CBI
Ministry of Foreign Affairs

CBI Product Factsheet:

Capacitors in the UK

Introduction

The electrical and electronic components market in the United Kingdom (UK) is expected to grow; driven by the UK (Government) initiative to increase R&D investments and to create additional high-skilled jobs. Exporters in developing countries can benefit from the growing energy demand, the increasing importance of renewable energy, and the penetration of electronic content for the automotive and lighting industries by supplying UK companies with efficient, high-quality and low-value capacitors.

Tip:

- Develop clear market positioning before setting up distribution channels for the market. Some retailers are more appealing to younger consumers and some target older demographics. For high-end segments, product quality must be in line with customer expectations. Minimum delivery volumes and terms of payment vary greatly and will need to be requested on an individual basis. For more information, see CBI Market Channels and Segments for Apparel.

Product Definition

Capacitors are a subcategory of the broader product category of passive components within the sector Electronics and Electrical Engineering (EEE). Capacitors are widely used in electrical circuits in nearly all common electrical devices. Typical capacitor types sold in Europe are:

- power (HS code 85321000),
- aluminium (HS code 85322200),
- ceramic (HS code 85322300 and 85322400),
- tantalum (HS code 85322100),
- metallised polyester/polypropylene film (HS code 85322500),
- variable trimmer (HS code 85322900).

Typically, capacitors are used as part of electrical circuits in many common electrical devices and in many industries, including industrial, automotive, lighting, energy, communication, and consumer electronics.

Brand names of capacitors are not very significant; product quality and design are of higher importance. Nevertheless, brand names can be significant in some applications. Established brands in electronic components are known for their better quality and design. Therefore, industrial users may prefer established brands. The number of global suppliers of capacitors exceeds 100. Some of the leading suppliers of capacitors in the UK include: AVX, Epcos, Electronicon, Vishay, Maxwell, and Kemet.

Product Specifications

Quality:

The UK companies are typically looking for capacitors that fulfil the current market requirements.

- Capacitors have a large variation of specifications and can be classified based on the materials used. Additionally, voltage, tolerance, nominal capacitance, leakage current, temperature, polarisation, and resistance are key parameters that define product quality.
- Current market requirements for capacitors include:
    - greater efficiency (higher Q=quality factor) and minimised power losses;
    - ability to handle high voltages and current;
    - more compact size;
    - ability to connect the renewable energy sources.
- To assure durability and safety, products must comply with the relevant EU regulations and standards. The materials used, and especially hazardous substances, have to comply with RoHS and must meet REACH requirements (see "Legislative requirements" in this document).

Labelling:

- Capacitors are typically labelled with the description of content, including the following type of information:
    - type of product,
    - model type,
    - quantity,
    - net and gross weight (in kilograms),
    - supplier/manufacturer name
    - supplier/manufacturer location,
    - serial number.

Packaging:

- Capacitors are typically packaged in plastic bags and cardboard boxes.
- Larger AC power capacitors are exclusively packaged in cardboard boxes to protect them from becoming damaged.

Legislative Requirements

To assure the durability and safety, products must comply with the relevant EU regulations and standards. Compliance with EU legislative as well as non-legislative requirements is a basic necessity for all exporters in the electronics and electrical engineering sector. 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 below-listed EU directives. Otherwise they are not allowed to be sold in the EU.

Liability for defective products.

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

Tip:

- 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.

CE marking.

With a few exceptions, capacitors must be marked with the CE mark. When capacitors are sold within an assembly, sub-assembly or a finished good, they do not legally require a CE mark. However, driven by market requirements, nearly all customers will still demand the CE mark for most components, in particular when the components are critical in the application, e.g. power capacitors. For capacitors, the following directives may be relevant:

- Electromagnetic compatibility (EMC Directive 2004/108/EC),
- Low voltage equipment (LVD 2006/95/EC),

- Eco-design for Energy-related products (Directive 2009/125/EC),

Equipment for use in a potentially explosive atmosphere (ATEX Directive 94/9/EC).

Tip:

- Apply for CE marking. If you are a manufacturer, you have to be familiar with the process of affixing the CE marking to capacitors. The European Commission has a very insightful website that illustrates the key steps to undertake from the beginning to the trading of 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 waste of these products. EU producers are obliged to participate in product take-back schemes. Although this does not directly affect exporters from developing countries, its requirements may have an impact when EU buyers ask their suppliers to meet specific design requirements or provide certain information.

