



CBI
Ministry of Foreign Affairs

CBI Product Factsheet:

Electronic Components for RFID in the UK, Germany and the Netherlands

Introduction

RFID (Radio-Frequency Identification) systems have a wide range of applications for industrial, commercial and consumer use. Passive and electromechanical components, embedded sub-assemblies and software as well as other electronic and electrical engineering products are used in RFID. The penetration of RFID is growing in smart manufacturing and supply chain management for process optimisation benefits. Since high-tech RFID is cost-intensive in Europe, Original Equipment Manufacturers (OEMs) are increasingly buying hardware or low-tech products from low-cost production countries.

Product Definition

RFID (radio-frequency identification) systems include RFID transponders (also known as tags), RFID readers, RFID cards, as well as software (embedded system or sub-system).

- RFID transponders contain a minimum of 2 parts: a microchip (85421112, 85421114, 85421116) and an antenna (HS code 85438100). RFID transponders can be read-only (information stored can be recorded during manufacturing and cannot be modified) or read-write (a tag with which memory can be modified). Moreover transponders are active or passive. Latter do not have an own power supply while active transponders have. Active transponders are the high-tech products among RFID transporters, because they able to operate on much larger distances which is still a challenge for RFID.
- An RFID reader, also called transceiver, communicates with the RFID transponder. The RFID reader broadcasts a radio signal, which is received by the tag, while the tag transmits its information back to the reader.
- The RFID system is supported by software. RFID-specific software translates the data received from the tag into information. For read-write tags, software controls data transmission and changes the tag's data. Software is regularly used to support SPS/SCADA, MES, ERP, eKanban as well as robotics applications, for inventory and material tracking, quality assurance as well as for subsystems of additional processes and applications.

RFID systems are currently used in automotive (locking system), government/public (passport, ID cards), transport and logistics (track and trace solution) retail (inventory tracking), healthcare (inventory control of medications, high-value supplies and other medical supplies, patient tracking and document and data file tracking), pet and animal identification (implanted tags), and sports (results tracking and accuracy in sports, e.g., location of a ball on a football field). RFID is increasingly penetrating the supply chain and (smart) manufacturing.

The leading suppliers of RFID in Europe are [ams](#), [Fraunhofer](#), [Laird Technologies](#), [Mitsubishi Materials](#), [Murata](#), [Neosid](#), [Smartrac](#), [Barco](#), [IDTronic](#), [NXP](#), [Intel](#). Brand names play an important role in Europe, especially for the high-frequency RFID that is still in the development stage worldwide.

Product Specifications

Quality: European companies are typically looking for electronic components for RFID systems and RFID-specific software. All products must fulfil the specifications agreed between the supplier and the buyer and use up-to-date technology.

- An RFID transponder is characterised by radio frequencies, tag types, and methods of coupling. The RFID frequency band is a key criterion for the product quality and possible application areas.
- RFID readers are usually characterised by the read frequency and read range.
- With the increasing penetration of RFID systems into new application areas and with the introduction of RFID transponders with integrated sensors, the quality of RFID systems can be measured by the signal transmission range for the RFID sensor and the antenna used in the transponder. The transmission range is currently being developed and extended.
- Besides the signal transmission range, there are several ongoing projects investigating the materials that have a negative influence on the transponder antenna's range, and on the quality of data transmission (e.g. the EU-sponsored "SmartFiber" project managed by German Fraunhofer IIS).
- To assure durability and safety, all electronic products must comply with the relevant EU regulations and standards. The materials used and hazardous substances, in particular, have to comply with RoHS and must also meet REACH requirements (see Legislative Requirements in this report).

Labelling:

- All electronic components for RFID are typically labelled with a description of the content, including the following information:
 - type of product,
 - model type,
 - supplier/manufacturer name and location,
 - serial number.

- DEVELOPING COUNTRY exporters have to familiarise themselves with the energy-related products directive Waste of Electrical and Electronic Equipment (WEEE) in order to formulate labels, indicate all product information and mark products accordingly (e.g. the symbol of the crossed-out wheelee-bin).

Packaging:

- Electronic components for RFID are typically packaged in plastic bags and cardboard boxes to protect them from damage.

