

**SET
PLAN**
Conference
2015

Research, innovation
and competitiveness
for the Energy Union

**INDUSTRIAL EFFICIENCY
IN ENERGY-INTENSIVE INDUSTRY**

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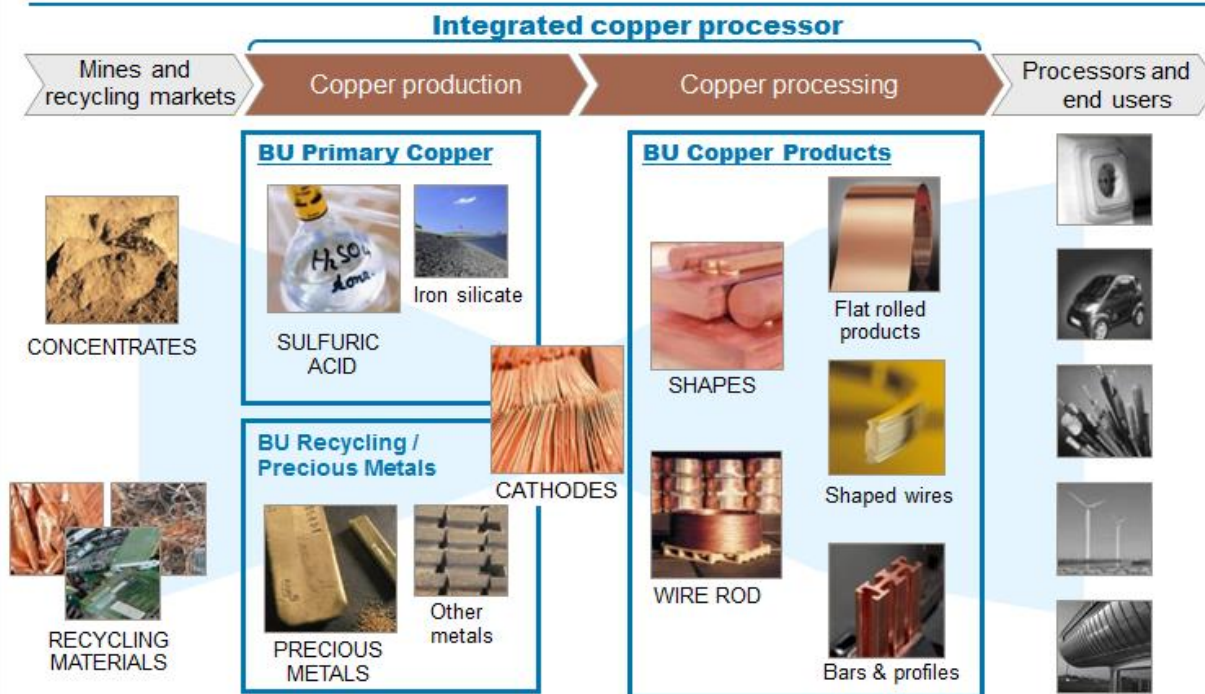
SESSION 5

Efficient energy systems
Tuesday 22 September 2015



- 1 Aurubis & IFIEC
  - 2 Innovative actions for Energy Efficiency Improvement at Aurubis
  - 3 Result : Lower Specific Energy Intensity and Lower Specific Emission Intensity
=> One of the best performers in the world
  - 4 Other Actions for Improvement
  - 5 Some Considerations
  - 6 Summary
- Back-up slides

Aurubis, an integrated copper processor





Aurubis Group production sites

Production sites



Copper production

BU Primary Copper

- » Hamburg DE
- » Olen BE
- » Pirdop BG
- » Röthenbach DE

BU Recycling / Precious Metals

- » Fehrbellin DE
- » Hamburg DE
- » Lünen DE

Copper processing

BU Copper Products

- » Avellino IT
- » Buffalo US
- » Dolný Kubín SK
- » Emmerich DE
- » Hamburg DE
- » Mortara IT
- » Olen BE
- » Pori FI
- » Smethwick GB
- » Stolberg DE
- » Zutphen NL

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

Past Energy Savings Actions- 1

- Optimisation of the charge composition to generate maximum exothermic heat.
- Regenerative burners, recuperative burners, heat exchangers and boilers to recover the heat.
- Reducing the water content of feed material. Pre-drying of raw materials reduces the energy consumption during smelting because evaporation of water at low temperature requires less energy compared to high temperature processing. These measures shall be balanced with need to keep certain moisture content of materials in order to prevent dust emissions.
- Use of effective furnace lining and insulation at installations at high temperatures. Insulation of steam pipes and hot-water pipes.
- Pre-heating of the fuel gas and combustion air. The heat of off gases can also be used to heat combustion air and gas through a heat exchanger.
- Hot process gases from melting stages are used to heat up the incoming furnace charge. Example is the use of shaft furnace where charge preheating takes place within the furnace.
- Recirculation of waste gases through an oxy-fuel burner results in significant energy savings. The burner recovers waste heat in gas, uses the energy content of the contaminants and removes them.

