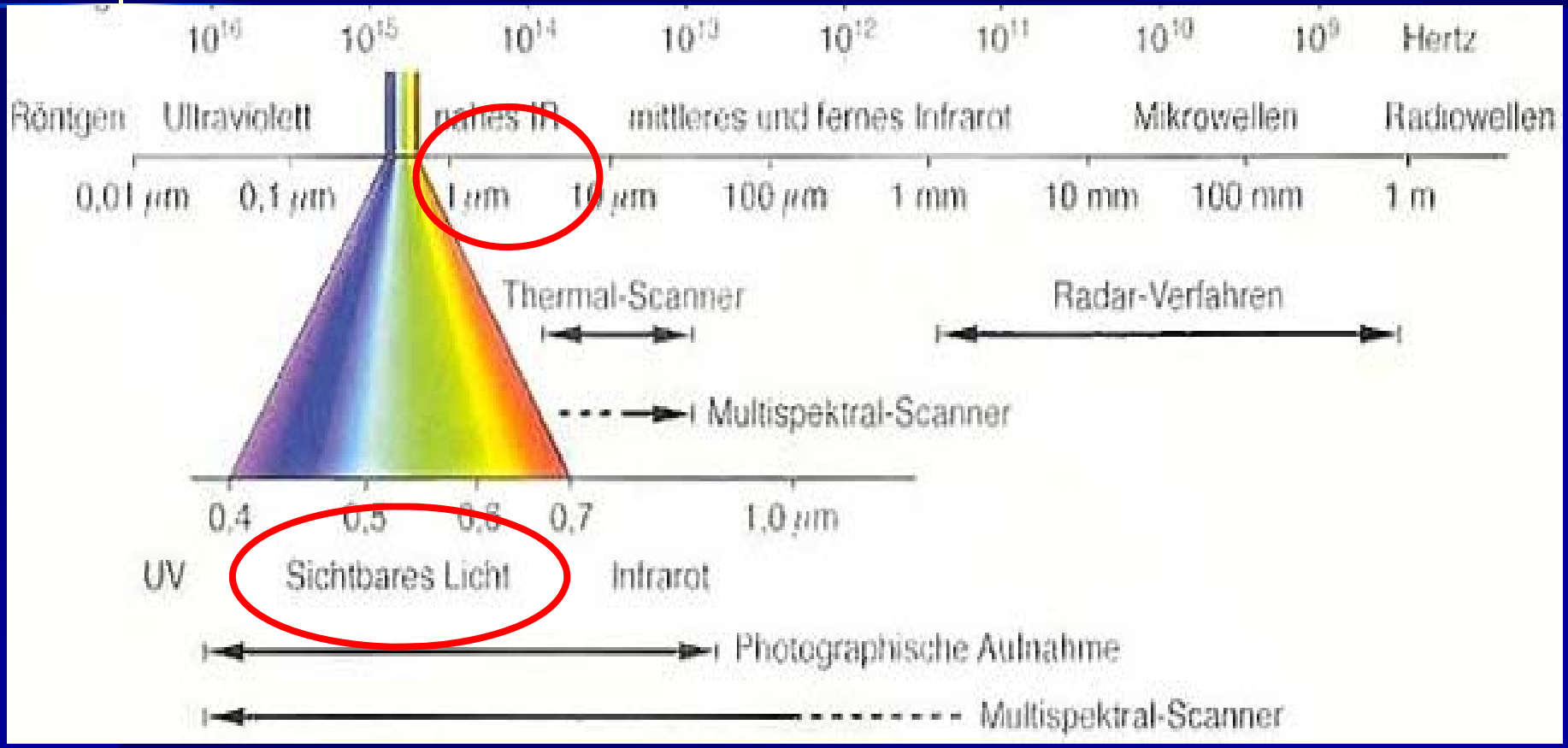
Main elements of the classification unit



Material identification through NIR (Near InfraRed)

