HK Handelskammer Hamburg

Sector Profile

Green Technologies

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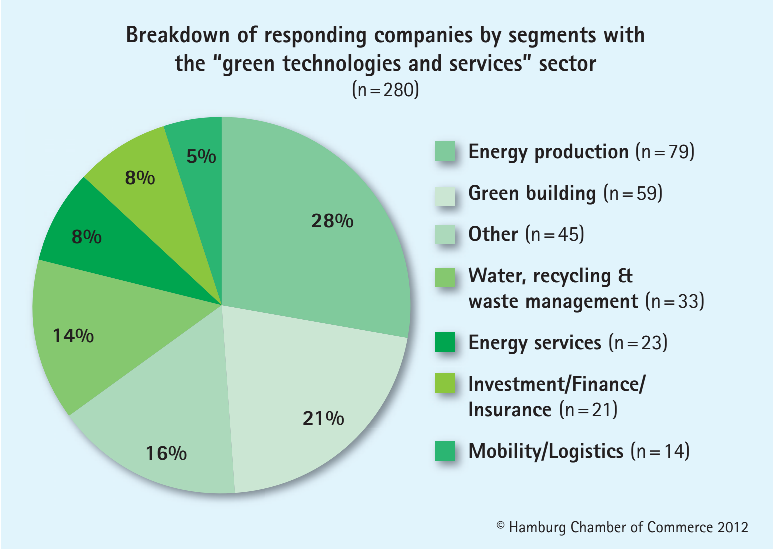
The top priorities on Germany's political agenda include the energy transition programme (known as the "Energiewende"), climate change mitigation, and resource efficiency. The goals are to cut greenhouse gas emissions by 40% by 2020, and to increase the share of renewables in final energy consumption to 18%.[1] So it is no wonder that the "green" technologies are growing so fast. By 2025 they are expected to account for some 20% of Germany's GDP and 15% of the world market.[2] Green technologies generate value, and also create the conditions for long-term stable economic and social development. Hamburg has a total of 1,980 greentech companies with some 33,400 employees, as identified by the Hamburg Chamber of Commerce based on its membership data. Their annual sales volume is estimated at roughly EUR 10.66 billion. Hamburg's renewable energy industry alone directly or indirectly provided a total of 14,500 jobs in 781 companies in 2011.[3] It is a cross-sectional industry, including many related markets in addition to renewables, such as sustainable mobility and green construction. However, it is difficult to give exact numbers because there is no clear definition of separate categories for greentech markets in the official "Statistical Classification of Economic Activities". Despite this, the Chamber of Commerce has conducted a survey of Hamburg's greentech companies, to find out their growth expectations. The following trend statements are based on responses of 280 companies that took part in the survey.

Structure of the Sector

A common feature of all companies in the green technology sector is that they pursue closely linked environmental and economic goals, supplying products which help to conserve natural resources and prevent or minimise environmental damage. The companies can be assigned to separate market segments within these general green activities. And there are now many companies which supply a range of green products and services to companies in other, less "green" sectors of the economy.

The largest greentech group is in the **power generating** sector, including manufacturers (plant builders, component manufacturers, etc.) and service providers (project developers, consultants, etc.), accounting for 28% of greentech companies. The second largest group is **green construction;** one in five of the companies operates in this area, which includes project developers, architectural and construction engineering consultants, and suppliers of building facilities. **Water, recycling and waste management** companies are a well-established group, accounting for 14%. **Finance and insurance** (8%), **energy services** (8%) and **mobility and logistics** (5%) companies are mostly recent start-ups, but there are now enough of them to define them as individual market sectors, even if small ones. **"Others"** account for 16% of the companies.