Past Energy Savings Actions- 2

- Oxygen enrichment of combustion air for smelting decreases the consumption of fossil fuels and associated direct emissions. Waste gas volumes are decreased allowing use of smaller fans. Oxygen manufacture requires the use of electricity so a careful energy and emissions balance must be made.
- Installation of high efficiency electric motors for e.g. fans, equipped with a frequency drive
- Use of Waste – Heat – Boilers (WHB) to recover energy and to produce steam. This steam is used for heating process air or steam dryers, driving smelter blowers or compressors, generating electricity or process heating other plants.
- Steam produced by recovering excess heat from an anode furnace is used to heat the electrolyte in refineries and/or to produce electricity in a co-generation installation.
- Insulation and covers of electrolysis tanks decreases heat losses and decreases consumption of heat necessary to maintain the temperature.
- Use of the excess heat that is produced during smelting or converting process to melt different qualities of scrap without the use of additional fuel.
- Use of recycled copper in smelting process improves the energy balance proportionately. Due consideration has to be given to variation in quality and availability of secondary materials
- During the smelting of electronic scrap the combustible plastic content contributes to the energy that is used in the smelting process and reduces the amount of fossil fuel that is needed

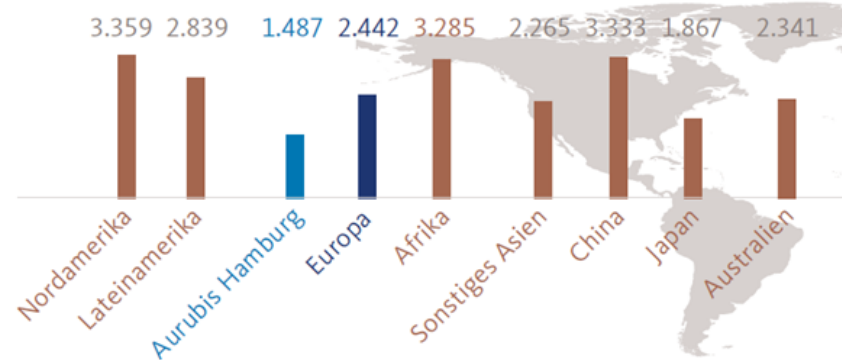
Turbine for waste heat recovery



Aurubis – leading in Energieefficiency



in GJ/t Kathode in 2010



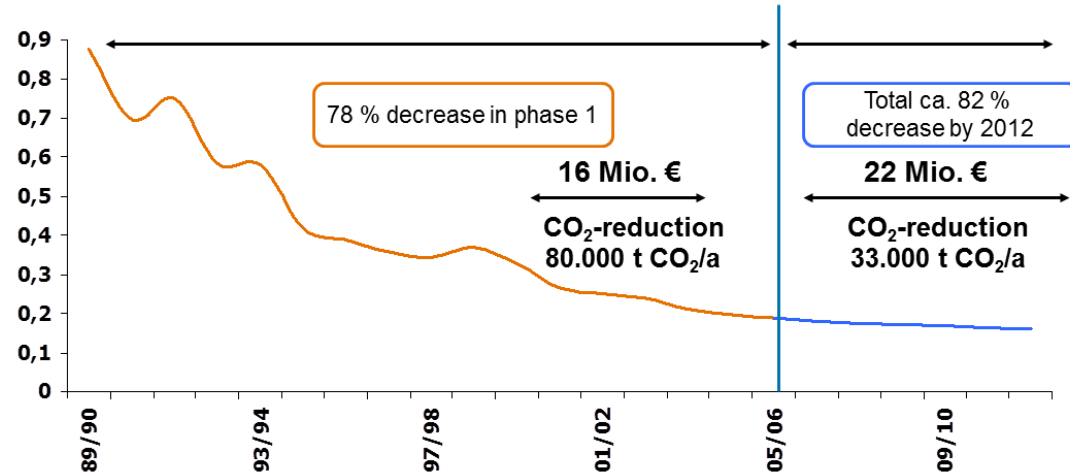
Source: Brook Hunt, a Wood Mackenzie Company Copper Refinery Cost Service –
Summary and Analysis – Februar 2012