Tips:

- 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 wheelie bin).

- Get more information about 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 into industrial used products. 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. 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. This legislation restricts the use of certain hazardous chemicals used. Furthermore, it sets some requirements regarding information on the used chemicals. Manufacturers are required to provide information on the properties of chemical substances used to their buyers.

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 placing on 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) on the relevant EU webpage.

Non-Legislative Requirements

Buyers often request compliance with non-legislative requirements even though compliance is voluntary. In effect, 'private' or 'voluntary' standards are often established by industry players themselves. They are regularly perceived by producers as a barrier to entering a market, but compliance equally constitutes an opportunity to gain a competitive edge in terms of export of your product.

Quality management systems (QMS) – ISO 9001.

If you plan to export to Europe, all products must meet 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.
For automotive application, components within an assembly, subassembly, and finished goods have to meet quality demands outlined in *ISO/TS 16949 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/TS 16949.
- See the document Quality management systems at the ISO webpage.
- See automotive application-related requirements in terms of quality management systems on the 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 EU buyers' social requirements for their suppliers.

Tip:

- Consider implementing a management system on OHS (e.g. OHSAS 18000). European buyers are increasingly becoming more sensitive and need transparency in the supply chain and in labour conditions at all levels. Even though these requirements are not mandatory, they will definitely give you an 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 especially relevant for first tier suppliers.

Tip:

- Find out what buyers (what industry) may require 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's literature. See the EICC website for more information on the sustainability initiative.

British Standard Institute (BSI) publishes also standards for the electrical and electronic industry in the UK.

National standards are harmonised with European and International Standards, and define best practices and requirements for the design, use, installations, and specifications of electric and electronic components. The application of standards is generally voluntary. However, for medical, toy, military, and some other applications, there are some additional standards on a country level, which have sometimes different limits/requirements vis-à-vis the European standards.

Tip:

- Primarily, you should aim for global compliance, but also consider country-specific requirements. Familiarise yourself with the UK standards if you plan to enter this market. Even though these requirements are not (legally) mandatory, they are often required by buyers. The decision whether to apply for country-specific standards can be driven by the application industry you are aiming for. Besides, Waste of Electrical and Electronic Equipment standards are regulated on a country level. See the BSI website for more information on the national standards in the UK.

Trade Statistics

Imports and Exports

The UK offers a good potential for DEVELOPING COUNTRY exporters to enter the electronic components sector, driven by the UK strategy to significantly grow the electronic systems industry by 55% until 2020. The development of electronic components sector in the UK will have a direct impact on capacitors, which are used in nearly all electrical devices. DEVELOPING COUNTRY exporters can benefit from the better-priced product offerings for capacitors. The ability to meet current market requirements, in terms of product quality and design, as well as short production time and delivery terms is crucial.

Figure 1: Imports of capacitors to the UK in 2014, %

	British share of total import in EU+EFTA, 2014	CAGR* of total imports (2009-2014)	Share from developing countries of imports, 2014	CAGR of imports from developing countries* (2009-2014)
Imports	4.5%	14%	8.2%	-1.3%

**Compound annual growth rate*

Source: Eurostat (2015)

In-country import and export mean the imports entering and exports leaving Germany.

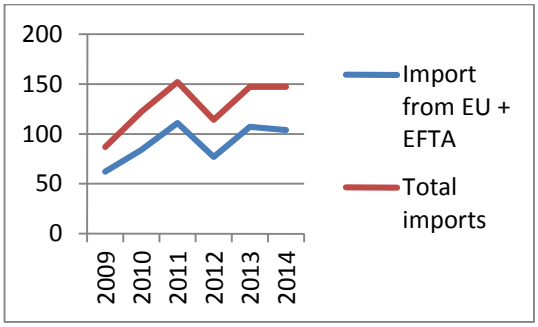
Figure 2: Exports of capacitors from the UK in 2014/2012, %

	British share of total export in EU+EFTA, 2014	CAGR* of total exports (2009-2014)	Share from developing countries of exports, 2014	CAGR of exports to developing countries* (2009-2014)
Exports	5.7%	-2.8%	12.6%	3.8%

