



Electronic Products

High Risk Sector



Manufacture of electrical equipment and machinery linked to electrical devices.
 For manufacture of mechanical machinery refer to the related 'Metal Products and Machinery' or 'Precision Instruments' sectors.



Related Sectors:

- Iron, Steel and other Metals
- Metal Products and Machinery
- Precision Instruments

Production Processes

The main components produced and processed in the electronic industry are resistors, capacitors, transistors, integrated circuits, diodes and coils. Finished electronics goods may also contain electrical components, such as transformers.

Industrial processes involved in the manufacture of the basic **electronic components** include metal cutting, metal degreasing, welding, riveting, bolting, gluing, polishing, lacquering, filling of condensers and transformers, etc. A wide range of metals, plastics and chemicals serve as raw materials in the production of electronic elements.

To manufacture **semiconductors**, an ultra-clean, dust-free working environment has to be established. The production process starts with growing silicon crystals and making ingots, which are then sliced and cleaned. This is followed by photolithography or etching techniques to imprint a pattern on the silicon wafer. Chemical developers then remove unnecessary coatings. After etching, rinsing and drying of the boards, dopants are added to increase electrical conductivity. Now the wafer surface can be coated in thin layers of metal. A final layer of oxide seals the circuit. After extensive testing the chips are mounted on a metal frame and connected to strips.

Many firms in the electronics sector supply circuit boards as semi-manufactured products. Assembling electronic components such as resistors, semiconductors, etc. on the raw printed circuit boards may involve large amounts of manual labor or highly automated technology.

Typical **finished goods** supplied by the electronics industry are televisions, radios, computers, pocket calculators, communications equipment, etc. Most electrical devices, vehicles and any kind of industrial equipment contains electronic components.

Sustainability Issues

	Energy
	Water Use
	Emissions to Water
	Waste
	Emissions to Air
	Ecosystems
	Workplace Health & Safety
	Disaster Risk
	Site Contamination

Sector Rating

- High risk issue
- Medium risk issue
- Low risk issue

Risks & Opportunities

- **Wastewater and liquid waste may contain toxic substances which present a risk to water quality.**
 Potential water pollutants are: Solutions and sludges from electroplating (containing heavy metals, cyanides, fluorides, etc.), chlorinated solvents used for degreasing, PCBs, paint sludge, acids and alkalis, photochemicals.
- **A contamination of property presents a risk to its value, to human health and to the environment.**
 Spills of liquids in production and disposal of liquid waste may contaminate buildings and the ground. This may present a risk to groundwater resources or to human health. Clean-up costs may be considerable. The market value of contaminated property may be impaired. Contaminations can be avoided by training of staff and technical measures.
- **The main risks to workers' health are: Noise, exposure to metal dust and fumes (e.g. from welding), heat and vapours from metal working fluids.**
 Training, adequate process and workflow design as well as state-of-the-art protective equipment keep these risks to the health and lives of workers to a minimum level.
- **Part of waste will be recyclable (recoverable metals), part of it may be hazardous.**
 Examples of (hazardous) waste that must be disposed of appropriately: Oil and grease, solvents and degreasing fluids, sludges from electroplating and wastewater treatment, insulating oil containing PCBs, dust from ventilation filters. Recycling and appropriate disposal of hazardous waste improve efficiency and minimize environmental impacts.