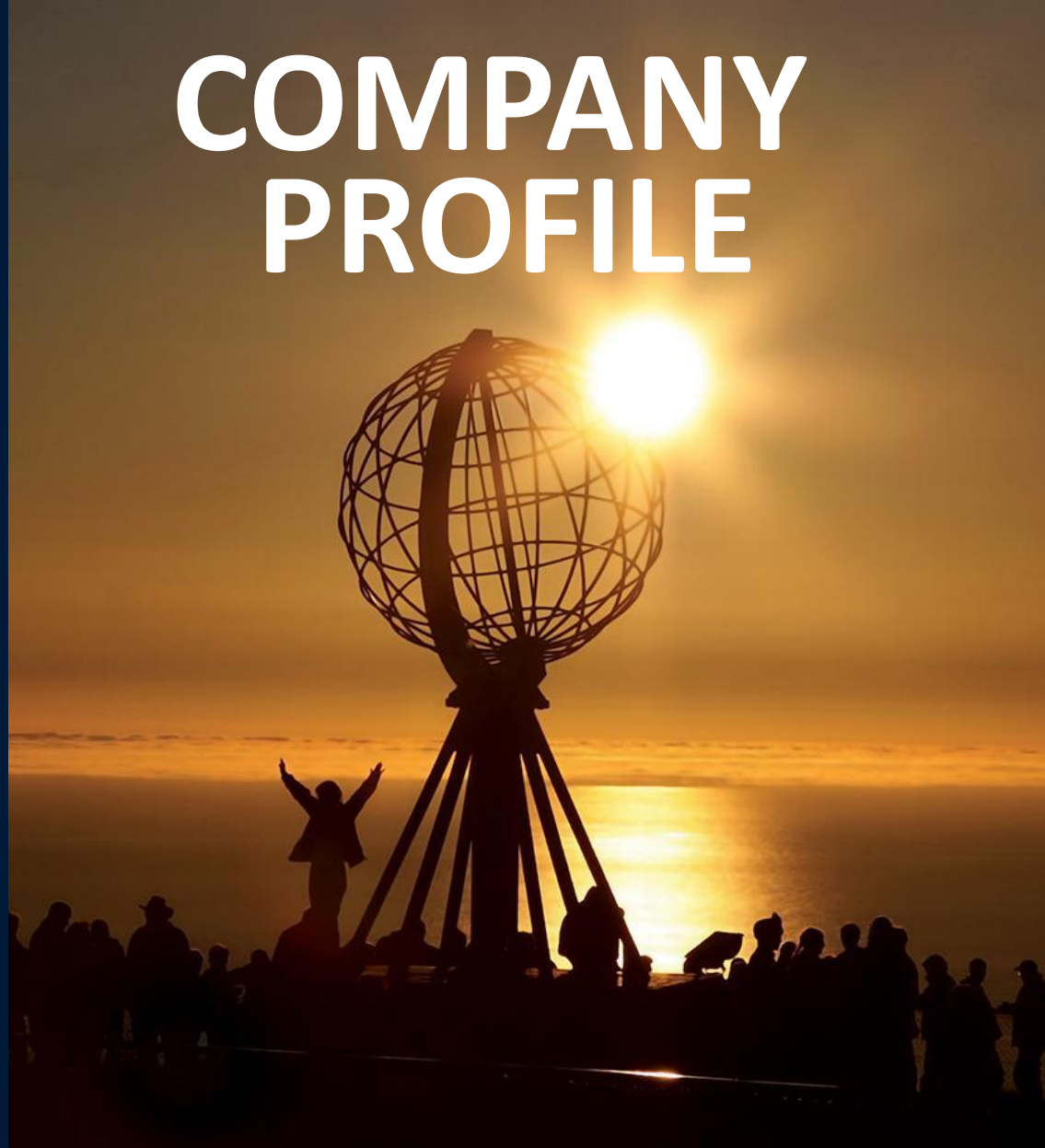
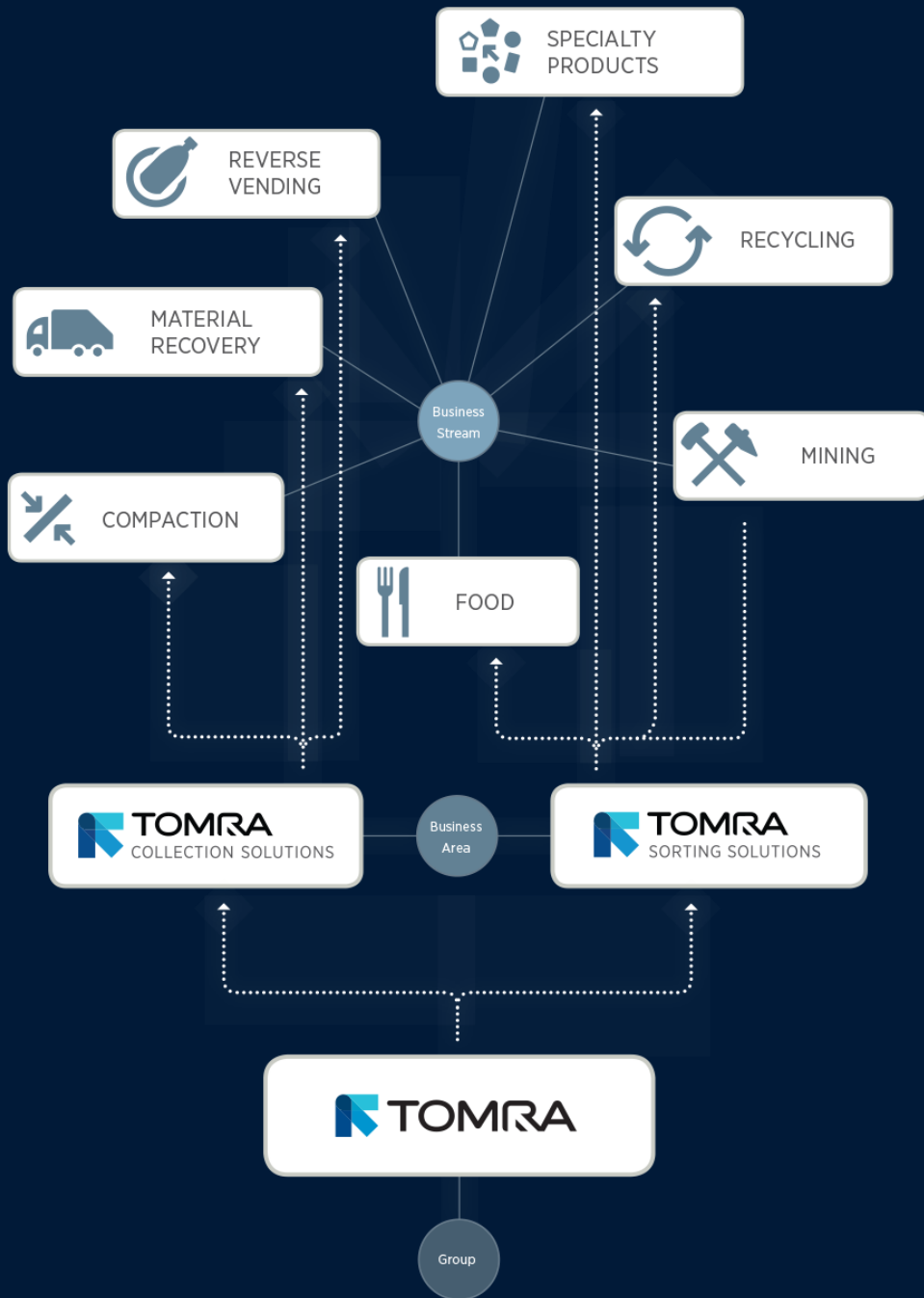


