



## **Smart Chemistry Specialisation Strategy**

**“Report on recommendations for the Involvement of Stakeholders  
and Governance of Regional Innovation Strategies in  
Saxony-Anhalt”**



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## 1. Introduction

The S3Chem Project wants exchange experiences for the implementation of Regional Innovation Strategies with focus on chemistry and bioeconomy. During the second semester the partners have analysed the question how regional stakeholders were involved in the development and implementation of the RIS and how the governances of the whole process is organised. The original RIS idea was clearly focused on a bottom up approach to identify promising innovation priorities in the region under involvement of the relevant stakeholders from science and industry. The early involvement of a broad range of stakeholders should also ensure a high acceptance of the funding programmes and a high participation in the upcoming calls with high quality projects.

The chapter 2.1 focuses on a short description of the RIS governance. It gives a summary of the RIS in Saxony-Anhalt, how regional stakeholders are involved and which challenges are existing in relation to their participation. A special focus is given to the existing Networks and Clusters that play a special role for the involvement of stakeholders.

Chapter 2.3. describes the thematic priorities, which have been identified in the RIS Saxony-Anhalt especially for the Lead Market Chemistry and Bioeconomy. In the chapter 2.4 Conclusions and Recommendations are developed, which are based on strength and weaknesses of the existing RIS governance process. Furthermore, needs for improvements and expectations to interregional learning have been formulated.

In chapter 2.5 an Annex of Regional Stakeholders is included, which gives a detailed description of selected important research institutes, companies, networks and clusters, that play an active role in the RIS implementation. The Annex provides information on the relevant thematic innovation priority and research field, the description of the main competencies and fields of activities as well as contact details. Furthermore, the public administration as important driver and coordinator of the RIS process is also mentioned.

## 2. Description of RIS governance

### 2.1 General Description

Already in 2009 Saxony-Anhalt presented a Regional Innovation Strategy in which cluster potentials, objectives, measures and activities were identified. The Regional Innovation Strategy for the period of 2014-2020 is based on this existing strategy, verify the results and develop more approaches according to the requirements of the EU-Commission in the sector of structural funds. The strategic framework is set on the EU-Strategy 2020, which requires an intelligent, sustainable and social growth for the development of each specialisation profile. The Strategy specifies the content-related design of the OP ERDF Saxony-Anhalt with the following EU headline targets:

- „improve conditions for innovation, research and development“ (R&D expenditures of 3 % of the GDP, improvement of the circumstances for R&D) and
- „reduce greenhouse gas emissions, push renewable energies and energy efficiency“ (until 2020 reduction of greenhouse gas emissions by 20 % as compared to 1990, increase the share of renewable energies of overall energy consumption to 20 %, increase in energy efficiency by 20 % as compared with forecasted developments).

Beside the thematic focus, the RIS3-Guide of the European Commission is an essential requirement and key element to support the regions by preparation of the research and innovation strategy for intelligent specialisation. One of the most important pillar of the RIS3-Guide is the intensive dialogue and the involvement of the relevant stakeholders, clusters and innovation networks. According to the RIS3-Guide clusters and networks (intermediaries) will pay particular attention because of “their knowledge, their networks and their dynamic, which are the essential components at local and which enable regions to create more added value, to reach a higher level of excellence and to successfully growth into the global economy”.

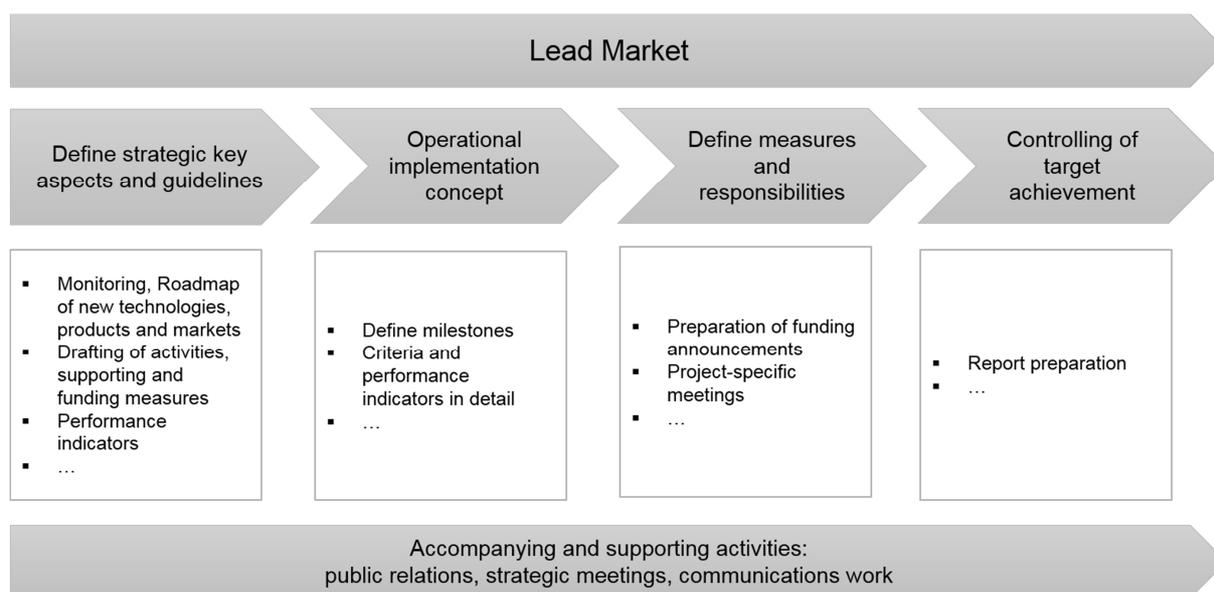
In 2013 a fundamental study for the Regional Innovation Strategy Saxony-Anhalt 2014-2020 was published by the “VDI Technologiezentrum GmbH” (technology centre) and the “GIB Gesellschaft für Innovationsforschung und Beratung GmbH” (Innovation Research and Consultancy) on behalf of the Ministry of Science and Economic Affairs Saxony-Anhalt. In this study all Lead Markets were analysed regard to competences, requirements, trends and investment priorities. Based on existing competences in the field of science and economy in Saxony-Anhalt, 5 important leading and growth markets were chosen in order to be able to face the future global challenges and mega trends like the demographic change or the climate change. The Lead Markets with the most future potential in Saxony-Anhalt are: Energy, Mechanical and Plant Engineering and Resource Efficiency, Health and Medicine, Mobility and Logistics, Food and Agriculture and Chemistry/BioEconomy.

For the implementation of the RIS Saxony-Anhalt, the analysis of VDI and GIB advise to develop

- the exchange of knowledge, information and experiences in the region,
- the development of commitments of the relevant stakeholders and the prioritisation of objectives of the innovation strategy and
- the establishment of a result-orientated working method with ambitious and measurable targets as well as the using of effective supporting measures and funding instruments

through existing structures and committees with focus on analysed Lead Markets. Next to the already existing networks and clusters, adequate sustainable structures for the technical and coordinating support have to implement. A steering group of the RIS as well as a Lead Market Working Group should be coordinated by the Office RIS in responsibility of the Ministry of Science and Economic Affairs Saxony-Anhalt.