**Compound annual growth rate*

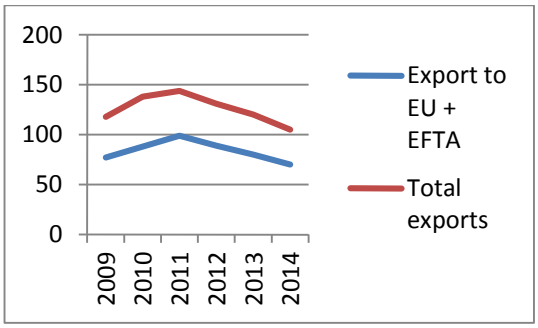
Source: Eurostat (2015)

Figure 3: Imports of capacitors to the UK, value in € million



Source: Eurostat (2015)

Figure 4: Exports of capacitors from the UK, value in € million



Source: Eurostat (2015)

Most important developments

Demand has stabilized after short period of weakness in 2012. Demand for capacitors and imports depend mainly on the automotive and industrial applications in the UK. Developments have been better than the European Passive Components Industry Association predicted. There was no significant decline in the European market overall. The UK may see a better development of electronic components as compared to the total European market, driven by the UK strategy to significantly grow the electronic systems industry by 55% until 2020. (Source: ESCO).

Tip:

- Enter the UK market with a value-for-money proposition for capacitors, which are used in nearly all electrical devices. As electronics and electrical engineering are expected to grow in the UK, start actively looking for partners in various industries including automotive and energy, as well as other industrial sectors.

The import of capacitors from China to the UK has increased again. Trade with South Africa, Turkey, Brazil, India, and Mexico has increased between 2009 and 2014, and is mainly the result of a better-priced product range, as well as short production times and delivery terms.

Tip:

- Any developing country with profound know-how and high product quality has opportunities for entering the European market. Optimise your production process to be able to meet all current market requirements, such as product quality and design, as well as short production times and delivery terms.

UK's export of capacitors declined (including trade with the top export markets such as Germany, France, Sweden, Italy, Hungary, Spain, Belgium, and Austria), suffering from the unfavourable economic situation in 2012 and the declining production in the UK. So far exports have not been revived.

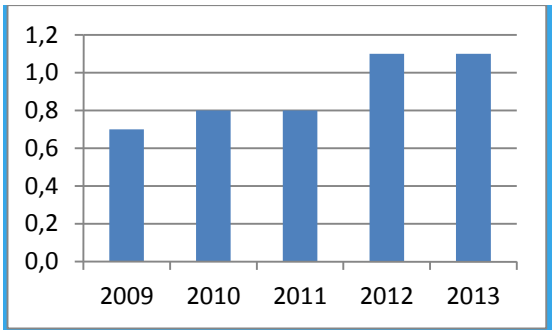
Tip:

- There is a possibility to target other European countries through the re-export. However, be aware of the economic slowdown in European countries, including the UK.

Production and Consumption

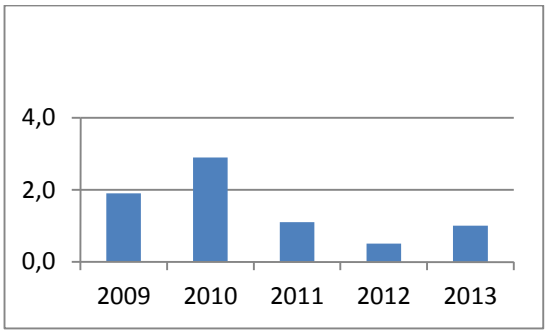
In Europe, as well as in the UK, the growing energy demand, the increasing importance of renewable energy and the penetration of electronic content into automotive and lighting industries will be beneficial for many suppliers of electronic components such as capacitors. The market for power transmission solutions will boost the demand for power capacitors in the UK. Consider modifying and adding to your product range to enter energy application markets, as an example.