Legislative Requirements

To assure durability and safety, products must comply with the relevant EU regulations and standards. Compliance with European legislative, as well as non-legislative requirements is a basic necessity for all exporters in the electronics and electrical engineering sector. Below you will find the main mandatory requirements for your products. Make sure you have familiarised yourself with legal requirements in terms of labelling, dangerous substances, product safety and liability. Your products must comply with all EU directives.

Liability for defective products. This liability applies to all products manufactured or imported into the European market. Typically the company that brings the product into the European market is responsible, but a claim can be passed onto the producer or exporter.

Tips:

- Familiarise yourself with standards that specifically apply to your products. To ensure that your products are of high quality, review your quality assurance and testing procedure, e.g. through the implementation of an accredited quality management system (ISO 9001). Carefully formulate labels, instructions for use and disclaimers.
- Make sure your insurance covers product liability. Check EU legislation on liability for defective products in this context. Also consult with EU Export Help Desk and ITC standards map..

CE marking. With a few exceptions, all electronic components or embedded systems sold to RFID system (transponders, readers) manufacturers must be marked with the CE mark. When electronic components are sold as a sub-system or part of a finished product, they do not legally require a CE mark, however, market requirements mean that nearly all customers will still demand the CE mark for most components, particularly if the components are critical to the application. The following directives may be relevant for exporters of electronic components for RFID systems:

- Electromagnetic compatibility (EMC Directive 2004/108/EC).
 - Low voltage equipment (LVD 2006/95/EC)
 - Ecodesign for Energy related products (Directive 2009/125/EC)
- Equipment for use in potentially explosive atmosphere (ATEX Directive 94/9/EC).

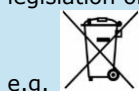
Tip:

- Apply for the CE mark, which is required by all customers, even if your product is a sub-system or part of a finished product and legally does not require the CE mark. If you are a manufacturer, you have to be familiar with the process of affixing the CE marking to your products. [The European Commission](#) has a very insightful website that illustrates the key steps from the start to trading the product. See the following documents for more information on EU legislation:
 - [CE marking for Electromagnetic compatibility](#)
 - [CE marking for Low Voltage Devices](#)
 - [CE marking for Eco-design of energy-related products](#)
 - [Directive 94/9/EC \(ATEX\)](#)

Waste of Electrical and Electronic Equipment (WEEE). If you want to export electronic or electrical products to the EU, you have to take into account that your EU buyers have obligations regarding the disposal of these products. EU producers are obliged to participate in product take-back schemes. Although, this does not directly affect exporters from developing countries, the requirements may have an impact in terms of EU buyers asking their suppliers to meet specific design requirements or provide certain information.

Tip:

- Make sure your product design complies with WEEE and enable product recycling, recovery or dismantling. (Note that these requirements may differ per EU Member State.) Carefully formulate labels and mark products in accordance with WEEE (e.g., the symbol of the crossed-out wheelee bin). Get more information on the EU legislation on [Waste Electrical and Electronic Equipment \(WEEE\)](#).



Labelling of energy-related products. EU producers and exporters are obliged to indicate energy consumption on household appliances and other energy-related products (the list is being extended to include industrial products). Make sure you check when importing your products and discuss this with your European customers.

Tip:

- Make sure you indicate all product details (including, energy class, performance, capacity, noise level, etc.) required by the EU. Make sure you indicate all product details (including energy class, performance, capacity, noise level, etc.) required by the EU. See the EU legislation on energy labelling of energy using and energy-related products at [EU webpage](#).

REACH regulation to manage the risks from chemicals and provide safety information on the substances concerned. This legislation restricts the use of certain hazardous chemicals. Furthermore, it sets some requirements regarding information on the used chemicals. Manufacturers are required to provide their buyers with information on the properties of chemical substances used.

Tip:

- Ask your buyer for their requirements regarding REACH. List all chemicals, including raw materials and additional materials, used in your production process. See the EU legislation REACH on chemicals at [EU webpage](#).

Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS). The directive bans the introduction into the EU market of electrical and electronic equipment that contains more than the agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl and polybrominateddiphenyl ether flame retardants.

Tip:

- Make sure that none of the hazardous substances referred to in the RoHS Directive is used in your production process. Exporters of electronic components have to meet the requirements under both RoHS and REACH, since they are complementary. See the EU legislation on the Restriction of Hazardous Substances (RoHS) at [EU webpage](#).