The following implementation steps are proposed to adapt individually for each Lead Market in order to reach a successful implementation and functioning of RIS in the Lead Market Working Groups.



**Figure 1: Work process for the Lead Markets**  
Source: isw gGmbH, modelled after Ministry of Science and Economic Affairs Saxony-Anhalt, 2013.

VDI and GIB carry out separate analyses for each Lead Market, also for the Lead Market Chemistry/BioEconomy. This analysis is based on interviews with experts of the “Cluster Chemistry/Plastics Central Germany“, research institutes and company representatives, on evaluations of documents and roundtable-discussions. In this process important topics like profiles of competences and locations, individual requirement areas, sub markets and trends, relevant actors, vision and aims, SWOT-analysis, strategic activity fields, investment priorities and recommendations for implementation were identified and presented.

Based on the framework of this analysis, the first draft of the roadmap for the Lead Market Chemistry/BioEconomy were framed. It was drawn up by the isw Institute in close cooperation with the Cluster Chemistry/Plastics Central Germany on behalf of the Ministry of Science and Economic Affairs Saxony-Anhalt. The aim of this draft was to elaborate already existing strategic approaches with the stakeholders of the Lead Market in order to develop the identified highlight thematic priorities more detailed with a substantiated work scheduling. This process was supported by working groups in the individual thematic priorities too. As a result, summaries of the current state were discussed and new project ideas were developed. During further proceedings of the roadmap-draft recommendations for actions and approaches

of the methodical and organisational implementation for the Lead Market initiatives were developed and appropriate organisational structures were proposed.

At the end the Ministry of Economy, Science and Digitalisation Saxony-Anhalt finalised the roadmap-draft in an intensive process of coordination with all stakeholders of the Lead Market Working Group. In this Development Strategy of the Lead Market Chemistry/BioEconomy specialised profiles, responsible actors, pilot projects and networks as well as a rough project schedule were defined for the 4 thematic priorities:

- » New polymer materials – development and application of polymer-based light-weight materials for mobility/energy/Medicine«,
- » regenerative hydrogen production, hydrogen storage and hydrogen distribution «,
- » BioEconomy « and
- » Coal Chemistry – CO<sub>2</sub> Economy «.

Furthermore, there is a part for description of additional projects in form of data sheets, which can be continuously updated. The really final Development Strategy of the Lead Market Chemistry/BioEconomy is published by the Ministry of Economy, Science and Digitalisation Saxony-Anhalt in the end of January 2017.

The figure 2 below clearly shows the whole process flow of the RIS governance and the development of the Roadmap Chemistry/BioEconomy.

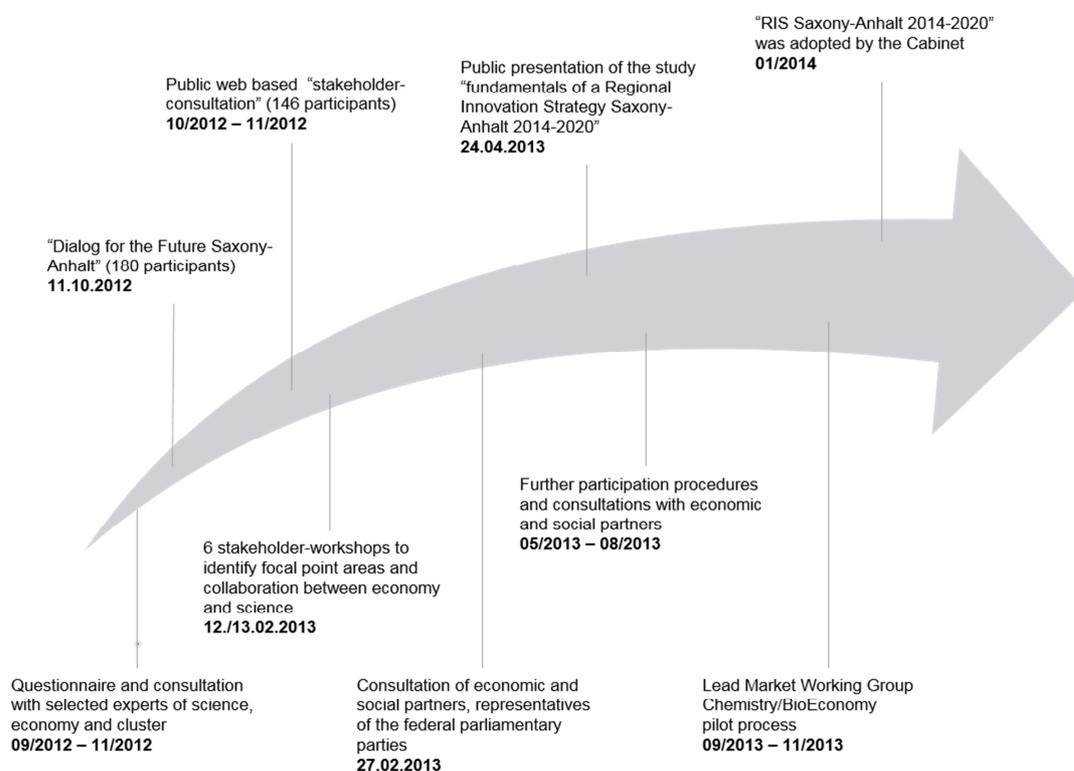


**Figure 2: Process flow of the RIS**  
Source: isw gGmbH.

## 2.2 Involvement of Regional Stakeholders

### Preparation of RIS

The development of the Regional Innovation Strategy Saxony-Anhalt was consciously prepared as an iterative multi-level process, which was essentially pushed by the region itself. Furthermore, another players were involved in the regard to regular meetings of the inter-ministerial working groups as well as meetings to the RIS with economic and social partners (Monitoring Committee of the EU-structural funds) and with the Committee on Industry of both Chambers of Industry and Commerce in Saxony-Anhalt. On 18th of February 2014 the "Regional Innovation Strategy Saxony-Anhalt 2014-2020" was adopted by the Cabinet. The following figure shows the process of involvement of stakeholders up to the preparation of RIS.



