REMONDIS

REMONDIS Headquarter – Lippewerk – Gemany

REMONDIS Assets & Services
Philipp Kempkes

2019/01/22

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RETHMANN-Group – Activities and Key Figures

RETHMANN-Group

- Turnover 2017 (€ mn): 14,500*
- Employees 2017: ca. 72,000
- Equity 2017 (€ mn): > 3,000

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- Recycling
- Services
- Water

- Turnover 2017 (€ mn): 7,380 *
- Employees 2017: ca. 34,000

RHENUS LOGISTICS

- Contract Logistics
- Freight Logistics
- Port Logistics
- Public Transport

- Turnover 2017 (€ mn): 4,800 *
- Employees 2017: ca. 29,000

SARIA®

- High-quality goods from animal by-products
- Producer of renewable energy
- Service provider for the agricultural and food sector

- Turnover 2017 (€ mn): 2,460*
- Employees 2017: ca. 9,000

* provisional Figures,
Differences due to consolidation

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Present Company Figures
Results of Competence, Performance and Capacity

7.380 billon **Total revenue (in Euro)**

33.000 **Employees**

approx. 800 **Sites**

in 34 **Countries**

More than 800 **Plants and installations**

10.700 **Vehicles**

30 million **Tonnes of Commodities from recycling**

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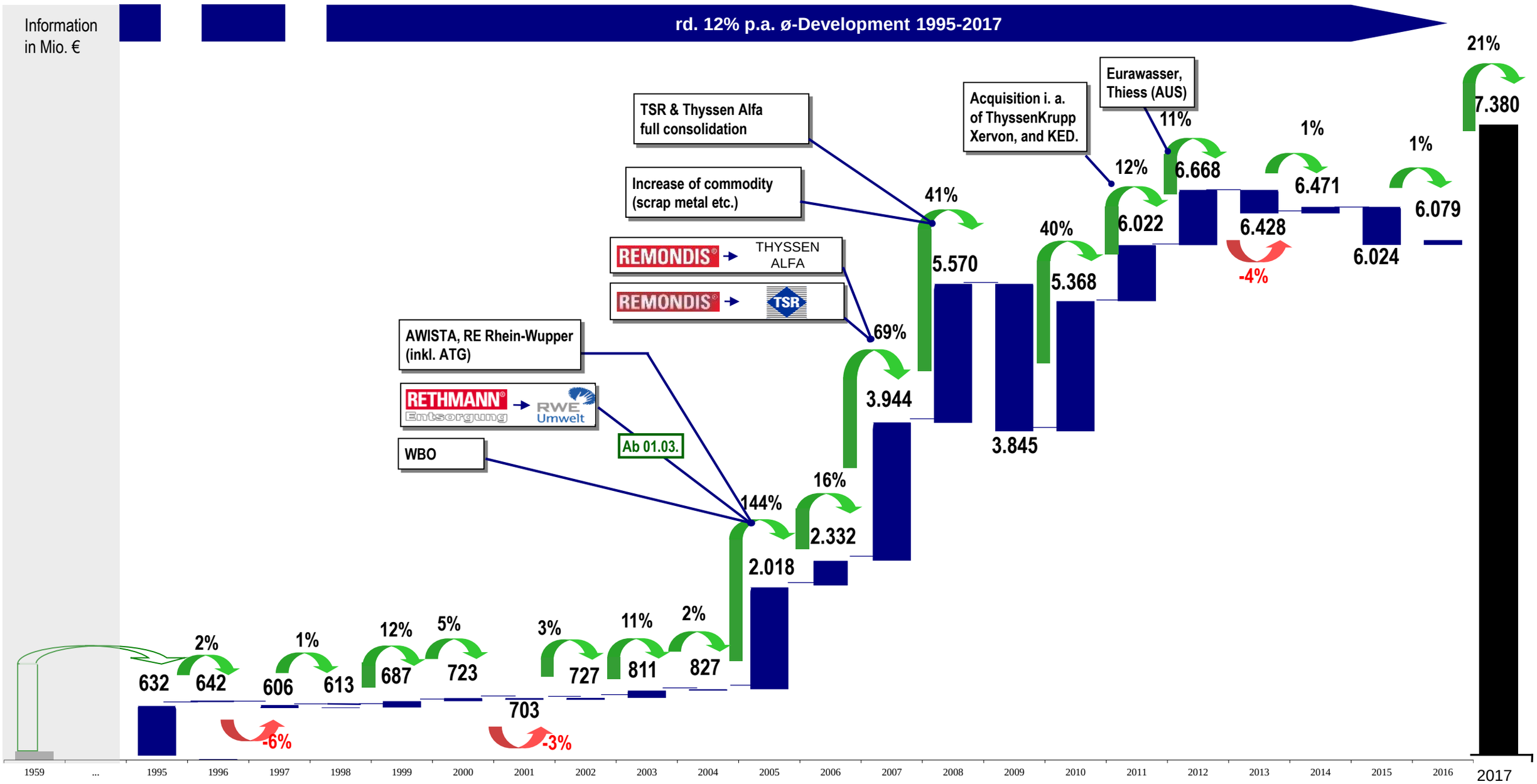
REMONDIS
Development of turnover 1995 – 2017, consolidated