Figure 5: Production of capacitors* in the UK, value in € million



**Fixed power capacitors with a power handling capacity of > 0.5 kvar*
Source: Prodcom (2015)

Figure 6: Consumption* of capacitors in the UK, value in € million**



**Apparent consumption (Production + Imports – Exports)*
***Fixed power capacitors with a power handling capacity of > 0.5 kvar*
Source: Prodcom (2015)

Most important developments

After a short period of weakness in demand in 2012, the performance of both automotive and industrial sectors in the UK increased again which is also a sign of the economic recovery. The production of capacitors has increased by CAGR 12% in 2009-2011. The production of capacitors is expected to grow in the next seven years, driven by the UK's (Government) initiative to create additional highly skilled jobs and to grow the investment in R&D in electronics industry. (Source: ESCO).

Tip:

- Consider supplying the UK with low-cost passive components, including capacitors, to support the expected growth of the electronic industry. Be aware of other current market requirements such as product quality and design, as well as short production times and delivery terms.

The demand for capacitors is driven by the growing amount of electronic content in the automotive application, the growing energy demand, and renewable energy development, as well as the growing importance of new markets such as electronic lighting and the automation of manufacturing processes. Moreover, the market for power transmission solutions

is expected to rise 14% in 2008-2015 in Western Europe (including the UK), pushing up the demand for power capacitors. (Source: Siemens Energy MOP3 – scenario "Base" Case 2008).

Tip:
- Depending on your production capacity and know-how, consider supplying capacitors to the new markets such as electronic lighting (UK is the second-largest lighting market in Europe). Differentiate your product offering to enter other application industries such as energy, since the power transmission solutions market is growing in Europe. If you consider supplying power capacitors, then mind the performance, quality, and efficiency improvement trend in electronic solutions.

For more information on trade statistics, please refer to CBI Trade Statistics for Electronics and Electrical Engineering.

Market Trends

Most important developments
- *Technological development*: Technological developments such as energy from renewable resources and electric vehicles resulted in the following trends:
  - electronics penetrate new markets such as the electronic lighting industry;
  - the amount of electronic components in vehicles is constantly growing.

The UK is the second largest lighting market in Europe, and there are several projects ongoing in the energy and automotive industries.

Tip:
- Consider offering capacitors to industries with high R&D investments volume in the UK, e.g. automotive (electric vehicles), energy (wind, solar and other renewable energy projects), and electronic lighting. Consider sharing your knowledge and take part in pilot projects.

Product innovation: Miniature electronic products for safer and more exact works are increasingly penetrating the market. Thus, miniature robots are an important development for the installation and test purposes that can be applied for catastrophe or disaster regions.

Tip:
- Continue innovating and investing in new product design and launching capacitors that meet the market trends. Expand your product range by introducing miniature capacitors (examples can be found at the leading capacitors makers such as AVX).

Product quality: As the demand for energy grows, contemporary electronic systems need to handle high voltages. This means that requirements for product quality, safety, and efficiency become tougher, the lead time shortens, and supplier reliability plays a significant role in cooperation.

Tip:
- Meet the safety and quality demands by integrating a quality assurance programme in your production process. Work on the production process optimisation and delivery time reduction. Make the production process more efficient and flexible by introducing a modular production approach and using different technologies. Minimise the risk of damage during production and meet customer requirements in terms of product quality and delivery time.

Political measures (EU):
A number of EU Directives has been issued in the last few years that accelerate the development of renewable energy sources and diminish the industrial impact on the environment (CO2 emissions). As a result, electronic systems and components become more efficient and environment-friendly.

Tip:
- Work on the efficiency improvement of capacitors through energy loss reduction, thus reducing the environmental burden (CO2 emissions) and making the electric systems more cost effective.

Political measures (UK): The UK Government leverages growth and development in the national electronics industry.

Product design: Not only the product quality is essential for European OEMs, but also the product design is increasingly important. DEVELOPING COUNTRYs need to work on acquiring Europe's best practices in regards to advanced engineering know-how, not only in the implementation of quality standards, but also in product design and presentation; e.g. no signs of handwork on product surface, clean and accurate packaging.

Tip:

- Work on the improvement of product design and packaging. Work in line with European standards and follow all buyers' requirements.

Minimisation of the total cost of ownership: European companies will increasingly be facing various risks (e.g. increased international competition) that need to be measured and managed in order to keep the total cost of ownership (abbreviated as TCO: a financial estimate to help buyers or owners to determine the direct and indirect costs of a product) at a reasonable (low) level. Both smaller and larger companies will increasingly be looking for the most reliable suppliers and will try to eliminate the risk through supplier contract and cost management.

