

**Aurubis**

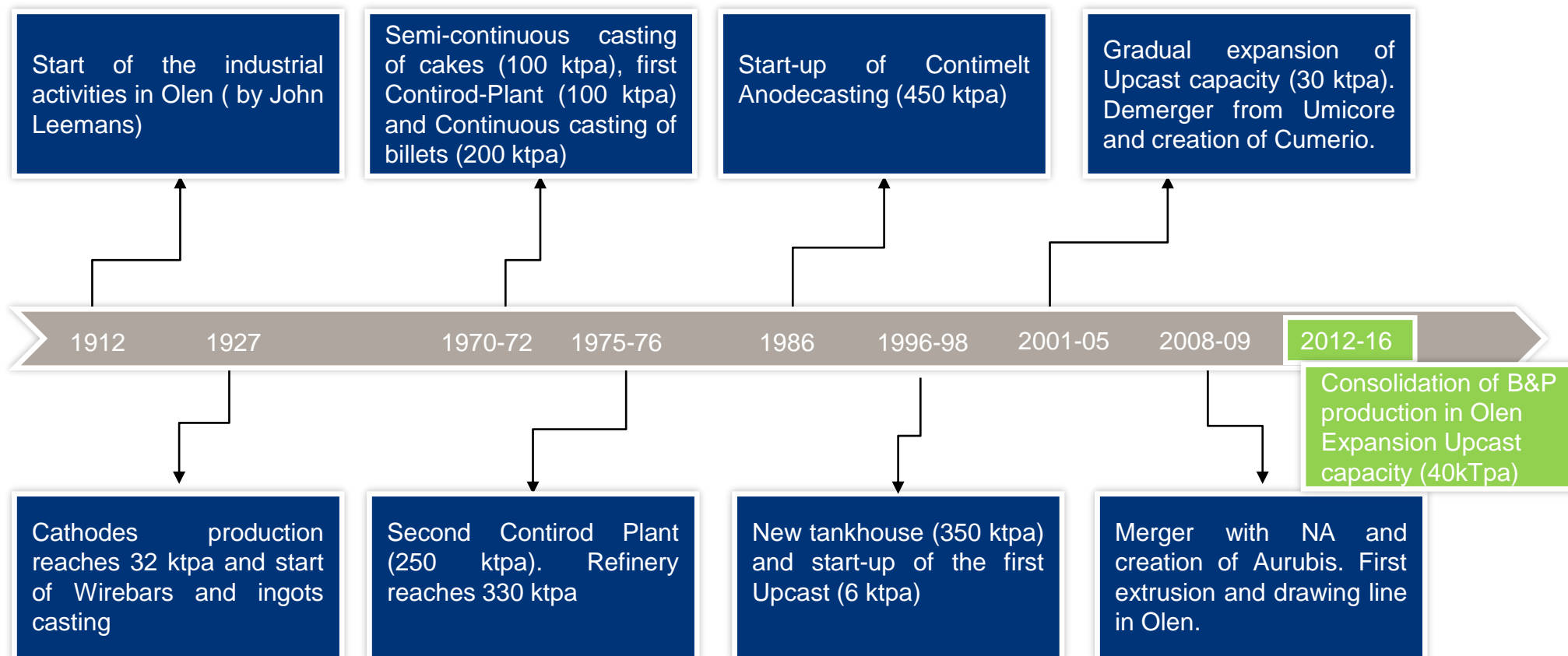
**16-11-2017**

**The Mental Shift**



**Aurubis Belgium**  
**100 Years of Experience in**  
**Copper Production and**  
**Processing**

# History of Aurubis Belgium



**The Aurubis Group celebrated its 150th birthday last year!**



- » Demerged from Umicore in 2005 and creation of Cumerio.
- » Renamed in Aurubis Belgium in 2009 after the acquisition of Cumerio by NA.
- » Aurubis Belgium consist out of two sites:
  - » Brussels: Commercial Services and Group Competence Centres
  - » Olen: Operations, HR and Finance
- » Today Aurubis Belgium employs about 570 employees; and our workforce has grown with 4% per year in the last 5 years.
- » Aurubis Belgium is one of the top 30 Belgian companies ranked according to turnover and represents about 1% of Belgium's GDP. We invest more than 10 million € per year in our Belgian facilities.
- » Aurubis Belgium has subsidiaries in Switzerland, Hong Kong, Finland, Russia, Sweden, Netherlands, Italy and USA.
- » We are operating in a wide "Open Innovation" Network, including many Top Universities. Our RDI-research work is being recognized by funding of the EC and the Flemish authorities.

# Copper – the material of modern life



High  
electrical  
conductivity



High  
thermal  
conductivity

High  
durability

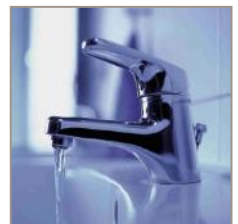
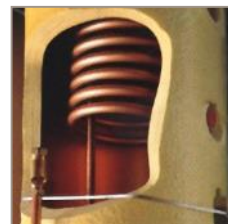
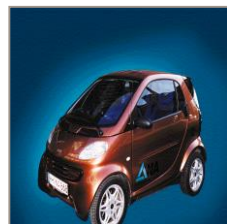
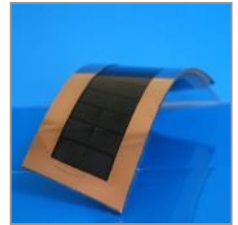


End  
products



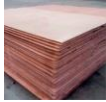






Electric motors  
Cable and wires  
Microchips  
Transformers

Air conditioners  
Heat exchangers  
Kitchen  
appliances  
Brake pads

Sanitary  
installations  
Pipelines  
Roofs and  
facades  
Coins



# Aurubis is a world leader in the copper value chain

	FY 2015/16	Position
 Custom concentrate processing	2,156,000 t	No. 1 worldwide
 Copper scrap processing	253,000 t	No. 1 worldwide
 Cathode production	1,084,000 t	No. 4 worldwide
 Rod production	758,000 t	No. 1 worldwide
 Shape production	172,000 t	No. 1 in Europe
 Strip production	218,000 t	No. 1 worldwide
 Sulfuric acid production	2,068,000 t	
 Gold production	42 t	
 Silver production	961 t	



