



STRONG PILLARS OF THE REGION'S ECONOMY

Master Plan
Cluster Plastics & Chemistry

THE GERMAN CAPITAL REGION
excellence in plastics & chemistry

LEGAL NOTES

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INTRODUCTION

The Plastics and Chemistry Cluster is a strong pillar of Brandenburg's industry. It is characterised by its unusually wide range of business and science stakeholders. With a few large, mainly chemical and petrochemical industry companies and numerous small and medium-sized enterprises that mostly belong to the plastics industry, the cluster has a varied industrial structure that represents a stable basis for future development. Thanks to a marked research landscape with excellent universities and non-university research institutions with a particular focus on a wide range of plastics and chemical industry aspects, there is an accelerated constant transfer of knowledge which is then translated into innovative technologies and products. The cluster stakeholders are nevertheless facing specific challenges as well as the same future tasks other industries are also forced to address. These include social challenges such as those the EU's latest growth strategy „Europe 2020“ focuses on, „employment, research and development, education, social inclusion and poverty reduction and climate/energy“. Some of these issues were also taken into account in the 18th legislative period coalition agreement Deutschlands Zukunft gestalten („Shaping Germany's Future“).

The specific measures in the master plan's six areas of action are designed to ensure and increase the long-term competitiveness and future viability of the cluster stakeholders, to generate growth and to safeguard the region's employment opportunities. Under consideration of regional specifics, the state of Brandenburg's economic policy strategy Stark für die Zukunft – Kräfte bündeln („Strong for the Future – Consolidating Strengths“) is based on the European strategy and the German federal government's High-Tech Strategy, which is influenced by the European strategy, to ensure the state's successful economic development. In this context, the master plan is an instrument of the state of Brandenburg's regional innovation strategy innoBB that reflects the key issues addressed by the various cluster stakeholder groups. Based on the specific expertise of the cluster stakeholders, smart specialisation is envisaged in order to be able to utilise the effectiveness of the existing capacities in a targeted way, in line with European Regional Development Fund (ERDF)¹ and the European Social Fund (ESF)² guidelines and also the objectives of the European funding programme „Horizon 2020“.

¹ *European Regional Development Fund (ERDF); online*
URL: <http://www.efre.brandenburg.de>

² *European Social Fund, online* URL: <http://www.esf.brandenburg.de>

Increasing the points of interface and the interdisciplinary collaboration with the Brandenburg and Berlin-Brandenburg clusters „Energy Technology“, „Food Industry“, „Healthcare Industries“, „ICT/Media and Creative Industries“, „Metal“, „Photonics“ and „Transport, Mobility and Logistics“ should result in an additional growth impulse that will encourage the cluster stakeholders to consolidate their respective capacities in order to achieve the goals set.

The Brandenburg Plastics and Chemistry Industry Cluster encompasses three areas of action the stakeholders should focus their specific expertise on: „Bio-based specialty chemicals“, „Biopolymers“ and „Light engineering/composites“, as well as three areas of action that affect all of the industry sectors in this cluster: „Plastics and chemical industry locations“, „Plastics and chemical industry logistics“ and „Future plastics and chemical industry workforce“. The integrative issue of internationalisation, which is very important to the stakeholders, is addressed by a three-part strategy aimed at raising the cluster stakeholders' awareness of the topic and at providing information, making access to the international markets easier and initiating cooperation projects with international partners. With the support of actively committed partners from the business development agencies, the tradesmen's chambers, educational institutions, industry associations, policy makers and the regional government, the measures in the areas of action will gradually be implemented.

1 CLUSTER DESCRIPTION

PLASTICS AND CHEMISTRY CLUSTER

1.1 Current cluster situation

1.1.1 Sector structure

The statistics show that the Plastics and Chemistry Cluster encompasses 649 businesses and 12,120 employees on permanent contracts³; it is therefore a strong pillar of Brandenburg's industry. In 2012, a good 11 per cent of the total number of people employed in the local economy's industrial sector worked in the plastics and chemical industry. It is therefore Brandenburg's third-largest business sector. Every eighth employed person works in these industries; every seventh euro is generated in the chemical and plastics industry. Hardly any other industry sector in Brandenburg has such close ties with other industry sectors. The chemical and plastics industry plays a key role when it comes to the development of innovations in such industries as medical engineering/pharmaceuticals, energy technology, information and communication technology, photonics, vehicle and aircraft engineering and others, in particular as a supplier of many base products. Brandenburg-made products such as fibres, fibre-reinforced polymers, films, tyres, household appliance and wind turbine components, polyurethane base products, pesticides, water-based coatings and technical polymers ensure that the capital region is well-known beyond its borders.

The profile of the chemical industry part of the cluster is characterised particularly by the chemical industry parks in Schwedt/Oder, Premnitz, Neuruppin, Guben and Schwarzheide where structure-defining medium-sized and major companies are based. Among the region's chemical industry businesses are some of Europe's leading companies in their sector, such as PCK in Schwedt, BASF in Schwarzheide or Atotech in Neuruppin, as well as the major synthetic fibre manufacturers Trevira in Guben and Märkische Faser in Premnitz. Most rubber and plastic goods as well as fibre-reinforced plastic components are manufactured by medium-sized and small companies. They cover a wide range of specific areas in the plastics processing industry. These businesses supply internationally active companies and exhibit major growth potential. Around 6,300 people are employed by 71 companies (with more than 20 employees). The cluster core includes eight major companies that employ more than 300 people each.⁴

³ Cf. Federal State of Brandenburg, Ministry for Economic and European Affairs [May 2014, draft]: *Development and Importance of Brandenburg's Industrial Clusters 2008-2012. Monitoring Report*, p. 11. The statistics refer to the economic activities („WZ“) listed in Appendix 1.

⁴ Cf. ZAB ZukunftsAgentur Brandenburg GmbH, Statistical Office for Berlin-Brandenburg [2012]: *Statistik des Verarbeitenden Gewerbes*. („Processing Industry Statistics“).

In particular, the chemical industry businesses⁵ in the cluster include manufacturers of

- man-made fibres,
- perfumes and toilet preparations,
- soap and detergents, cleaning and polishing preparations,
- paints, varnishes and similar coatings, printing ink and mastics,
- pesticides, disinfectants and other agrochemical products,
- plastics in primary forms,
- other chemical products n.e.c.,
- other inorganic basic materials and chemicals.

In addition, there is also expertise in the petrochemical industry.

In particular, the plastics industry businesses⁶ in the cluster include manufacturers of

- builders' ware of plastic.
- plastic packing goods,
- plastic plates, sheets, tubes and profiles
- rubber tyres and tubes; re-treading and rebuilding of rubber tyres,
- other plastic products.

In addition, there is also expertise in further elastomer fields.

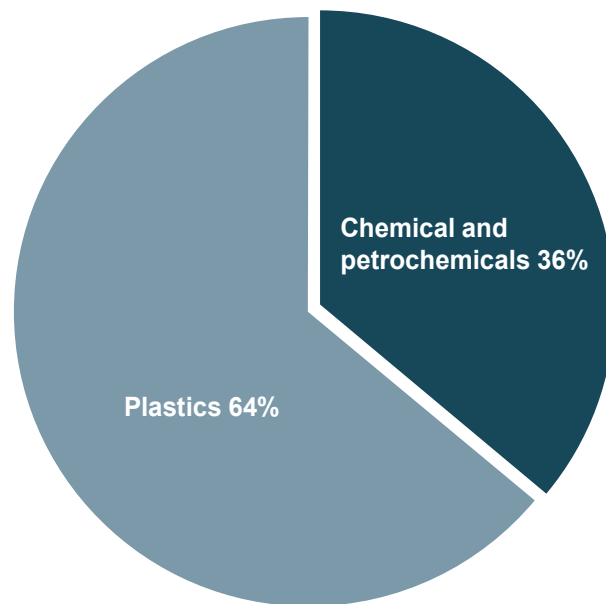
The following figure illustrates the per cent distribution of employees of companies that belong to the Plastics and Chemistry Cluster on the basis of their official allocation to certain economic activities.⁷ Due to the statistical data collection method applied, businesses with fewer than 20 employees are not included in these statistics. Statistically proven employment data is also not available for each individual company in this cluster.

⁵ Cf. economic activity allocation („WZ“) in the cluster, Appendix 1

⁶ Economic activity allocation („WZ“) in the cluster, Appendix 1

⁷ Based on German Classification of Economic Activities, NACE Revision 2 Edition 2008, online URL: http://ep.eurostat.ec.europa.eu/portal/page/portal/nace_rev2/introduction

Figure 1: Plastics and Chemistry Cluster workforce (> 20 employees) according to economic activity of business („WZ classification“)⁸



⁸ Figures taken from: Statistical Office for Berlin-Brandenburg [2013]: Statistics Report E I 1 – j/12 Verarbeitendes Gewerbe im Land Brandenburg Jahr 2012. („Brandenburg Processing Industry Statistics“) and Statistical Office for Berlin-Brandenburg [2013]: Statistics Report J I 2 – j/11 Dienstleistungen im Land Brandenburg. („Brandenburg Service Industry Statistics“).

1.1.2 Research landscape

The capital region has a considerable concentration of scientific institutions that are active in the area of plastics and chemicals. Numerous small and medium-sized companies utilise this potential. Besides universities and universities of applied science, there are also many non-university research institutions, including Fraunhofer-Gesellschaft, Helmholtz Association, Leibniz Association and Max Planck Society institutes that are active in fields from basic research to application-oriented development.

Figure 2: Universities and non-university research institutions in Brandenburg and Berlin with connections to the Plastics and Chemistry Cluster⁹ (selection)



Source: http://d-maps.com/carte.php?num_car=23870&lang=de

⁹ *Plastics and Chemistry Cluster Brandenburg information, online URL:*
<http://www.kunststoffe-chemie-brandenburg.de/de/Das-Cluster/Wissenschaft>

Table 1: Scientific institutions in Brandenburg with connections to the cluster

Name, location	Key research subjects (selection)
1 Brandenburg University of Technology, Cottbus-Senftenberg	Inorganic, organic and physical chemistry, analytics; chemical reaction engineering, polymer materials, plastic/rubber processing; processing of basic polymers for high-performance polymers; mechanical engineering; polymer engineering tools and appliances
2 German Research Centre for Geosciences, Potsdam (GFZ)	Dynamics of the lithosphere; geomechanics and rheology; chemistry and physics of geomaterials, near-surface geochemistry
3 University of Applied Science Brandenburg (FH Brandenburg), Brandenburg an der Havel	Automation engineering; energy and environmental engineering; manufacturing/production engineering; design and calculation in machine/plant engineering and construction; laser technology; mechatronics; metrology and sensor technology; micro engineering; materials testing
4 Fraunhofer Research Institution Polymeric Materials and Composites (PYCO), Teltow	Research and development from monomer to (fibre-reinforced) component, including characterisation, processing on a pilot-plant scale and recycling of used components, materials, semi-finished products and components with high fire resistance, damage tolerance, high temperature stability, low weight and special properties
5 Fraunhofer Institute for Applied Polymer Research (IAP), Potsdam-Golm	Development of materials and processes for fibres, films, nonwovens, materials, composites, materials with functional properties, additives and fine chemicals on the basis of natural and synthetic polymers, bio-based technical fibres, thermoplastics and duromers, biocomposites; polymer electrons, OLED, OPV, flexible displays, sensors; micro composites and encapsulations, polymers for life sciences; polymer synthesis at pilot-plant scale
6 Helmholtz Centre Geesthacht Institute of Biomaterial Science Teltow	Innovative, polymer-based biomaterials for medical applications; separation and environmental engineering techniques using membranes

Name, location	Key research subjects (selection)
7 Eberswalde University for Sustainable Development	Forest and the environment; landscape management and nature conservation; wood engineering; sustainable management
8 Institute for Thin Film and Microsensoric Technology (IDM Teltow)	Development of special polymers; synthesis of specialty chemicals; development of materials for microsensor and biosensor applications; structural characterisation, polymer recycling; micro and nano structuring; electricity conducting polymers and electrochromic coatings
9 Max Planck Institute of Colloids and Interfaces, Potsdam-Golm	Polymeric films; membranes, organic and inorganic nano structures; micro capsules; nano and micro reactors, polymer dispersions; polyelectrolytes, colloid structures and analytics; biomimetic materials and biotemplates; interfaces and membranes; charged polymers and colloids; liquid interfaces; macromolecules on solid surfaces; surface tension measurements by means of x-ray diffraction and fluorescence microscopy
10 Prignitz Institute for Thermoanalytics Wittenberge	Basic research and applied development in the field of thermoanalytical techniques
11 Wildau University of Applied Science	Processing of thermoplastics (PET, PBT); development of composites; polymer alloys and new materials made from thermoplastics and duromers, recycling; process and equipment development; environmental analytics; mechanical/process engineering
12 University of Potsdam	Applied polymer chemistry; inorganic chemistry; bioorganic chemistry; didactics in chemistry; colloid chemistry; development of biomaterials; natural products chemistry; organic chemistry; organic synthesis chemistry; physical chemistry; polymer chemistry; structure analytics, supramolecular chemistry; theoretical chemistry

Table 2: Scientific institutions in Brandenburg with connections to the cluster

Name, location	Key subjects (selection)
13 BAM – Federal Institute for Materials Research and Testing (BAM), Berlin	Materials research, materials engineering, safety engineering, testing engineering
14 Beuth University of Applied Sciences, Berlin	Pharmaceutical manufacturing and chemical engineering, biotechnology, packaging technology, machine engineering, mechanical engineering, process and environmental engineering, environment and sustainability
15 Fritz Haber Institute	Heterogeneous catalysis, dynamics of elementary processes on surfaces and in solid structures
16 Helmholtz Centre for Materials and Energy, Berlin (HZB)	Macromolecular crystallography, colloid chemistry, interfaces
17 Humboldt University (HU) Berlin	Functionally structured materials and catalysis
18 University of Applied Sciences (TU) Berlin	Designing with polymers; polymer processing (injection moulding extruding); polymer recycling; polymers in medical engineering; materials testing; rheology, tensile test, bending test, impact test, light microscopy, determination of residue on ignition according to DIN; inorganic and analytical chemistry, organic chemistry, physical and theoretical chemistry, technical chemistry, environmental chemistry, environmental process engineering, water pollution control

In addition, the Plastics and Chemistry Cluster also has a wide range of working relationships and contacts with numerous relevant scientific institutions in the neighbouring regions that will hopefully be continuously expanded in future.

1.1.3 Networks

Several networks connected to the plastics and chemical industries are active in Brandenburg and the neighbouring regions; some of these in more than one region. The umbrella organisation Kunststoff-Verbund Brandenburg Berlin (KuVBB e.V.) coordinates the networking of plastics industry companies and scientific institutions in Brandenburg.

