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Addendum proposal for the emerging techniques section of Copper and ferro-alloys

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INTRODUCTION

Heat recovery is present in the BREF rev 3 of Non-Ferrous Metal Industries in the BAT conclusions (general, copper, alumina, lead and tin, zinc, ferro-alloys and nickel)[1], and in some cases it is also specified that the recovered heat can be used to produce electricity (copper, zinc and ferro-alloys).

In the entire document there is only one explicit reference to the Organic Rankine Cycle (the table without number and title at pag. 984, in 9.3.8.1 "Recovery of heat from semi-closed furnaces"), within the techniques that have to be to considered in the determination of BAT for ferro-alloys.

In this context of high international competition, growing energy prices and rising climate change awareness, the energy efficiency and the recovery of wasted energy are a central topic, not anymore limited to the industries under IPPC and emission trading.
If there are no internal or external uses of the recovered waste heat, its conversion in electricity is an option that must be evaluated.
The Organic Rankine Cycles (ORC) generators accept low grade heat, operates fully automatically in all working conditions with good performances also at partial loads. Those cycles are spreading for the electricity generation from waste heat recovery in various sectors, with new plants built in the last 5 years in cement (2 plants in Europe and 1 in Mediterranean area[2]) and in the flat glass manufacturing (2 plants in Italy[3]).
At the moment there are no installations in the field of non-ferrous metal industries, but there are a number of feasibility studies in ferro-alloys (silicon metal, ferro-manganese, ferro-chrome) and copper (primary copper smelter and rolling mill), some at an advanced stage.

Economic benefits need to be evaluated case by case, since they are related to the price of electricity and the availability of supporting schemes for waste heat recovery or innovative systems.

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[1] General BAT conclusions 14.1.2 "Energy management", Copper 14.2.3 "Energy", Alumina 14.3.2.1 "Energy", Lead and tin 14.4.2 "Energy", Hydrometallurgical zinc production 14.5.2.1.1 "Energy", Ferro-alloys 14.7.2 "Energy", Nickel 14.8.2 "Energy"

[2] Turboden references, www.turboden.eu

[3] Waste heat recovery expertise, D. Forni, Glass WorldWide August 2013

Environmental benefits due to the lower electricity consumption have to be evaluated on country basis considering the average emission factor for electricity generation.

1. ADDENDUM PROPOSAL

The following addendum are proposed in the sections of emerging techniques:

3.4 Emerging techniques

The following techniques are emerging techniques, which means that these techniques are not fully implemented in the copper industry:

Heat recovery in primary copper smelter and rolling mill for electricity generation via ORC modules with sizes ranging from hundreds of kW to various MW.

9.4 Emerging techniques

The following techniques are emerging techniques, which means that these techniques are not fully implemented in the ferro-alloy industry:

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Heat recovery from submerged arc furnace for electricity generation via ORC modules with sizes ranging from hundreds of kW to various MW.