# COMPANY PROFILE

**KNOWLEDGE  
INTO   
RESOURCES**



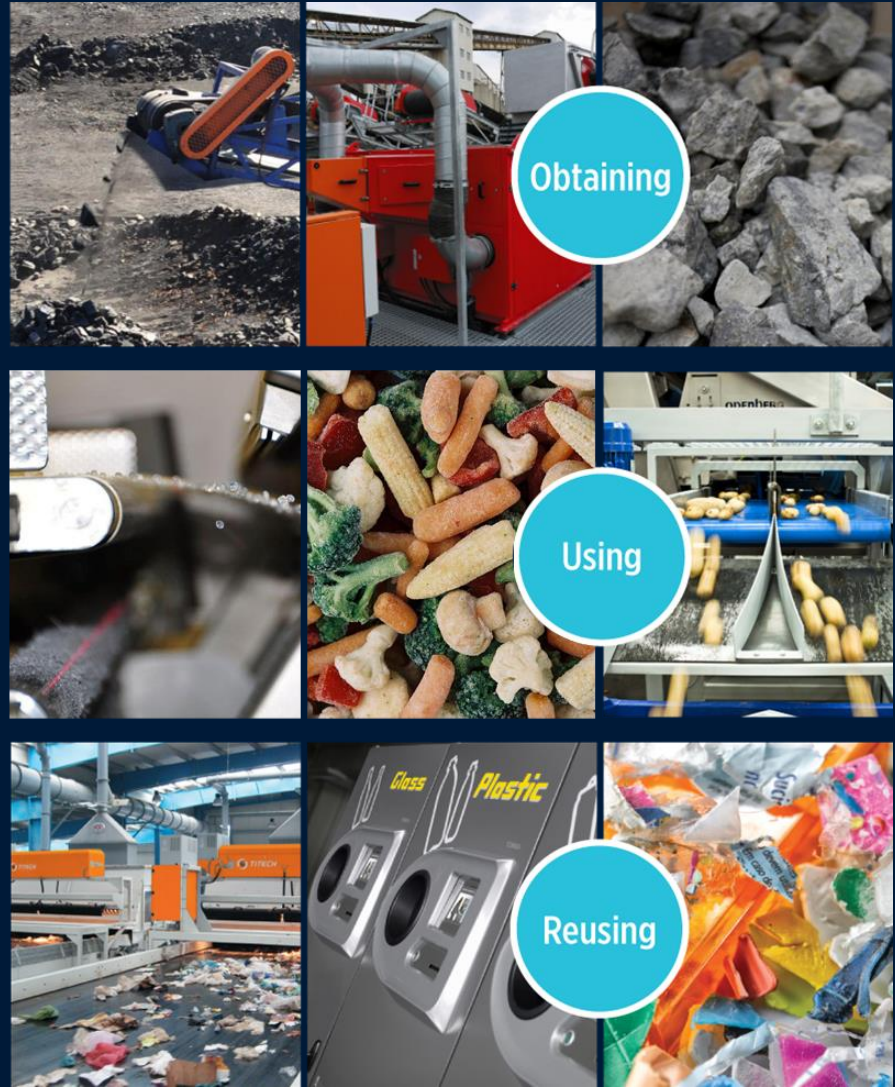


# THE TOMRA GROUP

- Publicly listed on Oslo Stock Exchange (OSEBX:TOM)
- 2 200 employees globally
- Revenues of 565 million EUR (2013)

MISSION:

**TOMRA creates  
sensor-based  
solutions for  
optimal resource  
productivity**





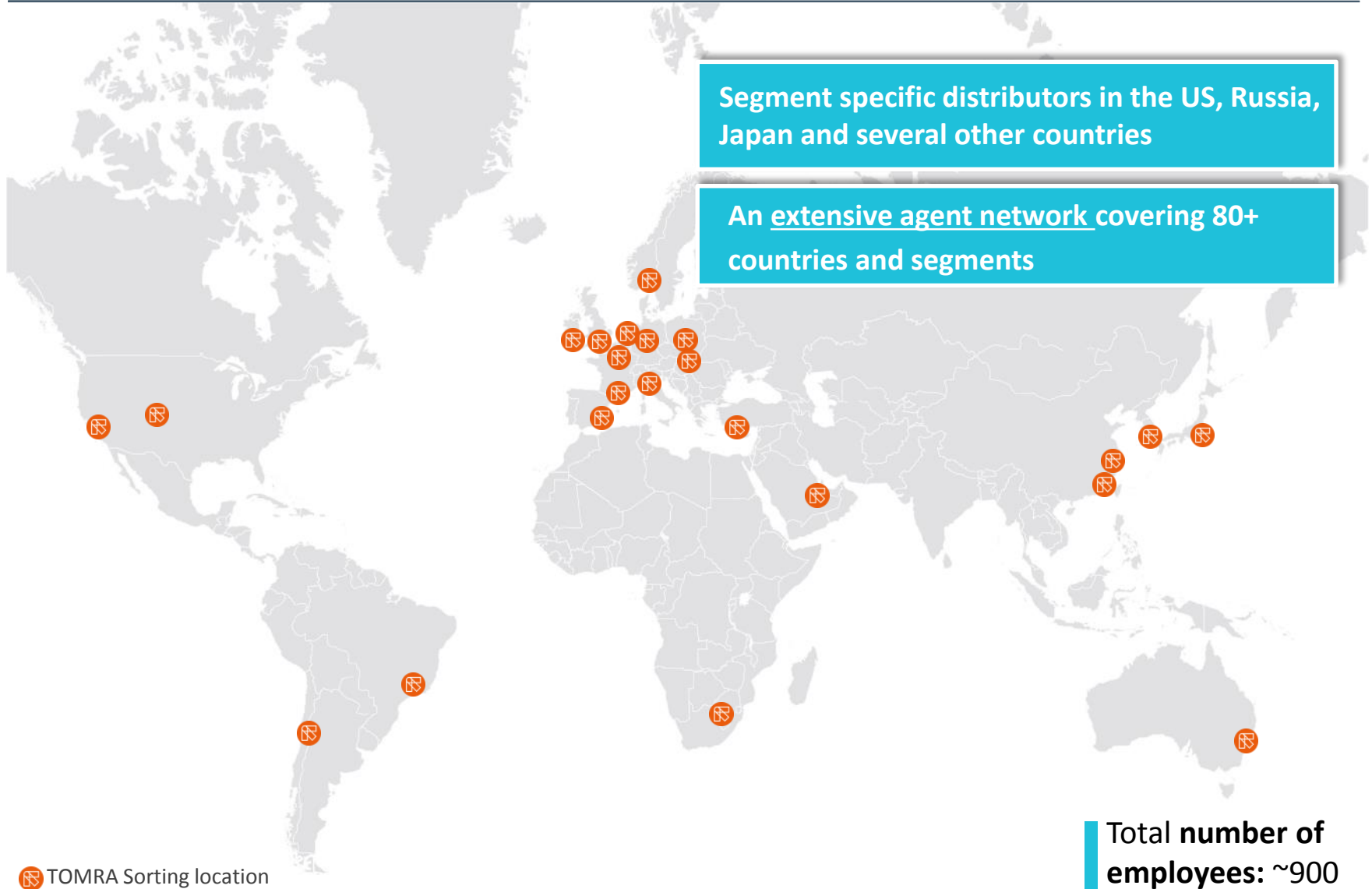
VISION:

# LEADING THE RESOURCE REVOLUTION



For more information, please visit: [www.tomra.com](http://www.tomra.com)

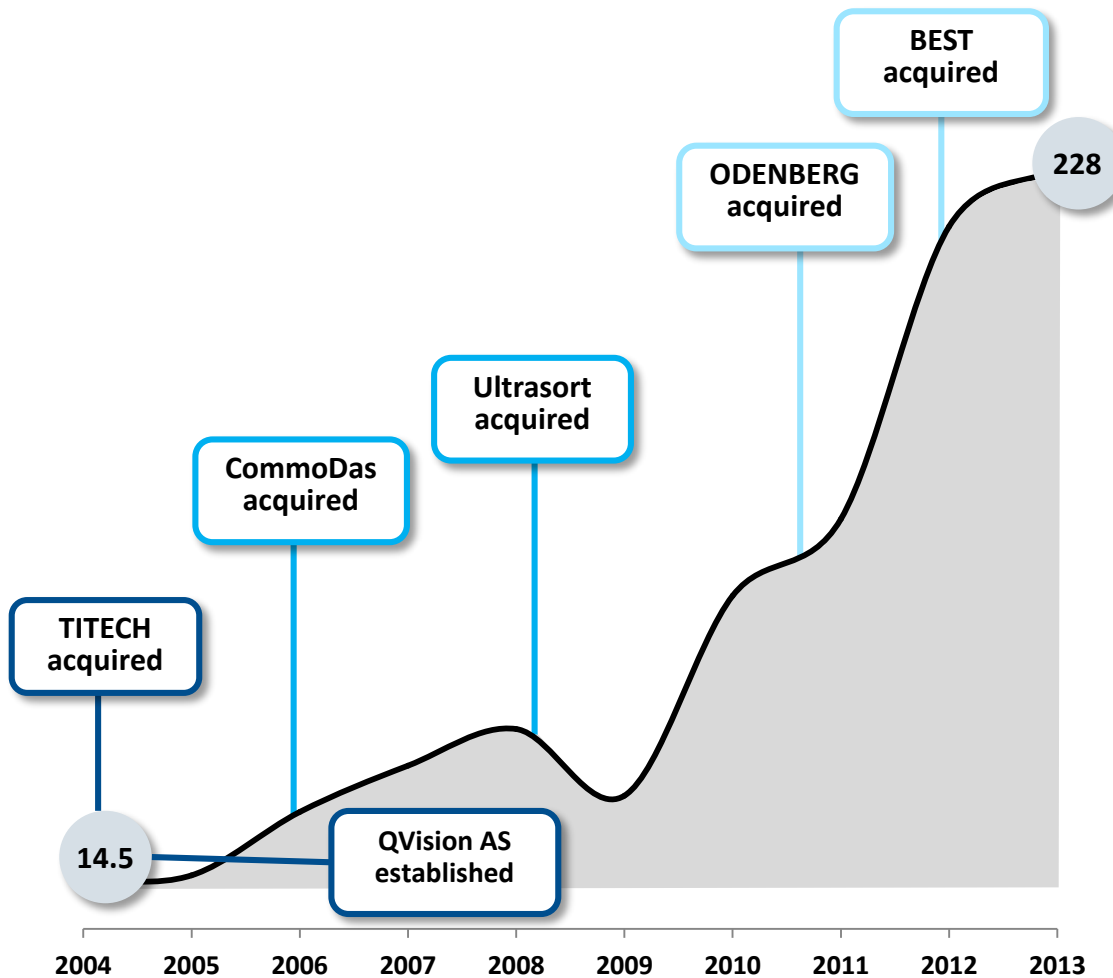
# GLOBAL PRESENCE THROUGH OWN SUBSIDIARIES





# STRONG REVENUE GROWTH SINCE 2004

## Revenue development and milestones EUR million



- Annual revenue growth (organic and inorganic) of 36% from 2004-2013
- Technology base and segment / application knowledge expanded both through acquisitions and in-house ventures
- Growth driven by:
  - Price increases in food, commodities and landfill costs
  - Enabling technology
  - Favorable changes in regulatory framework:
    - Food safety
    - Dual System Germany
    - WEEE
    - ELV
    - Etc.
  - Quality awareness

# WE SUPPORT CUSTOMERS ON ALL CONTINENTS

## RECYCLING



MARKET	Europe	Asia	US/Canada	Other Incl. OEM sales	~ 4,045
INSTALL BASE	~ 2,450	~ 310	~ 650	~ 635	

## MINING

MARKET	Europe	US/Canada	Australia	Southern Africa	Other	~ 200
INSTALL BASE	~ 70	~ 35	~ 20	~ 50	~ 25	