## Production sites



### Copper Production:

- » Hamburg DE
- » Pirdop BG
- » **Olen** **BE**
- » Lünen DE

### Copper Processing:

- |               |    |               |           |
|---------------|----|---------------|-----------|
| » Avellino    | IT | » Mortara     | IT        |
| » Buffalo     | US | » <b>Olen</b> | <b>BE</b> |
| » Dolný Kubín | SK | » Pori        | FI        |
| » Emmerich    | DE | » Röthenbach  | DE        |
| » Fehrbellin  | DE | » Smethwick   | GB        |
| » Hamburg     | DE | » Stolberg    | DE        |
|               |    | » Zutphen     | NL        |

- » Aurubis has a service and sales network in more than 20 countries (Europe, Asia and North America)

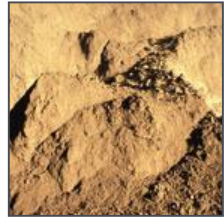
## Integrated copper processor

Mines and  
recycling markets

Copper production

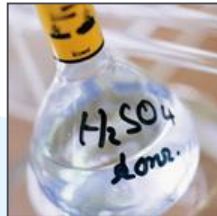
Copper processing

Processors and  
end users



Concentrates

### Primary Copper

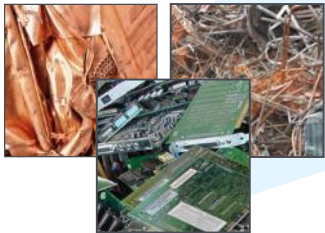


Sulphuric Acid



Iron silicate

### Recycling / Precious Metals



Recycling  
Materials



Precious Metals



Other  
metals

Olen

Cathodes

### Copper Products



Shapes



Flat rolled  
products



Wire Rod



Olen

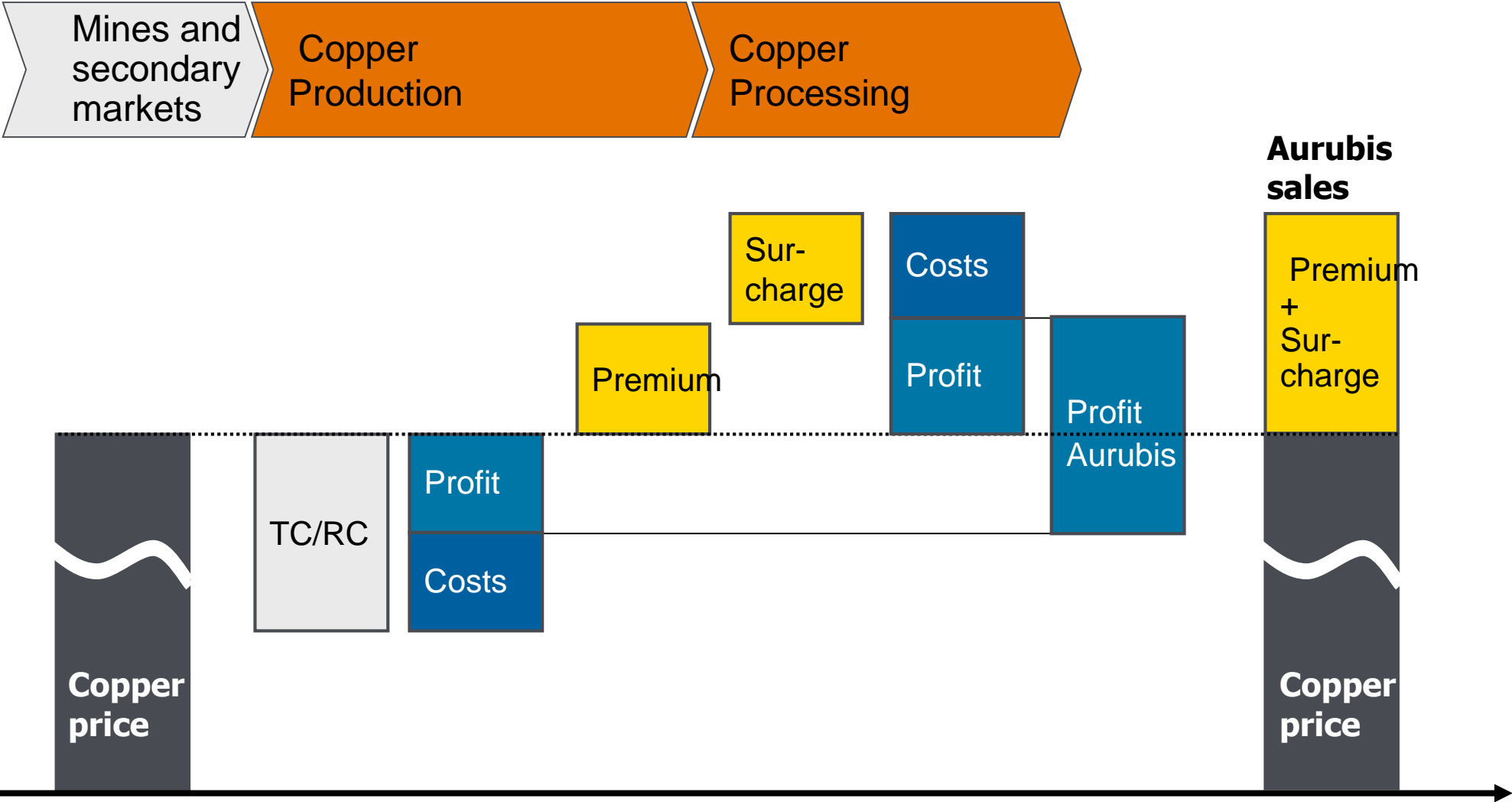
Other semi-finished  
products

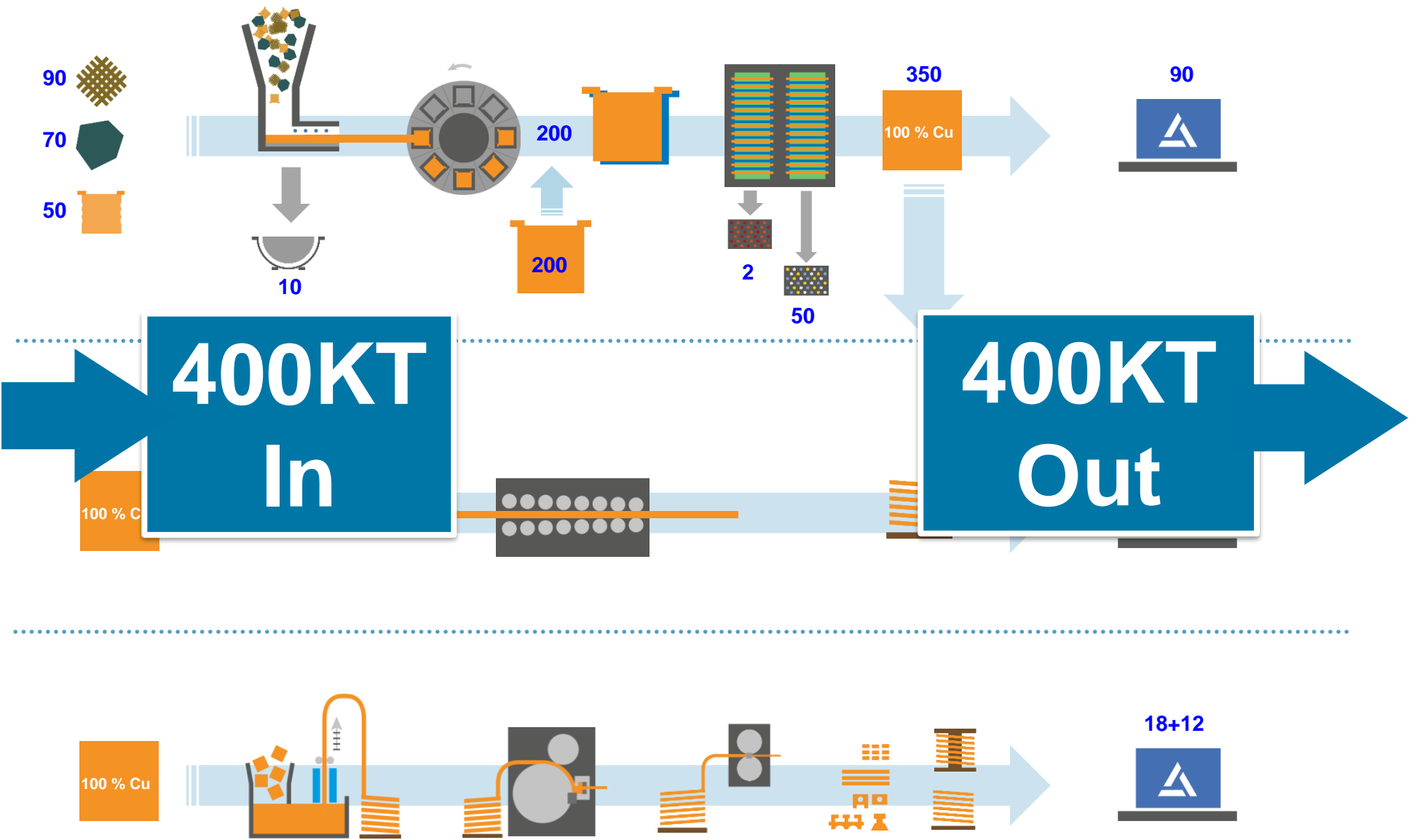


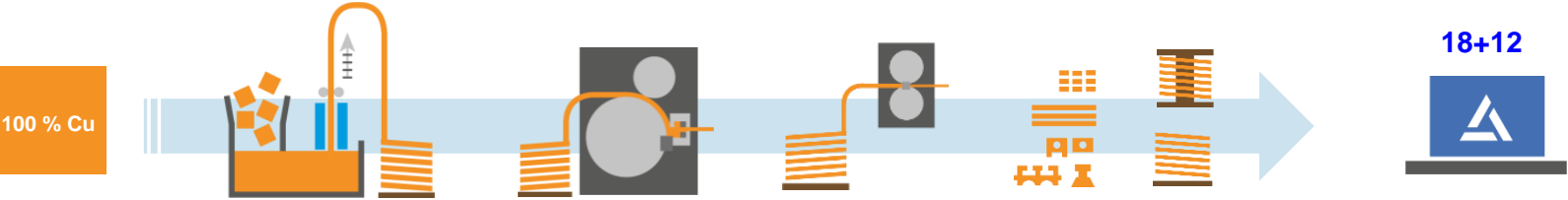
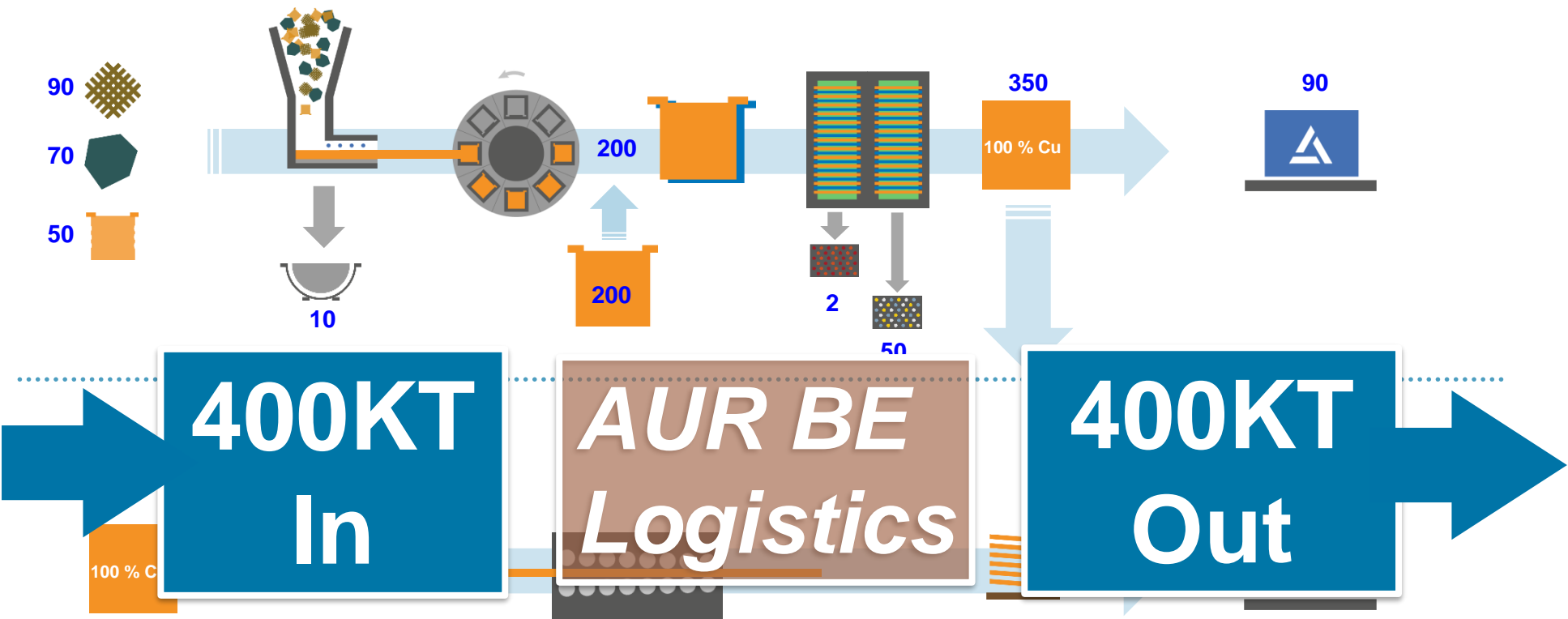


