

**Abstract to:****Topic:****Authors:**

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**Title: System analysis of implementing an OXYFINES concept for residual materials upgrading and use**

In the Swedish ore-based steel industry, much work is put on further increasing the recycling of in-plant residual materials, thereby making use of valuable contents, and minimising the landfilled amounts. However, blast furnace sludge is one residual currently put on landfill or long-term storage. Although the sludge contains substantial amounts of valuable elements, such as iron and coal, all freshly generated sludge is today deposited in settling ponds at the production sites. The reason for this is the zinc content in the sludge which due to process related restrictions makes it unsuitable for a direct recovery to the existing in-plant processes.

Linde has developed the OXYFINES technique which is suitable for upgrading zinc containing fine particulate materials, i.e. dust and sludge, thereby generating usable products. In the OXYFINES process the components such as zinc, sulphur and alkalis are vaporised at various degrees to a generated dust phase, whereas other non-gasifiable contents in the BF sludge, such as iron, forms an oxidic sinter phase in the bottom of the reactor. The generated zinc dust is intended as a raw material in zinc production and the sinter product is intended for use as raw material in steel production (i.e. blast furnace or basic oxygen furnace).

In this research work, system analysis was performed with the aim to assist in the assessment of possibilities for an implementation of an OXYFINES concept at the steel production site for upgrading of blast furnace sludge. The calculations were made based on one option for a full-scale OXYFINES concept for indicating the effects on blast furnace zinc load, raw material, energy and CO<sub>2</sub> from using the OXYFINES sinter product as a raw material in blast furnace ironmaking or in the basic oxygen furnace steelmaking processes. The summarised system analysis results showed that the optimal metallurgical, environmental, and economic potential was realised in the calculations of using the sinter in the basic oxygen furnace. However, the sinter was found equally suitable for use in the blast furnace when considering mainly the metallurgical and the economic effects.