**Figure 3: Participation process up to the preparation of the RIS**

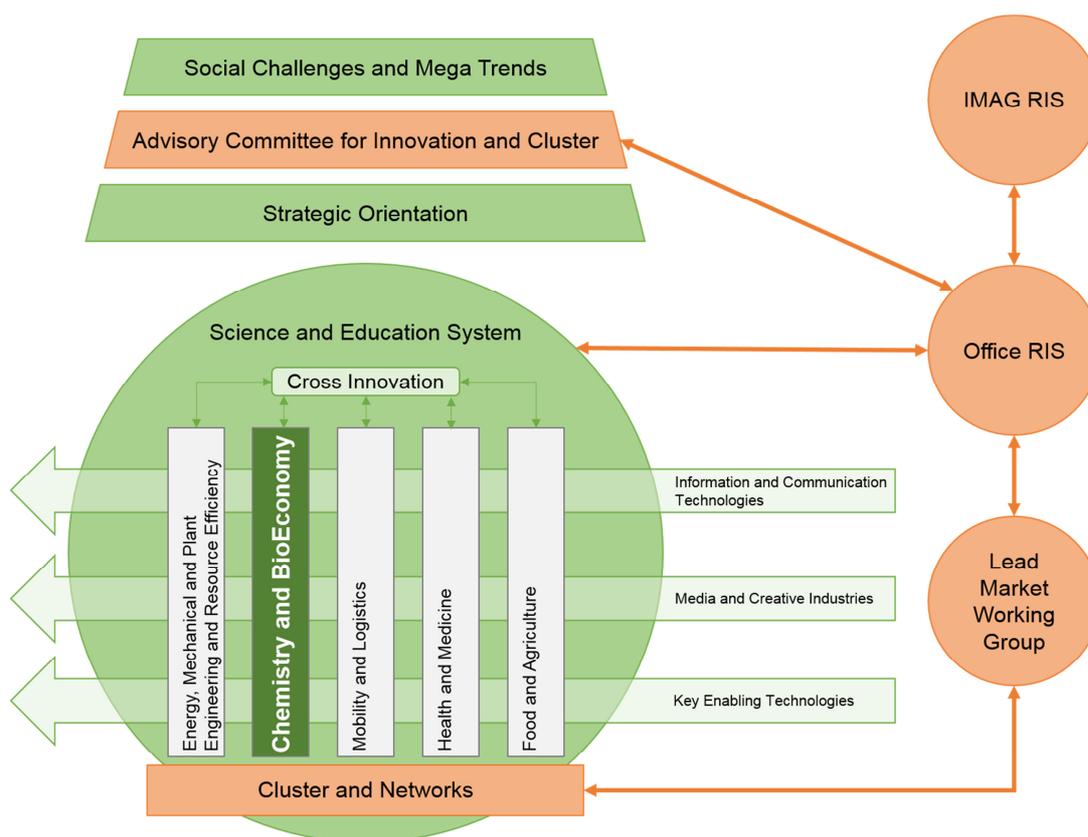
Source: isw gGmbH, modelled after Ministry of Science and Economic Affairs Saxony-Anhalt, 2013.

Most of the time, the multi-level participation process consisted of public stakeholder-consultations, political consultations and roundtable-discussions. In **public stakeholder-consultations** all interested actors are invited to discuss the RIS in a public way: companies, universities, science, research, politics, administration as well as intermediaries like cluster and transfer organisations. The priority was to define visions and objectives for potential thematic focuses of the innovation strategy and to probe the need for thematic development and measures in important areas of activity.

Also in the **political** space **consultations** were organised. Intermediate results, especially for visions and objectives were presented and discussed with representatives of government bodies in individual conversations but also in meetings with inter-ministerial working-groups. Furthermore, **roundtable-discussions** are organised in order to determine Lead Markets, their future topics and specialisation profiles more detailed with stakeholder in Saxony-Anhalt. Representatives of science reflected upon the results of collaboration between science and economy. The identified results and topics of the Lead Markets as well as cross-cutting issues information and communication technologies have been discussed in roundtable-meetings too. The activities were supported by an inter-ministerial working group (IMAG RIS).

### Implementation of RIS

For the implementation of the RIS Saxony-Anhalt a process-oriented functioning are proposed to establish. Therefore existing structures and panels should take up. The figure 4 below shows the whole process organisation for the implementation of RIS:



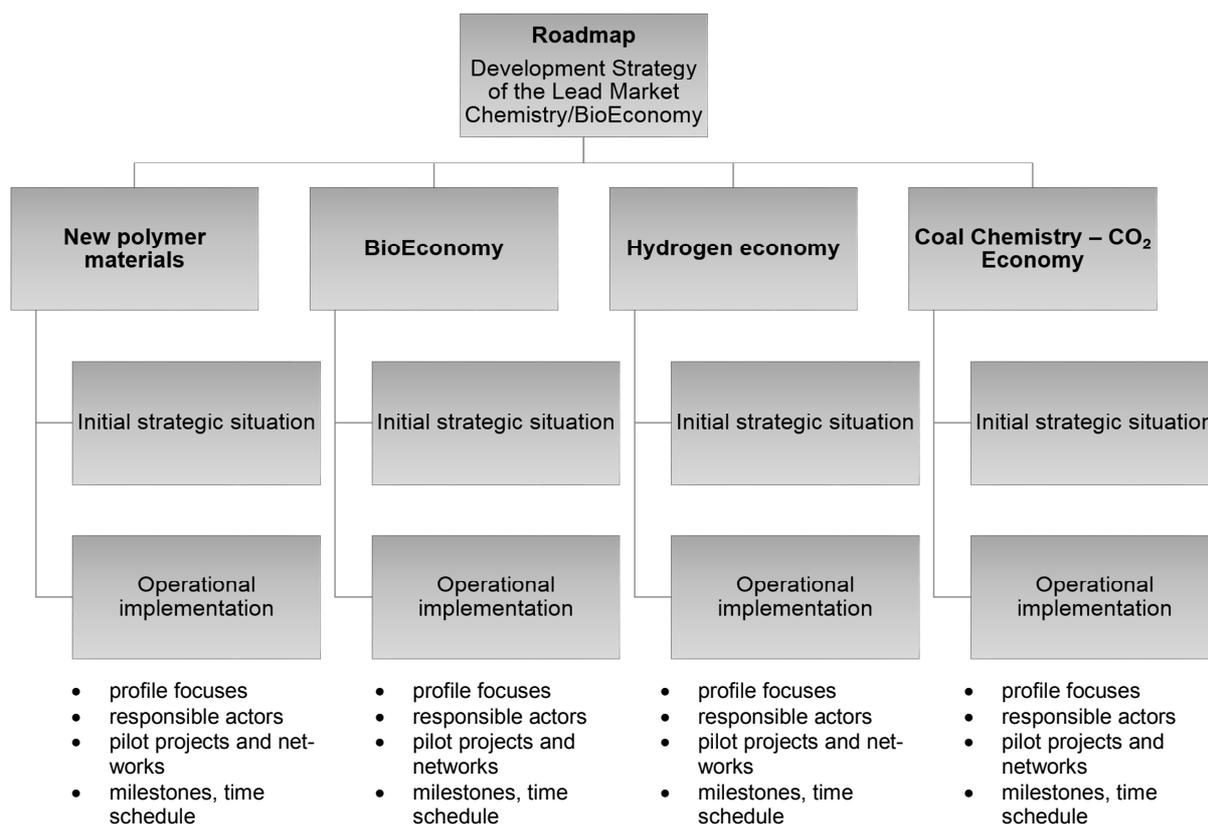
**Figure 4: Process organization for the implementation of RIS**  
Source: isw gGmbH, modelled after Ministry of Science and Economic Affairs Saxony-Anhalt, 2014.