## FOOD



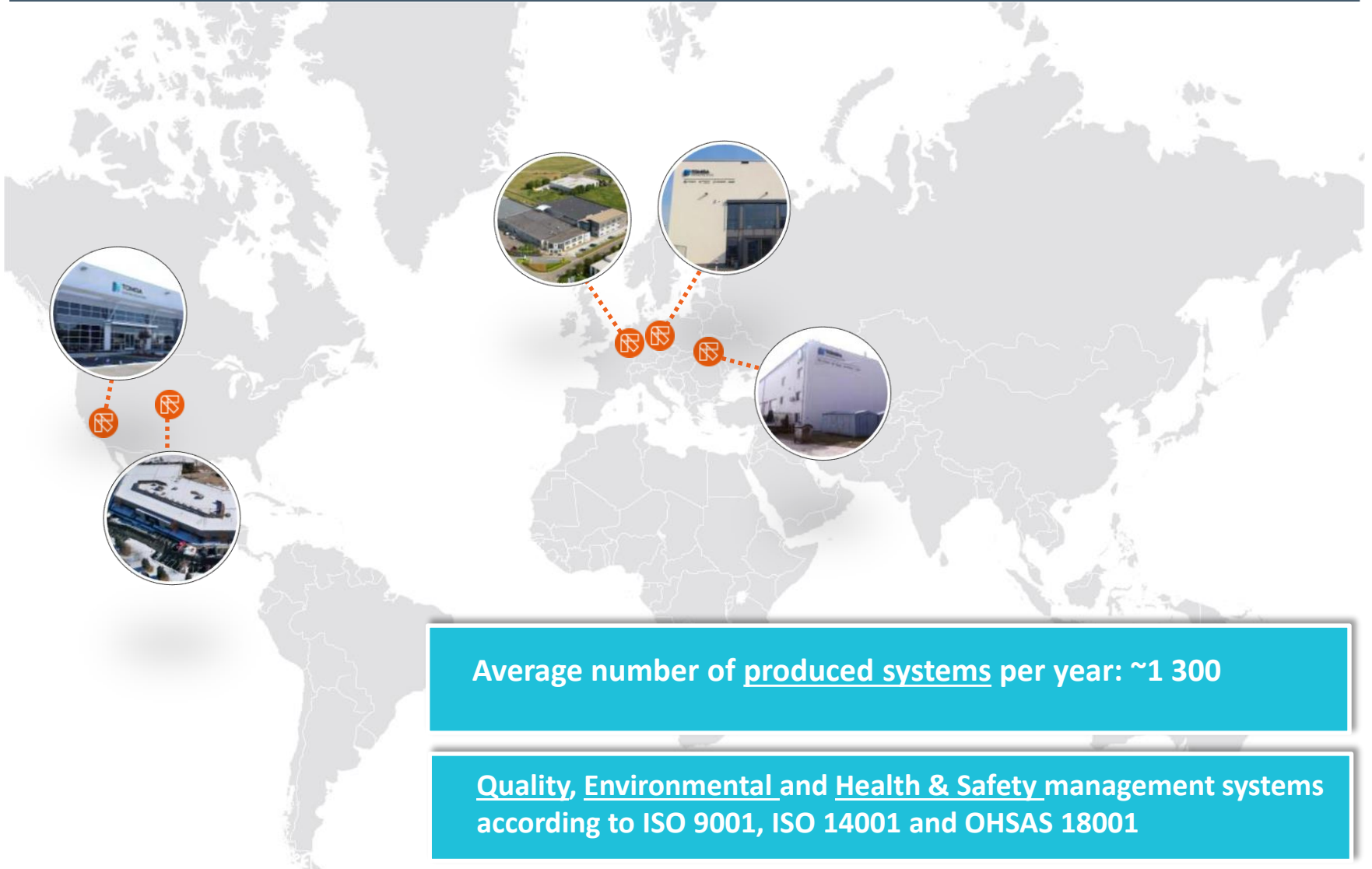
MARKET	Europe	US/Canada	Middle East/Africa	Asia/ Oceania	South America	Other	~ 7,365
INSTALL BASE	~ 3,440	~ 2,980	~ 210	~ 390	~ 245	~ 100	

## SPECIALTY PRODUCTS \*BEST

MARKET	Europe / Middle East / Africa / Russia	Americas	Asia / Oceania	~ 320
INSTALL BASE	~ 95	~ 40	~ 185	

11,500 units in  
over 80  
countries

# HIGH STANDARD PRODUCTION FACILITIES



Average number of produced systems per year: ~1 300

Quality, Environmental and Health & Safety management systems according to ISO 9001, ISO 14001 and OHSAS 18001

 TOMRA Sorting production



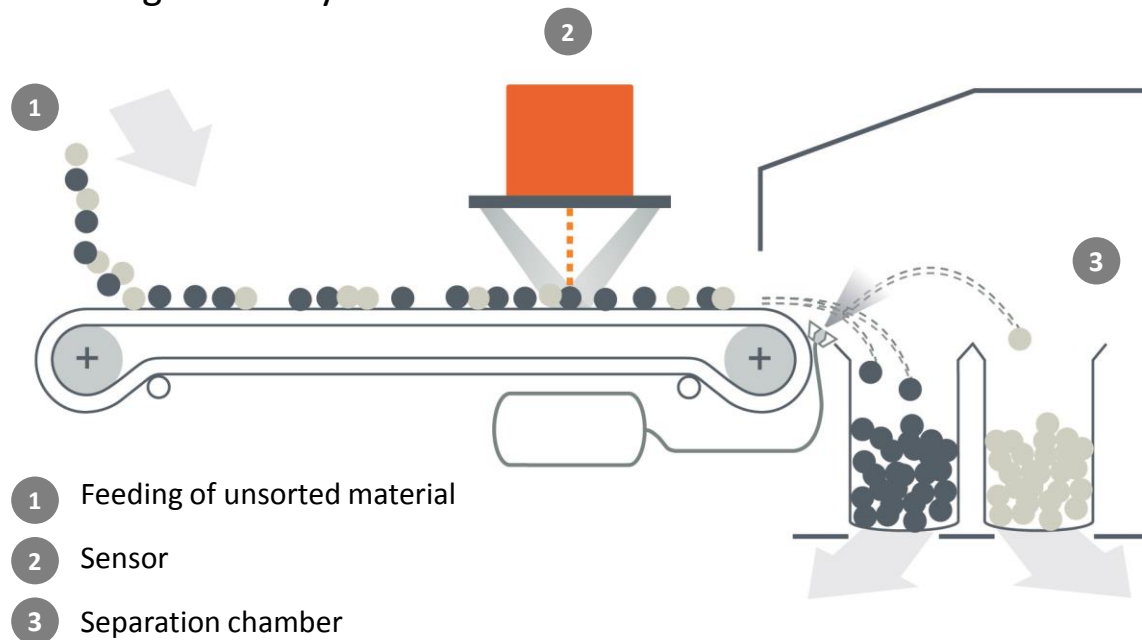
# A GLOBAL LEADER IN SENSOR-BASED SORTING

Offering cutting-edge technology for industries where automated sorting and processing are key for value creation.



# OUR CORE TECHNOLOGY – THE EYES AND BRAIN OF SORTING AND PROCESSING

- High-tech sensors to **identify objects** on a transport system
- **High speed processing** of information (material, shape, size, color, defect, damage and location of objects)
- **Precise sorting** by air jets or mechanical fingers
- Product **specific equipment design** often including multiple technologies to maximize sorting efficiency.