Wavelength spectrum of NIR

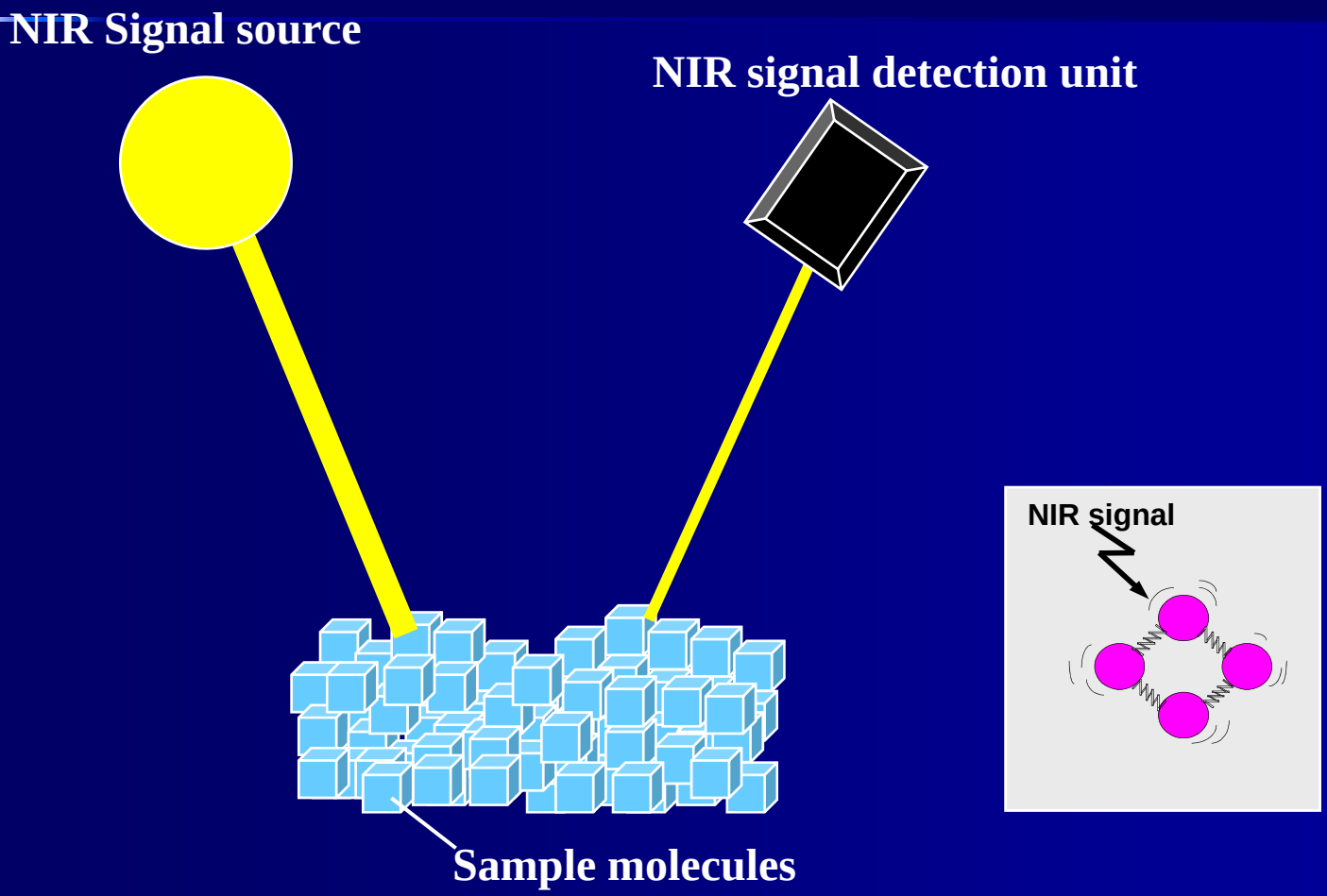
Near Infrared wavelengths: 800 - 2.500 nm