The **Advisory Committee for Innovation and Cluster Saxony-Anhalt** act as a steering group of the RIS. This position takes up personalities of economy and science with special know-how of the whole value-added chain, priority topics for the relevant Lead Markets, cluster potentials, analysis of clusters and networks as well as innovation policy. Their vocation is a result of their professional qualification in science and/or economy and

<p>their personal commitment. This Advisory Committee ensure the regular collaboration/coordination with further economic and social partners, representatives of clusters (e.g. cluster spokesman), education, civil society and chambers and associations.</p>	
Tasks	<ul style="list-style-type: none"> <li>▪ Exchange of information and experiences to the RIS</li> <li>▪ Commitment and prioritisation as well as the development of strategic objectives of the RIS</li> <li>▪ Submission of recommendations for thematic development of the Lead Markets</li> <li>▪ Give recommendations and votes for strategic projects</li> <li>▪ Initiate and manage evaluations (ex-ante, accompanying, ex-post) of clusters and innovation/knowledge transfer systems</li> <li>▪ Receiving of progress reports for the implementation of RIS</li> <li>▪ Advisory support of the scientific and transfer system</li> <li>▪ Report to the policy/resorts</li> </ul>
<p>The <b>Office RIS</b> assume responsibility for organisational and technical support. The office assists the Advisory Committee in their particular functions, coordinate and moderate the implementation of RIS Saxony-Anhalt, for example in the execution of working groups referred to the Lead Markets. At the same time the office RIS advice the government in order to develop the RIS Saxony-Anhalt. They conduct an active communication strategy (in- and outside) for the purpose of presenting Saxony-Anhalt as an attractive research-, innovation-, investment- and education location. Moreover, the office assume a coordinating function to professionalise further technology transfer if needed.</p>	
Tasks	<ul style="list-style-type: none"> <li>▪ Support the Advisory Committee by preparation and follow-up meetings</li> <li>▪ Convocation and professional support of Lead Market Working Groups with representatives of research, science, clusters and networked innovation landscape (Definition of work processes and their realisation, propose of strategic projects in Lead Market Working Groups)</li> <li>▪ Development of measured quantities specialised up to Lead Market as well as the implementation of a monitoring and control system</li> <li>▪ Report to Advisory Committee</li> <li>▪ Initiation of further cross-innovation projects</li> <li>▪ Monitoring of topics</li> <li>▪ Coordinating and moderating function in order to professionalise and link further innovation/knowledge transfer systems</li> <li>▪ Development of the office RIS as an umbrella brand for the innovation location Saxony-Anhalt and purpose a strategic communication and public relation</li> </ul>
<p>The <b>inter-ministerial working group</b> (IMAG RIS) is responsible for the inter-ministerial cooperation in order to update and implement the RIS.</p>	
Tasks	<ul style="list-style-type: none"> <li>▪ Reflection of topics and thematic development of the Lead Markets into the ministry and the other way round</li> </ul>
<p><b>Cluster and Networks</b> provide their flexible and technical competences to develop new Lead Markets as needed. They are an active partner of the RIS and support in accordance with their technical grasp.</p>	
Tasks	<ul style="list-style-type: none"> <li>▪ Support of the implementation of RIS and tasks in Lead Market by market and strategic knowledge correlating to their work priorities</li> <li>▪ Monitoring of topics, needs of actors in Saxony-Anhalt and produce new ideas in the Lead Market Working Groups</li> <li>▪ Initiate and support of projects in order to develop new Lead Markets (e.g. Development of funding programmes of Saxony-Anhalt, of the federal government and EU)</li> <li>▪ Socialise and development of contacts to further actors of the networked innovation landscape in Saxony-Anhalt and supra-regionally and international partners</li> <li>▪ Collaboration with the office RIS and Advisory Committee</li> <li>▪ Communication and public relation for the specific topic of cluster and support of the communication and public relation of the RIS</li> </ul>
<p>The development and the support of the roadmap as well as technical consultant of specific themes and strategic projects are carry out by the <b>Lead Market Working Group and working groups for special technical issues</b> from case to case.</p>	
Tasks	<ul style="list-style-type: none"> <li>▪ Bottom up-preparation and support of the implementation of roadmaps related to the Lead Markets (action plan of each Lead Market)</li> <li>▪ Promoter of strategic projects</li> <li>▪ Monitoring and controlling of the implementation of the roadmaps</li> <li>▪ Technical support of specific topics like cross-sectoral issues, knowledge and technology transfer, start-ups, aspects of the funding system</li> </ul>

The most important pillar of the implementation of RIS Saxony-Anhalt is the **Lead Market Working Group**. Especially Chemistry/BioEconomy is one of the five Lead Markets with the furthest advances in methodical approach and furthest status. A direct involvement of the stakeholders with chemical related topics was given through the regular meetings of the Lead Market Chemistry/BioEconomy, which took place sixth times since September 2013 and should regularly implement twice a year.

Next to the usual method of roundtable-discussions within the Lead Market Chemistry/BioEconomy, a **technology roadmap** is used. Companies, research institutes, networks and associations out of the sector Chemistry and BioEconomy were invited to support the process of development and implementation of the roadmap for the Lead Market Chemistry/BioEconomy continuously. In this Development Strategy of the Lead Market Chemistry/BioEconomy specialised profiles, responsible actors, pilot projects and networks as well as a rough project schedule were defined for the 4 priority topics. Furthermore, there is a part for description of additional projects in form of data sheets, which can be continuously updated. The figure below shows the basic structure of the current roadmap:



**Figure 5: Basic structure of the Roadmap of the Lead Market Chemistry/BioEconomy**  
Source: isw gGmbH.

Another tools which are using to involve stakeholder are **two online platforms** structured according to the Lead Markets of the RIS Saxony-Anhalt. A research portal ([www.forschung-sachsen-anhalt.de](http://www.forschung-sachsen-anhalt.de)) offers information about topic-related projects, research institutes, publications and actors in the research landscape. In the innovation portal ([www.innovationen-sachsen-anhalt.de](http://www.innovationen-sachsen-anhalt.de)) there are further information about funding and industrial property rights.

## 2.3 Participation Challenges

The Regional Innovation Strategy with focus on chemical related topics has been well established with the active work of the Lead Market Chemistry and BioEconomy. Several meetings with representatives from companies, research and administration have been organised to discuss thematic priorities of innovation funding in the next years. Based on an in-depth analysis and contribution from the relevant stakeholders the roadmap has been defined, that describes concrete measures for promotion of innovation in the chemical and bio-economy sector.

One of the key challenges is to activate and acquire companies, especially SME to participate on the Lead Market Process. The majority of companies in Saxony-Anhalt are small and medium-sized with little own research capacity. The attendance of universities, research institutes, public authorities and networks is unfortunately disproportionate compared to companies and SME. Main drivers of innovation projects are research institutes like Fraunhofer or larger companies. But it is precisely that innovations and economically sustainable products of these companies should be supported. Reasons for the low use of funding and participation of companies, especially SMEs are:

- High administrative burden for applications
- Small corporate structures and few employees for research and development as well as to solve the organisational effort
- Long process time and intensive audit process
- Higher standards and requirements associated with shorter detection time cycles
- Higher requirements for project contents (e.g. additional public relations)
- Worse funding rates compared to the funding at federal level
- High own contribution and co-payment

The funding programmes are already open for applications of interested organisations, who can submit continuously their applications. First funding projects have been approved and are running. Due to delays in the programming process the funding programmes started with a delay, which now has to be caught up to be in line with the spending forecast. Another problem is the certain reticence of companies. In this current period fewer applications seems to be submitted for the bigger existing subsidy amount.