-  Food | larger products
-  Food | smaller products
-  Recycling
-  Mining
-  Specialty Products

# OUR SOLUTIONS ARE USED IN NUMEROUS APPLICATIONS ACROSS MULTIPLE INDUSTRIES



## Recycling

### Applicable for:

E-scrap · CRT Glass · Wood  
Single Stream · Paper  
Packaging · Wire · C&D waste  
Car shredder · Plastics  
Organic · MSW · Metals  
RDF monitoring



## Mining

### Applicable for:

Precious metals  
Ferrous metals · Non-ferrous  
metals · Industrial minerals  
Fuel · Gems



## Food

### Applicable for:

Dried fruit · Fresh cut · Fruit  
Nuts · Seeds · Processed  
potatoes · Whole potatoes ·  
Seafood · Meat · Vegetables



## Specialty Products

### Applicable for:

Raw Materials  
Virgin plastics · Synthetic rubber  
Virgin wood chips ·  
Pharmaceuticals

### Tobacco

Threshed stems · Oriental leaf  
Primary lamina · Primary stems  
Cigar · Recon · OTP · Additives



# WHY SENSOR-BASED SORTING?

	RECYCLING	MINING	FOOD	SPECIALTY PRODUCTS
INCREASE REVENUES	<ul style="list-style-type: none"> <li>• Increase purity of sellable materials</li> <li>• Increase recovery rate</li> <li>• Increase capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Increase recovery of valuable minerals and ores</li> <li>• Increased feasible ore reserve</li> <li>• Increased capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Increase yield</li> <li>• Increase throughput</li> </ul>	<ul style="list-style-type: none"> <li>• Increase purity of sellable materials</li> <li>• Reduction of lost materials</li> </ul>
REDUCE COSTS	<ul style="list-style-type: none"> <li>• Reduce labor requirements</li> <li>• Lower operating and service costs</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce energy consumption</li> <li>• Reduce water consumption</li> <li>• Less wear and tear</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce labor requirements</li> <li>• Lower operating and service costs</li> <li>• Reduce waste</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce labor requirements</li> <li>• Lower operating and service costs</li> <li>• Reduce waste</li> </ul>
OTHER BENEFITS	<ul style="list-style-type: none"> <li>• Consistent quality of output streams</li> <li>• Increase flexibility of production line</li> <li>• Monitor material composition</li> </ul>	<ul style="list-style-type: none"> <li>• Less environmental impact</li> <li>• Reduce carbon footprint</li> <li>• Easier permitting</li> </ul>	<ul style="list-style-type: none"> <li>• Increased and consistent quality and safety</li> <li>• Increased flexibility of production line</li> <li>• Production reporting and analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Increased and consistent quality</li> <li>• Production reporting and analysis</li> </ul>

# CUTTING-EDGE TECHNOLOGY DRIVEN BY SIGNIFICANT INVESTMENTS IN R&D

## SENSOR PORTFOLIO

### Electromagnetic Sensor (EM)

*Material property detected:*  
electromagnetic properties like conductivity and permeability

### IR Camera (IR)

*Material property detected:* heat conductivity and heat dissipation

### CCD Color Camera (COLOR)

*Material property detected:*  
color properties in the color are as red, green and blue

### X-ray Fluorescence (XRF)

*Material Property detected:*  
elemental composition

### X-ray Transmission (XRT)

*Material property detected:* specific atomic density irrespective of size, moisture or pollution level

### Near-Infrared Spectrometry (NIR)

*Material property detected:* specific and unique spectral properties of reflected light in the near-infrared spectrum

### Visible Light Spectrometry (VIS)

*Material property detected:* visible spectrum for transparent and opaque materials

### Infrared Transmission (IRT)

*Material property detected:*  
light absorption

### Laser / Fluo

*Material property detected:*  
+ Monochromatic reflection / absorption  
+ Scattering of laser light Fluo or bio-luminescence, Super K

- **In-house R&D department** with more than 17% of all employees
- **8% of revenue** invested in R&D
- Developing **own sensors**
- Using **own software** and data processing tools
- Ownership of **80 patents**
- **Partnership with leading R&D institutions:** SINTEF, CTR, Fraunhofer ILT; universities like RWTH and Brussels



# OUR TEST CENTERS: SORTING EXCELLENCE



Food test center  
in Leuven, Belgium



Mining test center  
in Hamburg, Germany

**Test your own produce or material** in 16 test centers worldwide.

The **complete sensor portfolio** can be tested.

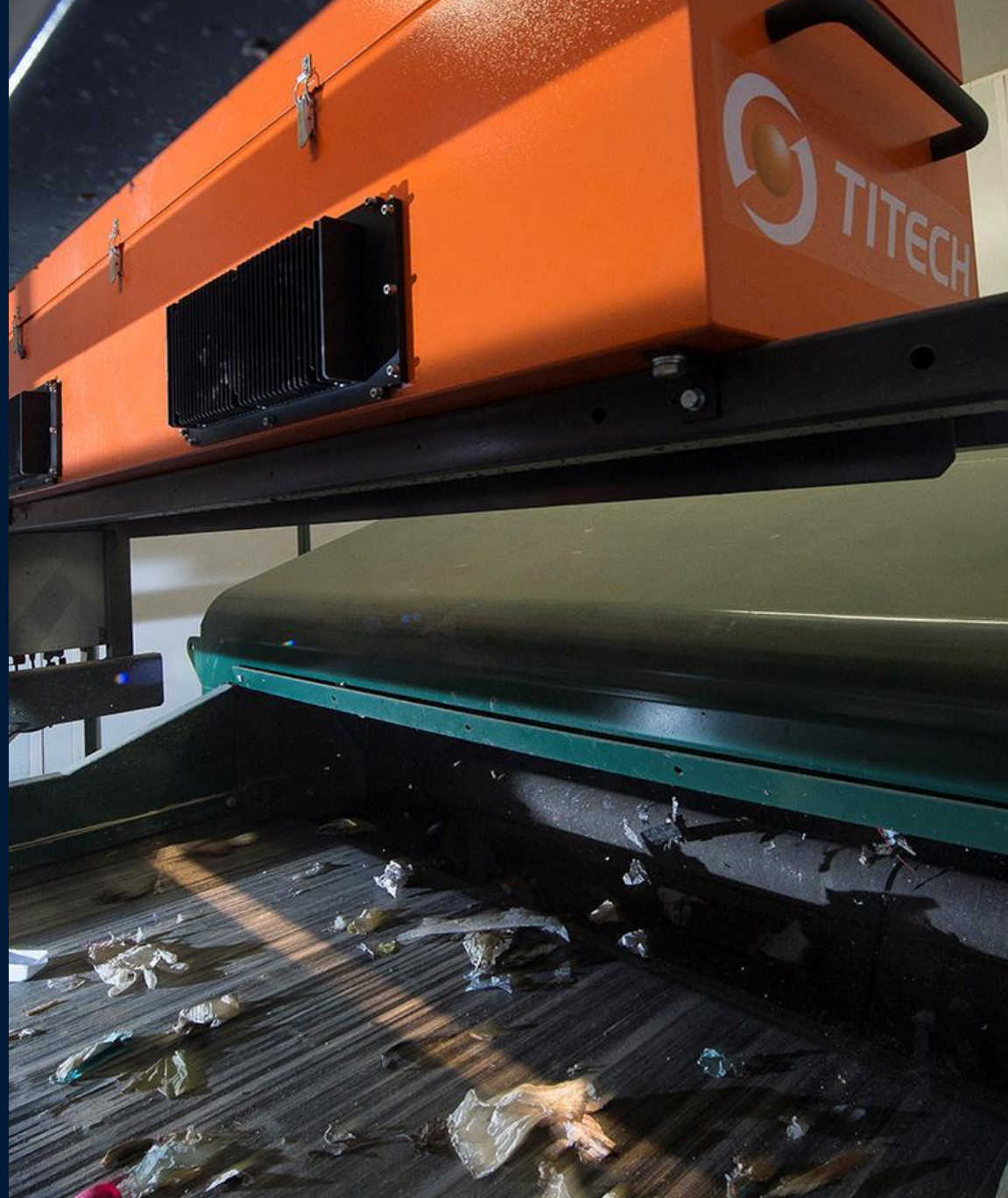
**Experienced application engineers** develop tailored solutions for individual needs.



