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Topic: Recycling of in-plant residues

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Title: OXYFINES technique for upgrading zinc containing blast furnace sludge

In the Swedish 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. In Swedish ore-based iron production, i.e. SSAB steel plants, roughly 20,000 tonnes of blast furnace sludge (dry weight) is generated annually in the off-gas treatment system. Despite valuable contents in the blast furnace sludge, such as iron (ca. 35%) and coal (ca. 25%), it is currently deposited due to its zinc content and concerns regarding the allowed blast furnace zinc-load.

AGA 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. The material is fed to an Oxyfuel burner whereby its zinc content is evaporated to a zinc rich dust, intended as a raw material in zinc production, and the non-gasifiable contents, such as iron, forms a zinc free product for utilisation as a raw material in the steel production. The technique is relatively flexible, simple and cost-effective and has been shown to have a high degree of zinc separation and for which sludge pre-treatment, such as drying, is not required.

Pilot set-up and trials using the OXYFINES technique were performed at Swerim's research facility during the year of 2019. In the trials the effects from altering different process parameters were tested and analysed to develop an optimised concept for upgrading the blast furnace sludge. The pilot trials' results showed the required process settings to attain a high degree of zinc separation from the sludge, and to generate an iron oxide product, with ideal characteristics for straightforward charging to the steel production processes, i.e. blast furnace or basic oxygen converter.