Non-Legislative Requirements

Although compliance with non-legislative requirements is still entirely voluntary, buyers often request it. In effect, 'private' or 'voluntary' standards are often established by industry players themselves. They are often perceived by producers as a barrier to entering a market, but compliance equally constitutes an opportunity to enhance your product's competitive edge in terms of export.

**Electronic Product Code (EPC) conformity**

EPC is a worldwide standardized code that is allocated to any product that is RFID-tagged

Tip:

- Make sure that you get familiar with the coding standard and that your component or chip is EPC-codable



Quality management systems (QMS) – ISO 9001. If you plan to export to Europe, all products must meet the buyers' quality demands. ISO 9001 is designed to make sure that the manufactured and/or exported products to Europe meet the needs of customers. This document provides information on the world's most widely used QMS.

Tips:

- Apply for ISO 9001 as quickly as possible. Understand your target customers' requirements and if you plan to target the automotive industry, get ISO 16949.
- See the document Quality Management Systems on the [ISO webpage](#).

For automotive application, components within an assembly, sub-assembly and finished product have to meet quality demands outlined in *ISO/TS 16949 QMS*.

Tip:

- See automotive application-related requirements in terms of quality management systems also on [ISO webpage](#).



Functional Safety in accordance with ISO 26262. ISO 26262 focuses on the functional safety of electrical and electronic systems in vehicles.

Tip:

- Apply for ISO 26262. Even though these requirements are not mandatory, they will definitely give you an advantage over other DEVELOPING COUNTRY exporters. See the ISO webpage for more information on the guidelines [ISO 26262](#).



Occupational health and safety in the electronic components sector. Occupational health and safety (OHS) issues are all aspects related to labour conditions and are very often part of the EU buyers' social requirements for their suppliers.

Tip:

- Consider implementing a management system on OHS (e.g. OHSAS 18000). European buyers are becoming increasingly sensitive and need transparency in the supply chain and labour conditions at all levels. Even though these requirements are not mandatory, they will definitely give you a competitive advantage over other DEVELOPING COUNTRY exporters if you can comply with them. Find more information on occupational health and safety in the electronic components sector at [ISO webpage](#).



Electronic Industry Citizenship Coalition (EICC) Initiative. The most important sustainability initiative in the Electronics Sector, in Europe and internationally, focuses on social, ethical, health and safety and environmental issues. Members are required to comply with the Code requirements. Some industry buyers can require their suppliers to follow the EICC code of conduct. This is particularly relevant for first tier suppliers.

Tip:

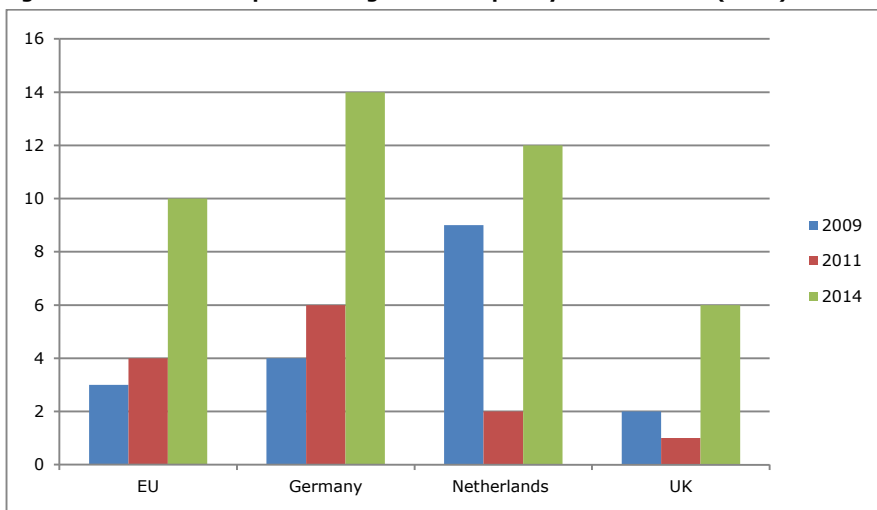
- Find out what buyers (read industry) may require regarding the EICC code of conduct. Try to implement this policy; this will give you an advantage over other exporters. Explain your steps in this area on your website and in other company literature. See the [EICC](#) website for more information on the sustainability initiative.