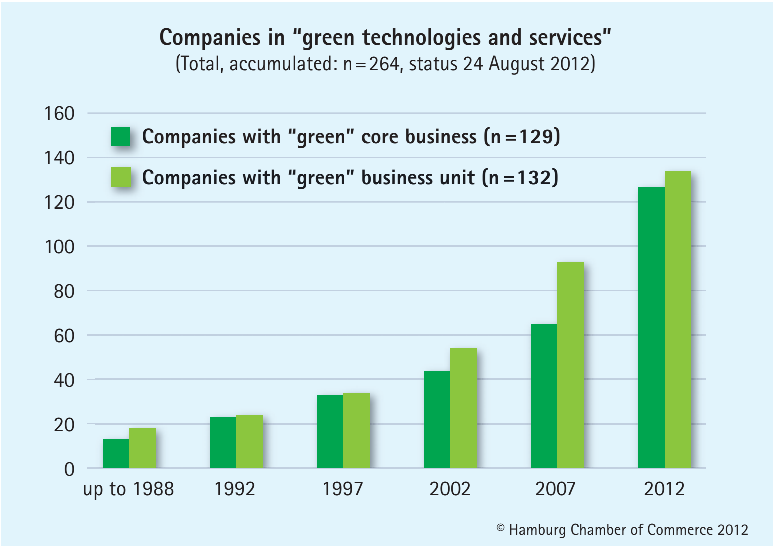


Dynamism in Greentech Activities

The creation of specialist market segments corresponds to the dynamic pace of company start-ups in this sector. More than half the surveyed companies with 100% of their business in the greentech sector started their activities in this sector within the last three and a half years.[4] Half of these companies were created before 2008. The growth in the sector is also shown by the fact that many of the companies have expanded their existing range of products and services to include green sectors.

Company Size

Small companies with up to 5 employees are very much the largest group (44%). 60% of greentech companies have less than 10 employees. That is partly because most of the companies with their core business in greentech were set up within the past few years; and many of them provide mainly consulting services,



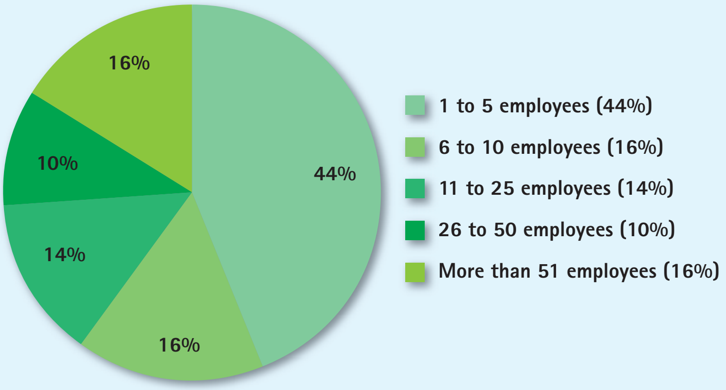
[1] Versus baseline 1990, cf. Energy Concept of Federal Government
[2] Federal Environment Ministry (BMU) 2012, Greentech made in Germany 3.0.
[3] Prognos AG, 2012, renewable energies sector in Hamburg and its metropolitan Region.

[4] Companies defined as "greentech" are the 137 companies indicating in the survey that the whole of their organisation is engaged in the green technology sector, and earning 100% of their revenues (2012) from greentech activities.

which often need smaller organisations. Just over a quarter of the companies surveyed have a workforce of more than 25 people.

The geographical radius of operations of responding companies is quite evenly distributed. About a quarter of them operate mainly in Hamburg and its metropolitan region, 30% are active throughout Germany, and the others (somewhat more than a third) operate throughout Europe and worldwide.

Workforce in companies responding, 2012
(n=265, status 24 August 2012)



The Market Sectors in Detail

Renewable Energy

In view of the general growth trends in the renewable energy sector and the development of Hamburg as a competence centre for this field, it is hardly surprising that the largest group of the companies surveyed (28%) operate in this field. Wind energy is the biggest segment here, accounting for about one third of the companies. Photovoltaic and solar heating is the second largest group (30%). It is notable that one in five of responding companies has activities in more than one "green" energy category – that is due to the relatively large number of service providers (for example consulting, maintenance, certification) based in Hamburg. Bioenergy is the third largest group.

The appeal of Hamburg as a location for administrative and development departments of leading wind energy companies is demonstrated by the "big names" and the latest arrivals: **REpower Systems SE, Vattenfall Europe Windkraft GmbH, PowerWind GmbH, Vestas, Siemens AG, Nordex SE, GE Energy.** Most of the companies surveyed are plant and component manufacturers, and also service providers and users, and project developers for the renewable energy sector. Examples are **Conergy Deutschland GmbH** and **Sharp Electronics (Europe) GmbH,** two major solar cell manufacturers. And **Voltwerk electronics GmbH,** which makes components and software solutions for operation of photovoltaic systems. Half of the companies surveyed are engaged at least in part in "project development/installation/maintenance", for example **Colexon Energy AG, Yardalux GmbH** and **SunEnergy Europe GmbH.** The core business of **Centrosolar AG** is complete plug-and-play systems for private households. **RWE Innogy GmbH** is active in several sectors of the renewable energies business. **Samsung Heavy Industries** plans to relocate to Hamburg in 2012.