# Business model largely independent of copper price

## Aurubis business model







# Major trends that are important for Aurubis' business



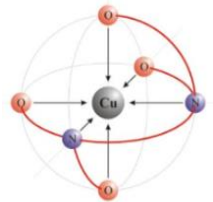
## Rising Copper Demand

Global refined copper demand will increase, compensating for substitution effects



## Multipolar Business World

Emerging countries (especially China) will outpace Western countries



## More Complex Materials

Rising no. of elements and decreasing metal content in primary and secondary raw materials



## Increasing Recycling Efforts

Volume and complexity of recycling materials will rise



## Growing Sustainability Ambitions

Shifting customer values towards sustainability

### Implications

Global expansion of copper production and supply

**Sustainability**

Demand for global delivery and international production platforms

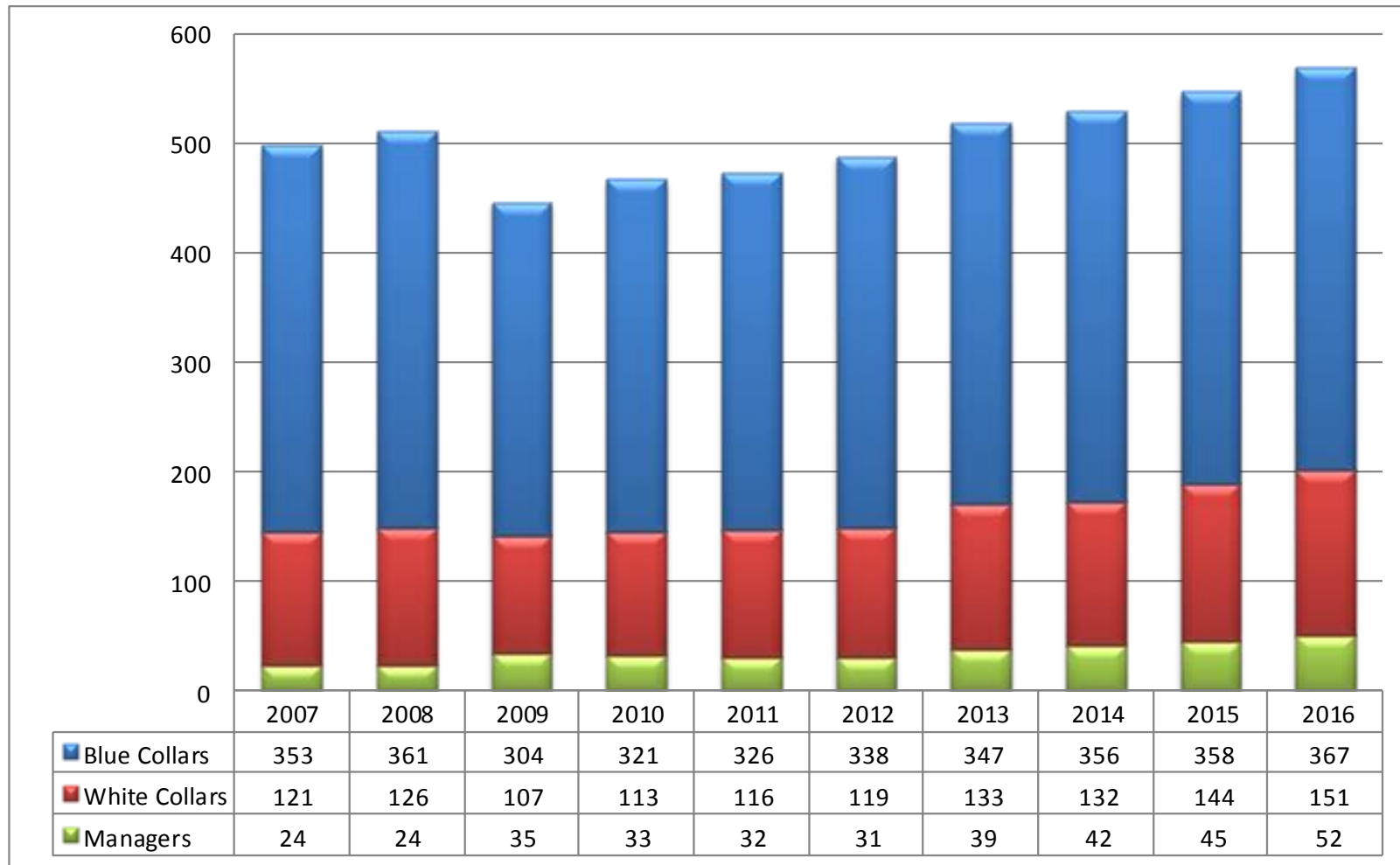
**Globalization**

Requires extensive production know-how, innovative technologies and customized solutions for suppliers