Trade and Macro-Economic Statistics

Use of RFID Technologies in Europe

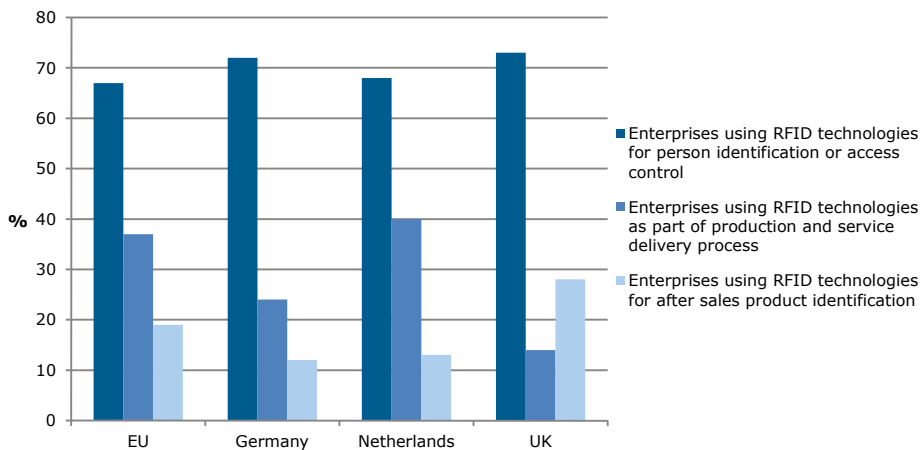
RFID technology is forecast to grow by 20% on an annual basis in the next five years, mainly driven by demand in the retail and logistic industry. Exporters from developing countries have opportunities to enter Germany, the UK and the Netherlands with low-tech components for RFID systems, including the full range of passive and electromechanical components, embedded sub-assemblies and software. Co-design and co-innovation in partnership with corporate partners or clients in Europe can also advance sales of electronic components for exporters from developing countries in Europe.

Figure 1: Share of enterprises using Radio Frequency Identification (RFID) technologies in 2009, 2011 and 2014, %



Source: Eurostat (2015)

Figure 2: Use of RFID technologies by purpose of enterprises using RFID technologies in 2011, %



Source: Eurostat (2013 – not updated since then)

Analysis and interpretation

RFID is an increasingly attractive application for electronic components. The market size of RFID technologies used in Europe strongly increased between 2011 and 2014, and it is expected to generate growth rates in the double digits in the upcoming three to five years. The fastest growing industries where RFID systems are used include government & the public sector, (i.e. electronic pass and IDs), retail, transport & logistics (track and trace solutions). These areas will be responsible for about 60% of the growth.

Tip:

- Electronic component (including the full range of passive and electromechanical components and embedded sub-assemblies) producers have opportunities in supplying European RFID (transponder and reader) manufacturers with low-cost hardware for RFID systems (for example with antennae for RFID transponders).

Germany holds one of the leading positions in RFID technology development in Europe. In Germany, sales of RFID systems more than doubled in the last five years. RFID is forecast to further penetrate the supply chain and manufacturing industries to fulfil process optimisation and product tracking needs. (Source: Federal Ministry of Economics and Technology). Germany has a number of best practices for RFID implementation (e.g. Metro Group is the largest company in retail RFID implementation). The country is leading in RFID R&D projects in Europe, e.g. Siemens is the top German RFID patenting company (Source: JRC, European Commission). The implementation of RFID systems in Germany is expected to rise, driven by the trend of bar-code replacement in all countries.

Tip:

- Depending on your know-how, consider differentiating your electronic component offering and entering RFID system application in Germany. Do your homework and find out who your potential customers are; these could be chip manufacturers (e.g., NXP Hamburg), RFID software - Middleware (SAP), or any other integration service provider. Consider participation in RFID projects in Germany, e.g. in RFID use in logistics, traffic, and production.

The Netherlands is strong in RFID implementation in the production and service delivery process, where mainly ultra-high frequency RFID technology is used. NXP Netherlands and Philips are the top RFID system patenting companies in the country. Schuitema is a case study in RFID implementation for distribution and supply cycle monitoring. (Source: e-Business Watch by European Commission) RFID is expected to further penetrate the supply chain and manufacturing industries and will see significant growth in the Netherlands. Bar-code replacement will also have a positive impact on the growth of RFID system implementation.

