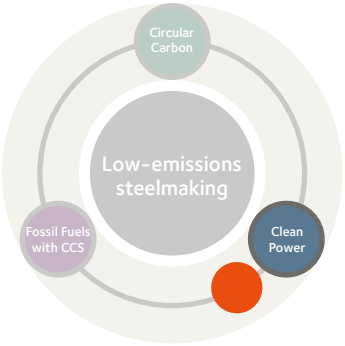
Once affordable clean power is abundantly available, direct electrolytic iron ore reduction becomes a very attractive route. With the Siderwin project, we are building an industrial pilot.



Siderwin: reducing iron ore via electrolysis

In principle, iron can be reduced from iron ore (Fe_2O_3 or Fe_3O_4) through direct electrolysis. When iron ore is introduced into an electrolytic bath (a bath with an electrical current running through two electrodes), the iron (Fe) will be attracted to one electrode and the oxygen (O) to the other.

Our R&D laboratories in Maizières, France, have developed the first electrolytic cell prototype, proving the viability of iron electrolysis. It also showed that the process can operate in a highly flexible start/stop mode, ideal for power grids dependent on large amounts of intermittent renewable power. Moreover, our tests have shown that less power is required than is needed to make hydrogen from water using electrolysis.

ArcelorMittal is the lead company of the Siderwin project, which is further developing this technology. Together with 11 partners and with €7 million funding from EU Horizon2020, a three-metre industrial cell is under construction and various types of iron ore sources (including waste sources) will be tested.

With sufficient access to affordable clean power, the development of this process will pave the way to zero-emissions iron ore reduction.

Figure 11: the Siderwin process