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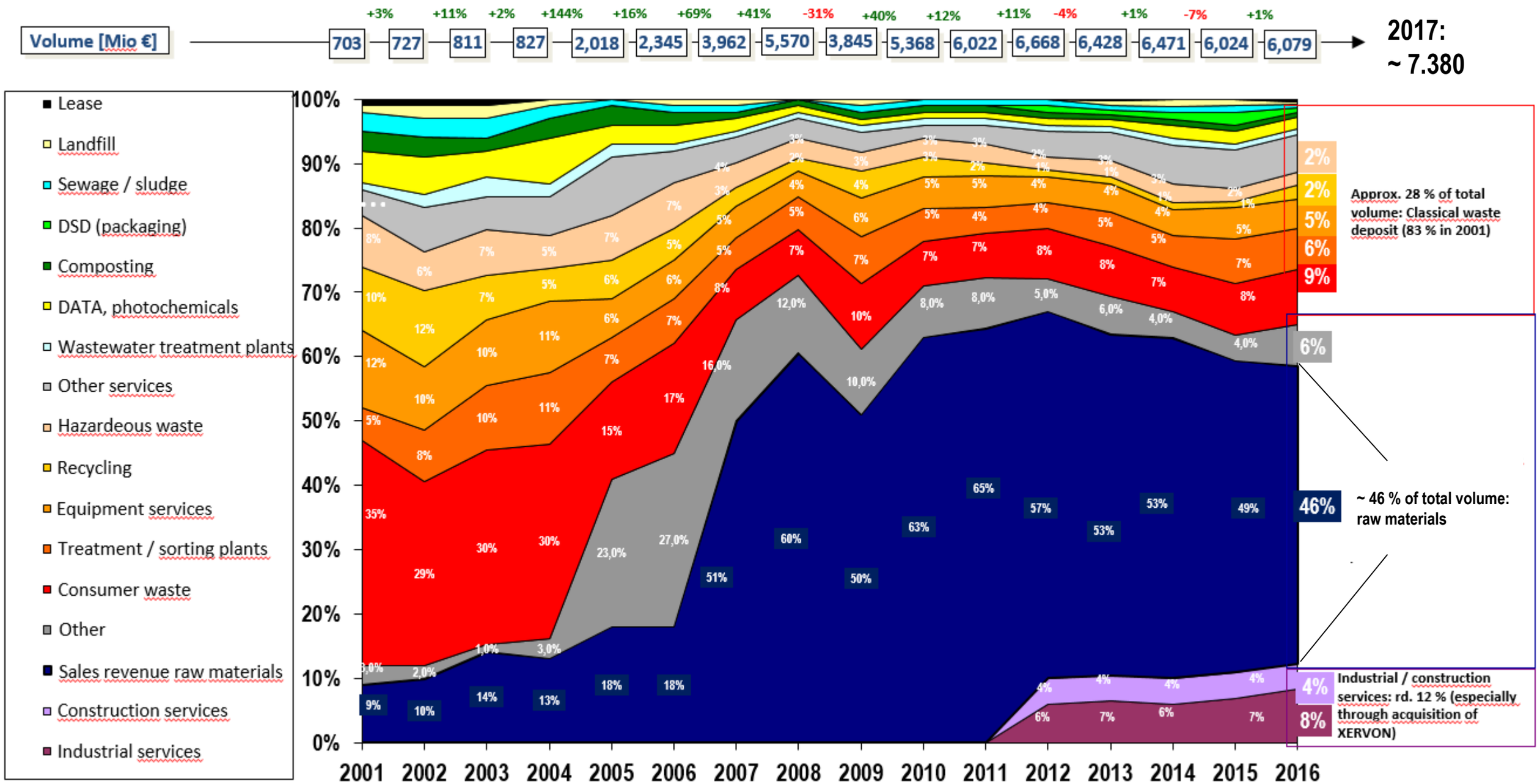
Company Figures
From Disposal to Raw Materials