Visible wavelengths: 400 - 700 nm

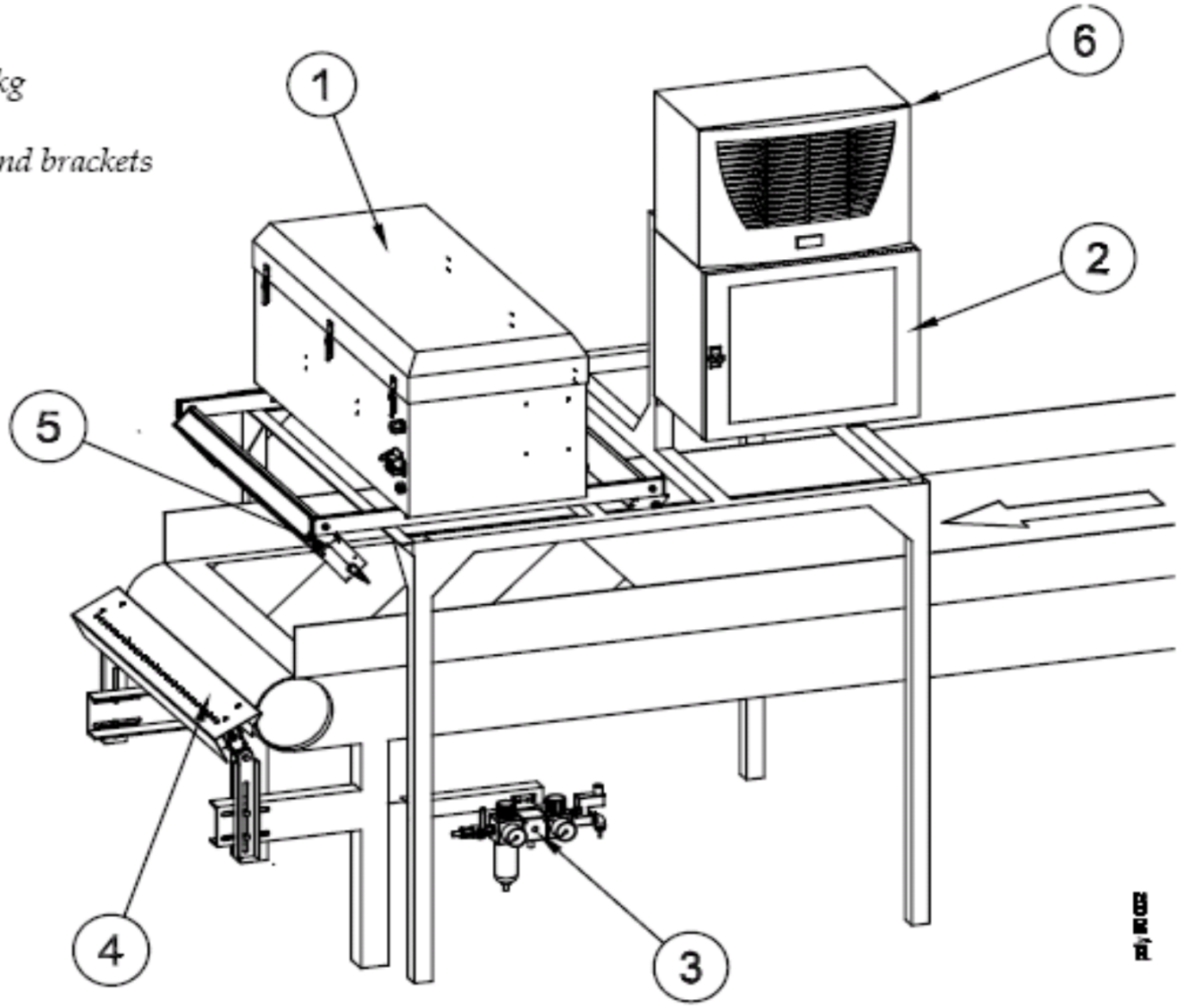
Material identification through NIR (Near InfraRed)

When NIR signal is emitted towards a sample, the sample completely absorbs specific frequencies and merely absorbs other frequencies.



Overall system configuration

1. *Scanner Unit, 40 kg*
2. *Control Unit, 45 kg*
3. *Pressure Regulator, 2 kg*
4. *Valve Block, 15 kg*
5. *Light barrier w/cable and brackets*
6. *Cooler 30 kg*



After the completion of all separation, classification and recovery processes, all recovered materials streams are transported to the quality control station (negative handpicking station). Each specific stream is further manually cleaned and controlled.

Each specific recovered material is intermidiately stored prior being baled, weighed and loaded for transportation.

Baling of recycables

Storage area.

Landfill

- Both reception and mechanical facilities are equipped with dedusting and deodorization (biofilters) systems.

  The excessive process air of the composting unit is treated to a recuperative thermal oxidation (RTO) system prior being delivered to the atmosphere. The quality of the RTO emmisions is constantly recorded.

- The Installation is also equipped with a two-step wastewater – leachate treatment facility (Aerobic stabilisation and Reverse Osmosis) capable of processing 200 m3/day. The produced permeate is used as cooling media of the heat exchangers used in the composting process and for irrigation purposes. The quality of the produced permeate is regularly monitored and fulfills the EC legislation.

- The landfill area for the residues of the mechanocal treatment is isolated and equipped with leachate collection pipe network. Additionally, the effective landfill volume is covered by a biogas collection system (horizontal and vertical). The system is attached to a flare unit for the combustion of the produced biogas.

Deodorization-dedusting systems

Wastewater Treatment Station.