Sustainable Building

Nearly one in five of the companies surveyed is engaged in the "green building" sector. This high proportion is the response to the rising demand for more energy-efficient and thus more cost-effective buildings, and to stricter legal requirements.[5] This market segment is also characterised by the fact that "green" building, architecture and planning services are currently a supplement to the conventional range of services – more than 80% of the companies surveyed indicated that they provide "green" building services only in one area of their operations. However, specialisation is increasing, and nearly 20% of respondents define "green" building services as their core business.

A positive impact on the sustainable building sector also comes from the development of Hamburg's new HafenCity district and the site of the International Building Exhibition (IBA).

Drees & Sommer Advanced Building Technologies GmbH provides engineering and consulting services for "green" construction of new buildings and optimisation of existing buildings. **Ingenieurgesellschaft Ridden und Meyn mbH** designed the technical facilities for the buildings of HafenCity University, and received the HafenCity Gold Environment Pre-Certification for this work. **360grad+ architekten GmbH** has also been honoured with this pre-certification for its winning design for the "Musikerhaus" in Hamburg's HafenCity. **Petersen Ingenieurbüro GmbH** provides environmental protection planning and consultancy specifically for industrial and commercial buildings. **REESE Beratende Ingenieure GmbH** develops concepts for the use of geothermal heating systems (with heat pumps and ground loop systems) for heating and cooling buildings. **Imtech Deutschland GmbH & Co. KG** is a leader in energy engineering and building equipment. **gen-ax GmbH** specialises in energy-efficient lighting systems, and specifically LED systems. **Velux Deutschland GmbH** includes energy-efficient windows in its product range.

Water, Recycling and Waste Management

With raw material prices rising and resources becoming scarcer, the companies in water, recycling and waste management have long since become important energy and raw material suppliers; in 2009, secondary raw materials replaced EUR 8.4 billion worth of imports to Germany.[6] The energy or material use of waste materials also makes a major contribution to cutting CO_2 emissions.[7]

Most of the responding companies in this segment are operating in the waste management and recycling sector. For example the municipal waste management company **Stadtreinigung Hamburg AöR.** The biggest private-sector companies include the **Buhck Group, Otto Dörner GmbH & Co., ETH Umwelttechnik GmbH** and **Veolia Umweltservices GmbH.** Specialist recycling

[5] Amendment of the Energy Performance Ordinance is planned for 2012/2013.
[6] According to a forecast by the Institute of the German Economy (I), secondary raw materials worth more than EUR 18 billion will be produced in Germany by 2015; Institut der deutschen Wirtschaft, 2009, The Macro-Economic Importance of Waste and Raw Materials Management.
[7] Avoidance of some 18 million tonnes of CO_2 per annum, equivalent to about one fifth of the carbon emissions from cars in Germany.

services are provided by **SAT Strassensanierung GmbH,** which recycles old road surfaces in situ. **Müllverwertung Borsigstrasse GmbH** incinerates materials to generate district heating. Other companies in the waste-to-energy sector are **Müllverwertung Rugenberger Damm GmbH & Co. KG** and **AVG Abfall-Verwertungs-Gesellschaft mbH. HÖG Hamburger Ölverwertungs-Gesellschaft mbH** recycles 70,000 tonnes per annum of toxic liquid waste from shipping and industry. Production of biogas and biodiesel from food waste is the business model of **BioCycling GmbH.** Secondary raw material production is the core business of **Exsor GmbH** (sorting machines for recycling of electric and electronic scrap) and **RSH Polymere GmbH** (plastic granulates). **Aurubis AG** is a manufacturer of copper and copper products, noble metals and speciality products, and also recycles metal. Consultancy services are provided by **wastecon AG** with "waste management contracting", and by **v. Bülow + Söhl Entsorgungs-optimierung GmbH.** Specialist IT services for the sector are supplied by **Consist ITU Environmental Software GmbH.** Water recycling is one of the activities of **WaCo Wassertechnik Consult GmbH,** which designs rainwater utilisation facilities. **Mahle Industriefiltration GmbH** and **UF-Systeme GmbH** develop waste water cleaning technologies.