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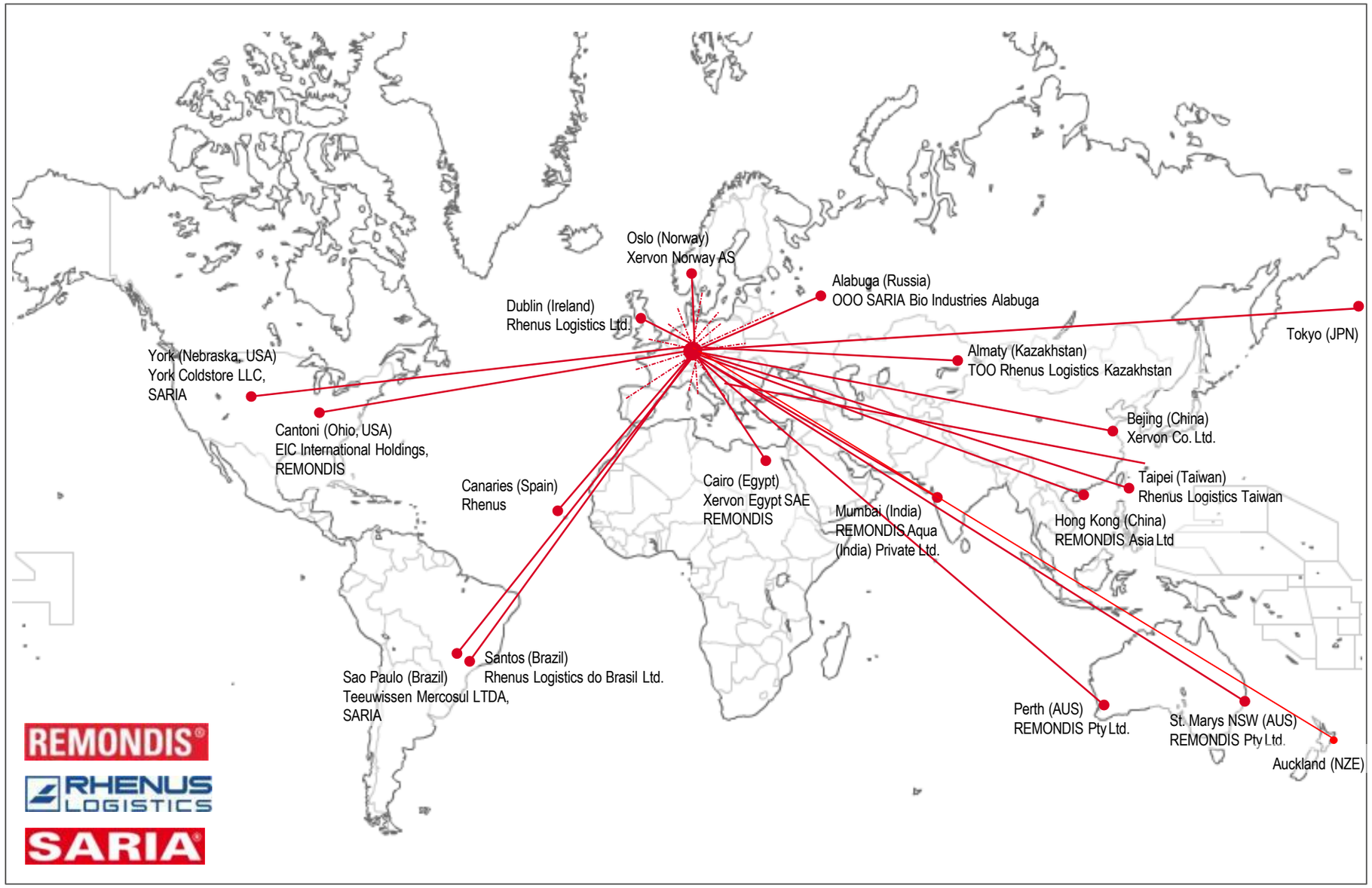
The RETHMANN Group

