



Methodology

Manufacturing Sector research

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Manufacturing Sector

Methodology and approach

The manufacturing sector centers on the development of smart factories. There are several types of technologies within a smart factory that can improve productivity, lower energy consumption and reduce CO₂ emissions. Factories are fitted with connected technology and networks to improve overall productivity via automation. IoT sensors are typically fitted to machinery, which can be linked back to analytics suites to analyse very large streams of data in real time. This allows for production capacity to be shifted dynamically and faults to be repaired remotely.

There was a three step process.

1. Forecasts were used from Exponential Roadmap¹ to determine the aggregate amount of CO₂ savings a given industry will need to make over the next 10 years to ensure it remains on track for net zero by 2050. For all sectors, this reduction is equivalent to 50% of 2020 CO₂ emissions
2. Assumptions were made for how much of manufacturing IoT connections are set in factories specifically. An average rate of energy savings per year is then applied to the number of smart factories and combined with the electricity emission factors to calculate a total CO₂ savings associated with smart factories in each region
3. The use case savings over a 10 year period are divided into the aggregate sector reduction (from step 1) to arrive at a contribution share

Research by – [GSMA Intelligence](#) and [Carbon Trust](#)

¹ J. Falk, O. Gaffney, et al. Exponential Roadmap. 1.5.1 (2020) www.exponentialroadmap.org

Key assumptions

Vertical	Use case	Indicator	Trajectory	Supporting data/sources
Manufacturing	Smart factories	Number of smart factories	Total factories in operation worldwide estimated at 9.6 million as of 2020. Using the average IoT density figures, an estimate of 130,000 smart factories were in operation as of 2020, or 1.4% of the global total	WEF, China Statistical Yearbook
Manufacturing	Smart factories	IoT proliferation	Assume approx. 420 million IoT connections in smart factories worldwide as of 2020, rising 40% per year to 2.1 billion by 2030	GSMA Intelligence
Manufacturing	Smart factories	Energy savings	Assume energy savings of 15% per year on average for smart factories	Bosch, Nokia (Oulu factory)

Source: GSMA Intelligence & Carbon Trust



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