- **Kunststoff-Verbund Brandenburg Berlin KuVBB e.V.**

The plastics industry umbrella organisation Kunststoff-Verbund Brandenburg Berlin stands for the cooperation, qualification and joint public relations work of all industry stakeholders and maintains relationships with other networks and relevant political bodies. Its aims in the area of the manufacture, processing and application of synthetic and bi-based polymers in the Berlin-Brandenburg region are

- the promotion of research, development and corporate collaborations, the mutual transfer of knowledge and the expansion of the industry's expertise
- the securing of a future workforce for this industry through promotional campaigns in schools and vocational qualification and university education
- the establishment of an appropriate industry image, including the maintenance of relationships with other bodies, associations and networks.

To realise its goals, the KuVBB e.V. maintains cooperative relationships with networks, associations, public institutions, business development agencies and partners in Brandenburg as well as elsewhere.

- **FIRM e.V.**

Firm e.V. is a regional project and technology transfer oriented network supported by the Gesellschaft zur Förderung der innovativen Region Mittelbrandenburg e.V. association. It has close ties with TH Wildau university of applied sciences and intends to strengthen the long-term innovation capacities and thereby the competitiveness of research and development institutions together with Brandenburg-based companies and the local government. The association has developed the InnoRegio FIRM concept in the Dahme-Spreewald and Oder-Spree districts in the central part of eastern Brandenburg. Thanks to this network, stakeholders from all over Brandenburg now fully exploit their innovative capacities in the areas of recycling management, new materials and renewable raw materials. Within the scope of FIRM, the innovations focus on marketable new products and also on how the materials developed could potentially be applied to already existing products. Linking scientific expertise with the business know-how of the local metal and plastics industries engenders the development of a new outlook for the region.

The network maintains close relationships with a wide range of different clusters outside of Brandenburg:

- **Central European Chemical Network CeChemNet**

CeChemNet is a network that is active across regional borders and links five chemical industry parks located in Saxony-Anhalt and Brandenburg. Project partners are the respective local associations of the chemical industry centres in Bitterfeld-Wolfen, Leuna, Schkopau, Zeitz and Schwarzheide. Nordostchemie, an umbrella organisation that unites various chemical industry related associations in the north-east of Germany, and the isw (“Gesellschaft für wissenschaftliche Beratung und Dienstleistung mbH”, a regional business development agency) are also involved in this partnership. The Central European Chemical Network is an interdisciplinary association that links a wide range of different areas of expertise and special location development know-how with successful chemical park management. On the one hand, CeChemNet is active within the industry as it consolidates regional chemical park development strengths, creates synergies as a result of the chemicals network and promotes the knowledge transfer between the various chemical industry business clusters. On the other, the CeChemNet activities also address an audience beyond the local industry: the network assists with the development of tailor-made concepts for companies that wish to settle in central Germany’s “chemical industry triangle”.

- **Berlin-Brandenburgischer Verband für Polymerforschung BVP**

The BVP is an association of more than 30 polymer research working groups and departments at universities and non-university research institutions, companies and also some corresponding members established for the purpose of promoting polymer research and the respective sciences within the Berlin-Brandenburg region.

- **Central Germany Cluster Chemicals/Plastics**

The Central Germany Cluster Chemicals/Plastics is a platform initiated by businesses with a focus on joint activities across regional borders in Brandenburg, Saxony, Saxony-Anhalt and Thuringia. It is a collaborative effort involving small and medium-sized companies, their associations, education and research institutions and service providers, as well as policy-makers and local governments. The cluster promotes the development of value creation chains.

- **Norddeutsches Kunststoff Netzwerk NORKUN**

Norddeutsche Kunststoff Netzwerk is a technology oriented network that pursues the following aims in the area of plastics production, processing and application, both internationally and within the various regions in northern Germany:

- the promotion of research, development and corporate collaborations and the mutual transfer of knowledge
- the sourcing of research capacities for small and medium-sized companies
- the securing of a future workforce for this industry through promotional

- campaigns in schools and vocational qualification and university education
- lobbying activities and the communication of a qualified image for this industry and
- the maintenance of close relationships with policy-makers, associations and networks.

- **Fördergemeinschaft für Polymerentwicklung und Kunststofftechnik in Mitteldeutschland POLYKUM e. V.**

Due to the important, long-standing and well-established structure of the local chemical and plastics industries, a well-established network landscape which Brandenburg now also benefits from developed quite early on in Saxony-Anhalt. A typical example for this are the activities of the Polykum e. V. network, which aims to increase the competitiveness of the network stakeholders through intensive collaboration and mutual support within the scope of a cooperation network.

- **PolymerMat e. V.**

PolymerMat e. V. is a network that consolidates the interests of companies active in the Thuringian plastics industry. It offers a platform for plastics industry company collaborations when it comes to innovation and the realisation of outstanding new technological achievements in the plastics industry. The aim of the association is to help its members to expand their scope for activities through (joint) innovations, and so strengthen and expand their position in the market. As a meeting point for the plastics industry companies and policy-makers, the association contributes to the promotion of science, research, vocational training and education, innovation and the development of Thuringia as a business region.

- **VDI Association of German Engineers Berlin-Brandenburg District**

The VDI Association of German Engineers Berlin-Brandenburg District is one of 45 VDI district associations. This district association currently looks after around 6,000 members and other people or institutions interested in technology.

The majority of the content-related work of the district association is carried out in working groups. The plastics technology working group is one of the regional disseminators of all matters related to plastics, and organises up to 12 conferences and a network meeting with approx. 300 participants every year. The working group intends to illustrate the diversity of plastics, their manufacture, processing and potential applications to engineers, and to assist them with their day-to-day requirements.

In keeping with the wide spectrum of topics addressed, the processing technology and chemical engineering working group provides many different offers to its members, and organises production plant tours or lectures on relevant and current topics, for example. This gives the process technicians and chemical engineers active in the Berlin-Brandenburg region this working group is responsible for the opportunity to exchange experiences and establish and maintain relationships and networks.

1.2 Prospects and action plan

1.2.1 Opportunities and potentials

Due to its geographical location in central Europe, Brandenburg's prospects as a hub that links western and eastern Europe are excellent. Thanks to its close proximity to the eastern European growth markets, the region can profit from new or emerging markets and the new customers or additional sales in these markets. An annual GDP growth of 2.3% between 2011 and 2030 is forecast for eastern Europe (compared to 1.6% in western Europe). Over the same period, the annual production growth rate in the area of chemicals is expected to grow by 3.2% in eastern Europe, and by 1.8% in western Europe.¹⁰ The geographical location also harbours potential for new value creation thanks to the direct proximity of multi-modal transport terminals that make it possible to offer well-organised logistics services that meet all bi-directional transport needs. However, the cluster can also profit from the further economic development of the capital region. With its knowledge and technology potential, it transmits important impulses.

Throughout Germany, the areas specialty chemicals, biopolymers and light engineering/composites are expected to prosper in future.

Compared to 2011, the specialty chemicals production quota, for example, is forecast to increase by 3.4 per cent to 46.7 per cent of the total chemical production by 2030¹¹, representing the highest growth of all of the various chemical industry sectors. According to one prognosis¹², the global consumption of bioplastics will rise by 18.9% annually in the near future. The demand is expected to increase rapidly in the period ending in 2021. This is flanked by another prognosis¹³ that expects the global production capacities for bioplastics to increase by 2017; for comparative purposes, the capacity totalled around 1.4 million tons in 2012, this will rise to 6.2 million in by 2017. With a view to such positive development prognoses for certain sectors, the plastics and chemicals master plan for Brandenburg therefore focuses on areas such as bio-based specialty chemicals and biopolymers. Gaining a high profile in new technology fields at an early stage therefore offers the chance to utilise this growth potential in order to secure additional value creation for Brandenburg.

¹⁰ Cf. Verband der Chemischen Industrie (German chemical industry association, VCI) [2013]: *The German Chemical Industry in 2030 VCI-Prognos study*, p. 36 and p. 40.

¹¹ Cf. Verband der Chemischen Industrie (German chemical industry association, VCI) [2013]: *Factbook 06. Chemie 2030 – Globalisierung gestalten*. („Factbook 06. Chemical Industry in 2030 – Managing Globalisation“).

¹² Cf. Ceresana [2014]: *Market Study: Bioplastics (3rd edition)*

¹³ Cf. European Bioplastics press release [12.12.2013]: *Bioplastics market will grow strongly between 2012 and 2017*.

The light engineering/composites market is also considered to harbour particular potential. There is already a great demand for light engineering concepts for the aerospace industry. The figures needed to cover the worldwide demand for aircraft by 2030 quoted by the two major aerospace engineering companies (Airbus 27,800, Boeing even 33,500) illustrate this point.¹⁴ The same also increasingly applies in the automotive industry (34% growth per annum until 2020 together with a reduction of the component price down to €20 to 30/kg)¹⁵ and in the rail transport technology industry. If it is technologically feasible to transfer these concepts to a mass market at an adequate quality level, this will unlock new and significantly bigger additional market potentials. Light engineering will also become more important in the course of the energy turnaround, in view of the fact that using CRP potentially offers a 70% weight reduction compared to steel, and up to 30% compared to aluminium.¹⁶ At the same time, the proportion of CRP material components which, although they offer less weight reduction potential, are comparatively cheap, is also increasing.

The high profile university landscape facilitates the ongoing transfer of technology to the region's companies. Furthermore, well-qualified academic professionals could move from the universities to positions in companies in the plastics and chemicals industry. The universities therefore make an important contribution to ensuring the availability of a qualified workforce and to innovative process and product development. However, the capital region's creative potential also has a positive impact on the future development of Brandenburg as a plastics and chemical industry location. With targeted innovations and creative products or business ideas, it provides new impulses that strengthen the location through new value creation but also additionally enhance the industry's image beyond the region's borders. Furthermore, the opportunity to realise region-independent networks along the value creation chain or to expand these further must be used. This will make it possible to make better use of the potential available in the neighbouring regions.

Brandenburg's well-equipped chemical industry parks represent even more potential. They must attract new companies with an efficient industrial structure and efficient logistics connections. The potential harboured by encouraging more companies to settle in the region must be expanded further in future, and the intensity of the attractiveness must be increased by targeted development measures in the areas energy supply, logistics connections and qualified workforce availability.

¹⁴ Cf. CCEV Market Report 2013, p. 13, see also: URL: http://www.carbon-composites.eu/sites/carbon-composites.eu/files/anhaenge/13/09/17/ccev-avk-marktbericht_2013-final-deutsch-bj.pdf

¹⁵ Cf. *ibid.*, p.15

¹⁶ Cf. *ibid.*, p.16

At the same time, it must also be stated that the above mentioned topics, in particular biopolymers and light engineering/composites, currently do not yet reflect the wide spectrum of the Brandenburg plastics and chemical industry. With these potential-related topics, the cluster clearly counts on meta-trends for Brandenburg's future prospects. However, in some cases, these have yet to be developed or at least taken on board to a much greater extent at company level. Besides promoting technological developments, all cluster-relevant companies must therefore become involved within the scope of the master plan implementation. Other aims are the targeted attraction of suppliers/customers currently missing in the value creation chain and suitable collaborations with partners from other regions.

Nevertheless, beyond this, other already existing growth and innovation potentials harboured by the local companies must also be taken into account: from the further development of manufacturing processes to plastics processing and quality auditing.

1.2.2 Cluster support and master plan process

Accompanying structures were put in place to support the development within the cluster: a cluster spokesperson was tasked with representing the cluster externally. The implementation of activities is supported by the cluster management. A strategy advisory council whose members are representatives from businesses, associations, networks, research institutions and social partnerships determines the cluster strategy. Through its close ties, it promotes increased technology and knowledge transfer between the cluster stakeholders. Due to its interdisciplinary makeup, the advisory council involves the various – regional as well as national and international – stakeholders in the cluster process.

The cluster's activities focus on the identification and detailed specification of primary areas of action; for the cluster's stakeholders, these are priorities in terms of the anticipated meta-trends or simply in general. The areas of action were determined on the basis of dialogues with those involved and through analyses. There is a body of experts for each area of action that is professionally coordinated and represented externally by an area of action spokesperson. The area of action expert bodies and the individual areas of action communicate intensively. The cluster stakeholders are actively involved in this exchange through area of action dialogues and workshops.

Figure 3: Cluster structure organisation and master plan process activities

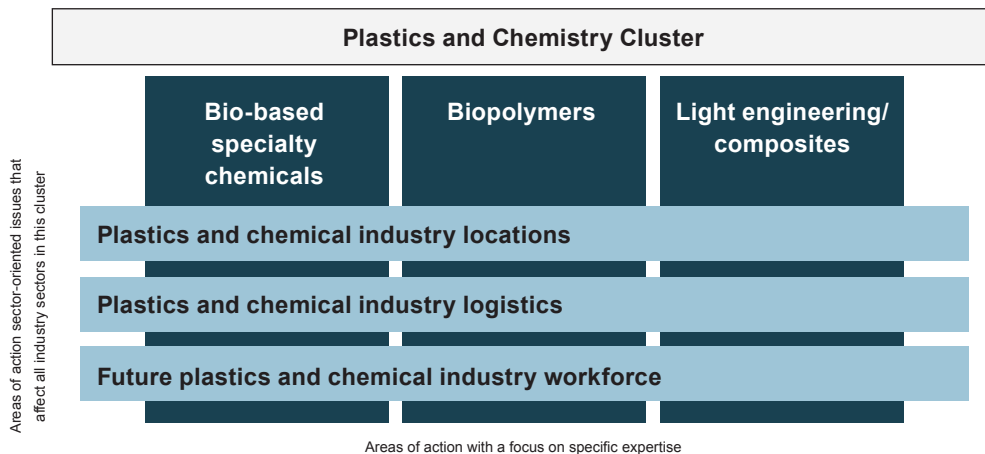


The cluster's master plan was developed in several stages (see Figure 3). The key issues in the areas of action are the results of an ongoing discussion process within the area of action expert bodies. The results of these discussion rounds were widely discussed, focused and set down as the cornerstones of the master plan at a respective symposium. Via an online dialogue forum on the cluster website, the cornerstones were made available to the general public, which was then invited to discuss these. A platform was therefore made available to all cluster stakeholders interested in this exchange who wished to participate actively in the master plan discussion. On the basis of the results of this public discussion, the contents of the key issues in the areas of action were specified in more detail and further additional issues outside the areas of action were included in the master plan.