Energy Services and Energy Suppliers

The green energy services market includes all entrepreneurial activities aimed at energy savings and energy efficiency improvements in companies and private households. Energy consulting focuses on solutions for more efficient use of energy in the building sector (thermal insulation of buildings, heating and control systems, etc.), and process optimisation in small and medium sized enterprises (SMEs). The energy consultants for buildings are often architects, planning and construction engineers, and skilled workers from the areas of heating, plumbing and air-conditioning who provide energy consulting in their fields of expertise. They include **dimaru Haustechnik GmbH** and **Berthold Auf der Hart KG.** Other specialists in this field are **BRUNATA Wärmemesser, Hagen GmbH & Co. KG** and the **Kalo Group.** Energy contracting services are provided by **CWE Contracting-Wärme-Energie GmbH** and **Techem Energy Contracting GmbH.** Energy services also include consultation on energy management systems – a wide range of services, from planning and energy management systems advice on the implementation of individual components, right up to complete handling of energy management for a company. Organisations specialising in energy optimisation of technical and organisational workflow are **Hamburg green Energy GmbH, entax energiemanagement Gmbh & Co. KG, B.A.U.M. Consult GmbH** and **Ökopol Institut für Ökologie und Politik GmbH. Hamburg Energie** is a municipal energy company operating as a "green" energy provider. And traditional energy suppliers such as Vattenfall **Europe AG** and **E.ON Hanse AG** have for many years been increasing their activities in production and marketing of renewable energies, for example in the offshore wind energy sector, in operation of combined heat and power systems, and in power generating from biogas. **Hamburger LichtBlick AG** is Germany's biggest eco-power supplier, and **Greenpeace Energy eG** also operates nationwide in this area. **mk-group Holding** provides energy and services under the "Care-Energy" brand. About 8% of the responding companies are active in this segment of "green technologies and services".

Green Investments, Financing and Insurance

Companies in this area account for 7% of responding companies, mainly specialised in financing and investment services for renewable energies. Project funding with loan capital is a particularly important field of activity, not least due to the relatively stable government funding programmes, which give a fairly high level of return for reasonable risk. Funding of these projects requires specialist financial know-how, so many banks have set up centralised departments to handle this area. They include **HSH Nordbank AG,** which specialises in Europe-wide financing of wind energy and solar projects, and **Hypovereinsbank** and **Commerzbank AG** in Hamburg. Apart from these specialist departments of the major banks, a number of companies have been set up in Hamburg in the last five years with investment in renewable energies as their core business. For example **LUXCARA GmbH** and **Capital Stage AG.** There are now also investment products outside of the range of renewables in the form of a "GreenBuilding Fund", as available for example from **HESSE NEWMAN CAPITAL AG.** The Private Equity and Venture Capital Financing of **CCE Management GmbH** also includes companies which act as manufacturers and component suppliers in the energy efficiency, geothermal and energy storage sectors. Insurance solutions are available from **NW Assekuranzmakler Hamburg Verwaltungs GmbH** and **Marsh GmbH.**

Sustainable Mobility and Logistics

Mobility is a key requirement for the further development of modern industrial and service societies. At the same time, the forecast growth in traffic volumes means considerable environmental problems.[8] Restricting mobility is not an option, because mobility is essential to ensure efficient flow of goods and travel – so more efficient means of transport and transport concepts is becoming increasingly important.[9] This segment now accounts for 5% of the green sector, and its growing importance can also be seen from the age of the companies involved – half of them started their activities in sustainable mobility and logistics within the last five years.

Economymax GmbH has developed a fuel-saving engine management system for buses. **Admin Solution Service GmbH** supplies an electronic driver training system for a more economical, fuel-efficient driving style. **Silver Atena Electronic Systems Engineering GmbH** operates in the automotive sector, designing fuel tank management systems for hydrogen powered vehicles. About one in five of the electric vehicles on German roads today is from **Karabag GmbH. e-Collection** (a business unit of o.m.t GmbH) sells electric scooters and e-bikes. **hySOLUTIONS GmbH** works within various subsidised projects on application strategies for hydrogen and fuel cell technology and the application of electric vehicle concepts. **City Express Logistik GmbH** is a "green logistics" company providing urban messenger services with electric vehicles. **Becker Marine Systems GmbH & Co. KG** is an international rudder manufacturer which has developed propulsion optimisation for big cargo ships, claiming fuel savings of up to 5%.