Furthermore, stricter rules on state aid and de minimis requirements constitute a burden to finance networks and clusters in the chemical sector. So Saxony-Anhalt is interested how other regions finance their network structures and dealing with these European common requirements.

ERDF funding from regional level competes with national innovation and research funding from the federal government. Due to the existing regulations for structural funds the ERDF funding is more complicated and less flexible for the applicants and users. Especially the rules for the reporting of eligible costs are disfavoured the structural funds programmes. The two principles cost based or effort based reporting are competing with each other. Moreover, the regional funding concentrate only on partners, who are located in Saxony-Anhalt. Because of the personnel and research strength, primarily big sized companies have the possibility to push research and innovation projects. Therefore, it is complicated to find partners in Saxony-Anhalt.

Regional stakeholder expect less bureaucracy to submit an application, a better linking between companies and science across regional and organisational boundaries and more transparency of the existing funding programmes.

The low visibility and the transparency of funding opportunities should strengthen by measures in public relations. The existing innovation and research platform is a good fundament to implement these actions. A high topicality, the linking to ministries, investments banks, but also the publicity/high profile has to develop, in order to ensure a real use by the stakeholder. Another challenge is to change in a web based application procedure for the purpose of streamlining processes for the application of funding.

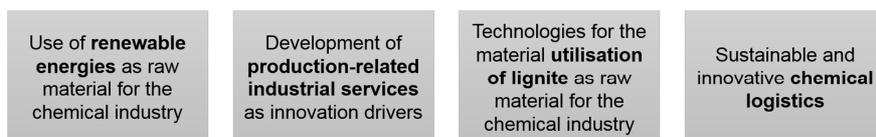
### 3. Networks and Clusters

#### 3.1 Cluster Chemistry/Plastics Central Germany and cooperation network „Chemistry+”



[www.cluster-chemie-kunststoffe.de](http://www.cluster-chemie-kunststoffe.de)

The “Cluster Chemistry/Plastics Central Germany” has been initiated a trans regional cluster process, which among others is aimed at improving the innovation capacity of especially the small and medium-sized companies as well as at establishing valued-added chains. Another declared aim lies in strengthening Central Germany as an internationally competitive region of chemistry and plastics, which is highly attractive for both start-ups and existing businesses and institutions that need a good market position. The cluster is and was an active partner during preparation and implementation of the RIS and of the roadmap for the Lead Market Chemistry/BioEconomy. From 2007 until the end of 2013 the cluster was supported by Saxony-Anhalt and co-financed by companies. “Cluster Chemistry/Plastics Central Germany” is to date well-established as a brand. 2016 it was restructured under the new name “Chemistry+” and with a new orientation. The cooperation network is also funded by “improvement of the regional economic structure” – GRW Saxony-Anhalt (200.000 € for 3 years). The emergence of a new quality in connection to the structural chemistry industry with other industrial sectors should be reached through the joint development and implementation of new, effective business-models in the regional topics for the future. In this regard the newly planned cooperation network “Chemistry+” want to handle with research and development issues, building up new businesses areas in such fields and thereby generate new value-added chains. The strategic focus is on following future-proof topics:



**Figure 6: topics of cooperation network “Chemistry+”**  
Source: isw gGmbH.

Within the “Regional Innovation Strategy” of Saxony-Anhalt, securing raw materials is the major duty in the lead market “Chemistry/BioEconomy”, which can only be achieved by the common leadership of a cross-sector. Therefore, the comprehensive approach of sustainable raw materials for chemical industry should be consistently pursued by the new cooperation network. In this way, during the creation of value, significant elements of the overall context can further be developed and a comprehensive approach can also be focussed on. The founding partners of “Chemistry+” are 6 companies, one research institute and one university of applied science. The isw institute is responsible for the organisation of this complex net-

work. It's a project-funded network/cluster without legal personality, which is open for new partners at any time.

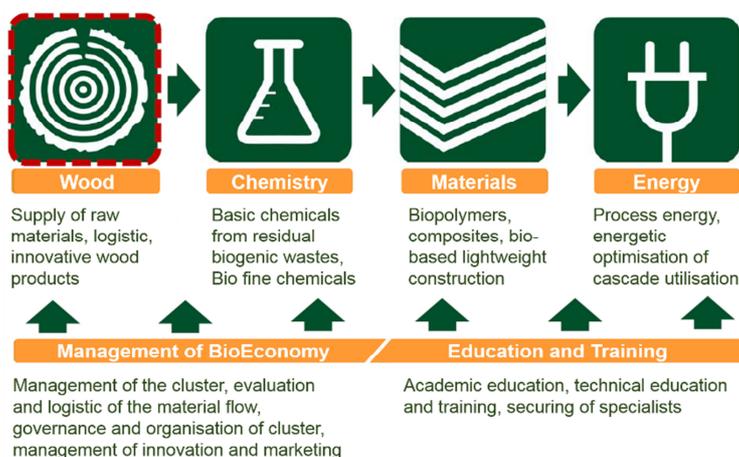
### 3.2 Cluster BioEconomy



BioEconomy Cluster

[www.bioeconomy.de](http://www.bioeconomy.de)

Partners from industry and research are working on the foundations of the material and energetic use of non-food biomass. Relevant sectors, like the timber and forestry industry, the chemical industry, the plastics industry and plant engineering, are all working together as part of a regional centre of competency in bioeconomics. An integrated approach to up-scaling enables processes to be developed quickly from laboratory to industrial scale. Since 2012 the BioEconomy Cluster is a Leading Edge Cluster of the German Federal Ministry of Education and Research (40 million €). It is a registered organisation with 55 SME, 16 big-sized companies, 18 research institutes, 7 universities and 5 networks (status as of December 2016). The BioEconomy cluster contributed to the draft of Roadmap as well as to the finalisation of the roadmap for the Lead Market Chemistry/BioEconomy. Furthermore, it regularly takes part in the Lead Market Working Group. In order to receive an efficient use of biomass by combined production processes and cascade utilisation, the development of the BioEconomy strategy is focused along the value-added chain on the following topics:



**Figure 7: Topics of Cluster BioEconomy**  
Source: BioEconomy e. V.

Non-food biomass, like wood, can be processed into basic bio-based chemicals, primary and intermediate chemical products, innovative polymers or even just conventional bio based polymers using various treatments and pulping techniques. The biggest challenge is to develop the new processing techniques that are required for this. There are already many such processes that function in the lab but which have to be up-scaled to industry-relevant dimensions, i.e. enlarged. Many process steps have to be combined in order to ultimately achieve new products. Today individual chemical companies are usually specialised in specific process steps. Many different companies need to work together in order to put into practice the necessary process chains needed for processing the biomass into the desired end product.