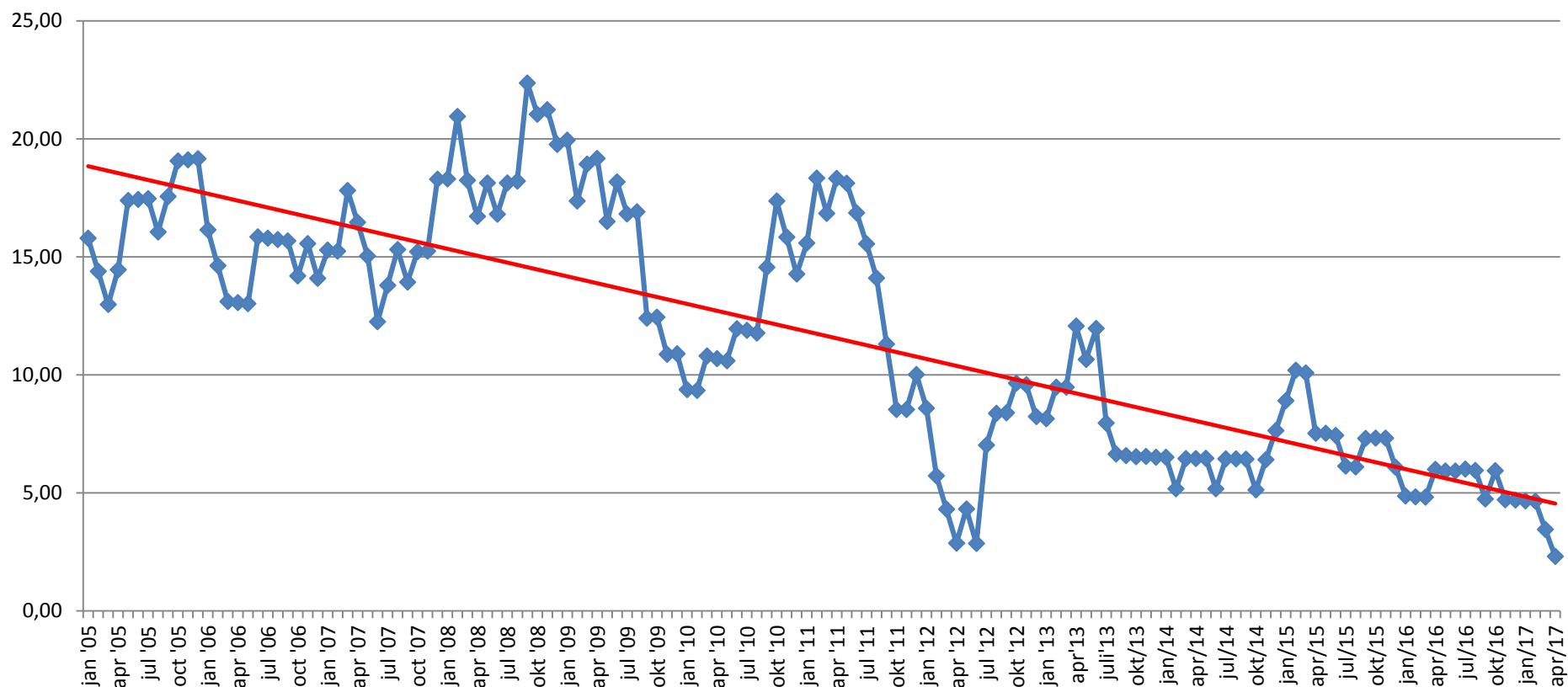
Recycling capacity and capability with high technical standards needed to meet customer and supplier requirements

**Logistic solutions**

Sustainable activities balancing economy, environment and people



LTIFR







# **Aurubis Belgium**

## **Logistics**

# Aurubis Belgium Logistics is a benchmark by location, infrastructure and organisation

## » Olen's great location

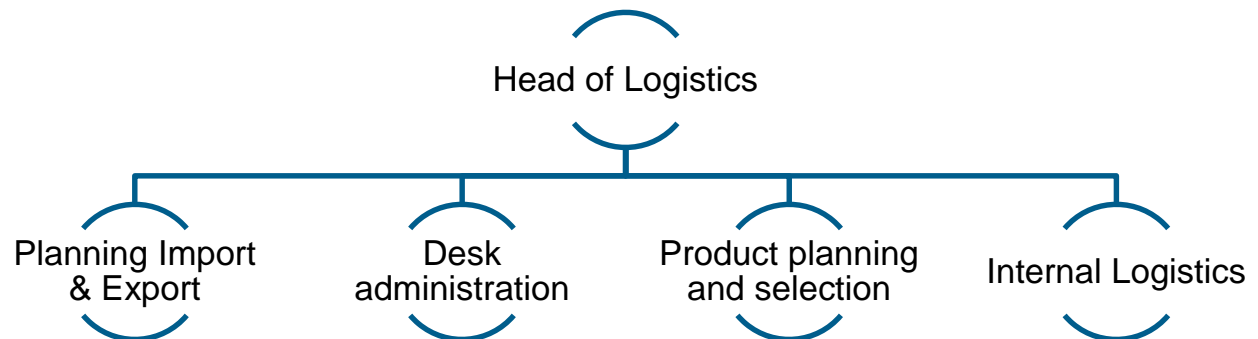
- » 50 km from Antwerp Port
- » 120 km from Rotterdam Port
- » 60 km from Genk Railway Terminal
- » 5 km from main highways