[8] The transport sector causes not only noise nuisance and air pollution, but is also responsible for 18.3% of greenhouse gas emissions, according to figures from the Federal Environmental Agency (UBA).
[9] EU Commission, 2011, Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system (white paper).

Others – Generalists and Specialists

The companies in this sector are mostly "specialists" in individual market segments, while some are "generalists" operating across several market sectors. 16% of the respondent companies are in this group, showing that "green technologies" are no longer only present in the classic areas such as the renewable energy sector, but have also created specialist sub-segments. Examples of this are companies working in "Green IT", such as **ifu Institut für Umweltinformatik Hamburg GmbH,** which provides software for preparation of eco-inventories, and **Probusiness Hamburg AG,** which develops concepts for more energy-efficient computer centres. Due to the growth in this cross-sector business, there are now human resources companies such as **greenmindconsulting** and **Rochus Mummert Executive Consultants GmbH** based in Hamburg, specialising in placement of skilled personnel from the greentech sector. **GIC** is an agency which organises specialist forums for companies, professional associations and research organisations, to promote networking within the sector. **Eurofins Control GmbH** is an environmental analytics specialist, included in the **Durag Holding AG. Kiwa Deutschland GmbH** is a certification company. Generalists such as **Siemens AG, Germanischer Lloyd** and **TÜV Nord** cover almost the whole of the sector with their product range.

Research, Development and Networks

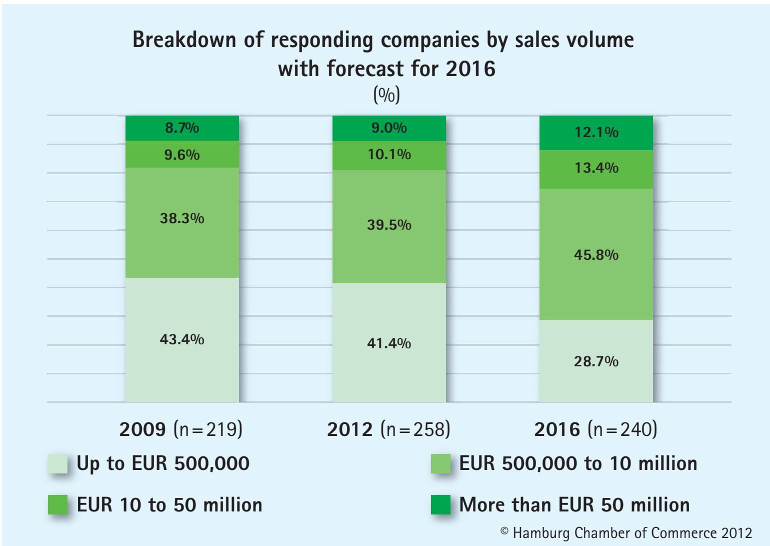
A strong innovation and research scene and effective networks are extremely important for the international competitiveness of green technology companies.[10] Hamburg now has a research scene with a wide range of focal areas, and is set for further growth in the future.

The **Competence Center Renewable Energies and Energy Efficiency** (CC4E) at HAW (Hamburg University of Applied Science) has focused these competencies since 2008. CC4E is now intended to set up the technology centre "Hamburg Energy Campus" by 2014, in order to enhance know-how and technology transfer between the scientific community and business companies, and to promote the relocation to Hamburg of companies in the renewable energy sector. The **Helmut Schmidt University** has established a research focus for sustainable energies. The **Hamburg University of Technology** (TUHH) has given research and teaching in the green technologies a special position, grouping them in a competence field of that name. The **HafenCity University** (HCU), University of the Built Environment and Metropolitan Development, is engaged in the KLIMZUG-Nord research project together with other institutions such as the **Hamburg Institute of International Economics** (HWWI) in development of various strategies for cities to adapt to climate change. The **KlimaCampus** is mainly engaged in basic research into natural and manmade climate change. The research network includes not only the 18 university institutes, but also partners such as the Helmholtz Centre Geesthacht. The nucleus of the KlimaCampus is the excellence cluster "Integrated Climate System Analysis and Prediction" (CliSAP), which was recently granted a second funding period (2012 to 2017) by the Excellence Initiative of Federation and States. The **Climate Service Center** (CSC) also operates in this area, with an interdisciplinary team to process knowledge from climate research into a practical form for decision makers in government, administration and the business community.