### 3.3 HYPOS - Hydrogen Power Storage & Solutions East Germany

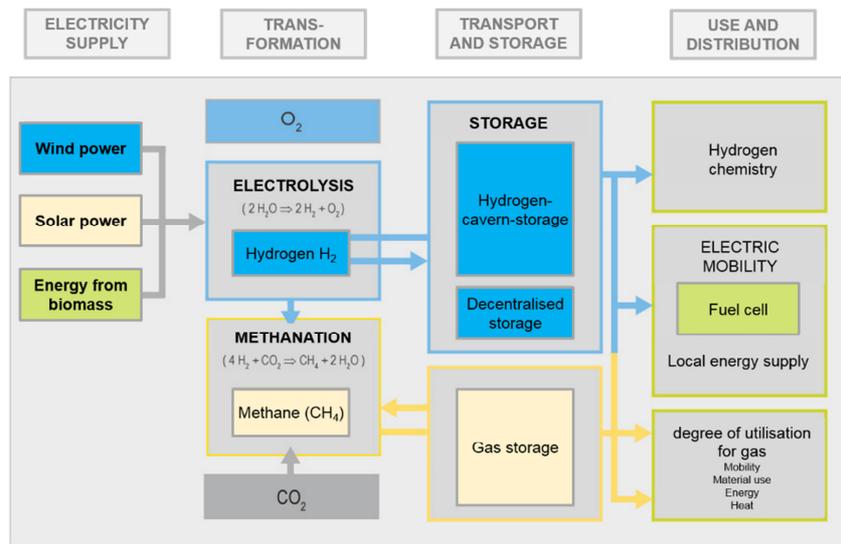


[www.hypos-eastgermany.de](http://www.hypos-eastgermany.de)

The “Hydrogen Power Storage & Solutions East Germany” project initiated by the “Fraunhofer Institute for Mechanics of Materials IWM”, the “Industrial Initiative for Central Germany” and the “Cluster Chemistry/Plastics in Central Germany” intends to develop economic solutions for using wind and solar power to produce hydrogen via electrolysis on an industrial scale until 2020. It would be a revolution in the hydrogen industry if turning the electricity out of wind and solar power systems, which is only available very inconsistently, into hydrogen through particular chemical processes was possible. Thereby, saving and transporting it for ongoing use is another essential condition being met. Then this “green” hydrogen shall serve as raw material for the chemical industry being basis for an extensive electro mobility as well as energy source for electricity and heating supply.

With the project HYPOS out of the initiative „Twenty20 – partnership for innovation“, which is supported by the Federal Ministry of Education and Research (BMBF), the electricity grid and material flow of chemistry in Schkopau and Leuna, the gas storage in Bad Lauchstädt and the electricity grid in East Germany should be connected by the green hydrogen in a model approach. The objective is to achieve system and network infrastructure innovations for the economic efficiency of safe and green hydrogen until 2022. It is a registered association with approx. 75 members consisting of 12 large sized companies, 35 SME and 28 research institutes (status as of November 2016).

This organisation was and is also integrated in the preparation and implementation of RIS. Moreover, the HYPOS-Board is regularly involved in the Lead Market Working Group Chemistry/BioEconomy as well as Energy, Mechanical and Plant Engineering and Resource Efficiency. So far, 20 projects in the following topics (along the value-added chain) are already being implemented or in the application stage:



**Figure 8: Topics of HYPOS**  
Source: HYPOS e. V.

### 3.4 ibi - Innovative Lignite Integration in Central Germany



## From Mining To Refining

Innovative Process Technology

[www.ibi-wachstums-kern.de](http://www.ibi-wachstums-kern.de)

The Innovative Regional Growth Cores (BMBF) “ibi” (Innovative Lignite Integration in Central Germany), did the technical groundwork from 2010 until 2014, which were necessary for an innovative and modern material use of lignite in consideration of the local structures. In the Innovative Lignite Integration in Central Germany (ibi) 12 institutions, consisting of 10 companies, 2 universities have come together to develop the material use of lignite. In this context the processing steps by coal deposit, the extraction and separation up to the material use of lignite (extraction, catalytic decomposition and gasification) were analysed:

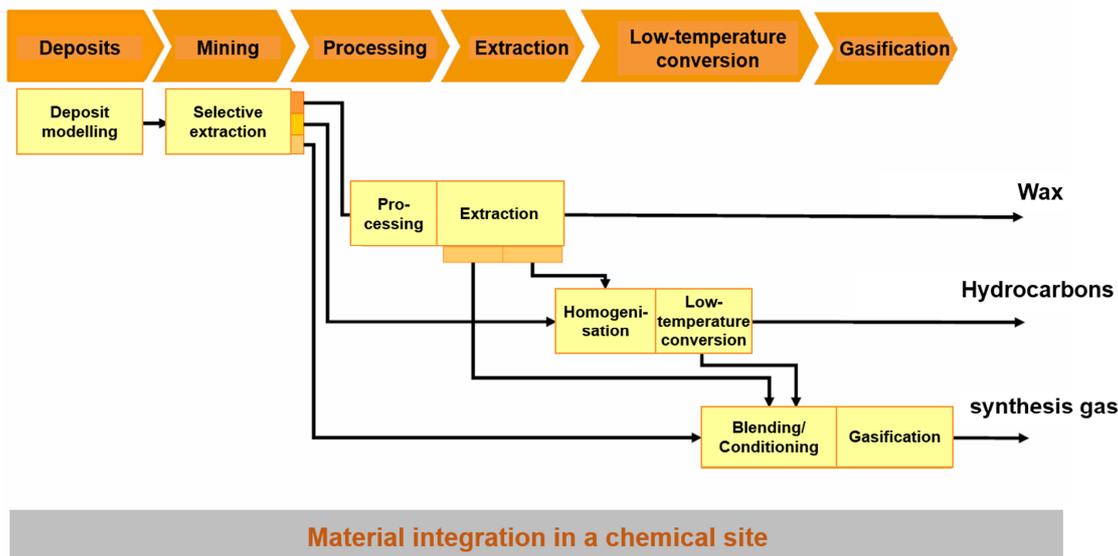


Figure 9: Topics of ibi

Source: Innovative Lignite Integration in Central Germany.

Apart from the economy, the amount of waste and the environmental impact should be minimized and reduced. For this it was necessary to develop completely new technologies, systems and procedures and connect directly therewith. The next step (ibi 2.0) is the establishment of the technologies at pilot and demonstration scale at the chemical site in Leuna. In this process the economic efficiency and the technical functionality of the elements of the lignite-based added value can practically be proved in an industrial environment. The pilot projects include research proposals like a large-scale pilot plant of gasification and catalysis, the development of an innovation and technology centre of carbon chemistry and a detailed examination of arising CO<sub>2</sub>-emissions with regard to a material use of lignite at the chemical site.

ibi 2.0 is an informal network without legal personality. The partners were also integrated in preparation and implementation of the RIS, as well in the Lead Market Working Group Chemistry/BioEconomy and in the roadmap for the Lead Market.