Tip:

- Find out who are the potential customers in the Netherlands. Consider supplying components to RFID chip manufacturers in the Netherlands (e.g. NXP Semiconductors) or to IT service providers who are engaged in RFID service integration (e.g. Capgemini).

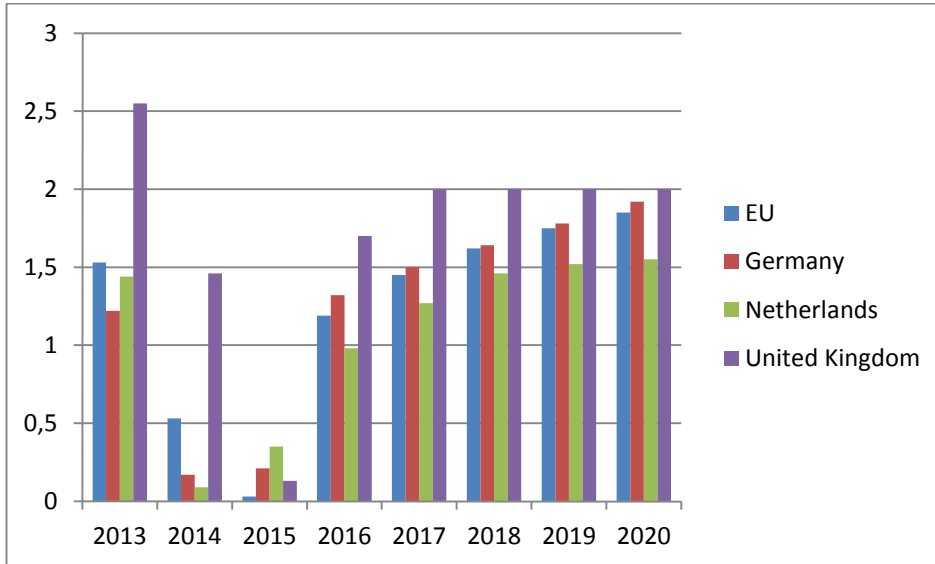
RFID R&D is well developed in the UK, being the second leading country in Europe in terms of R&D projects (after Germany). The UK is strong in RFID system implementation for after sales-product identification. Land Rover (vehicle tracking and management system) and New Look (product logistics) are some of the case studies in the UK (Source: e-Business Watch by European Commission). Logistics and consumer retail are expected to undergo significant growth in RFID system use. The implementation of RFID technologies is expected to grow, driven by the trend of bar-code replacement in all countries.

Tip:

- Consider participating in RFID projects in the UK, in particular in high-tech RFID technology with a wide signal transmission range that is currently under development. Find out who are your potential customers in the UK. Consider supplying components to RFID chip manufacturers, Middleware or integration services providers.

Macro-Economic Statistics

Figure 3: Inflation in Germany, the Netherlands, and the UK (end of year change), %



Source: Statista, International Monetary Fund (IMF), (2015)

Analysis and interpretation

Inflation in the UK will exceed the European level; in Germany inflation is expected to be about the European level; in the Netherlands it is expected to be below the European level. The growing level of annual inflation (especially in the UK) will have an impact on the market value growth of all goods manufactured and sold on the market, including electronic components for RFID and RFID systems as finished goods. The expected market growth for RFID systems will be influenced by the in-country inflation.

Tips:

- Inflation in the UK, Germany and the Netherlands will not have a significant influence on production costs in developing countries. Nevertheless, take inflation levels into account when analysing the future demand in the countries, i.e. production/demand for RFID systems in volume terms may develop more slowly.
- Increased inflation in the European Union will increase costs for imports which will slow down demand from DEVELOPING COUNTRY exporters.

Market Trends

Analysis and interpretation

Product separation by the level of technological advancement: European OEMs separate high-tech and low-tech, or high-price and low-price electronic product parts. For example, low-tech parts for RFID transponders and readers for consumer industry applications are mainly sourced overseas, while high-tech, wide-range signal transmission solutions are mainly produced by European OEMs.

Tip:

- Create a product portfolio on a modular basis, enabling low-tech electronic parts to be ordered separately (e.g., RFID antenna without a microchip) or in combination with high-tech electronics (a complete RFID solution). European OEMs will be able to make the decision based on their needs, intellectual property rights and the product quality.