2 AREA OF ACTION FOCUS STRATEGY

The Brandenburg Plastics and Chemistry Cluster is shaped by its wide spectrum of expertise and skills with a specific focus. The master plan therefore focuses on six areas of action that offer major realisation and innovation potential, determined on the basis of the illustrated opportunities and potentials for the plastics and chemical industry (see Chapter 1.2.1) and the forecast developments in the speciality chemicals, biopolymer and light engineering/composites sectors. On the one hand, these are the three sector-specific areas of action “Bio-based specialty chemicals”, “Biopolymers” and “Light engineering/composites”, and on the other the three areas of action that affect the entire cluster: “Plastics and chemical industry locations”, “Plastics and chemical industry logistics” and “Future plastics and chemical industry workforce”. With their respective key topic and the measures related to these, the cross-sector issues take the current structural disadvantages regarding meeting the needs of the entire plastics and chemicals industry in Brandenburg on board. They have been selected because they affect the industry itself as well as all sector-specific areas of action. In view of the future challenges the industry will face in the near future, these issues are of vital importance for Brandenburg as a plastics and chemicals industry location. Another important challenge for the cluster is the range of topics covered by Industry 4.0, for example.

Figure 4: Overview of Plastics and Chemistry Cluster areas of action



Bio-based specialty chemicals

The area of action “Bio-based specialty chemicals” not only focuses on the usual specialty chemicals but primarily on the further processing of bio-based, basic chemical primary raw material products or byproducts as precursors to more sophisticated applications. A clearly positive future development is expected in this sector of the chemical industry in particular. This focus offers the Branden-

burg-based stakeholders the chance to participate in the development towards sustainable chemical production in order to thereby achieve more value creation, which will in turn lead to a stronger market position. However, regardless of this fact, the development potentials based on fossil raw material sources are still taken into account.

Biopolymers

The area of action “Biopolymers” covers the processing of primarily bio-based polymers as well as their application in a wide range of different products. In this context, biopolymers are bio-based and/or biodegradable plastics. Just like in the area of action “Bio-based specialty chemicals”, sustainability is also an important driving force in the area of action “Biopolymers”. These materials respond to the requirements resulting from the sustainability efforts made by various industry sectors. This makes it possible to strengthen the Brandenburg region’s biomass strategy. However, shifting the focus towards bio-based plastics is also supported by economic prognoses. The global demand for polymers produced on the basis of bio-based raw materials is expected to rise considerably. It is therefore of vital importance for the Brandenburg-based businesses that they take the potentials biopolymers offer on board at an early stage to secure their future viability.

Light engineering/composites

In this area of action, energy efficiency is **the** innovation driver. Light engineering/composites is an issue that is of major importance to the construction, mechanical engineering, railway vehicle engineering and aerospace industries, and not least also since the fact that our future transport needs must be met with electric vehicles has been acknowledged, or rather since the discussion about the fuel consumption of vehicles powered by combustion engines. Over the past few years, light engineering/composites have become a central aspect when it comes to meeting these requirements. However, besides energy savings due to weight reduction and insulation, light engineered products and composites also offer other advantages, for example because of the increasingly integrated functional properties of components and in the area of product design, as they make completely new designs possible. Within the scope of this area of action, light engineering is understood to refer to light engineered plastics-based materials; metal is only included in composites. Light engineering and associated issues such as noise reduction are issues that have been given particular emphasis the German government’s coalition agreement. They therefore merit particular support, especially in connection with the energy turnaround. The planned measures are aimed at tying the already existing extensive research expertise in more closely with the companies in the Brandenburg cluster, however also with businesses in other clusters that might be potential users.

Plastics and chemical industry locations

Plastic and chemical industry locations are growth drivers that encourage the establishment of business and scientific communities. The infrastructure and the companies and scientific institutions already based locally attract new value creation and research activities. The catalyst effect these sites have should therefore be supported and increased in suitable locations, for example through infrastructure related measures, future qualified workforce related activities and profile raising through USPs in order to ensure their long-term competitiveness and to create the conditions needed for growth impulses.

Plastics and chemical industry logistics

This area of action addresses issues related to the specific plastics and chemical industry infrastructure needs. Especially for the plastics and chemical industry, logistics are vital for guaranteeing operational excellence. The expectations regarding logistics quality and performance are therefore also particularly demanding. Beside response times, these also includes aspects such as safety, capacity and availability. However, the focus is also increasingly on logistics support services. The multi-modal transport terminals must therefore take the needs of the plastics and chemical industry into account to a greater degree than is currently the case. Offering additional services can increase value creation in Brandenburg.

Future plastics and chemical industry workforce

The availability of a qualified workforce with a focus on the MINT disciplines (Mathematics, IT, Sciences and Technology) is an important aspect that is vital for the future, and not just the future of the plastics and chemical industry, although ensuring this in the long-term is a key issue here, considering the currently high level of specialisation. A comprehensive approach from many angles is needed, from getting children and young people interested in the sciences at an early age to offering career guidance and advice on suitable university courses and including the recruitment and retention of well-qualified staff. Brandenburg's plastics and chemical industry stakeholders will be forced to deal with the demographic developments in any case, but the decisive aspect is how well they are prepared for this.

The focus here is on encouraging more companies to offer practical vocational training places, guaranteeing sufficient university capacities and ongoing personal development through further qualifications. However, the overall aim of measures aimed at the development of a qualified workforce must be to ensure that these well-qualified people then also stay in the region, and to encourage others to settle in Brandenburg.

3 AREAS OF ACTION

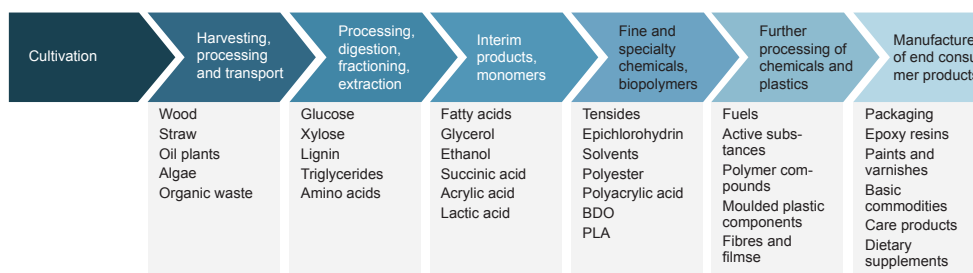
3.1 Areas of action with a focus on specific expertise

3.1.1 Bio-based specialty chemicals

Area of action description

This area of action not only focuses on the usual specialty chemicals but primarily on the further processing of bio-based basic primary raw materials, residual waste and by-products such as wood, straw, oil plants, algae or organic waste etc. into base products for more sophisticated applications. The substitution of fossil raw material sources with alternative, bio-based raw materials in keeping with Brandenburg’s biomass strategy and the German government’s national bioeconomy strategy can unlock vital sustainability potential. The utilisation of residual waste can have a particularly positive impact on land use. It is already possible to produce a wide range of chemical products based on biomass today.

Figure 5: The alternative chemical value creation chain



Source: BASF Schwarzheide GmbH

The ongoing research and development efforts of universities, scientific institutions and companies promise the further expansion of this product spectrum in future. This is accompanied by attempts to establish price parity. The prospects are good, as significant growth can be expected in the area of high quality bio-based chemical products in the next few years. This area can also participate in the disproportional growth of conventional speciality chemicals. The area of action therefore focuses on sharing in the growth of bio-based products by illustrating the complete value creation chain of bio-based chemical products in Brandenburg in order to encourage more businesses that offer employment opportunities for highly qualified people in this industry to settle here and to develop the respective expertise further.

Brandenburg offers the basic conditions for this, including an outstanding focus on agriculture and forestry, for example. At the same time, there is also the option of developing currently unused raw materials and residual waste as raw material sources. Base product manufacturers are available and close by, in the neighbouring German regions and the neighbouring country of Poland. Furthermore, there is the existing expertise of specialised companies at all levels of the value creation chain, and there are also established R&D activities in this specific

field in Brandenburg; both can offer support here. This allows the illustration of the complete value creation chain from a financial perspective. As a region with a large expanse of land and as a chemical industry location, Brandenburg offers the perfect conditions for the establishment of these future-oriented measures. In some areas, there are already activities aimed at establishing technology leadership. Not least, there are a great number of companies in the region that are likely to be interested in the potentially wide product spectrum.

Bio-based value creation as a means of accessing organic base materials and fuels at an industrial scale is realised through refinery concepts in a way that resembles the fossil path (cf. Figure 5). Biorefining refers to an integrative, comprehensive multifunctional processing system that uses biomass as a varied raw material source for the production of a spectrum of various intermediate products and products (chemicals, materials, bioenergy including biofuels) including the use of all raw material sources to a fullest possible extent. These processes may also produce additional food stuffs and/or feed by-products.

A fundamental step for bio-based value creation is separating the biomass components (e.g. lignocellulosic raw materials, LCF) by chemical and/or physical means to turn them into base products or raw materials which need to be processed further (e.g. cellulose, starch, sugar, vegetable oil, lignin and many more). In turn, these material platforms then form the basis for subsequent refinement into specialty chemicals.

In addition, numerous speciality chemicals such as nanomaterials, additives and pigments can also be manufactured from fossil organic or inorganic raw materials, for example for biopolymers or for use in the field of renewable energy storage.

Bio-based raw material examples:

- Plant constituents (green waste, straw etc.), wood (waste), oilseed crops, algae and many more.

Examples for bio-based base products or products that require further processing:

- Bioethanol, bio-glycerol, lignines, carbohydrates, lactic acid, furfural and many more

Bio-based specialty chemicals examples:

- Epoxy compounds, furan derivatives, oleochemicals, fatty amines and many more

Core issue, strategic objectives

Expansion of bio-based value creation chains

On the basis of the existing bio-based chemical product value creation chain elements in Brandenburg, the primary aim of the area of action “Bio-based specialty chemicals” is to pursue the expansion of the value creation chains up to the complete illustration of bio-based value creation in Brandenburg. The main focus in this respect is on the development of commercially exploitable products that can successfully compete with conventional chemical products. On the one hand, this can be achieved through cost-efficient production, and on the other through a spectrum of properties that conventional chemical products do not exhibit. The desired part-substitution of products or quantities produced on the basis of fossil raw material sources also results in a smaller carbon footprint, raw material source diversification and not least to improved sustainability. For this purpose, processes would have to be analysed with regard to their financial and technical feasibility on the basis of a market analysis, for example, and suitable processes would then have to be addressed within the scope of a test centre. These must be developed further until industrial production maturity. Simultaneously, stakeholders on the production and the user side will have to be brought together in order to be able to develop market-appropriate products along the entire value creation chain in a coordinated way. On the basis of the product specifications demanded by the market, the researchers and developers in the region’s scientific institutions, universities and businesses can create new and improved bio-based chemical products that contribute to Brandenburg achieving an internationally leading position as a supplier of high quality bio-based chemical products.

Bio-based specialty chemicals are considered separately in this area of action as an intermediate bio-based value creation chain stage. The main focus is on the further processing of primary raw material products or bio-based chemical by-products to base products for more sophisticated applications. In this context, there must be a clear differentiation from the manufacture of commodities and the use of conventional chemical raw material base products.

In terms of technology, it can be safely stated that in certain subareas, activities aimed at achieving technology leadership when it comes to the use of bio-based raw materials already exist. However, these are currently only possible due to the fact that they receive funding support.

It was also noted that the coordination and/or linking of existing capacities (manufacturers, service providers, R&D institutions etc.) is so far not particularly advanced in this area of action.

Strategic objectives

- Extension and completion of bio-based value creation chains
- Establishment of commercially exploitable products on the basis of bio-based raw materials
- Boosting synergies through the establishment of networks in this area of action that include potential customers
- Implementation of bio-based speciality chemicals as an area that offers economic potential
- Use of interfaces with the areas of action “Biopolymers” and “Light engineering/composites”
- Preservation and expansion of specialty chemicals made from traditional raw materials that are needed for use in combination with bio-based raw materials

Measures, previous and planned activities, stakeholders

1. Preparing a market analysis for bio-based chemical products at EU level

A market analysis for bio-based chemical products and the speciality chemicals made from traditional raw materials needed for these is an initial measure and a vital basis for expanding the bio-based value creation chains. In this context, attention must not only be paid to the national market but also to the EU markets. Assessing the EU-wide demand and supply situation for bio-based chemical products is the basis for the subsequent focus of further, more specific measures within the scope of the area of action “Bio-based speciality chemicals”.

Previous activities (selection)

- Study *Chemie 2030* commissioned by the VCI and carried out by economic research institute Prognos

Planned activities

- Relevant chemical product market analysis and evaluation of the potential market for bio-based chemical products taking growth and raw material availability into account
- Analysis and allocation of suitable Brandenburg-based companies and also partners outside of Brandenburg; highlighting the remaining gaps in the value creation chain that could offer a starting point for targeted activities aimed at encouraging companies to settle here

2. Establishment of a contact platform for bio-based chemical product manufacturers and their customers

Currently, not all of the stakeholders involved are aware of bio-based chemical products to the requisite extent or depth. The plan is therefore to set up an information platform where the manufacturers and users of bio-based chemical

products can get into contact with each other. These initial contacts might for example also lead to initiatives aimed at making first coordination attempts regarding the development of market-appropriate products.

Previous activities (selection)

- Workshop meetings in the cluster's area of action with active participants

Planned activities

- Consolidation of communication, wider accessibility (e.g. intranet forum) and involvement of additional stakeholders
- Networking in Central Germany (including Brandenburg) with chemical industry and bioeconomy stakeholders

3. Process evaluation

Before production processes for bio-based chemical products can be implemented, their financial and technical feasibility must be evaluated. In this context, selected processes must be examined, also taking logistics, process engineering, safety and not least ecological aspects into account, in order to subsequently initiate the implementation of the processes that are most suited to the profile of the chemical industry in Brandenburg.

Planned activities

- Identification of bio-based value creation key focuses taking existing activities into account (e.g. completion of the value creation chains)
- Technology evaluation and determination of cost benchmarks to assess the investment / innovation prospects of success

4. Identification of requirements for bio-based chemical product product specifications

On the basis of the information about the requirements of the market gleaned from the market analysis to be prepared within the scope of Measure 1, for example, the requirements for bio-based chemical product product specifications must be systematically compiled and communicated to the research and development stakeholders in order to develop products based on biological raw materials that meet the requirements.

Planned activities

- Definition of relevant quality parameters and their examination standards
- Determination of the acceptable bandwidth of specific product properties
- Generally applicable quality level and comparison in relation to established products

5. Creating the conditions needed to complete the bio-based value creation chain through the establishment/expansion of a test centre of industrial plant

To industrialise new chemical processes based on biological base materials successfully, the feasibility of production at an industrial scale must initially be illustrated within the scope of a test centre in order to then transfer fundamentally suitable processes into potentially financially and technically feasible production processes. Should these prove successful, an industrial plant for bio-based chemical products could be established on this basis as a business initiative (company settlement, expansion or cooperative alliance).