Quelle: Energieeffizienz in der Kupferindustrie, Nachhaltigkeitsbericht 2013

CO₂-Savings potential is close to technological and physical limits



Specific direct CO₂-Emissions Aurubis Hamburg (in t CO₂/t Kupfer)



Aurubis committed to decrease by 2018 further 12.000 tCO₂ /a in Hamburg site.

2. Online monitoring

- This is often used for the most important energy flows and combustion processes at the site. The data are stored for a long time so that typical situations may be analysed.

3. Reporting and analysing tools:

- Reporting tools are often used to check the average energy consumption of major processes. An energy controlling system offers the possibility of comparing actual data with historical data.

4. Energy Audits:

- These audits are a crucial tool to identify cost effective energy savings opportunity.

5. Under consideration:

- Increasing flexibility of demand
- Providing waste heat to the district heating networks
- Further optimisation along the value chain by contributing to the circular economy.

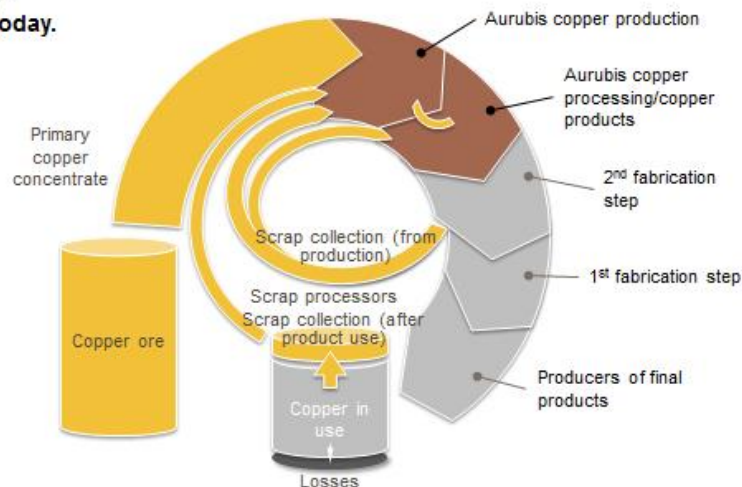
Actions under consideration need,

- 1 **Waste Heat Recovery** and supply to district networks will be possible if the District Heat Networks infrastructure are upgraded by new investments. At the moment waste heat can not compete with other sources of heat.
- 2 Decarbonisation and Energy efficiency must be put in **perspective** with **materials extraction efficiency**
  - => extracting more materials from complex primary or secondary raw materials require more energy and produce more emissions
- 3 **Develop** cost effective large scale **electricity storage**
- 4 Decarbonisation and energy efficiency need to be considered in combination with the other objectives of EU such as **circular economy**
  - => **proportionately low carbon cost burden**
  - => effective implementation of **waste export prevention**

**The target must be a far-reaching, closed value chain
and increasing sustainability**



Our Copper for your Life:
**We successfully produce the future –
tomorrow even more responsibly than today.**



Summary

- 1 Aurubis is among one of the best performers in the Energy Intensive Industries, represented by IFIEC
- 2 Energy is a core-cost, innovation for energy saving is a must and not an option, to remain competitive
- 3 Result : Lower Specific Energy Intensity and Lower Specific Emission Intensity
- 4 Future improvements require higher investments and are not economical with current technologies.
- 5 Waste Heat Recovery and supply to district networks will be possible if the District Heat Networks infrastructure are upgraded by new investments.
- 6 Decarbonisation and Energy efficiency must be put in perspective with materials extraction efficiency and circular economy.