Activities in over 50 countries

A selection of locations worldwide



1. **North & South America**
   - Brazil
   - USA
2. **Asia**
   - China
   - Hong Kong
   - India
   - Japan
   - Kazakhstan
   - Malaysia
   - Philippines
   - Singapore
   - Taiwan
   - Thailand
   - Turkey
   - Uzbekistan
   - Vietnam
3. **Oceania**
   - Australia,
   - New Zealand
4. **Africa & Middle East**
   - Bahrain
   - Egypt
   - Qatar
   - Saudi Arabia
   - UAE
5. **Europe**
   - Austria
   - Belarus
   - Belgium
   - Bosnia Herzegovina
   - Bulgaria
   - Cyprus
   - Czech Republic
   - Croatia
   - Denmark
   - Estonia
   - France
   - Germany
   - Great Britain
   - Hungary
   - Ireland
   - Italy
   - Latvia
   - Lithuania
   - Luxemburg
   - Netherlands
   - Norway
   - Poland
   - Portugal
   - Romania
   - Russia
   - Slovakia
   - Slovenia
   - Spain
   - Sweden
   - Switzerland
   - Ukraine

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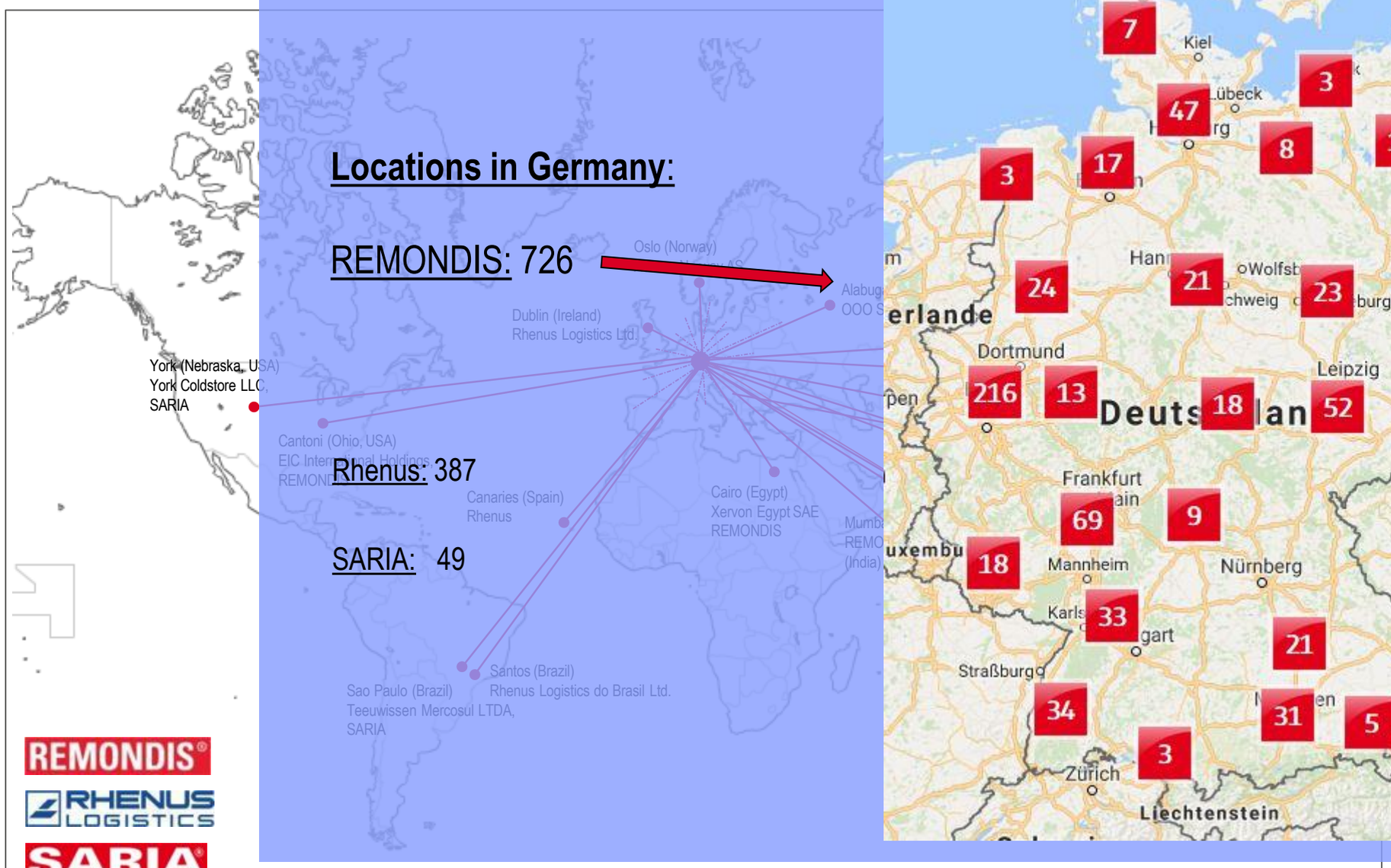
The RETHMANN Group