Recycling test center  
in Koblenz, Germany



# WASTE INTO VALUE



# RECYCLING APPLICATIONS

	HOUSEHOLD WASTE	PACKAGING	C & D	AUTOMOBILE SHREDDER	ELECTRONIC SCRAP
<b>APPLICATIONS</b>	<ul style="list-style-type: none"> <li>• Hard plastics</li> <li>• Plastic film</li> <li>• Mixed paper</li> <li>• RDF</li> <li>• Metals</li> <li>• Organics/ Biomass</li> </ul>	<ul style="list-style-type: none"> <li>• Plastics</li> <li>• Plastic film</li> <li>• Cardboard</li> <li>• Mixed paper</li> <li>• Deinking paper</li> <li>• Metal</li> </ul>	<ul style="list-style-type: none"> <li>• Inert material</li> <li>• Plastic film</li> <li>• Metals</li> <li>• Wood</li> <li>• Paper &amp; cardboard</li> <li>• Plastics</li> </ul>	<ul style="list-style-type: none"> <li>• NF metal</li> <li>• Stainless steel</li> <li>• Copper cables</li> <li>• Copper</li> <li>• Brass</li> <li>• Aluminum</li> <li>• Meatball sorting</li> </ul>	<ul style="list-style-type: none"> <li>• Printed circuit boards</li> <li>• Non-ferrous metal concentrates</li> <li>• Cables</li> <li>• Copper</li> <li>• Brass</li> <li>• Stainless steel</li> <li>• Meatball sorting</li> </ul>
<b>SENSOR TECHNOLOGY</b>	<p>NIR VIS XRT</p>	<p>NIR VIS EM</p>	<p>NIR VIS XRT EM</p>	<p>NIR VIS XRT EM COLOR XRF</p>	<p>XRT EM NIR COLOR XRF</p>



# BACKGROUND INFORMATION

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- Demand for secondary raw materials grows continuously
- Proceeds for secondary raw materials grow.
- Utilizing secondary raw materials saves natural resources and reduces CO2 emissions clearly.
- Landfilling is not the solution
- Valuable raw materials are irrevocably lost if incineration is chosen for disposal.
- Use of RDFs in cement mills - already standard in Europe - saves valuable raw materials and clearly reduces CO2 emissions.

# BACKGROUND INFORMATION

- Development of sensor based sorting was strongly related to separate collection of plastics in Germany
  - ➔ Need to obtain high qualities with high efficiency at low costs
- High demand and increasing prices for recyclables made world wide business of this