Improvement of RFID technology: Development of high-tech RFID is growing in Europe. RFID with sensors are beginning to penetrate logistics processes and smart factories, where the key benefits include more efficient logistics operations, recycling, and the identification of original products vs. copies. The future potential of RFID includes tracking consumer purchasing habits, the extension of RFID sensor networks and signal transmission range and connectivity of RFID

technology with smartphones. There are also numerous possibilities in the use of RFID that are still in the research phase. The main challenge remains the high price and the lack of know-how for transmission range extension.

Tip:

- Consider investing in RFID R&D or in co-designing through virtual cooperation with European peers. If you have know-how in RFID technology, share your knowledge with European peers at open innovation forums and peer group meetings. Look for cost-efficient sensor solutions and other components for RFID to meet the European demand for cheaper high-tech products.

Miniaturisation of RFID solutions is an ongoing trend. However, unlike in other industries, smaller RFID technology is not cheaper. It is, in fact, more cost-intensive in Europe.

Tip:

- Consider specialising in electronic components for miniature RFID solutions. DEVELOPING COUNTRY exporters will gain benefits by supplying European countries with value-for-money solutions.

Minimisation of the total cost of ownership: European companies will increasingly be facing a variety of risks (e.g. increased international competition) that need to be measured and managed in order to keep the total cost of ownership (TCO) at a reasonable (low) level. Both smaller and larger companies will increasingly be looking for the most reliable suppliers and will try to eliminate risk through supplier contracts and cost management.

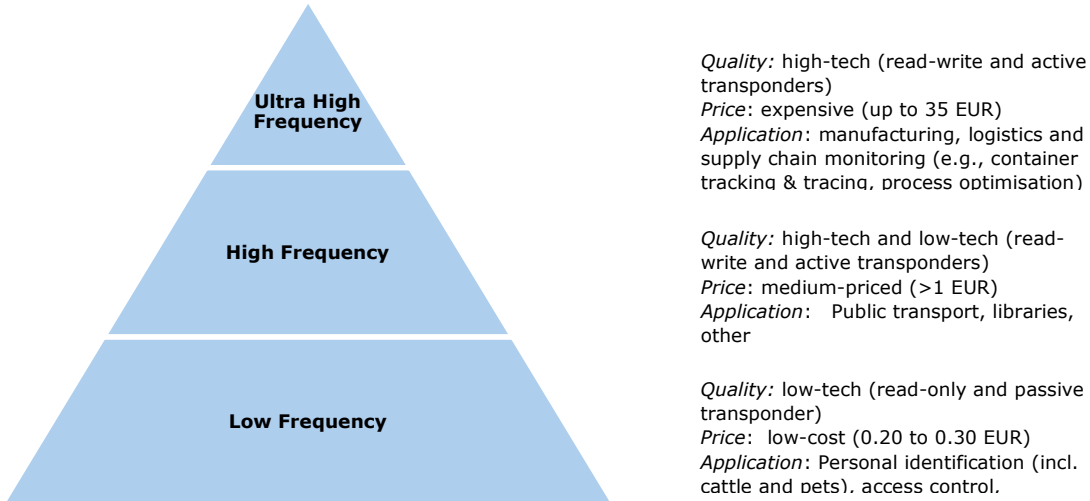
Tips:

- Increase the efficiency of your process to bring costs for it down
- European SMEs present better opportunities as potential customers for DEVELOPING COUNTRY exporters, but larger companies may also contact you as a potential supplier. That is why visibility on the market is crucial. Develop your sales and marketing strategy:
 - Work on well-structured and up-to-date content in your company's website;
 - Attend trade shows several years in a row; start preparations for the trade show far in advance (see a list of trade shows in Useful Sources);
 - Work on your *Unique Selling Proposition*, i.e. why should European OEMs buy your product;
- Work on the product pricing.

For more information on entering the European market, please refer to [CBI Trends for Electronics and Electrical Engineering](#).

Market Segments

Figure 3 Segments for RFID technology



Analysis and interpretation

RFID technology can be segmented according to the application industry. A certain frequency band is required for specific RFID application solutions, while the product price and quality depends on the frequency band. Thus:

- Low-tech / low-cost: RFID for personal identification and access control or as electronic price tag
- High-tech / cost-intensive: RFID solutions for supply chain (logistics & transport) and manufacturing. These also require in-depth know-how and even additional research.