Activities in over 50 countries

A selection of locations world



Locations in Germany:

REMONDIS: 726

Rhenus: 387

SARIA: 49

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RHENUS LOGISTICS
SARIA

5. **Europe**
- Austria
- Belarus
- Belgium
- Bosnia Herzegovina
- Bulgaria
- Cyprus
- Czech Republic
- Croatia
- Denmark
- Estonia
- France
- Germany
- Great Britain
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxemburg
- Netherlands
- Norway
- Poland
- Portugal
- Romania
- Russia
- Slovakia
- Slovenia
- Spain
- Sweden
- Switzerland
- Ukraine

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Services
Collection, Processing, Production, Energy

Logistics

- **Services:** collection, handling, transport
- **Materials:** recyclables, residuals, hazardous materials

Processing

- Mechanical and biological treatment
- Separation of recyclable fractions
- Separation of hazardous materials

Recycling

- Classification
- Conditioning
- Supply of materials, separated according to type, for marketing and further processing

Energy

- Use of energy
- Conditioning
- Supply
- Removal of hazardous materials

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Legislative / Legal Conditions (Packaging)

EU

- 2025: min. 65 % Recycling, 2030: 70 %
- Plastics from packaging: 2025: min. 50 %, 2030: 55 %
- Unified system / methodology for determination of recycling rates

Germany, 2018

- Recycling / Recovery: 60 %
- From this: 60 % material recycling
- → 36 % total for material recycling

Germany, from 2019

- Recycling / Recovery: 90 %
- From this: 65 % material recycling (2022: 70 %)
- → 58.5 % total for material recycling (2022: 63 %)

All figures in mass-%

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Motivation…

Deutschlands dreckiger Rest

SPIEGEL+

Die Müll-Lüge

Die Welt erstickt am Abfall. Und die Deutschen, angeblich Recyclingweltmeister, sind mit daran schuld. Lesen Sie hier die aktuelle SPIEGEL-Titelgeschichte. *Von Philip Bethge, Annette Bruhns, Nils Klawitter und Simone Salden* mehr…

spiegel.de, 2019/01/21

theoceancleanup.com

- Politically driven
- However, concerning recycling, there is room for improvement (quite a lot, actually)

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Challenges – Example: Packaging Diversity, Functionality

- Diversity: Tailored materials for every application, frequently hundreds to thousands of individual products

Collection of data sheets (large compounder): 2777 entries!

