

New, greener prospects for steel waste gases

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In a new steel plant under construction, the waste gases generated in steelmaking will be used to produce an eco-friendly transport fuel.

In the iron and steel industry, gaseous emissions are an unavoidable by-product of steelmaking. About 40 percent of the carbon used in

steelmaking leaves the process as carbon monoxide (CO) gas. Generated in blast furnaces and basic oxygen furnaces, the waste gas is either flared or used to produce electricity for steel mills. In either case, the CO is burned and CO₂ is emitted.

An innovative process developed in the EU-funded STEELANOL project has demonstrated a new, greener use for steel waste gases. Coordinated by steel and mining company ArcelorMittal Belgium, the project has shown that these gases can be recycled and fermented to produce bioethanol, a fuel used as an eco-friendly petrol substitute in vehicles.

STEELANOL is demonstrating the significant environmental benefits entailed in recycling waste streams. Reduced emissions at source lead to a smaller direct carbon footprint for steel mills. Furthermore, producing fuel that isn't made from oil keeps fossil fuels in the ground. The resulting ethanol will mainly be used in petrol blending, but also to produce other products, such as jet fuel.

ArcelorMittal has now begun construction of new facilities on its site in Ghent, Belgium. Gases produced from the blast furnace in the Ghent steel plant will be used to make bioethanol in what will be Europe's first-ever commercial-scale production facility. If successful, it may open the way to significant reductions in the steel industry's [greenhouse gas emissions](#). Currently, about a quarter of the global manufacturing sector's CO₂ emissions are generated by the iron and steel industry. Every tonne of bioethanol produced in the new plant is expected to supplant approximately 830 litres of petrol and reduce ArcelorMittal's CO₂ emissions by 2.3 tonnes.

The novel technology making this gas conversion possible was developed by project partner and carbon recycling company LanzaTech. In a pioneering gas fermentation process, anaerobic bacteria feed on the CO

in steel waste gases to produce bioethanol. This process has no impact on water, food, land use or biodiversity.

"Single-use carbon must become a thing of the past," said Jennifer Holmgren, CEO of LanzaTech, in a news release posted on the STEELANOL website. "In order to succeed in decarbonising our economy, we will need the commitment of large companies and governments from around the world to ensure carbon reuse is part of the solution. This facility in Europe embodies the key principles of the circular economy and drives to a zero-waste [steel](#) production world."

Once completed, the Ghent facilities are expected to produce around 80 million litres of [bioethanol](#) annually. The greenhouse gas impact of this production is believed to be more than 65 percent lower than that of oil-derived fuels. It can be equated with putting 100 000 electric cars on the road each year. Bioethanol production is expected to start by 2020.

STEELANOL has proved this technology's ability to meet the high-quality requirements of fuel-grade fuels. The developed process has the potential to displace a high amount of fossil fuels in the transport sector and beyond.

More information: STEELANOL project website:
www.steelanol.eu/en

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