Previous activities (selection)

- Existing infrastructure for the operation of test centres and mini-plants (e.g. Fraunhofer, BASF, maxbiogas, BTU Cottbus – Senftenberg, HNE Eberswalde)

Planned activities

- Consolidation and profile heightening of the existing infrastructure and identification of required capacities for the area of action's needs

6. Funding research and development activities that focus on selected bio-based reference chemicals

Bio-based chemicals and the associated processes that have proved particularly promising when it comes to their potential for substituting conventional chemicals during the process evaluation must be brought to an industrial level as so-called reference chemicals, i.e. best practice examples. Illustrating HMF bio-based furan derivatives as a monomer substitute for terephthalic acid in polymer production or the general product development of a pesticide against the pine wood nematode or the extraction of syringol derivatives as a flavouring agent and fragrance could be considered here, for example. Targeted funding of reference chemical research and development would accelerate the industrialisation process for outstanding bio-based chemicals in the area of applications for base polymers, special polymers, basic chemicals, specialty chemicals and polymer resin systems.

Previous activities (selection)

- Individual project funding with marginal region-wide integration or R&D and business networking

Planned activities

- Comprehensive projects along the development stages from laboratory to test centre and industrial scale

Stakeholders involved

- 1) Chemical/plastics production companies active in this area
including BASF Schwarzheide, CREMER OLEO Wittenberge, GIZEH Elsterwerda, Greibo-Chemie Velten, Linotech Forst, maxbiogas Marienwerder, PCK Schwedt, Uhde Inventa-Fischer Berlin and Guben, Zeppoil Schwarzheide

- 2) Research and development institutions in the field of bio-based chemical products
including Biorefinery Teltow, BTU Cottbus – Senftenberg, FI biopos Teltow, Fraunhofer IAP Potsdam-Golm, IGV Rehbrücke, Leibniz Institute for Agricultural Engineering Potsdam-Bornim

- 3) Potential bio-based chemical product users
including plastics production and processing companies, resin and coatings manufacturers, detergent and care product manufacturers, active substance manufacturers such as DOMO Premnitz, Dynea Erkner, for example

- 4) Raw material producers or wholesalers
including agriculture and forestry, paper and pulp industry, oil mills, feed factories, biofuel producers

- 5) Networks and agencies
including Kunststoff-Verbund Brandenburg Berlin, ZukunftsAgentur Brandenburg

- 6) Relevant local and national government ministries
including Brandenburg Ministry for Economic and European Affairs (MWE), Brandenburg Ministry for Science, Research and Culture (MWFK)

- 7) Non-regional partners

3.1.2 Biopolymers

Area of action description

The use of biopolymers can make a considerable contribution to industrial sustainability efforts. They are already being used to some extent, although this is not generally well-known and as yet, they are not being used to an extent that corresponds to their fundamental suitability. The spectrum of potential areas of application is diverse, and the market is expected to develop decidedly positive in future. Aside from these promising prospects, the basic requirements, i.e. expertise and products ready for further processing as well as at least some elements of the value creation chain are already available in Brandenburg. Making this field a priority by defining it as a separate area of action within the scope of the cluster is therefore a logical consequence. The scope of the field of biopolymers particularly includes the processing of polymers which have been produced in a bio-based way, or biodegradable polymers, and their combination in applications.

According to Brandenburg's biomass strategy, the current German national and also the European Commission's bioeconomy initiatives, cascading utilisation (multiple use, e.g. as a material and then subsequently for energy) of renewable raw materials is of considerable importance. In this context, the area of action "Biopolymers" addresses the extensive field of using the substances in plant and animal derived raw materials to develop and produce biopolymer based products such as fibres, foils, fleeces, moulded polymer parts and consumables for the paper and other industries. The aim is to also increasingly take raw material flows not directly usable for food production (recovered wood, waste wood, grain husks, straw, slaughterhouse waste etc.) into account. The key issue of bio-based raw material base products is addressed in the area of action "Bio-based speciality chemicals".

On the one hand, Brandenburg is an expansive region with a thriving agriculture and forestry industry that offers good conditions on the raw material side in this context. On the other, there are also excellent research institutions here that focus on agricultural raw materials (e.g. Leibniz Institute for Agricultural Engineering Potsdam-Bornim), biotechnology (e.g. BIOPOS Teltow) and biopolymers (Fraunhofer Institute for Applied Polymer Research Potsdam-Golm). Brandenburg is also well ahead when it comes to stakeholder networking. In this respect, the chemical industry region Lausitz, with its major BASF site in Schwarzheide and several medium-sized plastics processing companies, plays a pioneering role, as demonstrated for example by the Kunststoff-Verbund Brandenburg Berlin (KuVBB), BASF Schwarzheide and Fraunhofer IAP initiative for a "Lausitz Bioplastics Innovation Centre" with the Fraunhofer IAP's already active first nucleus, a pilot plant for biopolymer processing, or the Federal Ministry of Education and Research (BMBF) innovation forum on biopolymers and bio-based plastics as sustainable materials for the future, which was successfully concluded in early 2013. The latter activities in particular are intended to promote the technology transfer from the research institutions to Brandenburg's plastics processing industry. However, the main weaknesses are the fact that the relevant companies

are widespread throughout Brandenburg, that the mostly relatively small businesses have little own capital and therefore pursue own R&D activities only to a limited degree, and the inadequate public visibility of the topic of biopolymers.

This area of action can be allocated to Brandenburg's regional innovation strategy innoBB; in this context, it is deemed to be especially closely connected to the Brandenburg Metal Cluster, the Health Industries cluster (with regard to biotechnology), and also the issues of raw materials/materials and clean technologies, which affect all of the clusters. Existing non-regional (including the bioeconomy excellence cluster in Saxony/Anhalt and the FNR/BMLE biopolymer network) and international ties, for example within the scope of the "European Polysaccharide Network of Excellence" (EPNOE), must be expanded.

One of the most important primary tasks of the "Biopolymers" area of action is strengthening the respective industrial basis in the region.

Core issue, strategic objectives

Establishment and expansion of a Lausitz bioplastics innovation centre (Innovationszentrum Bioplastics Lausitz, IZBL)

The Lausitz bioplastics innovation centre is an initiative by the Kunststoff-Verband Brandenburg Berlin (KuVBB), the Fraunhofer Institute for Applied Polymer Research Potsdam-Golm (IAP) and BASF Schwarzheide GmbH. The initiative intends to establish a network for research institutions, technology developers, manufacturing firms and users. This offer is available to both Brandenburg and Berlin as well as national and international interested stakeholders. It strongly encourages the development of new products and processes in the emerging field of biopolymers and bio-based plastics. The starting points and basis for the innovation centre's work are chemicals and polymer manufacturing. The medium and long term goal is to increase the use of bioplastics by medium-sized plastics processing companies and product developers. Another aim in this context is the promotion of system solutions with bioplastics. It will also hopefully attract the respective R&D and production capacities to the chemical industry location Schwarzheide and to other locations in the Lausitz region. The measure is accompanied by a cooperative alliance, as yet to be established, with non-regional networks from Saxony, Saxony-Anhalt, Thuringia and the ECRN.

Strategic objectives

- Expansion of the product spectrum and creation of system solutions with biopolymers
- Pooling and if necessary expansion of the research capacities and production in the area of biopolymers in the region
- Contribution to a system solution for the cascading use of renewable raw materials
- Establishment of closed cycles
- Development of a concept that encourages biopolymer processing companies to settle in the area
- Cooperative alliance with non-regional networks from Saxony, Saxony-Anhalt, Thuringia, the European Chemical Regions Network (ECRN), the European Polysaccharide Network of Excellence (EPNOE) and the Polish “Green Chemistry” cluster in West Pomerania.

Measures, previous and planned activities, stakeholders

1. Carrying out an analysis of Brandenburg’s biopolymer capacities and potential

As a starting point for further measures, the biopolymer capacities that currently exist in Brandenburg must be recorded, and the potential biopolymers may harbour for Brandenburg must be analysed. On the basis of this, or rather, as the next step, the further measures with regard to effective and efficient implementation can then be specified in detail.

Previous activities (selection)

- Analysis of the current capacities and future potential of biopolymers and bio-based plastics (raw material availability, R&D, production) and development of a basic concept for the Lausitz bioplastics innovation centre carried out by the KuVBB (2011 – 2012)
- Application and implementation of the BMBF innovation forum on biopolymers and bio-based plastics as sustainable materials for the future; implementation of an innovation forum with three workshops focusing on the subject and a closing event (July 2012 - March 2013)

Planned activities

- Updating the analysis of the current capacities and the future potential in the area of biopolymers and bio-based plastics; expanding the analysis to include “technology transfer” and a “business settlement initiative at the Schwarzheide location” to support the measures. In parallel, it must be investigated whether, on the basis of the successfully completed BMBF innovation forum on biopolymers and bio-based plastics as sustainable materials for the future, a respective application could be made to the BMBF for a “Biopolymer” Regional Growth Core with a particular focus on the Lausitz region.

2. Expansion of the Fraunhofer Processing Pilot Plant for Biopolymers Schwarzheide

The Fraunhofer Processing Pilot Plant for Biopolymers Schwarzheide, opened in 2013, is a field site of the Applied Polymer Research Potsdam-Golm (IAP). The expansion of the capacities of the Fraunhofer Processing Pilot Plant is aimed at creating an effective research and development unit at a practical level that is close to the industry, can support the local SMEs and facilitate the market entry for bio-based plastics. The planned joint appointment of the director of the processing pilot plant by the Fraunhofer Institute for Applied Polymer Research and BTU Cottbus-Senftenberg is intended to strengthen the cooperation with the local university, and to make a contribution to attracting young skilled workers to the plastics processing industry.

Previous activities (selection)

- Planning of the Fraunhofer Institute for Applied Polymer Research Processing Pilot Plant for Biopolymers Schwarzheide including strategy development, submission of funding applications to MWFK, FNR and Fraunhofer-Gesellschaft (May 2011 – June 2013)
- Planning the IAP Processing Pilot Plant technical equipment and staffing, carried out by the Fraunhofer Institute for Applied Polymer Research, and equipment of the building by BASF Schwarzheide (May 2012 – April 2013)
- Opening of IAP Processing Pilot Plant (24 April 2013).

Planned activities

- Closer cooperation between the Fraunhofer IAP and BTU Cottbus - Senftenberg; from a cluster perspective, the joint appointment of a professorship for biopolymers and plastics processing is essential
- Systematic project acquisition by the IAP Processing Pilot Plant in cooperation with Kunststoff-Verbund Brandenburg Berlin (KuVBB) and BASF Schwarzheide
- Establishment of the future working structure of the Lausitz bioplastics innovation centre

3. Increased technology transfer

Research and development activity findings can have an effect only if they are used by companies and subsequently successfully launched on the market. The biopolymer related R&D results achieved by the Fraunhofer Institute for Applied Polymer Research and the IAP Processing Pilot Plant for Biopolymers in Schwarzheide must therefore be made available to the companies as required for market launch through increased and focused transfer measures.

Previous activities (selection)

- Establishment of the Fraunhofer Processing Pilot Plant for Biopolymers
- Activities within the scope of the FNR biopolymer network
- Use of conferences (biopolymer colloquium, Schwarzheide polymer colloquium) and trade fairs (such as International Green Week Berlin, K, nature.tec)

Planned activities

Specific technology transfer measures by the IAP Processing Pilot Plant in cooperation with Kunststoff-Verbund Brandenburg Berlin (KuVBB) and BASF Schwarzheide

4. Establishment of a regional centre of expertise

Due to its expertise in plastics and chemicals, especially at the Schwarzheide location, the western Lausitz region must be progressively developed further and designed in a way that promotes excellence, value creation and networking.

Previous activities (selection)

- Establishment of a German Federal Ministry of Education and Research (BMBF) innovation forum
- Schwarzheide polymer colloquium, increasing focus on biopolymers

Planned activities

- Analysis and activation of the existing potential of businesses for further networking within the cluster
- Strengthening the region through the establishment of an innovative Regional Growth Core within the scope of the BMBF initiative “Entrepreneurial Regions”
- Establishment of a cooperative alliance with non-regional networks from Saxony, Saxony-Anhalt and Thuringia, the European Chemical Regions Network (ECRN) and the Polish “Green Chemistry” cluster in West Pomerania.
- Cross-cluster activities with the clusters “Metal”, “Food Industry”, “Energy Technology”, “Photonics”, “Healthcare Industries”, “ICT/Media and Creative Industries”, and “Transport, Mobility and Logistics”.

5. Focusing the business settlement initiative at the Schwarzheide location on biopolymer processing

On the basis of a business settlement concept as yet to be developed, a campaign to encourage biopolymer processing companies to settle at the Schwarzheide location should be initiated in order to expand the production capacities and to broaden the value creation scope. The business settlement initiative is coordinated and promoted by ZukunftsAgentur Brandenburg, BASF Schwarzheide and the Kunststoff-Verbund Brandenburg Berlin.

Previous activities (selection)

- Location choice for Fraunhofer Processing Pilot Plant
- Targeted discussions with businesses willing to settle here

Planned activities

- Development of a business settlement concept for biopolymer processing companies to promote the Lausitz chemical industry region as a business location
- Running a campaign to attract biopolymer processing companies to the Schwarzheide location
- ZukunftsAgentur Brandenburg activities within the scope of the regional business settlement strategy

6. Intensify public relations measures

The public image of biopolymers has recently suffered due to the much-publicised “food or fuel” debate. As yet, the public and the potential users are not sufficiently aware of the contribution that biopolymers can make to sustainability, especially if they are produced from waste materials, rather than raw materials that may be used to produce food, which is the ultimate aim. In this area of action, the cluster stakeholders involved are therefore called upon to clearly illustrate how the potential of biopolymers should be categorised, also for the sake of Brandenburg as an industry location, and to improve the customer acceptance level with the aid of high profile image campaigns.

Previous activities (selection)

- Individual cluster stakeholder reports about current projects in the press and in the media as and when required
- Regular organisation of biopolymer colloquia and exhibitions

Planned activities

- Development of marketing concepts and corresponding demonstration projects by cluster stakeholders to improve the public image of biopolymers, for example bio-concept car races at the Lausitzring race track
- High profile publicity campaigns along the lines of the Kunststoff-Verbund Brandenburg Berlin project concept “Green Lausitzring”.

Stakeholders involved

- 1) Research institutions
including BTU Cottbus-Senftenberg, Fraunhofer IAP Potsdam-Golm, Leibniz Institute for Agricultural Engineering Potsdam-Bornim
- 2) Material manufacturers
including BASF Schwarzheide, BIOP Schwarzheide, PCK Schwedt, Uhde Inventa-Fischer Guben
- 3) Product developers
including BSH Nauen, Linotech Forst
- 4) Plastics processors
including BSH Nauen, GIZEH Elsterwerda, hesco Luckenwalde, Linotech Forst, Motzener Kunststoff- und Gummiverarbeitung Mittenwalde
- 5) Networks and agencies
including Kunststoff-Verbund Brandenburg Berlin; ZukunftsAgentur Brandenburg
- 6) Relevant local and national government ministries
including Brandenburg Ministry for Economic and European Affairs (MWE), Brandenburg Ministry for Science, Research and Culture (MWFK)
- 7) Non-regional partners

3.1.3. Light engineering/composites

Area of action description

Light engineering makes it possible to realise weight reduction without the loss of sufficient rigidity, dynamic stability and strength. Its primary aim, though, is energy- and resource-efficiency. This makes light engineering concepts essential in all areas where mass is moved. They have been used increasingly over the past few years. Due to the challenges associated with the energy turn-around, light engineering (together with composites) will gain considerably in importance. In this area, the aerospace and the automotive industries are still the primary drivers due to their use of carbon fibre reinforced polymers. However, light engineering is also possible with other materials such as ceramics, metals or hybrid materials.

