

# Technology Options in the Iron & Steel Sector

Five Technology options have been modelled in the Iron & Steel sector of Industry. In general, the default technology option is 1 and other options are denoted by increasing numerals. Increase in the numeral of the technology option is not necessarily an indicator of emissions reduction but in general denotes reduction in energy demand.

## 5. Increased Scrap

This tech option is a major driver for reduction of thermal energy consumption in iron and steel plants. European and Japanese plants are reportedly running with more than 30-50% iron being substituted by steel scrap. The utilization of scrap in steel plants in India is probably less than 3-5% and thus a large potential seems to exist over the long term, if the enabling infrastructure and incentives can be provided along with policy based support. Increased scrap utilization has the potential to significantly reduce the thermal energy consumption in steel plants since the typically 60% of the total energy is used for producing iron and this can be saved through the increased use of scrap in the downstream steel making process.

## 1. Default

This option does not invoke specific tech options and the trajectories are based on the levels which have been chosen and the SEC reductions are based on these chosen levels.

## 2. Switch to Electric Furnace

This tech option studies the impact of a major shift to electric furnace processes instead of the oxygen furnaces which are expected to be dominant in the autonomous/default scenario. Under this tech option a major reduction of the SEC can be expected based on the increased efficiency of the electric processes. A major transfer of efficient electric technologies is estimated giving rise to major improvements in the state of the art of electric processes in the next three decades.

## 3. Increased Gas based Direct Reduced Iron (DRI)

This option characterizes the impact of a concerted drive to increase the penetration of Gas based technologies in the manufacture of DRI. Plants using gas based DRI are under operation in developed countries and such plants have reported very low SECs and high efficiencies. In addition, the emissions from these plants is also much lower than coal based DRI plants. There are very few gas based DRI plants in India primarily due to the low availability of natural gas in the country and the priority mechanisms which are in place to allot the available gas to fertilizer and power plants. In fact, existing gas based power plants have been facing severe shortages of gas supplies with the hampering of operations. This tech option seeks to provide insights into the scenario in which large supplies of gas could be imported or domestically sourced enabled by strong government policy support and such supplies could be made available to steel plants for increased efficiency of use.

## 4. Increased Electricity from the Grid

This tech option models a major switch in the sourcing of electric power in the iron and steel sector. Current trends show that plants are preferring to produce most of their electric power through the use of Captive Power Plants which are largely powered by domestic and imported coal. This tech option provides insights into the impact of a switch to procuring most of the electric power from the grid. This assumes that the grid power would be available and would be reliable as well. Such a switch provides a major improvement in the energy efficiency of the specific plant since the inefficient CPP's energy consumption is now outside the plant boundary. The final energy use could be reduced significantly under this tech option.