



Stove Oxygen Enrichment Technology

Stove Oxygen Enrichment (SOE) technology is an application that is designed to lower the operating costs of blast furnace stoves.

In blast furnace stoves, some sweetening fuel gas, such as natural gas or coke oven gas, is usually mixed into the blast furnace gas to raise its heating value and achieve the desired blast temperatures. SOE technology, which enriches the oxygen content of the combustion air stream, can provide the same desired blast temperature without the need for sweetening fuel gas. In addition, SOE technology has the potential to further raise blast temperatures.

Typical SOE Benefits

SOE technology offers many potential economic, environmental, and production benefits, including:

- Replacement of high cost fuel gas (e.g., natural gas, coke oven gas) with available lower cost fuel (e.g., blast furnace gas) and oxygen.
- Potential coke savings from higher blast temperatures.
- Lower combustion air requirements and lower waste gas flow.
- Boost stove operation and production when stoves are plugging or failing.
- Potential for carbon dioxide emissions reduction.

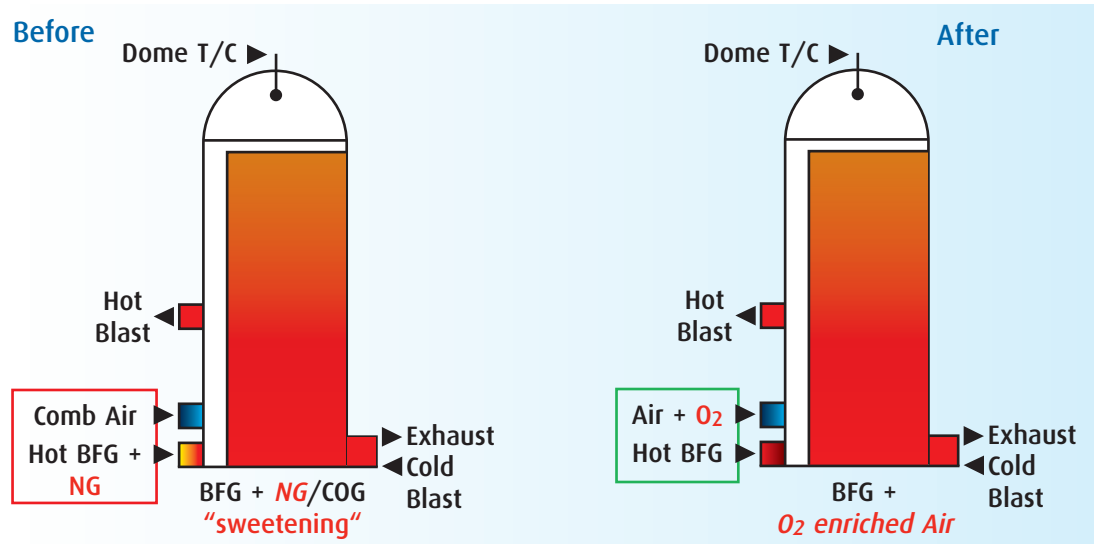


Table 1. SOE Operating Efficiency

Operating Specifications	With Coke Oven Gas Enrichment	With Oxygen Enrichment
Coke Owen Gas Flow	4,000 scfm (105 Nm ³ /m)	0 scfm (0 Nm ³ /m)
Oxygen Flow	0 scfm (0 Nm ³ /m)	4,500 scfm (118 Nm ³ /m)
Combustion Air Flow	48,000 scfm (1,262 Nm ³ /m)	29,000 scfm (762 Nm ³ /m)
Blast Furnace Gas Flow	45,000 scfm (1,183 Nm ³ /m)	69,000 scfm (1,814 Nm ³ /m)
Flame Temperature	2,550°F (1,399°C)	2,550°F (1,399°C)
Waste Gas Flow	89,500 scfm (2,353 Nm ³ /m)	89,000 scfm (2,340 Nm ³ /m)

Table 1 illustrates examples of the operating efficiency that can be realized by using SOE technology.

Table 2. Demonstrated Oxygen/Natural Gas Replacements

Furnace Size	Natural Gas Saved	Oxygen Used
28 ft (8.5 m) hearth diameter; 4,079 ton/day (3,700 tonnes/day) production	1,059 scfm (28 Nm ³ /m)	2,295-3,002 scfm (60-79 Nm ³ m)
45 ft (13.7 m) hearth diameter; (11,023 ton/day) 10,000 tonnes/day production	1,059 scfm (28 Nm ³ /m)	2,295-3,002 scfm (60-79 Nm ³ m)

Project Scope When commissioning SOE technology at the customer's facility pursuant to a contract, Linde typically will:

- Perform a full technical evaluation, including stove simulation modelling.
- Provide spargers to distribute oxygen into the combustion air, upstream of the burners.
- Provide one oxygen flow control skid per stove (three to four total, depending on the number of stoves).
- Modify the control system and human machine interface to include control of oxygen flow.

The Effective Solution SOE technology employs oxygen to replace the use of more expensive natural gas and may substantially lower carbon dioxide emissions. This technology has helped companies to improve production and lower operating costs.

Displaced Coke Oven Gas Replacing coke oven gas and some fuel gas with oxygen allows steel mills to deploy the coke oven gas into other applications, such as:

- Injecting it into the hot blast to replace fuel gas.
- Using it in reheat furnaces to replace fuel gas.
- Using it in power generation plants to produce electricity.
- Bringing up heating value for mills expanding hot metal production without coke-making capacity.

Contact Linde Today For more information about stove oxygen enrichment technology or other metal production applications, call Linde at **1-844-44LINDE**, or visit our website at www.lindeus.com.