The area of action “Light engineering/composites” covers light engineering with polymers only. Light engineering with metal is addressed in the context of the “Brandenburg Metal Cluster”. However, the area of action is more extensive with regard to composites to ensure that certain specific composites from various materials to metal and polymer composites are also included. In essence, each industry sector and application has very specific, complex demands in terms of light engineered and composite components. Usually, a specific spectrum of properties has to be achieved for each application; very often, opposing properties must be balanced out, e.g. low weight and noise insulation, high temperature resistance and low brittleness.

The light engineering and composites research landscape is highly developed in Brandenburg but does need to be more focused in organisational terms in order to increase its competitiveness and visibility. The university and non-university institutions cover the entire development chain, from basic chemicals to finished component; a wide range of industrial enterprises can therefore profit from the research and development results to improve their position in the market. In addition, there are well-established links between research and development and the industry, which has a positive impact on the usability of the research results.

This area of action focuses particularly on the following industry sectors:

- Aerospace
- Automotive
- Railway vehicle engineering
- Wind power
- Mechanical engineering/tools
- Construction
- Duromer-related chemical industry

This also leads to points of contact with other clusters in the region. Besides the Metal Cluster, which is closely involved with light engineering on the materials side, these are the clusters “Energy Technology” and “Transport, Mobility and Logistics”.

For Brandenburg, excellence in the field of light engineering/composites and in the associated production technologies is an important element for additional industrial value creation in the region, particularly as small and medium-sized companies can also develop and produce profitable new products without having to overcome entry barriers such as substantial investments, and can thereby improve their market position. Thanks to the increasing demand and the continuous transfer of innovative ideas from the research institutions to the local industry, value creation can be maintained and expanded and thereby make a contribution to the job security of those employed in this industry. Furthermore, light engineering and composites also make an important contribution to sustainability. As the products themselves weigh less, less energy is required to keep the vehicle moving. New construction concepts are another option, for example with composites that make it possible to use less material.

The core of the research and development projects and numerous industrial partners in the “Light engineering/composites” area of action are based at Wildau (Regional Growth Core Schönefelder Kreuz) and nearby. Wildau is the hub of an industrial heartland that stretches south from Ludwigsfelde and Dahlewitz via the German capital’s future international airport BER, Berlin-Adlershof and Wildau to the Lausitz region all the way to Central Germany’s main industrial hub around the cities of Dresden and Halle/Leipzig and Chemnitz. It therefore stands to profit considerably from the implementation of the master plan. The Fraunhofer PYCO and TH Wildau University of Applied Sciences are already important factors new businesses take into consideration when choosing a site; new research collaborations will ensure their continued growth.

With its strong focus on light engineering technologies, Wildau is the technological counterpart of the research hub in Potsdam-Golm, which focuses mainly on biopolymers. More than 60 companies have already settled in Wildau. In close cooperation with proven technology-oriented research, they will continue to dynamically develop this location further. In addition, the expansion of the Fraunhofer PYCO and an increased focus on the engineering sciences/technology at the University of Applied Sciences will result in heightening Wildau’s overall profile as a technology hub.

Core issue, strategic objectives

Expand light engineering and composites expertise for new, sustainable products

Composites and composite based light engineered products are also fabricated in Brandenburg without this production being driven by sustainability aspects or the innovation character inherent in these products. In actual fact, these are usually niche products with a special property profile. In contrast, the area of research and development makes a decisive contribution to the international trend, above all also in the field of carbon fibre reinforced polymers (CFRP), which are currently showing the biggest development potential; 90% of these CFRP materials are thermoset based. The Fraunhofer PYCO is internationally leading in the field of thermoset based fibre composites. The core of the development requirements for a wide range of different applications is easily defined in the area of polymer based light engineering/composites.

One of the challenges related to polymer based light engineering, especially when it comes to CFRP materials, is still the inadequate damage tolerance, compared to the traditionally used metal materials. Although there are cost-intensive solutions for damage tolerant CFRP aerospace industry materials, for example, there are so far none for cost-efficient manufacturing technologies and semi-finished products. This is a major obstacle for light engineering in mass markets such as the automotive industry, for example.

However, as the light engineered and fibre composite materials that are available on the market are useful for future areas of application only up to a certain point, there is a significant research and development need in the area of matrix systems here in order to develop semi-finished products and components for the industry. This also applies to monolithic components and sandwich constructions.

To establish new products on the market, the research and development requirements in the field of light engineering/composites are manifold:

- Optimum functionality performance of the semi-finished product or component (excellent weight related properties)
- Developing new materials with improved properties (high temperature resistant polymer materials [thermoplastics, elastomers, thermosets], fibres, foams etc.)
- Achieving optimum FST properties (fire, smoke, toxicity)
- Ensuring damage tolerance comparable to the levels displayed by metal materials (in part beyond these)
- Ensuring the simple and faultless processability of resin systems during the fabrication of semi-finished products, their further processing or during component manufacture (from fibre reinforced polymers) e.g. with injection by means of infusion or pultrusion, which also produce very little wastage; when it comes to very expensive components, for example

CFRP components, another very interesting aspect is also being able to repair components that were manufactured faultily

- More efficient light engineered component production processes (micro-wave technology, automation technologies etc.)
- Material developments for methods for joining plastics to other materials suitable for automation
- Limited resource and cost sensitivity (energy, material, process duration) make it necessary to recycle and repair light engineered components (lifecycle)
- Energy savings during raw material, semi-finished product and component manufacture and in terms of the logistics for the entire manufacturing process – “Green Production”
- Easy to repair when in use; it should be possible to carry out repairs in manual production conditions, and less well-qualified personnel should also be able to carry out repairs; the material needed for repairs should also be available in smaller batches
- Simple reuse after use, i.e. a recycling chain that is as complete as possible with as few problem substances as possible
- Use of sustainable raw materials
- Establishment and expansion of customer-specific supplier chains to ensure extensive availability of semi-finished products and matrix materials

The research and development work therefore frequently focuses on solutions that cover the entire value creation chain, from materials to components and including recycling. In this respect, the researchers usually address the technology related issues and carry out the production of demonstrators or components in close cooperation with industrial businesses.

Strategic objectives

- Expansion of the Wildau location into a centre of expertise for energy- and resource-efficient light engineering and composites in Brandenburg coordinated by the Fraunhofer PYCO in collaboration with BTU Cottbus-Senftenberg, TH Wildau and other regional stakeholders, especially with the involvement of already established companies
- Development of energy- and resource-efficient light engineered products as a contribution to the energy turnaround
- Development of new affordable matrix and fibre materials as well as new textile methods, material combinations aimed at corrosion prevention and light engineering solutions that are not noisier than the current standard solutions
- Automation of light engineering product manufacturing. Material and technology independent industrialisation of light engineering concepts

Measures, previous and planned activities, stakeholders

1. Establish centre of expertise for energy- and resource-efficient light engineering

The cluster stakeholders intend to intensify the interaction between the existing light engineering and composites experts in Brandenburg in order to improve the expertise and capacity efficiency as well as the way the cluster is perceived by cooperation partners and customers from the industry. Within the scope of this plan, closer ties are to be forged between the locally existing experts for internal and external image enhancement purposes. Along with the efficient communication of knowledge and advice regarding specialists whom industrial companies and tradespeople can contact, this will make another contribution to the further industrialisation of the Brandenburg region. Focusing these intentions in the form of a centre will make it easier to contribute the existing light engineering and composite expertise to industrial projects than before, and will thereby improve its visibility. The establishment of this centre of expertise would be coordinated by the Fraunhofer Research Institution Polymeric Materials and Composites (PYCO) and BTU Cottbus-Senftenberg. Cooperation with TH Wildau University of Applied Sciences is envisaged to involve further expertise in the area of light engineering. Further collaborations with other regional and other universities and research institutions are also planned. This measure is aimed at focusing research and development on solutions along the entire light engineering and composites value creation chain.

Previous activities (selection)

In this context, specific projects with companies based in the region are worth mentioning by way of example:

- High temperature stable thermosets for CFRP materials: applications for turbines used by the companies Rolls-Royce Germany and Florida Turbomaschinery Technologies Germany
- Injection- and transfer-moulded fibre reinforced polymers with new property profiles, e.g. with the company Hermann Römmler Kunststofftechnik
- Use of microwave technology with the aim of achieving energy savings and considerably improved property profiles at Motzener Kunststoff- und Gummiverarbeitung
- Organisation of the “Thermosets” series of international conferences coordinated by the Fraunhofer PYCO
- Establishment of a technology platform for semi-finished product and component engineering systems for light engineering, composites and energy-efficient process technologies (manufacture and further processing) by the Fraunhofer PYCO
- BMBF “Entrepreneurial Regions” light engineering/composites growth core potential focused funding
- Development of energy-efficient light engineering construction materials on the basis of fibre reinforced polymers for special applications (1 September 2009 to 31 August 2011; coordinator Fraunhofer PYCO)

Planned activities

- Analysis of the technology requirement situation in Brandenburg
- Development and establishment of the working structures for business and scientific community stakeholder networks
- Evaluation of strategic issues with the aim of strengthening the market position of the stakeholders along the development and value creation chain
- Initiation of technology development projects and helping companies, especially small and medium-sized companies, to carry out their own development projects – also when it comes to collaborating with partners
- Raising the profile of the location marketing in this area of action (including Wildau as a technology location)
- Non-regional chemical industry and bioeconomy focused networks with Saxony, Saxony-Anhalt and Thuringia in order to be able to achieve a new level of non-university research institution and university collaboration quality

2. Cross-cluster links between light engineering and plastics and metal

Cross-industry expertise through cooperation and the establishment of networks that involve raw material producers, designers, processors and scientific institutions are necessary in order to generate additional impulses for light engineering and to utilise synergies. The objectives are:

- Encouraging potential customers in other clusters to consider the use of light engineered polymer products (automotive, railway vehicle technology, energy technology sectors etc.)
- Expanding the range of light engineered products or light engineering concepts offered by the cluster's businesses
- Targeted approach of non-local companies with regard to collaborations or new sites

Planned activities

- Continuation and intensification of the needs and experiences focused dialogue with regard to materials and manufacturing methods to determine the market and user requirements in order to then conceive practical application oriented R&D projects in cooperation with the energy- and resource-efficient light engineering centre and other scientific community stakeholders
- Initiation of further technology development projects and helping companies at the points of interface, especially when it comes to networking with interdisciplinary cooperation partners
- Cooperation and the establishment of networks that involve raw material producers, designers, processors, scientific institutions and other networks
- Development of new materials with properties that have been adapted to particular industry needs such as high temperature resistance (composite materials), heat storage capacity or fire resistance
- Identification of the current situation, needs and potential of composites based on wood fibres (“wood-plastic composites”) and other bio-based materials as well as viscose and other bio-based fibres in cooperation with the area of action “Biopolymers”.

Stakeholders involved

- 1) Universities and scientific institutions:
including Fraunhofer Research Institution Polymeric Materials and Composites (PYCO), Teltow, BTU Cottbus-Senftenberg, Eberswalde University for Sustainable Development(HNE), TH Wildau
- 2) User companies (selection)
including Rolls-Royce Deutschland Blankenfelde-Mahlow, Florida Turbomachinery Technologies Deutschland Berlin, Hermann Römmler Kunststofftechnik Rehfelde, Motzener Kunststoff- und Gummiverarbeitung Mittenwalde
- 3) Networks and agencies
including Kunststoff-Verbund Brandenburg Berlin, ZukunftsAgentur Brandenburg
- 4) Relevant local and national government ministries
including Brandenburg Ministry for Economic and European Affairs (MWE), Brandenburg Ministry for Science, Research and Culture (MWFK)
- 5) Non-regional partners

3.2 Areas of action sector-oriented issues that affect all industry sectors in this cluster

3.2.1. Plastics and chemical industry locations

Area of action description

The Brandenburg plastics and chemical industry locations are a catalyst for regional value creation within the cluster and are facing competition at a national as well as an international level. They attract other companies from various different value creation stages and research, thereby contributing to the creation of valuable industrial jobs in the region. Additional employment opportunities also result from the industrial businesses that settle here through the establishment of service capacities in the region.

The chemical industry locations in particular are competing for investments both at a regional and global level and therefore need attractive framework conditions to successfully develop further in order to continue to be able to fulfil their catalyst function.

An analysis of the framework conditions critical for the success of plastics and chemical industry companies has shown that the basic conditions for specialty chemical businesses – which are particularly difficult to meet – are especially present at the Schwedt and Schwarzheide locations. The intention of this area of action is to support these locations through measures aimed at optimising the framework conditions to allow them to play a major role in Brandenburg and for the cluster. This will hopefully establish them as a strong pillar of the Brandenburg industry in future.

This is particularly of considerable importance because the chemical industry already has very close ties with various industry sectors in the region as a supplier of raw and other materials. The aim is to forge even closer ties. Furthermore, the scientific basis for new, innovative polymer and chemical products also already exists.

By no means will this have a negative impact on the importance of other, less industry sector specific locations such as Guben, Premnitz, the areas around Neuruppin and Oranienburg and also Spremberg in their respective specialist fields. However, not only a focus on the topic as such but also the spatial concentration of the core activities must be an essential part of any focusing strategy. A knock-on effect on other plastic and chemical industry locations is an explicitly desired outcome and is therefore promoted accordingly.

Core issue, strategic objectives

Strengthening Brandenburg's chemical industry locations through competitive access to basic chemicals

On the basis of the results of a market and business situation analysis, the chemical industry locations to be selected for targeted development are to receive support in the form of promotional measures designed to establish the right framework conditions and to heighten their profile. The key issue is aimed at ensuring the competitiveness of the locations compared to other regional and international locations, and to increase their catalyst function for up- and downstream companies as well as scientific institutions and universities. In this respect, the USPs are to be expanded with a focus on key future fields. The locations must therefore develop a profile that allows them to clearly distinguish themselves from the competition.

Strategic objectives

- Ensuring competitiveness:
 - In this area, the focus is on the targeted development of suitable chemical industry locations in the Brandenburg region to facilitate their long-term regional and international competitiveness.
 - Heightening the catalyst function:
 - Plastics and chemical industry locations are initial nuclei for value creation chain related networking with customer and user industry sectors and thereby promote the extension and consolidation of the existing value creation chains in the region. The respective fields of study at universities and scientific institutions profit from collaborations with successful chemical industry locations.
- Increasing USPs:
 - The activities are to focus on already identified future fields (biopolymers, energy storage, transport etc.) in and around the Cluster Plastics and Chemistry.