Tips:

- Make sure that you constantly work on the efficiency of your processes including the value chain (e.g. transport). This will help you to keep TCO low.
- European SMEs present better opportunities as potential customers for DEVELOPING COUNTRY exporters, but also larger companies may 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 on your company's website;
    - Attend trade shows several years in a row. Start preparations for the trade show far in advance;
    - Work on your *Unique Selling Proposition, i.e.* why should European OEMs buy your product;
- Work on the product pricing.

For more information on market trends, please refer to CBI Trends for Electronics and Electrical Engineering.

Market Channels and Segments

See CBI Market Channels and Segments for Electronics and Electrical Engineering, as the viable trade route of capacitors in the UK does not differ significantly from the general trade route.

Market Competitiveness

See CBI Competition for Electronics and Electrical Engineering, as the market competitiveness of Capacitors in the UK does not differ significantly from this general overview.

What are the end market prices for capacitors?

Price range for capacitors

Capacitors have a wide price range, which is indicated in the table below. For example, the price range of tantalum capacitors starts from € 0.04 to € 30 in Europe, depending on the specifications.

Main groups of capacitors for industrial, automotive, lighting, communication, and consumer applications	OEM volume price range, €
Aluminium capacitors	0.04 - 1
Ceramic capacitors	0.03 - 8
Tantalum capacitors	0.04 - 30
Metallised polyester film capacitors	0.06 - 3
Metallised polyester/polypropylene, AC	1 - 30
Variable trimmer capacitors	0.15 - 7

DEVELOPING COUNTRY producers have to be aware of different costs and value chain margins that add to the product price. Production and administration costs of the manufacturer usually make 44-51% of the end price (OEM volume price). The production and administration costs should include all raw material costs, development, labour, and other fixed and administration costs. To develop a unique selling proposition, DEVELOPING COUNTRY exporters will have to understand their own costs, liabilities, and responsibilities, and to analyse product market price levels.

OEM volume price breakdown	Margin
Production and administration costs	44-51%
Marketing and sales costs in DEVELOPING COUNTRYs	3%
Freight to Europe and other related costs	6%
Import and other (e.g. VAT, financing) costs	4%
Marketing costs in Europe	7%
Importer margin	8-10%
Distributor margin	20%

Main Sources

- Eurostat, URL: http://ec.europa.eu/eurostat/web/international-trade/statistics-illustrated
- Eurostat Prodcom, URL: http://ec.europa.eu/eurostat/web/proDeveloping Countryom/overview
- Organisation for Economic Co-operation and Development (OECD), URL: http://www.oecd.org
- Distributors of electronics in all countries, URL: http://www.list-of-companies.org
- Online news portal: http://www.newelectronics.co.uk/electronics-news
- Electronic Systems, Challenges & Opportunities (ESCO): http://www.esco.org.uk/
- Trade association NMI, representing the UK Electronic Systems, Microelectronics, and Semiconductor Communities: http://www.nmi.org.uk

Useful Sources

Leading trade fairs in Europe

- Electronica (www.electronica.de)
- CeBIT (www.cebit.de)
- Hannover Messe (www.hannovermesse.de)
- EFA (www.efa-messe.com) DELETE regional fair
- Embedded world (*/www.**embedded**-world.de/en/)*
- belektro (www.belektro.de) DELETE regional fair
- PCIM (www.pcim.com)
- SPS IPC DRIVES (www.mesago.de/**sps***)*
- Light & Building (www*. light-building.messefrankfurt.com)*

Leading trade fairs in the UK

- UK Plastic Electronics Show (http://www.biztradeshows.com/trade-events/ukplastic-electronics-show.html)
- Elex Surrey (http://www.biztradeshows.com/trade-events/elex-surrey.html)
- Southern Electronics (http://www.biztradeshows.com/trade-events/southern-electronics.html).

More information

CBI market information:

- Trade Statistics for Electronics and Electrical Engineering;
- Trends for Electronics and Electrical Engineering;
- Market Channels and Segments for Electronics and Electrical Engineering;
- Competition for Electronics and Electrical Engineering;
- Product Fact Sheet Capacitors in Poland.

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