### 3.5 Competence and transfer network “Polymer-based lightweight Saxony-Anhalt”



The competence and transfer network “Polymer-based lightweight Saxony-Anhalt” is a new cooperation network, which actually is in application. RKW Sachsen-Anhalt e. V. and POLYKUM e.V. are responsible for the organisation. The bundling of existing scientific capacity in the field of polymer-based lightweight and plastics should establish excellent conditions for the innovation and technology transfer with companies in the region by a coordinated and enhanced cooperation. For this, two “transfer scouts” should be used. In order to promote research and development projects, innovation processes should be stimulated especially in direct communication and result-orientated contacts to local supra-regional scientific competences have to be connected.

The function of this establishment is the networking of all relevant companies and research institutions in the country for the implementation of innovation projects in form of R&D projects in the areas of Process development (thermoplastic bound of fibre plastic composites, Surface functionalisation of polymers, rubber-nanoparticle composite, thermosetting plastics), Product development/design (lightweight construction modules, InterieurDesign GreenCabin, etc.) and Component safety and quality (material and component testing, ageing behaviour of components, Tolerability of manufacturing defects).

Based on the existing market activities, already framed needs and forecasts for future fields of innovation following, key topics are arisen:



**Figure 10: Key Topics of “Polymer-based lightweight Saxony-Anhalt”**  
Source: RKW Sachsen-Anhalt e. V.

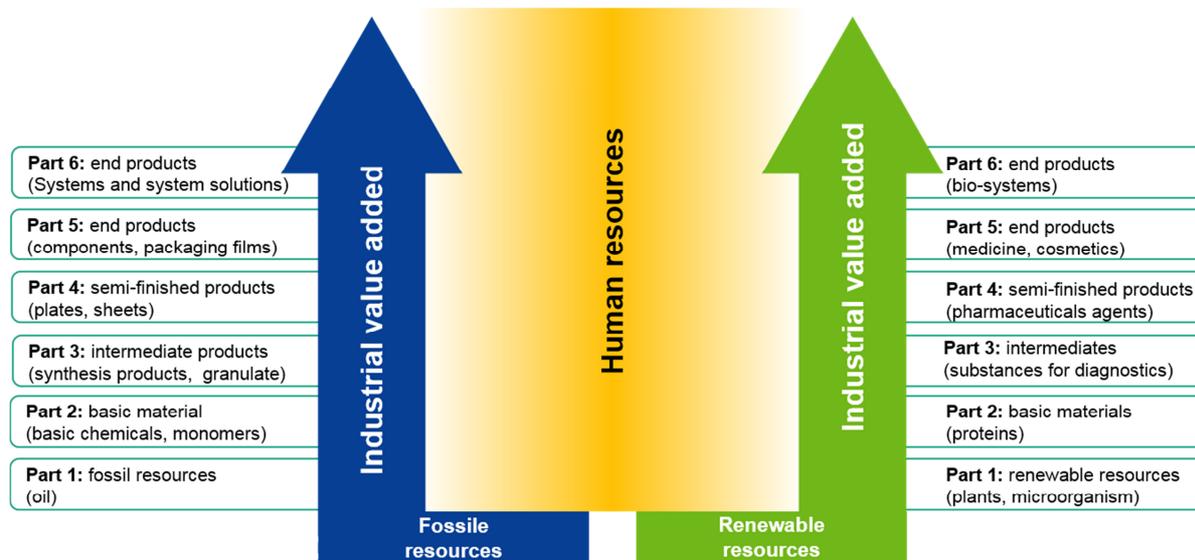
The required financial resources for the implementation of the research and development projects have to organise through different sources like federal and national programmes or EU-funding.

### 3.6 High Performance Centre for research and innovation in the region Halle/Leipzig



[www.chemie-bio-systemtechnik.de](http://www.chemie-bio-systemtechnik.de)

The aim of this centre is to investigate and optimize process chains of the plastics processing, chemical, biotechnological and biomedical industry. A particular focus is the support of innovation by SMEs and the deepening of cooperation between scientific institutions in the region with local businesses. The centre is intended to reflect the entire process chain from extraction to marketing of chemical raw materials and bio-based materials. The thematic focus is set on Polymer chemistry, Plastics processing, Chemical and process engineering, Fine chemistry, BioEconomy, Agrochemical sector, Medical technology and biomedical technology and Biotechnology and Biosystems technology.



**Figure 11: Topics of the High Performance Center for research and innovation in the region Halle/Leipzig**  
Source: Fraunhofer IMWS.

The competence centre "Chemical and Biosystems Technology" contribute to the implementation of the Regional Innovation Strategy of Saxony-Anhalt. It is financed by the "Fraunhofer-Gesellschaft", by the states of Saxony-Anhalt and Saxony as well as by the companies based in the region. 3 project alliances with 20 individual projects and 6 joint projects are currently being implemented or planned (status as of September 2016). The competence centre "Chemical and Biosystems Technology" should be viewed as a long-term establishment and as a "umbrella brand" for scientific and economic fortification of Halle Region. In 2017 the preparation of participation in the excellence initiatives of the Federal Ministry of Education and Research is planned. A board of directors, consisting of the institute's directors of "Fraunhofer" and the "Martin Luther University" is formed for the management of the centre. Further components of the organisation are the office, the industrial and the scientific Advisory Board.



## 4. Identification of thematic priorities

The Lead Market Chemistry/BioEconomy contains 4 important topics, in which pilot projects are defined for the future. These pilot projects include substantial infrastructure measures and network activities and offers only an orientation at the time. Furthermore, another projects of innovation should activate and implement in the topics for the future. The following graphic 12 gives an overview of the specialised profile of the Lead Market Chemistry/BioEconomy.

Chemistry/BioEconomy		
<p><b>New polymer materials</b></p> <ul style="list-style-type: none"> <li>Plastics processing, lightweight materials (CFK)</li> <li>Hybrid technology, rubber industry, photovoltaics</li> <li>Nanotechnology for surfaces</li> </ul>	<p><b>BioEconomy</b></p> <ul style="list-style-type: none"> <li>Bio refinery, bioplastics</li> </ul>	<p><b>Hydrogen economy</b></p> <ul style="list-style-type: none"> <li>H<sub>2</sub> as energy sources and recyclable material (raw material for new products)</li> </ul>
<p><b>Coal Chemistry – CO<sub>2</sub> Economy</b></p> <ul style="list-style-type: none"> <li>Material use of lignite</li> <li>Bio-lignite, CO<sub>2</sub> as raw material (algae)</li> </ul>	<p><b>Fine and speciality chemistry</b></p> <ul style="list-style-type: none"> <li>Functional pigments</li> <li>Catalyst</li> <li>Products for the pharmaceutical, electronic and fine and speciality chemistry</li> </ul>	

**Figure 12: Innovation priorities of Lead Market Chemistry/BioEconomy**  
Source: Ministry of Science and Economic Affairs Saxony-Anhalt, 2015.