Measures, previous and planned activities, stakeholders

1. Conduct an analysis of the market and business situation

As a basis for the development of a range of measures to promote the locations, specific location related USPs and the potential scope for interaction with other industry sectors are to be identified for the plastics and chemical industry locations on the basis of an analysis of the market and competitive situation.

Previous activities (selection)

- A location profile was developed for Schwarzheide by means of a strengths and weaknesses analysis which then served as the basis for a concept for the further development of the location into a speciality location under consideration of the BASF Group strategy. In doing so, criteria and evaluation methods for the potential capacity of industry locations were taken into account. These were based on the experiences gained within the Group and on dialogues with the VCI's chemical industry locations group of experts. They can usually be transferred to other chemical industry locations.
- A tailor-made location development concept is being implemented at Schwedt. It is based on the location's many years of experience with external investments.
- Location evaluation methods are also offered by consultancy firms specialising in this area. Some examples are:
 - Scopein Management Consultants "Chemieparcs 2.0 Site Benchmarking"
 - Festel Capitals "Marktstudie Quo vadis, Chemieparcs?" study
 - A. T. Kerney's studies on the outlook for chemical industry location onsite services
- There have also been studies focusing on this subject in the university area:
 - TUM, school of business and management research centre, Prof. Wildemann
 - University of Potsdam, business management and marketing institute, Prof. Balderjahn

Planned activities

- Continuation of previous activities
- Inclusion of further locations such as, the Schwarze Pumpe industry park
- Development of the analyses and of the respective conclusions and recommended measures
- Carrying out a joint analysis of the market and competitive situation in order to identify the unique selling points of the Brandenburg chemical industry locations

2. Development of a range of measures to improve the framework conditions for investor settlement

The analysis of the market and competitive situation can serve as the basis for a range of measures aimed at improving the conditions for the settlement of investors. In addition, interfaces with the areas of action “Plastics and chemical industry logistics” and “Future plastics and chemical industry workforce” are to be identified and highlighted in detail as the basis for the direction of a joint strategy for the design of logistic connections and qualified workforce related measures.

Planned activities

- Development of a list of recommendations for optimisation measures at the locations. This range of measures must explicitly examine and highlight the USPs of Brandenburg’s locations to allow the development of location-specific methods for the further optimisation of the product and service portfolio.

3. Active location marketing

Active location marketing instruments which have already proven their worth in regional government led campaigns for the Brandenburg region (such as business delegations and regional conferences) should be utilised with the aim of increasing the profile of the plastics and chemical industry production locations.

Previous activities (selection)

- BASF Schwarzheide GmbH and Industriepark Schwedt (IPS) GmbH have established the infrastructure conditions needed to encourage industrial companies, particularly those active in the area of chemicals and polymers, to settle here. Targeted business settlement campaigns are being organised in close cooperation with the parent companies and the respective RGC and ZAB.
- The Schwarzheide location has already participated in business delegation visits to countries with a potential interest in investing in eastern Germany.
- The Schwarze Pumpe location is currently developing its profile as a centre for industrial water management expertise. A start has been made with an international symposium on industrial water management expertise that focused on innovative solutions for complex problems in April 2014 within the scope of the cluster and location dialogues in the Spremberg RGC.

Planned activities

- Strategic positioning of the plastics and chemical industry locations in the cluster related location marketing
- Targeted marketing aimed at international investors (direct approach) and international network organisations in the plastics and chemical industry area to reach those that might potentially be interested
- Marketing of the locations at suitable national and international trade fairs
- Coordinated action by all stakeholders of a location in terms of its presentation to potential investors and partner organisations (networks, industry associations etc.)
- Targeted public relations campaigns, especially in national and international trade journals
- Utilisation of the planned cluster and location dialogues in the RGC to further raise the location profiles
- Organisation of tours and information events for national and international business delegations interested in investing

Stakeholders involved

- 1) Representatives of suitable plastics and chemical industry locations:
including BASF Schwarzheide GmbH, PCK Raffinerie GmbH
- 2) Financial support by the Brandenburg regional government for the local plastics and chemical industry locations
- 3) Networks and agencies
including Kunststoff-Verbund Brandenburg Berlin, ZukunftsAgentur Brandenburg
- 4) Relevant local and national government ministries
- 5) Non-regional partners

3.2.2 Plastics and chemical industry logistics

Area of action description

Chemical raw materials and refined substances pose particular logistical challenges in terms of safety, capacity, availability and supply speed. To meet these requirements, the logistics in turn require a well-developed transport infrastructure and dedicated terminals with additional services that meet these needs. At a proportion of up to 10% of the total costs, the logistics represent an important element of the plastics and chemical product value creation chain. Improving the logistics framework conditions therefore makes an important contribution to ensuring the competitiveness of Brandenburg's plastics and chemicals industry. Thanks to its central location in Europe and the three TEN-T (Trans-European Transport Networks) corridors running through its territory, Brandenburg has a major potential for establishing itself as a European logistics hub, especially along the west-east axis. The European plastics and chemical industry's future growth markets lie in eastern Europe. Regular and affordable transport connections must be established in this direction. In addition, the sea port inland connections are transport hubs that provide the all-important access to global markets. Chemical industry logistics focus mainly on the organisation of safe, efficient and environmentally compatible transport. Promoting multi-modal transport is therefore of particular importance. Expanding the range of multi-modal transport terminal offers and usage options and increasing the use of innovative loading technologies can make a contribution to shifting transport from road to rail or inland waterway vessels. This facilitates additional value creation for Brandenburg.

Core issue, strategic objectives

Designing Brandenburg's multi-modal transport terminals in a way that meets the plastics and chemical industry logistics requirements

In order to ensure that Brandenburg's multi-modal transport terminals are designed in a way that better meets the future logistics requirements of the plastics and chemical industry, the aim should be to further develop the present multi-modal transport terminals and their connections into logistics hubs for multi-modal transport users in the area of plastics and chemicals. One particular goal is to position the logistics services offered in the area of multi-modal transport as leading in terms of service and costs by international standards. To achieve this, the weak points in the existing system have to be identified, strategies for removing them must be developed and, with the future in mind, the added value services that will be needed must then also be developed, implemented and advertised. The project is to be realised in close coordination with logistics services providers and their customers. Universities, non-university institutions, policy-makers, the local business development agencies, networks and stakeholder associations will also be involved, and the entire project will also be a collaborative effort with other national and international participants.

Strategic objectives

- Improving the logistics framework conditions to ensure and increase the competitiveness of the plastics and chemical industry in Brandenburg and Berlin; eliminating transport infrastructure and multi-modal transport deficits to improve access to the future international growth markets
- Establishing the logistics location Berlin-Brandenburg as a European hub to consolidate transports with a special focus on the east-west routes; improved connection of the existing multi-modal transport terminals to the Trans-European Transport Networks (TEN-T)
- Offering dangerous goods specific services and infrastructures
- Promoting technology transfer through the implementation of innovative logistics solutions (e.g. use of ICT etc.)
- Strengthening the cooperation across regional and international borders with relevant stakeholders, networks and initiatives.

Measures, planned activities, stakeholders

1. Analysis of the logistical infrastructure in the Brandenburg region with a special focus on the requirements in the plastics and chemicals area

To design the multi-modal transport terminals appropriately, the current challenges and opportunities in the area of plastics and chemical logistics must be analysed. The first task is therefore an assessment of the status quo in Brandenburg. This will then serve as the basis for an action plan with recommendations for the implementation of activities specifically aimed at equipping the multi-modal transport terminals for future increased use.

Planned activities

- Assessment of the current multi-modal transport and infrastructure situation in Brandenburg including an analysis of existing deficits in terms of access to the TEN-T corridors; assessment of the current workforce structure (age structure, insourced-outsourced)
- Analysis of the future multi-modal transport terminal requirements in terms of equipment, services and workforce and identification of usage portfolio expansion options; identification of potential synergistic effects through closer cooperation with other relevant initiatives/networks in the capital region and in other neighbouring regions
- Development of a strategy for meeting the future requirements in terms of multi-modal transport terminal design and infrastructure and the availability of a suitably qualified workforce; preparing a visual representation of the existing multi-modal transport terminals including the range of services offered; stressing the special qualification requirements involved in handling and transporting dangerous goods; help with the establishment of new, innovative loading methods at respectively suitable locations
- Support during the extension and connection of terminal capacities and the expansion of the usage portfolio for plastics and chemical industry transports

2. Establishment of coordination structures for the area of action “Plastics and chemical industry logistics”

Ensuring optimum utilisation of the existing resources when it comes to supporting the envisaged measures calls for coordinated support to guarantee that all stakeholder needs are taken into account through the involvement of the stakeholders concerned. In addition, information can be exchanged.

Planned activities

- Agreement and coordination of measures and subsequent results
- Organisational and scientific support with regard to the content-focused work
- Organisation of industry events focusing on issues such as the current challenges, the progress of the planned measures, and general networking
- Establishment of networks involving plastics and chemical industry companies, logistics services providers, multi-modal transport terminal operators, universities and research institutions, ZAB, transport and economic affairs ministries, networks and stakeholder associations from Brandenburg and the neighbouring regions; helping the multi-modal transport terminal operators, the handling companies and the logistics services providers to develop strategic partnerships.

3. Improvement of transport infrastructure

On the basis of the analysis of the current situation and other analyses, a transport infrastructure development priority list must be agreed that improves the companies' access to the multi-modal transport terminals and their access to the TEN-T corridors.

Planned activities

- Illustrating the planning periods and decision-making procedures and also of the financing scope of infrastructure improvement activities
- Joint positioning and communication of the list of priorities together with the chambers of commerce and other stakeholder associations (German chemical industry association VCI etc.)
- Promoting the further development of multi-modal transport logistics hubs into added value service centres for the plastics and chemical industry
- Communication and coordination with infrastructure operators (including Deutsche Bahn, the national railway operator)
- Ongoing monitoring of the progress of the expansion measures

4. Strengthening the cooperation beyond regional and international borders; international marketing

“Unity is strength”. The aim is therefore to collaborate with plastics and chemical industry logistics stakeholders beyond the regional or international borders to raise the location’s profile. Alongside this, the logistics location also has to be marketed nationally and internationally, highlighting its potential.

Planned activities

- Expansion of the cooperation with existing structures, networks and initiatives in Berlin to jointly raise the profile of the capital region as a logistics location and to take up a joint position with regard to the elimination of infrastructure deficits under consideration of the multi-modal transport developments in the neighbouring regions and countries
- Establishment of an ongoing exchange of experiences with the Central Germany Cluster Chemicals/Plastics in order to cooperate more closely with Saxony-Anhalt, Saxony and Thuringia; involvement of Central Germany’s relevant stakeholders in cluster events; coordination of the logistics concepts and strategies of the east German federal states
- Closer cooperation with the neighbouring countries in the east as important plastics and chemical industry target markets and involvement in current Brandenburg Cluster Transport/Mobility and Logistics activities through networks and initiatives
- Increased public relations measures, including also, for example, presentation of the location at national and international trade events and fairs; highlighting the potentials of the location as a European hub site, with particular reference to logistics involving plastics and chemicals

5. Promotion of innovative logistics solutions and development of EU projects to expand and intensify the cooperation

Brandenburg’s logistics locations can only remain competitive by international standards if there is an ongoing creation of new, innovative added value. On the one hand, this can be promoted by supporting the identification, development

and use of innovative logistics solutions in areas such as sustainability or smart multi-modal transport terminals and also the transfer into EU projects, and on the other through intensified collaborations.

Planned activities

- Providing support in terms of the identification and use of innovative plastics and chemical industry logistics optimisation solutions
- Establishing links between the logistics stakeholders and information and communication technology (ICT) stakeholders, for example in order to collaborate on the use of tracking and tracing technologies to track and trace dangerous goods during multi-modal transport
- Ongoing screening of calls for proposals at EU level to identify suitable calls and monitor projects as well as inclusion of the project results in the cluster work of this area of action.
- Organisation of information events and direct approach of all interested stakeholders
- Supporting project ideas and establishing project partnerships, and providing assistance with the preparation of project submissions

Stakeholders involved

- 1) Intermodal transport operators and users
including BASF Schwarzheide, Bertschi, DHL, GVZ FF/O, GVZ Schönefelder Kreuz (Lutra), Lion Spezialtransporte Forst, Rail & Logistik Center Wustermark, Rieck Logistics Group
- 2) Infrastructure operators
including national government, Brandenburg state
- 3) Universities and scientific institutions
including Brandenburg University of Technology, Cottbus-Senftenberg, Technical University of Applied Sciences Wildau, TU Berlin
- 4) Networks and agencies
including Cluster Food Industry, Cluster ICT/Media and Creative Industries, Cluster Transport/Mobility and Logistics, tradesmen's chambers, Kunststoff-Verbund Brandenburg Berlin, LogistikNetzwerk Berlin-Brandenburg, business associations, ZukunftsAgentur Brandenburg
- 5) Relevant local and national government ministries
including Brandenburg Ministry for Economic and European Affairs (MWE), Brandenburg Ministry for Science, Research and Culture (MWFK), Brandenburg Ministry for Infrastructure and Agriculture (MIL)
- 6) Non-regional partners

3.2.3 Future plastics and chemical industry workforce

Area of action description

Suitably qualified staff are the most important asset of any company, university and non-university institution. Education, vocational training and further training and qualification measures that are of a high quality, especially those with a focus on the “MINT” (Mathematics, IT, Sciences and Technology) fields, ensure the competitiveness of companies and therefore their future viability. Education gives young people and the unemployed access to a working life with prospects. In view of the demographic change, which is leading to fewer students and an increasingly older workforce, the competition for human resources will increasingly become fiercer. At the same time, the permanent technological progress and the region’s consistent focus on technology-oriented target industry sectors calls for more in-depth expertise, especially in the “MINT” fields, and well-educated technical university graduates. In the present employment market, the focus is on knowledge and skills. In this respect, their complexity is frequently increasing, and the responsibilities become more concentrated. However, this is contrasted by the fact that young people increasingly lack the maturity needed for further education and vocational training. Increasingly, this calls for the short-term approach of vocational training institutions and universities offering complementary training and education measures, despite the fact that they can only meet these needs with great difficulty due to a lack of capacity. A long-term educational policy framework is therefore essential to ensure the future viability of the MINT occupations.

Besides ensuring the availability of a suitably qualified workforce for the existing companies in the region, Brandenburg also in parallel encourages the expansion of the value creation chains in the defined target industry sectors through business settlement, as this is the only way to develop the permanent and self-supporting economic structures the region urgently needs, not least in view of the fact that EU funding will dwindle significantly in future. Besides ensuring the availability of a suitably qualified workforce for the existing companies in the region, additional suitably qualified workers must therefore be available for any new businesses settling here.