## » Olen's tri-modal infrastructure

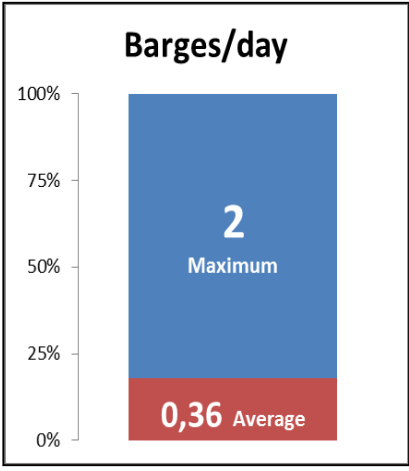
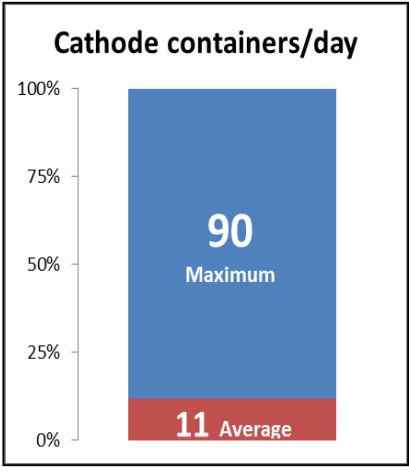
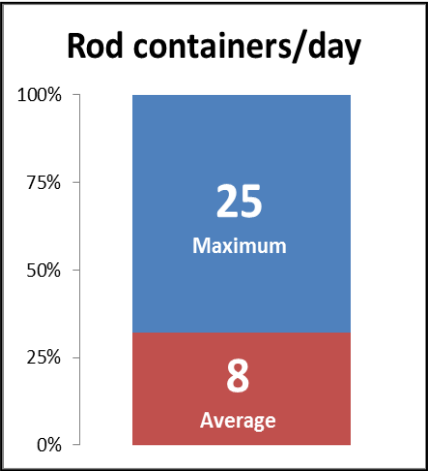
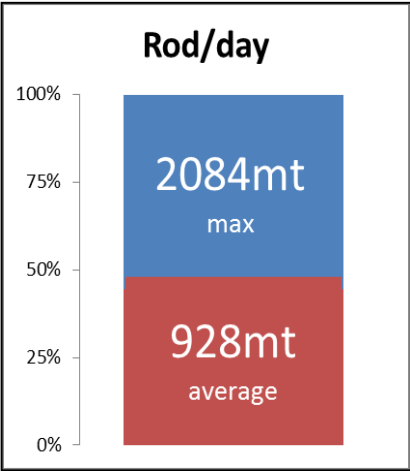
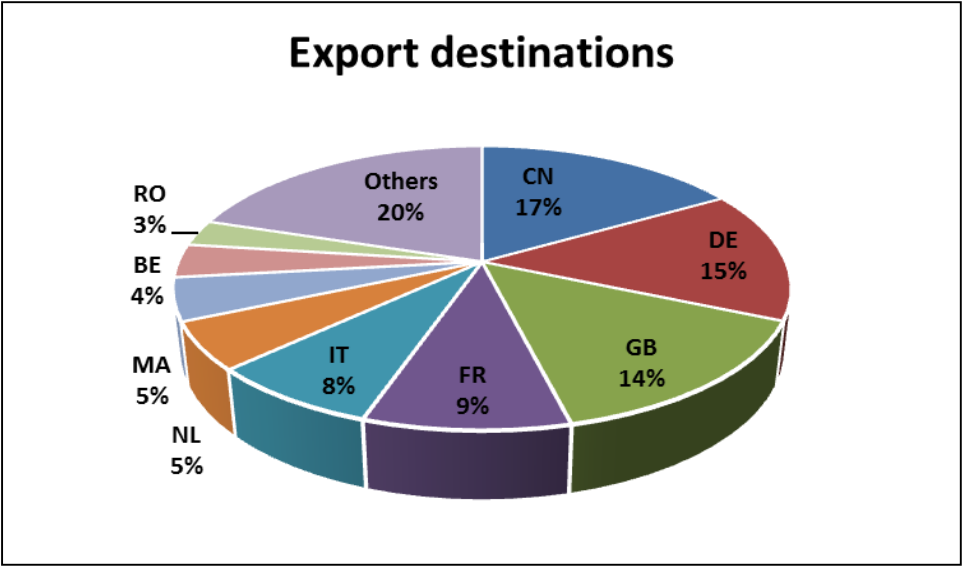
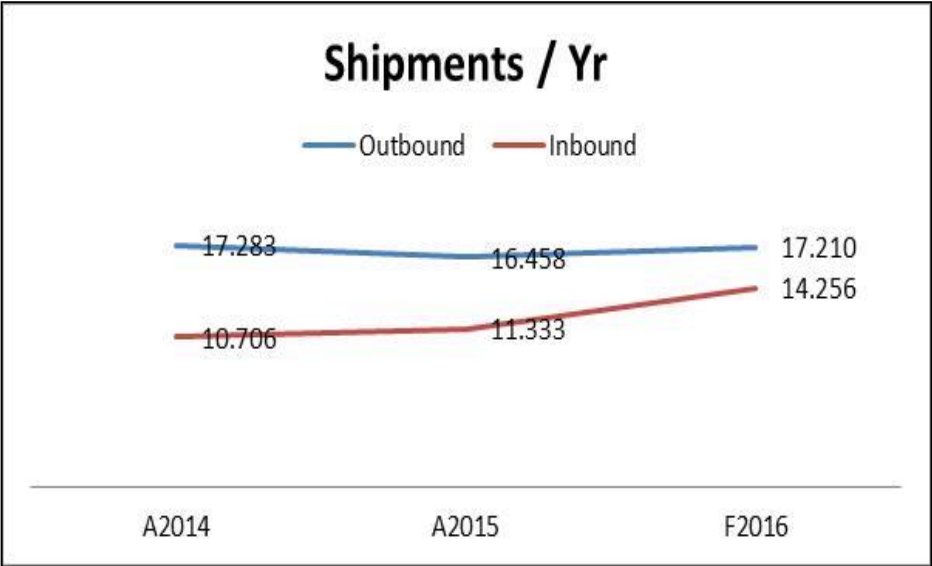
- » Access via road
- » Internal railway connection (Connection to line Antwerp – Aachen)
- » Kanaal Bocholt-Herentals (Connection to Antwerp via Albertkanaal)