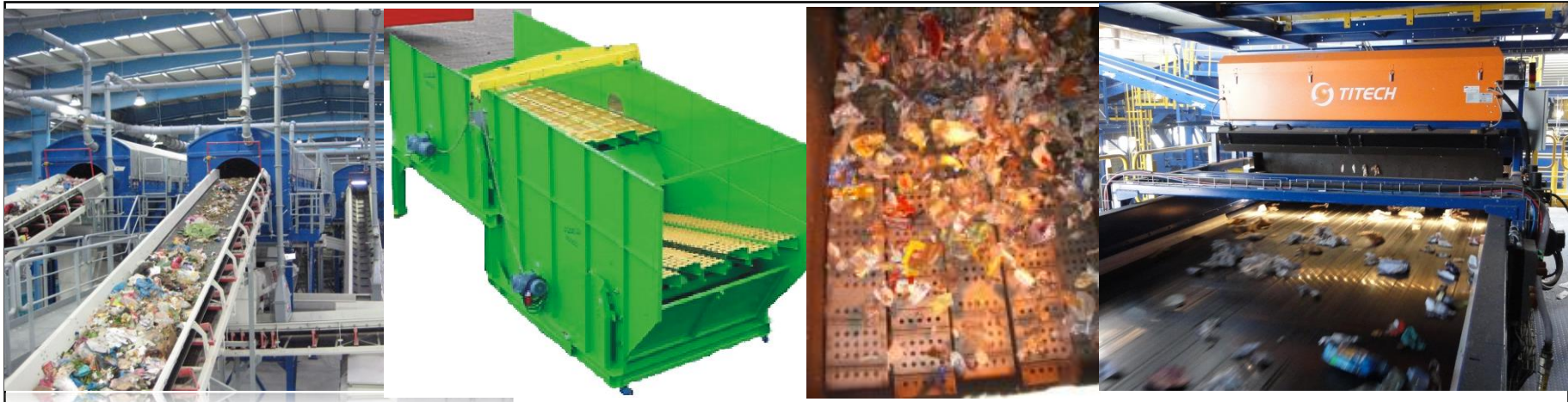




# MODERN MRF'S FOR MSW

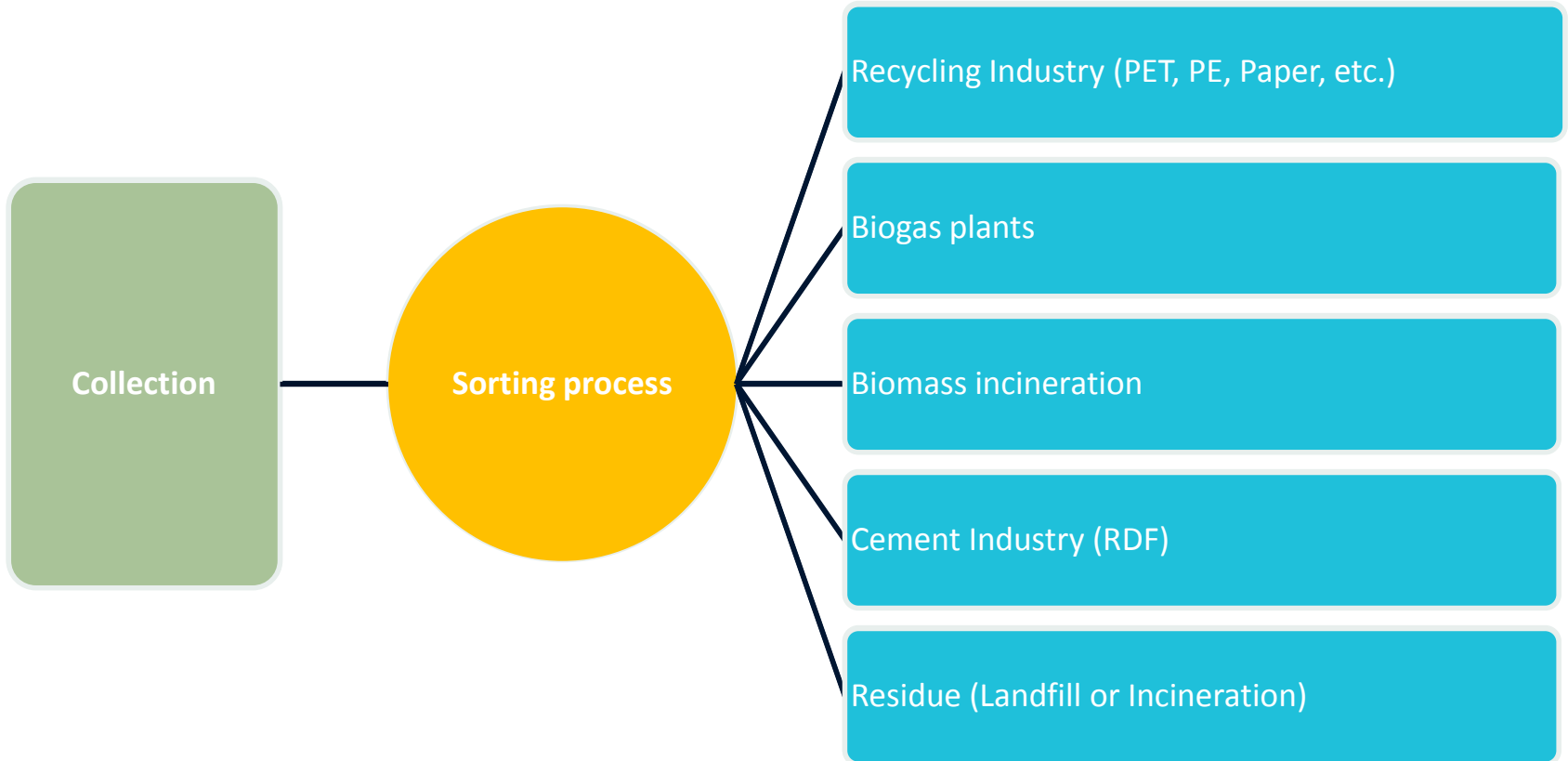
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- Several years of experience with MRF's for separately collected waste fractions
- Development of MRF's for recovery of recyclables of commercial standards from mixed MSW
- > 40 modern MRF for MSW in operation so far world wide



# WASTE MANAGEMENT CONCEPT

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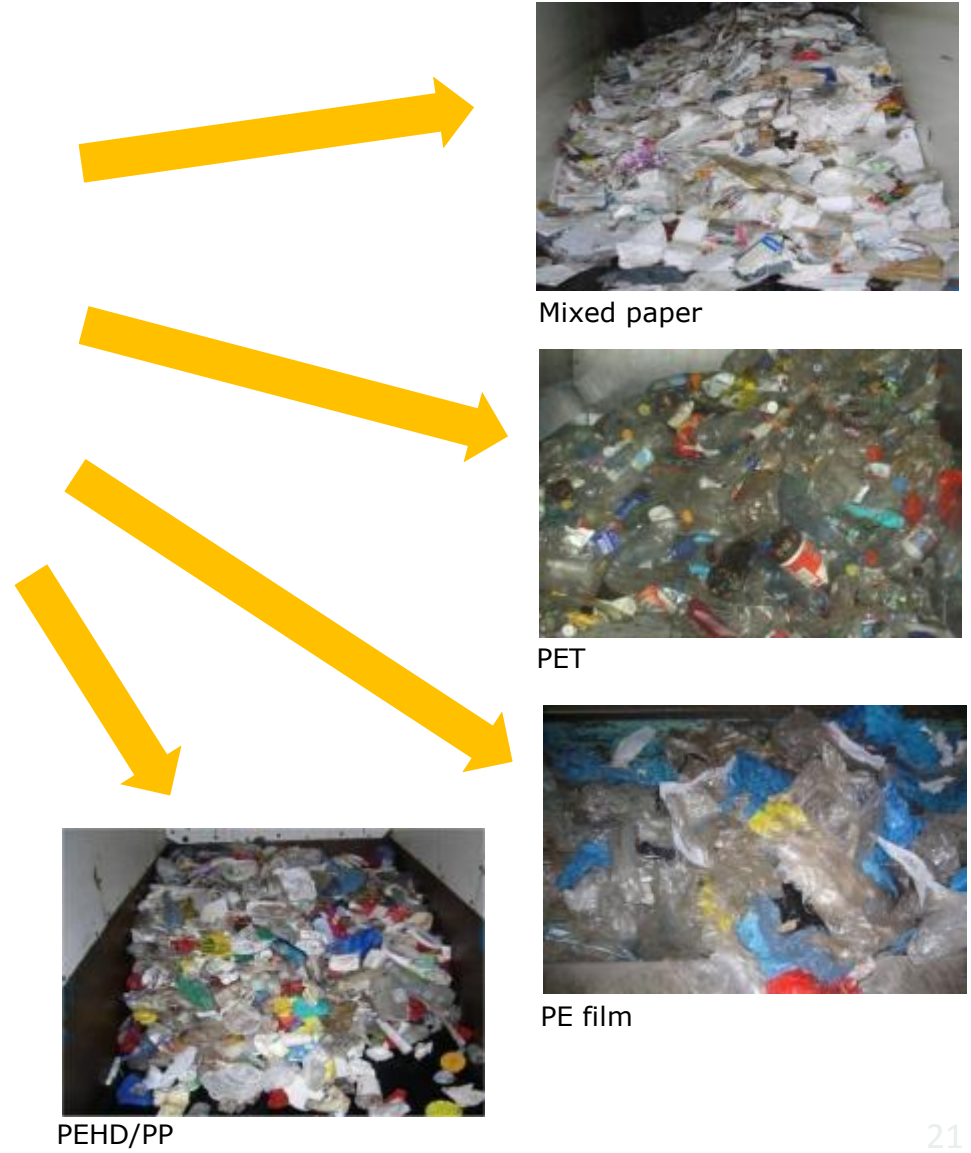
# MSW



Input material "MSW"