For Brandenburg and for the Plastics and Chemistry Cluster stakeholders, the availability of sufficient numbers of well-qualified workers in the region and ensuring that the skills of these workers are always kept up to date to meet the requirements of any future challenges through further training and qualification is of major importance for ensuring the future viability of the plastics processing and chemical industry. The core issue and the measures associated with it in this area of action focus on the MINT subjects, as skills in these fields are an essential basic requirement for the training and education of the employees the plastics and chemical industry will need in the future.

Core issue, strategic objectives

Training, retaining and recruiting qualified staff for the plastics and chemical industry

The core issue addressed in this area of action intends to initiate measures for ensuring that the future need for a suitably qualified plastics and chemical industry workforce can be met. They are aimed at training and educating people, keeping them in the region and, if necessary, at recruiting more qualified staff from outside the region. All stakeholders must make a joint effort where this is concerned.

Strategic objectives

- Meeting the future need for a well-qualified plastics and chemical industry workforce
- Increasing the skills and expertise of the existing workforce, including outside their primary fields of occupation
- Maintaining the supportive structures that ensure the availability of suitably qualified staff
- Maintaining and expanding the current vocational training and education capacities
- Promoting strategic personnel planning and development
- (Re-)recruiting qualified people who have left the industry/the region

Measures, previous and planned activities, stakeholders

1. Improved networking and dialogue encouragement

The cooperation between companies and schools and/or childcare centres with a focus on mathematical, technical and science subjects must be expanded, for instance through partnership programmes, to get children and young people interested in the MINT subjects at the earliest possible stage of their school or pre-school education.

Previous activities (selection)

- *Haus der kleinen Forscher*, a PCK Raffinerie and childcare centre collaborative project
- An offer by the KuVBB and other partners: *Kunos coole Kunststoffkiste*, career advice tours

Planned activities

- Expansion of the cooperation between companies and secondary schools with a science focus and childcare centres modelled on the PCK Raffinerie Schwedt project and the *Seecampus* project, a cooperation involving BASF Schwarzheide; establishment of approaches modelled on the *Haus der kleinen Forscher* project in the cluster dominating regions

- Establishment and expansion of collaborations between schools and regional companies/universities; analysis of the current collaborations between secondary schools (of all levels) and the region's cluster companies and universities; if necessary, offering assistance with contacting companies at a later stage.
- Promotion and support of schools that aim to establish themselves as "MINT" schools, for example those near cluster companies

2. Career and study guidance advice for teachers, teenagers and young adults

Cluster relevant career and study guidance curricula should be developed and implemented to give teenagers and young adults career and study guidance and to help teachers to provide this guidance.

Previous activities (selection)

- Offers such as the secondary school students' competition "Chemkids" or the BAVC vocational training campaign "Elementare Vielfalt", which highlighted the diversity of science related careers
- University offers such as "Studium lohnt" to encourage secondary school students to aim for university; secondary school students' laboratories and orientation weeks
- Offers by the KuVBB in cooperation with other partners such as the career guidance roadshow for teachers, career advisers and secondary school students

Planned activities

- Supporting regional vocational training and education platforms and "open days" in the cluster dominating regions; development of a dedicated trade fair presentation to illustrate the various education and vocational training opportunities and introduction of the cluster companies that offer training (trade fair concept, trade fair stand)
- Assisting the teachers at the primary and secondary schools in Brandenburg's key industry locations through the supply of teaching materials and by highlighting secondary school students' competitions and other chemical and plastics industry association offers
- Establishing cooperation partnerships with schools and businesses in the cluster relevant regions to provide career guidance to secondary school students who are thirteen years of age and older
- Development of curricula for disseminator qualification (including parents) with a stronger involvement of cluster companies, regional universities and other partners
- Increased use of the "Students on Tour" format as a targeted communication platform for university students to introduce the region's companies as potential employers

3. Maintenance and expansion of the vocational training and university education capacities

A central element for ensuring the future availability of a suitably qualified workforce is the maintenance and expansion of the vocational training and university education capacities. Various supportive activities are planned in this context that intend to put companies, educational institutions and universities in a position where they can provide the suitably skilled workforce the region will need in the future.

The companies must be able to rely on the education offered at both BTU Cottbus–Senftenberg sites, including the availability of the necessary technical equipment, and the educational offers must be expanded further with a special focus on plastics and chemistry.

Previous activities (selection)

- A wider scope with regard to university entrance qualifications, particularly with regard to admission to universities of applied science Offering additional modules aimed at meeting the entrance requirements

Planned activities

- Measures aimed at involving companies to a greater degree in career guidance activities including the highlighting of suitable courses of study and offers of internships, excursions and final thesis/dissertation support
- Instruments that utilise corporate infrastructures within the scope of vocational trainee and university student training and qualification; establishment of an infrastructure pool or “fab-lab” to improve the quality of the training and education and to ensure that the training and education focuses more on the practical skills the industry and businesses are looking for
- Creation of “second chance” training offers for those who have left university without graduating, including shorter study times and recognition of past higher education achievements
- Dual education system degree course focused needs assessment of Brandenburg cluster companies and, if necessary, establishment of part-time courses of study and/or dual education system degree courses; improving access to academic education

4. Strengthening and improving the dual education system

Besides the maintenance and expansion of the capacities, dual education system degree course opportunities must be promoted, and their quality must be improved further. Activities such as the targeted approach of companies, public relations measures and needs analyses are planned for this purpose.

Previous activities (selection)

- Chamber of commerce careers advisers and PCK mentoring model to improve the quality of the vocational training

- “Best trainee” award organised by the KuVBB
- Regional vocational training and education associations such as Schweriner Aus- und Weiterbildungszentrum, PCK-Ausbildungsverbund and TÜV Rheinland Akademie

Planned activities

- Targeted approach of companies that are accredited vocational training providers, and establishment of networks with non-corporate vocational training and education institutions
- Improving the image of dual education system degree courses and of the respective qualifications through increased public relations measures. Promotion of the “Best Trainee” competition
- Promoting the integration of additional qualifications into the dual education system degree courses; in doing so, including more in-depth specific expertise and general qualifications not specific to the occupation, for example through involvement of the planned Lausitz bioplastics innovation centre

5. Sector-specific further training and qualification offers for skilled workers and academics

Within the scope of this measure, the current sector-specific further training and qualification offers for skilled workers and academics are to be assessed, developed and implemented in order to develop the existing skills and expertise in the companies in the Brandenburg Plastics and Chemistry Cluster. The companies also have to be encouraged to be more willing to invest in further training and qualification measures. The companies must be offered help when it comes to finding suitable offers.

Previous activities (selection)

- Industry-specific further training and qualification offers through Nordostchemie (bbz Chemie) and KuVBB/TÜV, for instance
- Regional further training and qualification database and Federal Employment Agency qualification advisers

Planned activities

- Increasing the willingness to train and qualify further, especially in the cluster’s small and medium-sized enterprises; promoting the establishment of qualification associations throughout the broad range of cluster companies, and - especially in the plastics industry -the idea of subsequent later qualification
- Assessment and development of transparent sector-specific further training and qualification offers for skilled workers and academics as well as newcomers to the industry and unemployed people
- Ensuring that companies are given advice on how to ensure the availability of suitably qualified employees

6. Cooperation and transfer between companies and universities/scientific institutions and associations

With the aim of qualified staff, knowledge and technology transfer, collaborations between companies and universities/scientific institutions must be established, made secure in the long-term and, where already existing, supported and intensified. In addition to this, close ties must be established between the planned Lausitz bioplastics innovation centre, the universities that focus on the fields related to these industries and the regionally based cluster relevant companies with a view to developing and offering needs-specific vocational training, education and further training and qualification activities.

Companies can be supported directly through the transfer of knowledge management concepts and strategic sustainability management, as a company's knowledge and the acquisition of knowledge are a raw material just like any other production factor. The transfer offices at the universities play a major role in this respect and are developing their service and information offers further. Retaining knowledge and expertise and maintaining this long-term is therefore also particularly in the interest of small and medium-sized enterprises that depend greatly on the expertise of their employees. The development of knowledge management and sustainability concepts for plastics and chemical industry SMEs and their implementation is therefore an important element in the maintenance of their financial viability.

Previous activities (selection)

- Activities by the university transfer, start-up and career services offices
- Training and further education offers at BTU Cottbus–Senftenberg, TH Wildau, the University of Potsdam, Humboldt-Universität zu Berlin (HU), TU Berlin and HNE Eberswalde

Planned activities

- Systematic linking of the universities' transfer activities to business development funding (ZAB ZukunftsAgentur Brandenburg GmbH) and inclusion in networks (especially the Kunststoff-Verbund Brandenburg Berlin KuVBB)
- Development of a knowledge management model for smaller and larger plastics and chemical industry companies; acquisition and long-term retention of know-how
- Support when it comes to implementing the knowledge management concept
- Personnel development on the basis of specific research and development issues (R&D collaboration projects) including transfer of the knowledge sources from the universities and research institutions into the regional companies
- Evaluation and support when it comes to the implementation of strategic sustainability concepts including the offer of targeted further training and qualification offers

- Stronger involvement of the businesses in the Brandenburg Plastics and Chemistry Cluster in careers advice at university level, in internship-based training and especially in human resource qualification

7. Recruitment of suitably qualified staff for the companies

With the aim of recruiting and retaining suitably qualified staff, the companies in the cluster are to be made more aware of employer branding measures. The companies' efforts and targeted company and industry branding must be supported.

Planned activities

- Establishment of the issue of employer branding in companies; development of guidelines for the industry; transparent illustration of the guidelines including examples
- Establishment of a “trainee pool” for companies
- Activation and qualification of the “hidden reserve” through appropriate retraining measures and qualification adaptation
- Promotion of all activities already initiated in the Brandenburg region that are usually not MINT-specific, such as the re-recruitment of qualified people or the recruitment of people from other countries with the respective skills and qualifications
- Support of the Brandenburg region's workplace health promotion related activities/supporting SMEs during the introduction and implementation of a workplace health management system

Stakeholders involved

- 1) Cluster companies
- 2) Education providers, TÜV Rheinland Akademie, universities and scientific institutions
- 3) Secondary schools of all levels, as well as primary schools and childcare centres
- 4) Local education authorities
- 5) Networks, agencies, social partnerships, associations and chambers of commerce
including Arbeitgeberverband Nordostchemie, Kunststoff-Verbund Brandenburg Berlin, Landesverband Nordost des Verbandes der Chemischen Industrie, NORKUN, Netzwerk Zukunft, ZukunftsAgentur Brandenburg/ZAB Arbeit

- 6) Relevant local and national government ministries including the Federal Employment Agency
and also the *Brandenburg Ministry for Employment, Social Services, Women and Families (MASF)*, *Brandenburg Ministry for Economic and European Affairs (MWE)*, *Brandenburg Ministry for Science, Research and Culture (MWFK)*, *Brandenburg Ministry for Infrastructure and Agriculture (MIL)*
- 7) Non-regional partners

4 INTEGRATIVE ISSUES

4.1 Internationalisation

Introduction

The Brandenburg Plastics and Chemistry Cluster shows major potential for international networking in many ways, and therefore inherently potential for specific cluster stakeholder collaborations with the rest of Europe and beyond. In view of the qualified workforce situation, it is in particular the areas of action mentioned in this context call which for internationalisation in the fields of innovation research, the value creation chain (raw material supply, logistics solutions for chemical products etc.) and also in terms of exchanging experiences.

According to a business survey¹⁷, the most important export countries and regions purely in sales market terms are Poland, Belgium, the Netherlands and Luxembourg, France, Italy and Scandinavia; outside of Europe, they are Brazil, India, South Korea and China, as well as some African countries. Any future international collaborations should focus on the export markets, as the role of internationalisation is currently still quite heterogenous, apart from purely the sales aspect. In the area of research and market development, the major industry companies and the established research institutions are pioneers, whilst most of the industry's SMEs need help with the implementation of their international activities. This stretches from raising the awareness of the advantages in this area to providing specific support. An important starting point in this respect is the "piggyback effect" on SMEs through already active companies and research institutions.

Fundamental measures/activities for implementing the aim of internationalisation

Awareness raising and information

Ultimately, it is the cluster stakeholders who will be responsible for the cluster's internationalisation. The cluster management can prepare them for this process and provide the respective support when the time comes. One precondition here is that information about the international activities and the possibilities of sharing in the advantages of internationalisation projects and European funding must be made available, and that planned projects are then supported.

¹⁷ PricewaterhouseCoopers AG [2012]: *Tiefenanalyse für den brandenburgspezifischen Cluster Kunststoffe/Chemie („In-depth Analysis for the Brandenburg-specific Cluster Plastics and Chemistry“)*, p. 20.

A few businesses in the cluster, including some SMEs, are already extremely active internationally. However, as far as the majority is concerned, intensive awareness raising is needed in this area. The Enterprise Europe Network Berlin Brandenburg (EEN BB) in particular will format its services in a cluster-specific way in future and actively offer them to the stakeholders in cooperation with the cluster management.

Within the European Union, cross-border and international associations, which guarantee the Plastics and Chemistry Cluster a far-reaching voice to an international level, are constantly being established. Being able to influence political decisions within the EU, to establish initial contacts with international markets and a joint marketing campaign on the global market are the tangible advantages gained from this. In future, the cluster's international networking activities as well as any content-related co-determination will be pursued systematically, for example through the establishment of strategic networks with European partners. One important protagonist in this respect is the ECRN (European Chemical Regions Network), of which Brandenburg is already a member. There are major potentials for international cluster collaborations here, on the basis of the supplementary principle, especially in the areas of bioeconomy and dedicated logistics for the plastics and chemical industry. The supplementary principle must be utilised to a greater degree in future. In addition, international networks must be established with related industries such as the automotive, healthcare, agriculture and packaging industries.

Making market access easier – presenting, contacting and contracting

The international dialogues at the cluster management level offer an opportunity for establishing first contacts with potential international partners and for gathering information about markets. The needs and expertise of the cluster stakeholders are the starting point here, and all activities will focus on these. In addition, relevant international stakeholders should be contacted at the earliest possible stage with respect to all medium- or long-term issues.

The international trade fairs (in Germany and elsewhere) such as AACHEMA (world forum and leading show for the process industries), FAKUMA (international trade fair for plastics processing) and the K (the world's no. 1 trade fair for plastics and rubber) as well as supplier trade fairs and business delegations are very important for internationalisation activities and must be used as a presentation platform for the cluster and its stakeholders to a greater extent within the scope of a wide range of different event and dialogue formats. Besides the continuation of cluster and joint stands, the bundle is to be completed by industry-specific round table discussions and collaboration exchanges that will offer the best-possible services for cluster stakeholder customer acquisition, market entry and expertise illustration.