## » Olen's organization

- » One department
- » Highly integrated
- » Exchange of knowledge



# Each year we transport around 800.000mt of material



# Our usage of Olens Tri-modality

**RAIL**

**20%**



**Anodes from Pirdop by rail**

**ROAD**

**75%**



**Rod by truck all over Europe**

**WATER**

**5%**



**Anodes via barge from overseas**



**Rod by train to Eastern Europe**



**Blister from overseas via container**

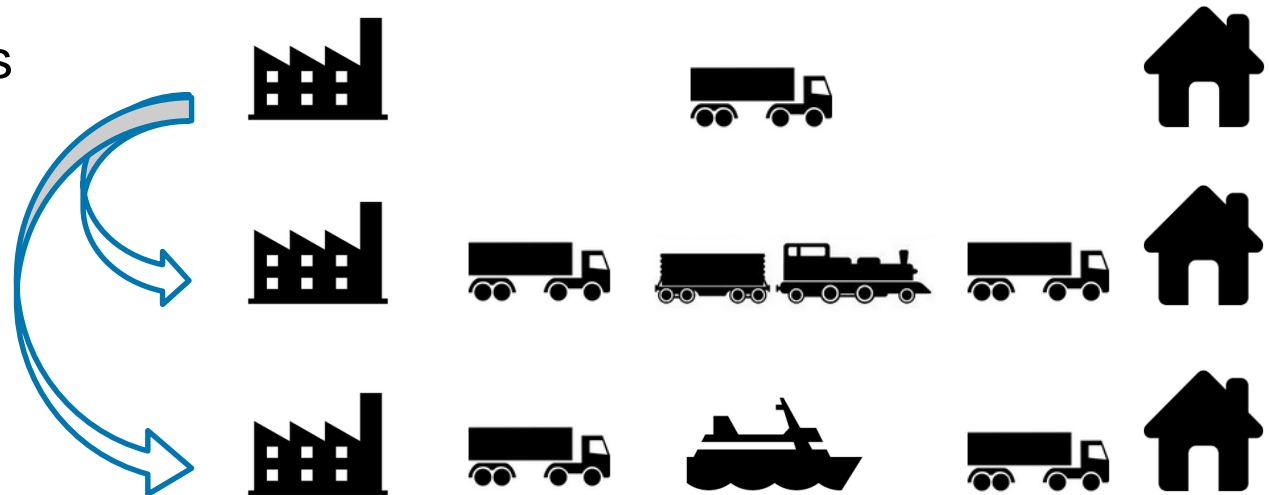
# The past showed a modal shift by transportcompanies

- » Outsourcing the fleet
  - » Lower personnel costs

- » Modal shift
  - » Truck to train
  - » Truck to shortsea

- » Intelligent systems
  - » Information flows
  - » Reports
  - » Fast communication
  - » Low empty kilometres

- » Squeezing the lemon





- » Road congestions
  - » Less km/day covered
  - » Same volume to be covered
- » Bigger distances to cover
  - » General move to eastern-Europe
- » Lack of (skilled) drivers
  - » High personnel costs
- » Restrictive laws by governments
  - » Taxes
  - » Less operational time



- » “Driverless” transport
  - » Material carrier as starting point
  - » Raising tons or volume per driver
  - » Investment in infrastructure
  
- » Giving up the link between driver and information
  - » Payment terms and transfer of ownership
  
- » Following the path of the regulations
  
- » Logistics as enabler
  - » Intelligent placed hubs, warehouses, big volumes, steady lanes,...
  - » Collaboration instead of providing services

# All Supply Chain Solutions brought forward must meet five key criteria

---



## RELIABLE

- Guaranteed for long time
- Well-known and established partners
- All kinds of risk to be avoided

## FLEXIBLE

- Quick response to peak volumes
- Multi-functional

## SUSTAINABLE

- Long term cooperations
- Set-up of a direct link
- Using standards
- Focus on big flows

## ENVIRONMENTAL FRIENDLY

- Reduced impact on environment
- Reduced impact on neighborhood

## USER FRIENDLY

- Lean
- Minimal impact on workload for all parties involved

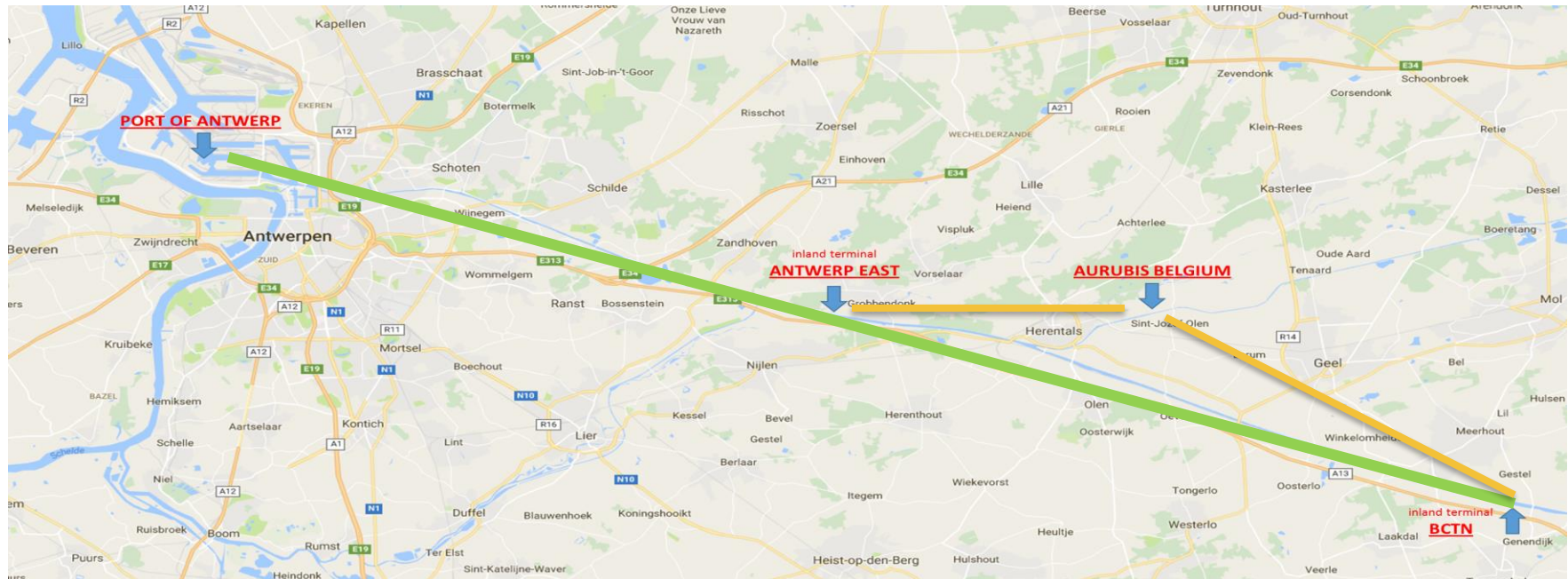
***“We do not simply transport from A to B but we take the whole supply chain in consideration for each decision. Therefore we strive for the multi-purpose use of each investment in order to guarantee the most cost-effective solution for the total material flow.”***