Tips:

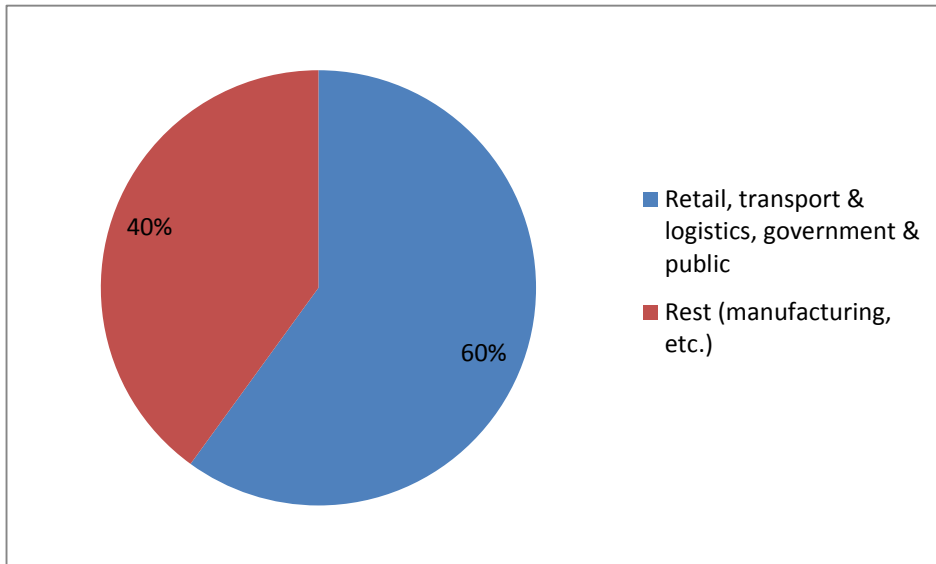
- DEVELOPING COUNTRY exporters have opportunities to supply European countries with electronic components for low-tech RFID solutions.
- Depending on your know-how, there is also a potential to offer customised high-tech components, but consider a modular product setup. Organise the manufacturing process so that you can integrate low-tech and high-tech in a quick and efficient way.

There are many requirements that transponders must meet. They often include protection category IP65 (dust- and splash-water-proof) or requirements for resistance against acids as well as high-pressure cleaner and explosion protection. RFID components used in the railway environment need to be especially temperature resistant (-40°C to +85°C) or protected against stone-chipping. RFID technology used in an environment where a lot of metal is used or that is exposed to a high-level of electromagnetic interference needs to be developed specifically to accomplish acceptable distances for operations.

Tip:

- Make sure that you understand the specific requirements of the market segment that you want to focus on.

Market segmentation according to application industries:



Source: *Elektroniknet.de*

Retail is expected to be the largest market segment by around 2020 as barcodes are going to be replaced gradually by RFID-powered electronic price tags.

For more information, please refer to [CBI Channels and Segments for Electronics for Electronics and Electrical Engineering](#).

Market Competitiveness

See [CBI Competition for Electronics and Electrical Engineering](#), because competitiveness of electronic components for RFID does not differ significantly from this general overview.

Main Sources

- Eurostat, URL: <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>
- Eurostat ProDeveloping Countryom, URL: <http://epp.eurostat.ec.europa.eu/portal/page/portal/proDevelopingCountryom/introduction>
- Distributors of electronics in all countries, URL: <http://www.list-of-companies.org>
- Online magazine for high-tech RFID: <https://www.rfidjournal.com>
- Joint Research Centre, European Commission: <http://is.irc.ec.europa.eu/pages/Homepage.html>
- RFID publications: <http://www.rfidtoday.co.uk/>
- RFID im Blick: <http://www.rfid-im-blick.de/>

Trade shows in Europe

- Electronica (www.electronica.de)
- CeBIT (www.cebit.de)
- Hannover Messe (www.hannovermesse.de)
- EFA (www.efa-messe.com)
- beelektro (www.belektro.de)
- PCIM (www.pcim.com)
- Embedded World (www.embedded-world.de)
- sps ipc drives (www.mesaqo.de/en/SPS/home.htm)

More information

CBI market information:

- [Trends for Electronics and Electrical Engineering;](#)
- [Market Channels and Segments for Electronics and Electrical Engineering;](#)
- [Market Competitiveness for Electronics and Electrical Engineering.](#)



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