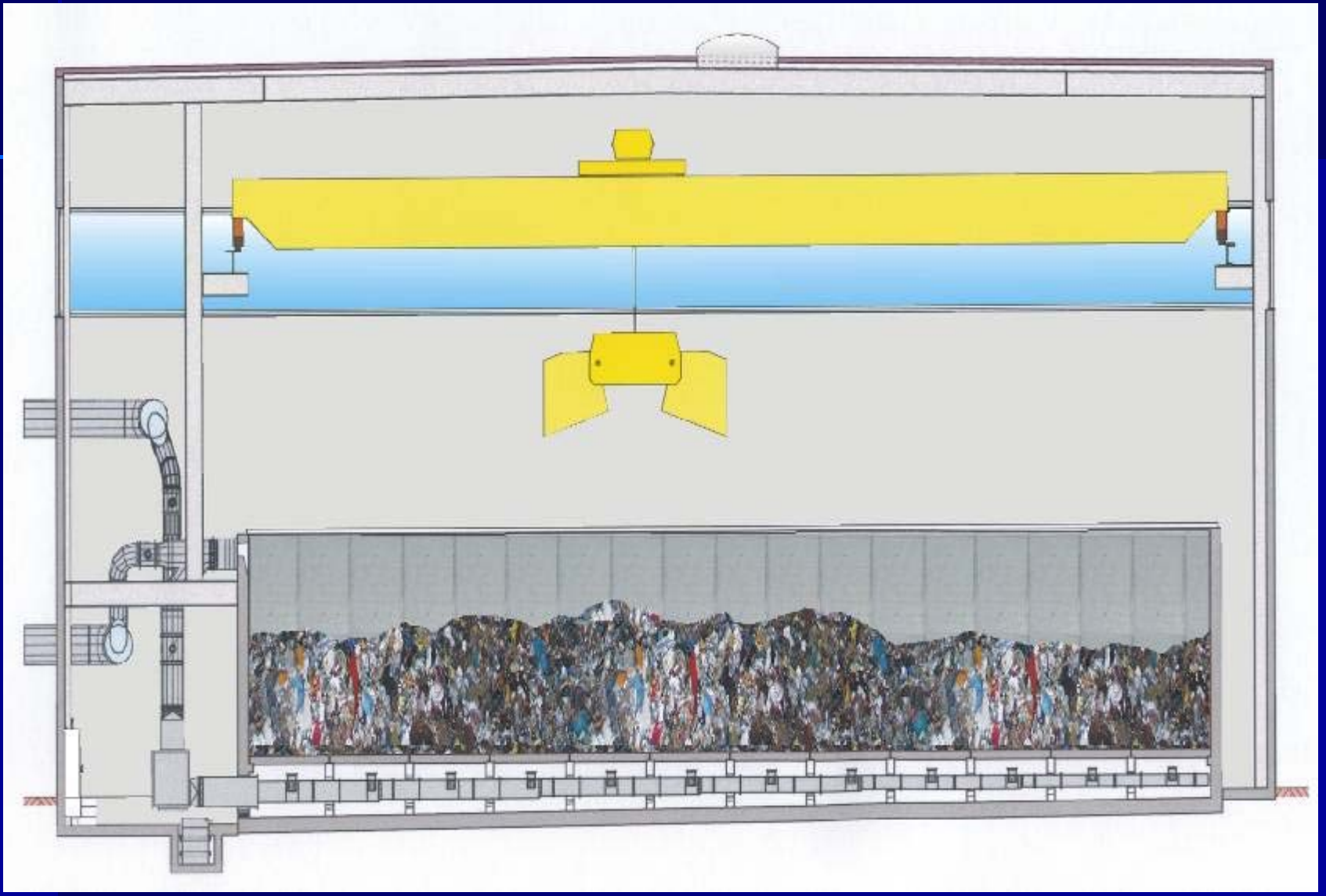
- Intensive Composting Unit

- The separated fine fraction of the waste, very rich in organic matter, is collected and submitted to intensive aerobic composting process in order to be stabilized. After the completion of this process the stabilized fraction is stored in piles and is mechanically aerated (by means of a compost turner) until its maturation.
- The ultimate stage of the organic fraction's treatment includes screening and air separation.
- The final product can be used either as covering material (in mixture with soil) for the residual waste in the landfill or as a soil amendment during restoration of old landfills.
- Pre-sorted and separately collected bio-waste can be independently treated in the intensive composting unit.

For the intensive composting of the organic fraction of the waste a closed – vessel (Bioreactor) batch system is used.

Bioreactors are special constructions equipped with perforated concrete plates. Through those plates a controlled air stream is guided to the waste matrix so that the material is evenly aerated. All critical parameters of the process are constantly monitored and recorded. By this way the operator can adjust all crucial parameters (matrix temperature, matrix moisture, oxygene concentration) and ensure the succesfull and on-time completion of the process.

- Schematic layout of Bioreactor



- Compost piles

- After completion of the intensive composting, the fine fraction of the waste is put in piles in a dedicated covered area. The material stays for a period of five to six weeks, periodically mechanically mixed, until its maturation is completed. For the mixing of the piles a special vehicle (compost turner) is used.

- During maturation the temperature and the moisture levels of each pile are recorded so that the mixing intervals can be adjusted.

- Compost turner-pile mixing

- Mature compost