# **Container Project**

## **An New Way of Handling Container Transport**

- » The transport of all inbound and outbound containers between Aurubis Belgium and the Port of Antwerp + the handling of containers after arrival with Aurubis Belgium



# Numbers of the current flows

**50%-50%**



split inbound-  
outbound

container with Rod

**+100%**



in 4 years

**10.000**



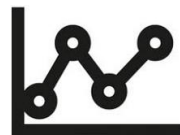
containers/year

fluctuating volumes

maximum

**108**

containers/day

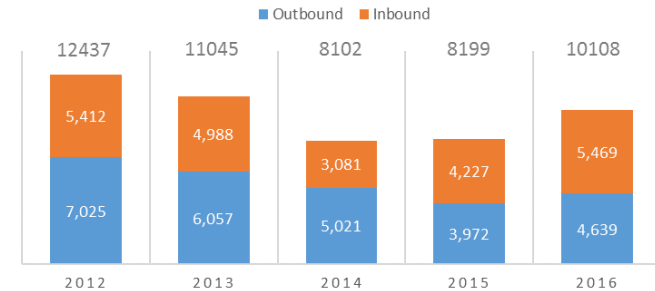


average

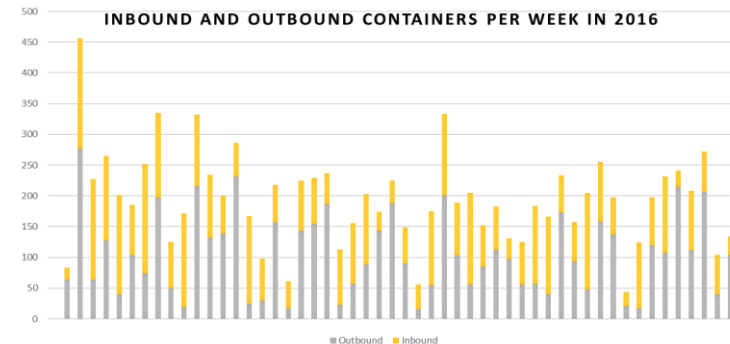
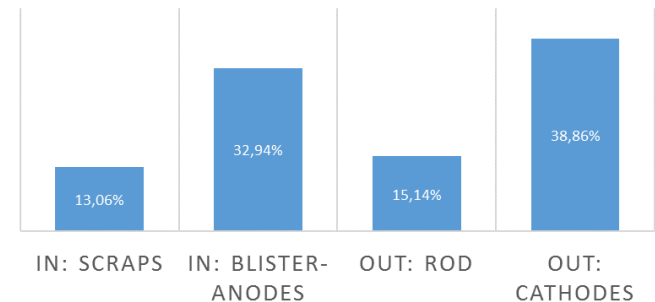
**39**

containers/day

IN- & OUTBOUND CONTAINERS  
HANDLED BY AURUBIS BELGIUM



DISTRIBUTION PER PRODUCT

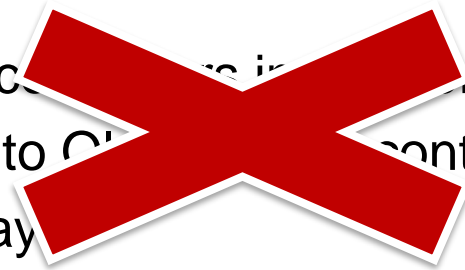


1. High impact on workload and number of FTE's
  - A. Individual processing
  - B. Limited to openingshours
2. High impact on environment and neighbourhood
  - A. CO<sup>2</sup> emission
  - B. Impact on local roads
3. High total cost of transport
  - A. Low volume and high labour costs per transport unit
4. Lack of capacity
  - A. Congestion
  - B. Transport legislation



## 1. RAIL

- Centralisation of containers in port of Antwerp
- 1 dedicated train to Oostende 10 containers per train
- 1 roundtrip per day



- Beneficial on workload and FTE's
- Very limited impact on carbon footprint
- Higher transport cost (+15%/container)

## 2. WATER

- Barges with max 24 containers per barge (max 16 full)
- A. Direct to the terminals in the port and/or centralisation in Antwerp
  - 7 barges in roundtrips
- B. Centralisation at inland terminal
  - 2 barges in roundtrips
  - 4 boxes and one pusher in roundtrips

## Partner choice based on the five key criteria for supply chain solutions

	INLAND	ANTWERP
Reliable	+	-
Flexible	++	+
Sustainable	+	-
Environmental friendly	=	=
User friendly	(+)	

» No final decision made yet but we are in favour of a certain option...



- » Building complete new terminal next to our existing quay
  - » 7000m<sup>2</sup> - room for 250containers
  - » Moving loading operations
  - » Efficient workload planning
- » PPS (???)



- » Loading and unloading multimodal boxtrailerbodies directly from trains
  - » For transport to UK, Italy, Spain, Austria
  - » +30% of our truck transport = 2000 trucks

- » Easy, cheap and reliable transport AND storage capacity in case of intercompany flows
- » Swap bodies via barges





# Aurubis Olen: Aerial View