PDF	Produkttype	Polymer
	ABS 4124 90/04	ABS
	ABS 4134 90/04	ABS
	ALCOM AWL 10/3 WT1308-05LB	ABS
	ALCOM AWL 109/15 WT1217-11LB	(ABS+PC)
	ALCOM AWL 113/15 WT1013-12LB	(ABS+PC)
	ALCOM AWL 15/1 WT1471-04LB	ABS
	ALCOM AWL 15/2 WT1471-04LB	ABS
	ALCOM CFX ABS 1000 16012 SV1017-16MC	ABS
	ALCOM CFX ABS 1000 UV 16013 GY1018-16MC	ABS
	ALCOM LD2 PC 1000 14008 WT1009-14	PC

Eintrag 1 bis 10 von 2777

Limit 10 Anfang Zurück 1 2 3 4 5 Weiter Ende

Skin packaging, compound or lacquer coatings, benzoe or sorbic acid

- Functional materials: Coatings / additives - Additional materials in very low concentrations

Growing complexity
Recycling: reduction of complexity

RFID labels, glued to or directly printed on packaging

- Information: Communication devices (e.g. RFIDs) are applied or directly integrated into the packaging → further increase of material diversity

- Mechanical treatment is no longer sufficient, separation grows more difficult (purity of materials, additives)
- Long term: fundamentally different treatment methods needed, but:
- **Very high capital intensity – distribution channels must be secured and logistics must be manageable!**

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Entropy & Complexity

Nursery, typical condition: Maximum entropy principle

Reduction of entropy requires **energy** (not only in thermodynamics)

Nursery after huge invest of (nerve) energy

- ἐντροπία (Greek: εν~ [en~] – in~ and τροπή [tropē] – change, evolution)[1]:

Boltzmann's constant

$$k_B = 1.38 \cdot 10^{-23} \frac{J}{K}$$

$$S = k_B \ln \Omega$$

Partition function (= Number of accessible states of a system)

Reduction of complexity requires energy

[1] T. Fließbach, Statistische Physik, Springer

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Entropy reduction

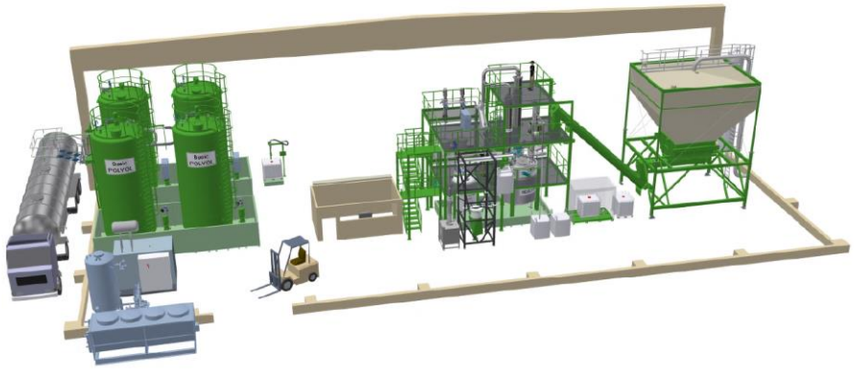
$$S = k_B \ln \Omega$$

Entropy – needs to be reduced.

Mechanical

- Comminution
- Sorting/separation
- Cleaning
- (Extrusion, etc.)
- Approved technologies, commonly applied

Chemical



- Mechanical pre-Treatment (see left)
- + Solvolytic Process, etc.
- Mainly lab-/pilot stage

Thermo-chemical

- Mechanical pre-Treatment (see left)
- Thermo-chemical process (pyrolysis, gasification, etc.)
- Economically feaseable technologies not available

Energy demand, complexity of process, invest, …

- Technical limits: the higher the entropy reduction of a given process, the higher its complexity – especially, this means high demands on input streams
- Economical limits: complex processes require large invests and tend to have high variable costs
- → Market acceptance is essential – customers must be willing finance complex recycling processes through product prices – can only be achieved through product quality

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Legislative / Legal Conditions (Packaging) Consequences

- REMONDIS: 45-53 % of revenue from raw materials
- Plastics increasingly important (political background, China, increasing volume, …)
- Mechanical treatment is limited ((energetic) effort vs. value added)
- Technological alternatives indispensable

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