One of the pillars of the global economy, the cement industry, faces multiple pressures to maintain its profitability and sustainability. Environmental regulations and higher cost of energy require an optimum operation to satisfy demand at the lowest cost but still satisfying any business constraints. Over the past decades, cement companies have invested in control systems, process data historians, and instrumentation to be more efficient and competitive in the marketplace. With the arrival of the next generation of manufacturing driven by Industry 4.0, cloud computing and artificial intelligence (AI) offer more opportunities to take the current efficiency to a higher level. This paper describes the implementation of optimal control of the clinker cooler to achieve sustained energy recovery while safeguarding the safety of the operation of this asset and supporting a better operation of the pyro-process.