Sorting plant



Mixed paper



PET



PE film



PEHD/PP

# COMERCIAL AND INDUSTRIAL WASTE



Input material



Sorting plant



RDF



wood



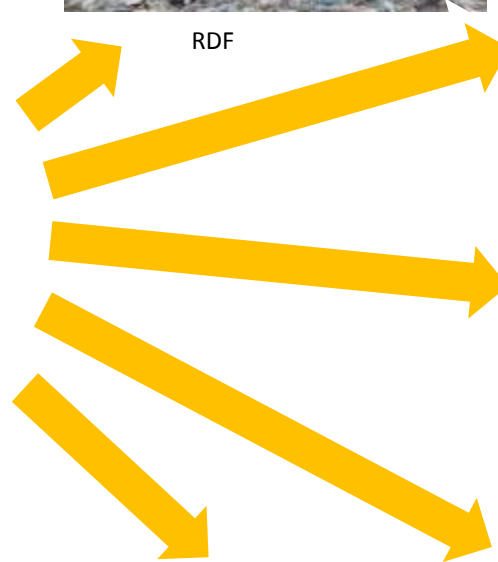
paper



hard plastics



film





# PACKAGING WASTE



Input material



Sorting plant



Tetra



PET

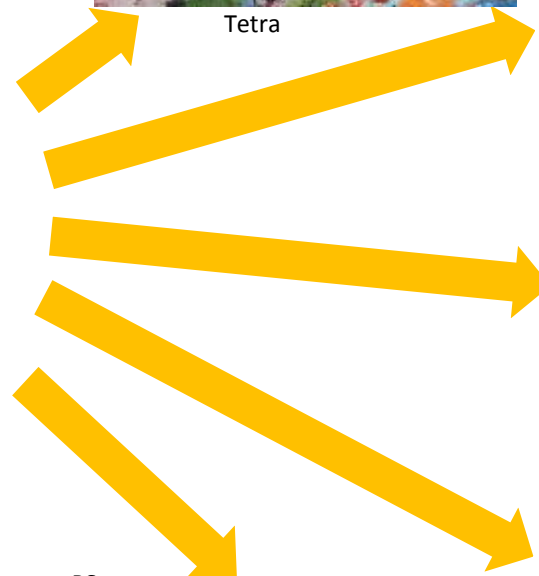


PEHD

PS



PP



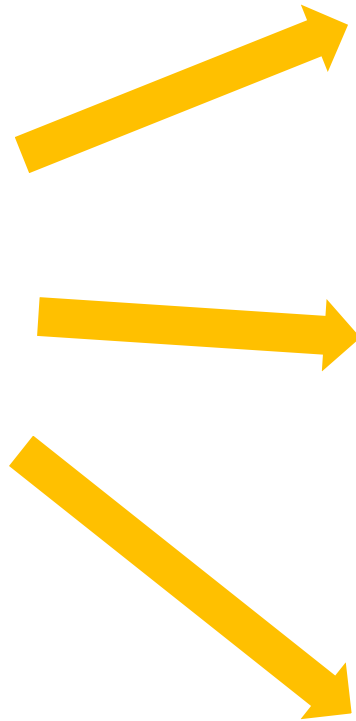
# RECYCLING / PRE-SORTED MATERIAL



Input material "Mixed PET bottles"



Sorting plant



PET clear



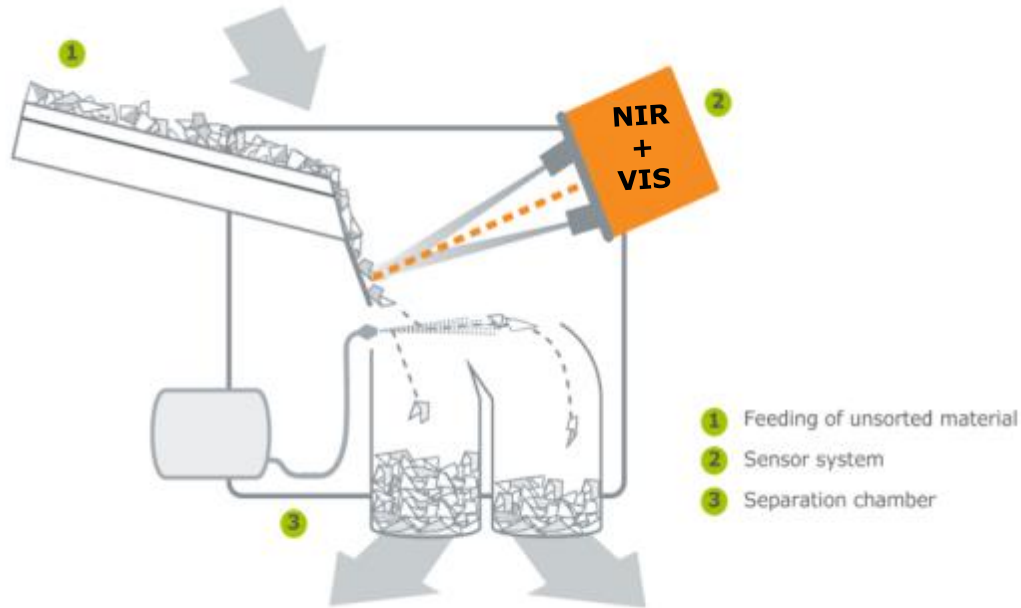
PET green/blue



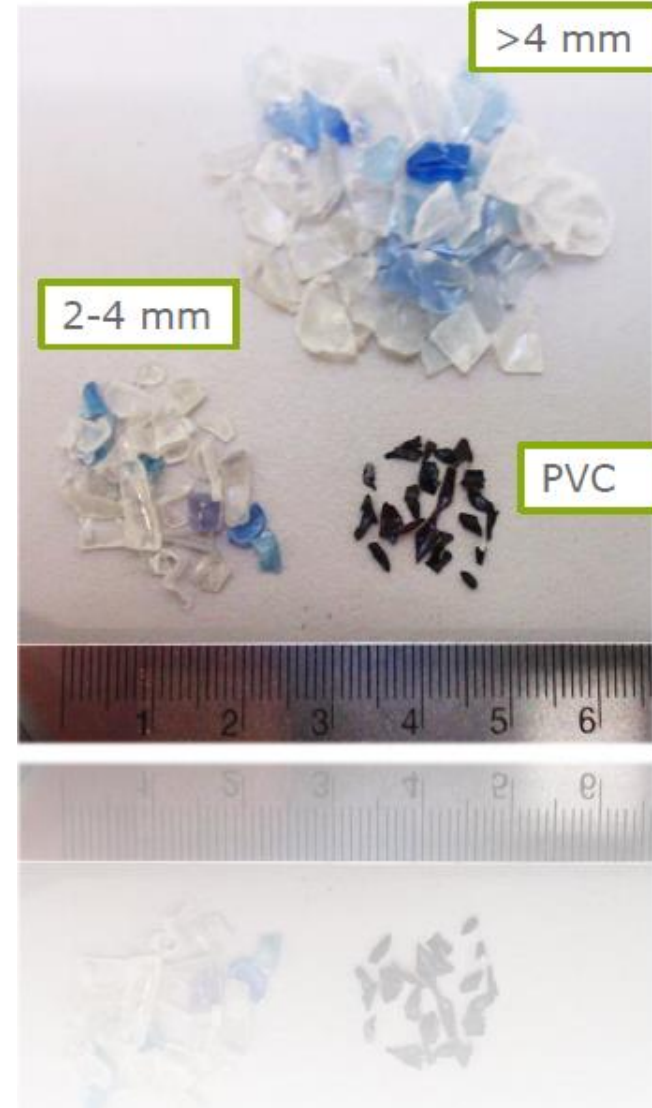
PET mixed



# RECYCLING / PRE-SORTED MATERIAL



Flake sorter



PET flakes

# POSSIBLE USE OF REFUSE DERIVED FUEL (RDF)



Cement plants



Lime plants



Coal power plants



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Thank you  
for your attention!

