

# Methanation as a Low-Risk, Low-Emission Pathway for the Integrated DRI-ESF-BOF Process Route — Part 1



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Many steel producers are considering direct reduced ironmaking (DRI) with subsequent hot metal production using an electric smelting furnace (ESF) as a decarbonization strategy. Little attention has been paid to the potential reuse of carbon-containing offgases when the DRI process is co-located with the ESF and an existing basic oxygen furnace (BOF) shop. Methanation of the CO-rich ESF and BOF offgases enables the recycling of carbon contained in these offgases back to the DRI plant as synthetic natural gas. Part 1 of this study focuses on methanation as an innovative way to use H<sub>2</sub> without modifying the operation of the DRI plant, reducing technical risk to the steel plant operator. In Part 2, an economic assessment of the new integrated DRI-ESF-BOF process route is presented.

## Introduction

Direct reduced ironmaking (DRI) is being considered by many steelmakers as an alternative to the blast furnace (BF) to reach near-zero-emission goals by 2050. Fig. 1 shows Hatch's predicted change in steel production routes and the associated iron sources expected by 2050.

Such a rapid shift toward DRI production would strain the already limited supply of DR-grade iron oxide pellets. To meet global demand for green steel, BF-grade iron oxide pellets will need to be used in new DRI facilities.

Two DR-based ironmaking strategies have emerged to decarbonize the steel value chain:

Figure 1

Global iron metallics use by iron- and steelmaking process route, 2020–2050 (Hatch estimate).