The **Renewable Energy Hamburg Cluster** (EEHH) is an industry network for renewable energies, and now has membership of 160 companies and institutions. It runs established industry meetings such as the regular Wind Meetings and Hydrogen Meetings. The **Wasserstoff-Gesellschaft** (e.V.) promotes the use of hydrogen as an environment friendly fuel. **ZEBAU GmbH** works in the green building sector as an independent, semi-public network organisation at the interface between government, administration, science & research, planning, and construction. The goal is to establish energy-efficient building and the use of renewables in the building industry. The **Entsorgergemeinschaft Großraum Hamburg e.V.** is the organisation representing the SMEs in the waste management sector. **hySOLUTIONS** GmbH aims to promote hydrogen and fuel cell technology in the sustainable mobility sector in Hamburg. The activities of the North German section of **Bundesverband Elektromobilität e.V.** (BEM, the Association for Electric Vehicles) have been taken on by e-Collection since spring 2012.

Outlook – Growth in Jobs and Sales

Hamburg's green technology industries are well set for the future – in July 2012 the companies in all the sub-sectors employed at least 20% more people than in 2009, and they are expecting further growth, an average of nearly 40% by 2016.[11] The companies in the energy generating sector are particularly upbeat, expecting employment to be up more than 60% by 2016. Companies in "water, recycling and waste management", "energy services" and "green mobility/logistics" are expecting to increase their workforce by more than 30%. These companies are also confident of growing their sales. A breakdown of company figures by sales volume shows that in 2009 and also in 2012 most of them were in the sales volume categories up to EUR 500,000 and up to EUR 10 million. That is due in part to the high proportion of start-ups



[10] For further information on energy research, the concept of the Hamburg Energy Research Association is recommended (recently prepared by Hamburg's universities).

[11] Employment growth adjusted for outliers at top and bottom end of data matrix.

in this sector – more than half the companies with green core business were set up in the last five years. Many of them will raise their sales volume in the next four years, as shown by the growing proportion of companies that expect to be in the EUR 500,000 to 10 million bracket by 2016. As many as a quarter of responding companies forecast a sales volume of more than EUR 10 million in 2016.

Further Information on Green Technologies in Hamburg

Federal Association of Renewable Energies
(Bundesverband Erneuerbare Energie): www.bee-ev.de

Federal Association for Wind Energy
(Bundesverband WindEnergie e.V.),
Hamburg Regional Group: www.wind-energie.de

German Solar Energy Association
(Deutsche Gesellschaft für Sonnenenergie),
Hamburg and Schleswig-Holstein Group: www.dgs.de

Federal Bio-Energy Association
(Bundesverband BioEnergie e.V.): www.bioenergie.de

Renewable Energy Hamburg Cluster
(Erneuerbare Energien Hamburg Clusteragentur GmbH):
www.erneuerbare-energien-hamburg.de

Federal Electric Vehicles Association
(Bundesverband eMobility e.V.),
North German Group: www.bem-ev.de

German Sustainable Building Association
(Deutsche Gesellschaft für Nachhaltiges Bauen e.V.):
www.dgnb.de

ZEBAU GmbH: www.zebau.de

Federal Association of the Waste, Recycling, Water and Raw Materials Management Industry
(Bundesverband der Deutschen Entsorgungs-, Wasser- und Rohstoffwirtschaft e.V.): www.bde-berlin.org

Waste Management Group North Germany
(Entsorgergemeinschaft Nord) www.egnord.de

hySOLUTIONS GmbH: www.hysolutions-hamburg.de

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- Güterverkehr in Hamburg – Drehscheibe Nordeuropa (Goods Transport)
- Hamburg – Europäische Verkehrsdrehscheibe (European Transport Hub)
- Hamburg – Handelsmetropole im Norden (B2C) (Trade in the North)
- Handelsmetropole Hamburg (B2B) (Trade)
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