SET PLAN Conference 2015

Country	Federation	Logo	Webpage
 Belgium	FEBELIEC		Federation of Belgian Industrial Energy Consumers
 Bulgaria	BFIEC		Bulgarian Federation of Industrial Energy Consumers
 Czech Rep.	SVSE		Sdružením velkých spotřebitelů energie
 Denmark	FSE		Foreningen for Slutbrugere af Energi
 Finland	EIFI Oy		EIFIOy
 France	UNIDEN		Union des industries utilisatrices d'énergie
 Germany	VIK		Verband der Industriellen Energie- und Kraftwirtschaft e.V.
 Greece	UNICEN		Hellenic Union of Industrial Consumers of Energy
 Hungary	IEF		Ipari Energiafogyasztók Fóruma
 Italy	AICEP		Associazione Italiana Consumatori Energia de Processo
 Netherlands	VEMW		Vereniging voor Energie, Milieu en Water

IFIEC Member Federations

 Norway	FNI		Norsk Industri
 Poland	IEPiOE		IZBA ENERGETYKI PRZEMYSŁOWEJ I ODBIORCÓW ENERGII
 Portugal	APIGCCE		Associação Portuguesa dos Industriais Grandes Consumidores de Energia Eléctrica
 Spain	AEGE		Asociación de Empresas con Gran Consumo de Energía
 United Kingdom	EIUG		Energy Intensive Users Group



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INDUSTRIAL EFFICIENCY IN ENERGY-INTENSIVE INDUSTRY



Annex 1: Company profile

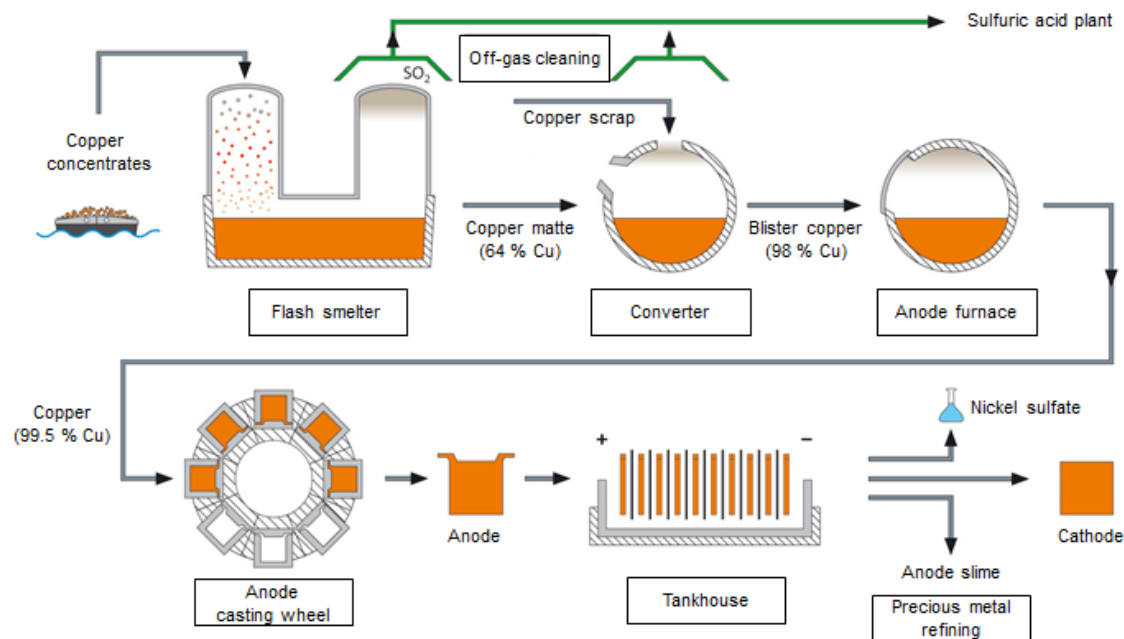


- » Founded in 1866 as Norddeutsche Affinerie AG in Hamburg
- » IPO in 1998
- » Renamed in 2009 after the acquisition of Cumerio

Aurum + Rubrum = the red gold = Aurubis

- » Production sites in European countries and North America with about 6,500 employees
- » Third largest producer of copper cathodes in the world with an annual output of about 1.1 million t of copper cathodes
- » No. 1 copper recycler in the world
- » Largest rod producer in the world
- » One of the world's leading copper foil and flat rolled product manufacturers
- » Production capacities for approx. 1.3 million t of different copper products
- » Global leader in environmental protection

Annex 2: Primary copper production process



**Aurubis recycling turns secondary raw materials
into first-class products**



Copper
scrap



E-scrap



Shredder
materials



Printed
circuit
boards



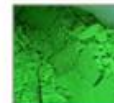
Slimes,
industrial
residues



Best available
technologies



Grade A
copper
cathode



Nickel
sulfate



SnPb alloy



Anode slime
(precious metals)



Zinc-bearing
KRS oxide



Iron silicate
sand