Initiation of collaborative projects – transferring and integrating innovations

In its 2014 – 2020 funding period, the EU has once more made available various opportunities for international collaboration projects. On the one hand, these facilitate cluster networking and dialogues and on the other support cross-border research and development. One important key issue here is the involvement of SMEs. In this context, too, the Enterprise Europe Network Berlin Brandenburg will act as a cluster management partner in terms of qualification and collaboration initiation and support, and utilise strategic cluster networking as the basis for initiating suitable collaborations at stakeholder level. Potential issues are new materials (from biopolymer research to light engineering components), the area of bioeconomy and innovative logistics solutions for chemical products.

4.2 Cross-cluster interfaces with other Brandenburg and Berlin-Brandenburg clusters

The identified points of interface with the Brandenburg and Berlin-Brandenburg clusters “Energy Technology”, “Food Industry”, “Healthcare Industries”, “ICT/Media and Creative Industries”, “Photonics” and “Transport, Mobility and Logistics” with a high innovation potential could be the starting points for tackling future cross-cluster cooperation.

Cluster Energy Technology

Across different areas of action

A key issue that can be addressed jointly with the Cluster Energy Technology is energy efficiency. An obvious choice, for example, would be a collaboration involving the clusters Energy Technology and Plastics and Chemistry and the VDI Centre for Resource Efficiency within the scope of an energy efficiency project, as yet to be initiated. Beyond this, the value creation chain efficiency of major consumers such as industry parks and individual companies is an issue that is particularly relevant for the cluster. Another interesting option is research and development collaborations that focus on innovative materials such as ceramic materials, functional materials and organic photovoltaics. There are already some initiatives or projects such as the Fraunhofer Innovation Cluster Solar Polymers with the Fraunhofer Institute for Applied Polymer Research IAP that focuses on accelerating the use of polymers and polymer technologies in the solar industry. Additional impulses could be given here. The clusters might also jointly approach issues related to materials or media for mobile and stationary energy storage, e.g. batteries for electric vehicles, and cascade utilisation.

Area of action specific

- Biopolymers:
Cascade utilisation (food – feed – substance recycling – energy recovery), in this context especially the use of biomass for energy is a point where these two clusters meet. The synergies between Berlin and Brandenburg must also be utilised in this context.
- Light engineering/composites:
Light engineered components in aircraft engineering, in the automotive industry, in railway engineering, in wind turbine engineering, in the manufacture of composites and light engineered products and also new further composites and light engineered product utilisation concepts make a significant contribution to saving energy.
- Plastics and chemical industry locations:
The energy consumption of major consumers is a challenge for the plastics and chemical industry locations that could be solved cooperatively through the use of efficiency technologies.

Cluster Food Industry

Across different areas of action

The use of innovative plastics during the production, storage and transport of food (e.g. food packaging, crop protection sheets or silages) is a key aspect that can be addressed cooperatively. In this context, the impact the materials have on food safety must also be investigated. Further points of interface can be found in animal farming or in feed production. Conceivable are plastic equipment or plastic pipe and hose systems.

Area of action specific

- Biopolymers:
The obvious choice is to manufacture food packaging from bio-based or biodegradable plastics. This can be addressed along with the development of biodegradable disposable tableware for major events (e.g. together with venues that host major events, such as the Märkische Ausstellungs- und Freizeitzentrum MAFZ in Paaren im Glien or the Lausitzring).
- Light engineering/composites:
Light engineered refrigerated vehicles for food transport and the substitution of stainless steel in silo plants are two engineering or composites aspects that could be accelerated if the clusters were to approach them cooperatively.

Cluster Healthcare Industries

Across different areas of action

Surface refinement and the integration of functional properties in medical equipment, and plastic coatings for metals (e.g. medical appliances) and the use of plastics for implants and technical components are points where both clusters meet. Additional interfaces are biocompatible materials, and regenerative medicine as well as biologised medical engineering and nanotechnology.

Area of action specific

- Biopolymers:
In the "Biopolymers" area of action, (bio)polymer ingredients for pharmaceutical products as well as dietary supplements and medical treatments are starting points for collaborative efforts.
- Light engineering/composites:
Cross-cluster activities could conceivably focus on light engineered medical aids and rehabilitation engineering products.
- Future plastics and chemical industry workforce:
For both clusters, corporate workplace health management (e.g. prevention, ergonomic work stations) is an aspect that lends itself to being approached jointly.

Cluster ICT/Media and Creative Industries

Across different areas of action

Particularly in the areas of action “Biopolymers” and “Light engineering/composites”, product design and product development are two development undertakings where the synergies between the clusters should be utilised. In addition, the advancing digitalisation of production systems is a challenge where the existing expertise could be utilised jointly. The aspects of IT security (the security of IT tools) and security with IT (securing the premises, for example, with the aid of IT tools) are also related to this.

Area of action specific

- Plastics and chemical industry logistics:
Information technology expertise or the further development and application of geodata based logistics are a worthwhile addition for the cluster.
- Future plastics and chemical industry workforce:
Digitally supporting the work in the area of action “Future plastics and chemical industry workforce” can provide additional impulses that have a positive effect on the implementation of the planned measures.

Cluster Metal

Across different areas of action

Two starting points for cooperation can be identified immediately: product design for metal and plastic hybrid materials and ensuring the availability and long-term engagement of suitably qualified staff.

Area of action specific

- Light engineering/composites:
Light engineering based on the use of metal and plastic hybrid materials is a particularly promising cross-cluster interface where joint efforts appear to be a worthwhile undertaking.
- Future plastics and chemical industry workforce
Initiation and coordination of efforts to ensure the future availability of suitably qualified people in technical occupations with a focus on MINT at both the pre-school and school career guidance stage.

Cluster Photonics

Across different areas of action

- Analytics, sensory systems, microsystem technology:
With the use of polymers for sensors and actors, organic photovoltaics and optical amplifiers on surfaces, the analytics, sensor sensory systems and microsystem technology area of the Photonics Cluster offers several starting points for collaboration with the Plastics and Chemistry Cluster.

- Nanotechnology:
It would make sense to jointly approach the production of defined particles in the area of nanotechnology.
- Photonics:
With the optimisation of algae growth in bioreactors by means of UV radiation, the further development of OLEDs and the development of special lenses, light technology can be an element that connects the two clusters.

Area of action specific

- Biopolymers:
In the area of action “Biopolymers”, the work on bioreactors for algae (e.g. optimisation of growth through use of light sources) and artificial corneas can be accelerated through cooperation.
- Light engineering/composites:
The laser technology addressed in the Photonics Cluster can be utilised by the Plastics and Chemistry Cluster through its use in separation and joining technologies for light engineered components and for composites (e.g. recycling of rotor blades). The further development of the 3D printing technology for various applications was another area identified as a task that could be tackled together.
- Logistics for the plastics and chemical industry:
A conceivable joint effort could be the tracking and tracing of goods flows in logistics chains by means of optical applications.

Cluster Transport/Mobility and Logistics

Area of action specific

- Light engineering/composites:
The use of light engineered and composite materials and the use of light engineering strategies for cars, aircraft and railway vehicles have been identified as points of interface. The energy efficiency, noise and thermal insulation of vehicles (e.g. with polymer foams) must be increased with light engineering measures. In parallel, information about the EU research programme “Shift 2 Rail” for the development of energy - and mass-efficient technologies for high performance trains to SMEs can be communicated
- Plastics and chemical industry logistics:
Both clusters alike are not only focusing on preparing multi-modal transport terminals for dangerous goods transport but also on integrating the safety equipment of multi-modal transport terminals into the logistics map.

The industry in eastern Germany still has considerable structural deficits, especially with regard to industrial research, which relegates even the subsidiaries of major companies into a mere supplier role. The applied research at universities and non-university research institutions plays a particularly important role in overcoming these problems. In order to use the potentials which definitely exist in these areas more efficiently and in a more targeted way for strengthening the economy in eastern Germany, one idea is to focus on innovative fields that are of direct interest to the respective regional industry within the scope of national centres of expertise or excellence. In this way, industry companies that directly participate in these activities could accelerate application and production oriented developments to reach a new level in terms of quality and volume. However, in order to be successful, this approach firstly calls for concerted action by universities, research institutions and suitable innovative companies and secondly for activities triggered by the national and regional policies, as well as on the part of the regional and national innovation and business development agencies. In Central Germany, an initiative for the establishment of a national “chemical and bio-systems engineering centre of excellence” has already made significant progress; the Fraunhofer Institute for Applied Polymer Research in Potsdam-Golm also participates in this initiative. In Brandenburg/Berlin, an analogue national centre of excellence for “function integration - integration of biological and physical-chemical material functions” could further strengthen the expertise at the Potsdam-Golm/Berlin location, particularly for the clusters Plastics and Chemistry, Health Industries, ICT and Energy Technology.

4.3 Additional topics

As already briefly emphasised in Chapter 1.2., not only the six areas of action illustrated here need to be examined in a focused way to facilitate the wide scale promotion of growth and innovation in the Plastics and Chemistry Cluster in Brandenburg; innovative development also needs to be supported on an ongoing basis. In particular, this applied to the topics listed below and to complementary technologies that are of benefit especially to medium-sized companies:

Research and development topics in the general area of specialty chemicals

Material development and extraction

- Development and application of inorganic materials for energy conversion and storage (thermoelectrics, heat storage, solar grade silicon, catalysators, adsorbents)
- Establishment of polymers as carrier materials for the immobilisation of biomolecules

Production

- Nanomaterials, additives and pigments on the basis of fossil organic or inorganic raw materials (highly porous carbon materials)
- Molecular and white biotechnology in the context of sustainable chemical production
- Energy efficiency in the chemical industry (e.g. modelling of crystal growing processes, recovery of materials from lithium-ion batteries or complex composite materials)
- Production, plants and data security in the chemical industry
- Reaction engineering for the manufacture of high purity fatty acids and the extraction of chemically pure plant ingredients
- New synthesis methods such as catalysis or photochemical approaches and new materials
- Industry 4.0 for the Plastics and Chemistry Cluster (e.g. measures for increasing product and process quality)

Application

- Converting microalgae into energy, use of microalgae biomass
- Use of high purity fatty acids and chemically pure plant ingredients in food production and in the cosmetic and pharmaceutical industry

Research and development topics in the general area of plastics processing

Material development and extraction

- Development of new polymer based materials and optimisation of existing materials
- Development of innovative polymers with integrated functional properties

Engineering

- Development of strategies for polymer appropriate construction, and making the necessary libraries available (e.g. specifications and material information)
- Development of innovative geometries with new function potential for plastic components

Production

- Development of concepts for flexible automation technology/robot solutions, especially for subsequent auditing tasks, primarily for small batches
- Tool design and manufacture for injection moulding, extrusion and various blow moulding techniques
- Mechanical plastic machining
- Further development of fabrication techniques such as injection moulding, micro injection moulding, extrusion, various blow moulding techniques
- Manufacture of functional components, back injection moulding of film touch sensors including investigations and prototypes as well as manufacture of experimental tools
- Processing and processing technology design for materials and products based on natural compounds
- Energy efficiency in the plastics industry
- Production, plant and data security in the plastics industry
- Industry 4.0 for the Plastics and Chemistry Cluster

Quality

- Quality auditing of polymers using ultrasound, including trying and testing of ultrasound auditing techniques for thermoplastics, carbon fibre reinforced polymers and glass fibre reinforced polymers
- Simulation and testing of plastic component stress resilience and special tests for plastic pipes

Supplier chain

- Further development of logistics and logistics packaging for plastic design components and investigation of global transport options

Application

- Solar thermal application of plastics

Cycle

- Recycling and reuse of plastics

5 SUMMARY

By focusing on three industry-specific areas of action and three areas of action that affect all industry sectors in this cluster, the Plastics and Chemistry Cluster intends to consolidate the available resources in order to address key issues that are particularly relevant for the cluster's competitiveness and future viability. They will continue to advance the cluster further in future through additional value creation in the plastics and chemical industry. Further growth and innovation relevant issues related to the development of already existing assets are also included and promoted.

The three areas of action "Bio-based specialty chemicals", "Biopolymers" and "Light engineering/composites" make sustainability a master plan key issue. Furthermore, the value creation in these fields can be expected to increase considerably; Brandenburg must secure a potential share in this. The expertise and skills therefore have to be developed further, the networking activities must be intensified, and framework conditions must be designed in way that is favourable. On the one hand, the areas of action "Plastics and chemical industry locations", "Plastics and chemical industry logistics" and "Future plastics and chemical industry workforce" focus on these framework conditions, and on the other on ensuring operational excellence with an appropriate infrastructure and the training, retention and recruitment of suitably qualified staff with mathematical, technical and natural science skills and expertise. In parallel, the integrative issues take the topic of internationalisation into account, which is increasingly gaining in importance. Cross-cluster interfaces are identified that are intended to contribute to the consistent, future-proof further development of the cluster and its stakeholders through cross-cluster collaboration. Issues that particularly focus on the needs of SMEs are included with the intention of promoting additional value creation along the value creation chain(s).

Within the scope of these six courses of action and parallel integrative issues, focused, targeted measures are offered as initial answers to the future challenges to ensure that the Plastics and Chemistry Cluster can maintain its strong position in Brandenburg's industry.

Any further development remains open to market and technology changes - also outside the areas of action set down here and towards topics outside of the key issues illustrated.

APPENDIX

Appendix 1: Plastics and Chemical Industry Cluster industrial sector (“WZ classification”) category allocation

WZ 2008	Description
20.11	Manufacture of industrial gases
20.12	Manufacture of dyes and pigments
20.13	Manufacture of other inorganic basic chemicals
20.14	Manufacture of other organic basic chemicals
20.15	Manufacture of fertilisers and nitrogen compounds
20.16	Manufacture of plastics in primary forms
20.17	Manufacture of synthetic rubber in primary forms
20.2	Manufacture of pesticides and other agrochemical products
20.3	Manufacture of paints, varnishes and similar coatings, printing ink and mastics
20.41	Manufacture of soap and detergents, cleaning and polishing preparations
20.42	Manufacture of perfumes and toilet preparations
20.51	Manufacture of explosives
20.52	Manufacture of glues
20.53	Manufacture of essential oils
20.59	Manufacture of other chemical products n.e.c.
20.6	Manufacture of man-made fibres
22.11	Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres
22.2	Manufacture of plastics products
71.2	Technical, physical and chemical inspection
72.19	Other research and experimental development on natural sciences and engineering

Source: Federal State of Brandenburg, Ministry for Economic and European Affairs [31.08.2011]: Cluster classification

Brandenburg Invest | **WFBB**

**Wirtschaftsförderung Land Brandenburg
GmbH (WFBB)**

Babelsberger Straße 21
14473 Potsdam

Tel.: +49 331 – 730 61-0

Fax: +49 331 – 730 61-229

E-Mail: kuche-brandenburg@wfb.de

www.kunststoffe-chemie-brandenburg.de/en

www.brandenburg-invest.com



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