The topic » **New polymer materials – development and application of polymer-based lightweight materials for mobility/energy/Medicine**« is one of the key issues in the Lead Market Chemistry/BioEconomy. New priorities are derived on fields of new materials and material combinations, improvement of characteristics of materials, component safety and quality, manufacturing technologies as well as sustainability and economy as a result of the ongoing activities in the market, existing requirements and projections to future fields of innovation. The focus of implementation and strategic prioritisation is set on the following 4 pilot projects as lighthouse projects, which represent a sustainable infrastructural and application-oriented research base for innovations of lightweight materials:

- Expansion of the Fraunhofer Pilot Plant Centre for Polymer Synthesis and Processing PAZ,
- Expansion of the technical centre – University Magdeburg-Stendal,
- Implementation of the centre of excellence for chemistry and biotechnology,
- Implementation of the innovative technology and application centre Merseburg (ITAM) and
- Development of the competence and transfer network of polymer based lightweight construction in Saxony-Anhalt.

One of the main objectives of the priority »**BioEconomy**« is the establishment of Saxony-Anhalt as a central region for bio-based value chains. In this regard the joint production and the cascade utilisation of biomass is the strategic approach. Appropriate technologies and production processes should be developed and tested for the material but also energy use to enable the rapid access to the market development. The focus is set on bio-based basic, fine

chemicals and special chemicals. Renewable raw materials should be used most likely for the chemical industry, if the characteristics equal the conventional oil-based platform chemicals. With so called “drop-in“-approaches it is possible to integrate some steps of production in existing systems without significant changes for the downstream processes. Starch, sugar, cellulose, lignin, plant-based oils and proteins are perfectly suited for the production of numerous base chemicals. These renewable raw materials can be processed to new platform chemicals and provide a basis for chemical intermediates, fine and special chemicals. In addition, wood and other bio-based materials and composites (Wood Plastic Composites and Natural Fiber Composites) as well as bio-based energy sources (supply of biofuels from the treatment of lignocellulosic substances) are counted among further priorities within the BioEconomy. The pilot projects and network supported in the future BioEconomy in Saxony-Anhalt are:

- Implementation of the demonstration projects for hybrid materials (plastic/wood),
- Development of the network forest,
- Centre for urban buildings/innovations,
- Planning and construction of a demonstration plant for disintegration of biomass according to the procedure to the Organosolv-method,
- Expansion of the Fraunhofer Centre for Chemical-Biotechnological Processes CBP and further investments and
- Exploitation of results of the cluster BioEconomy in Saxony-Anhalt.

One of the key challenge in the topic » **regenerative hydrogen production, hydrogen storage and hydrogen distribution** « is the electricity surplus, that is generated by wind and sun. In this process hydrogen should be generated out of the electricity surplus by means of electrolysis on a large scale and economical way, which can be used as a basic chemical product, as a fuel for mobile applications, for heat production as well as the reconversion, this means for the appropriate electricity production. The goal of the project HYPOS is to achieve system and network infrastructure innovations for the economic efficiency of safe and green hydrogen until 2022. The project “Kopernikus“ will transfer the existing developments of “Power-to-X“ and HYPOS to market solutions by systemic and integrated approaches and the development of a large electrolysis and a large cavern. In this regard pilot projects are:

- Electrolysis Platform Leuna EPL Sachsen-Anhalt
- Exploitation of the results of the project HYPOS in Saxony-Anhalt
- Implementation of large electrolysis and large cavern as a pilot project within the phases 2 and 3 of Kopernikus

The topic » **Coal Chemistry – CO<sub>2</sub> Economy** « deals with the material use of lignite. The project ibi delivers a nucleus of innovative technique and open-minded companies exists for all steps of the value chain. The aim of the following step is the establishment of the technologies at pilot and demonstration scale at the chemical site in Leuna. In this process the economic efficiency and the technical functionality of the elements of the lignite-based added value can practically be proved in an industrial environment. The pilot projects include:

- Large-scale pilot plant of gasification and catalysis
- Development of an innovation and technology centre of carbon chemistry
- Detailed examination of arising CO<sub>2</sub>-emissions with regard to a material use of lignite at the chemical site



## **5. Conclusions and Recommendations**

### **5.1 Strengths and weaknesses of existing RIS governance process and involvement of regional stakeholders**

The existing RIS governance already indicates an advanced level of cooperation. Stakeholders and partners are fully integrated into the preparation of RIS, the development of the roadmap as well as into the regular meetings of the Lead Market Working Group. The following chart illustrates the strengths and weaknesses of the RIS governance as well as the opportunities and threats, which could impact the RIS process positively and negatively from the outside. First strategies, which are explained in the following section, are derived from it.

<p style="text-align: center;">Internal</p> <p style="text-align: center;">External</p>	<p><b><u>Strengths:</u></b></p> <ul style="list-style-type: none"> <li>▪ Strong presence of research institutes, clusters and networks</li> <li>▪ Generally accepted methodological procedures in form of the roadmap</li> <li>▪ Regularly meetings</li> <li>▪ Broad range of topics</li> <li>▪ Possibility of continuous adaption of the roadmap</li> <li>▪ Link of RIS Governance to research platforms</li> </ul>	<p><b><u>Weaknesses:</u></b></p> <ul style="list-style-type: none"> <li>▪ Low participation of small and medium-sized or big-sized companies</li> <li>▪ Always the same group of participants, same mailing-list</li> <li>▪ Low visibility and perceptibility</li> <li>▪ Low use of funding and participation of companies</li> <li>▪ High administrative burden for applications</li> <li>▪ Low use of research and innovation portal, no currency</li> <li>▪ Several changes in management level of the Ministry of Science and Economic Affairs Saxony-Anhalt</li> </ul>
<p><b><u>Opportunities:</u></b></p> <ul style="list-style-type: none"> <li>▪ Acquisition of new partners (Companies, universities and research institutes)</li> <li>▪ Continuation of topics of completed projects (e. g. HYPOS)</li> <li>▪ Improved process organisation</li> <li>▪ Close connection to other funding programmes (federal government, EU)</li> </ul>	<p><b><u>Strengths-Opportunity strategies:</u></b></p> <ul style="list-style-type: none"> <li>▪ Acquisition of further partners and new ideas</li> <li>▪ More advertising for RIS Governance in clusters and research institutes → broad platform in order to generate new projects</li> <li>▪ Possibilities to support transnational projects and partner consortiums</li> </ul>	<p><b><u>Weakness-Opportunity strategies:</u></b></p> <ul style="list-style-type: none"> <li>▪ Acquisition of new companies, add-on new mailing addresses</li> <li>▪ Greater visibility through events, innovation conferences, meetings and visual aids</li> <li>▪ Clear application procedures</li> <li>▪ Networking outside Saxony-Anhalt</li> <li>▪ Implementation of continuous evaluations</li> </ul>
<p><b><u>Threats:</u></b></p> <ul style="list-style-type: none"> <li>▪ No acceptance of RIS among companies, research institutes and universities</li> <li>▪ Available Funding of the OP ERDF Saxony-Anhalt are unused</li> <li>▪ Thematic priorities are only ideas without chances for implementation</li> <li>▪ Deterioration of funding conditions</li> <li>▪ Permanently changing of general conditions</li> </ul>	<p><b><u>Strengths-Threats strategies:</u></b></p> <ul style="list-style-type: none"> <li>▪ Improve of funding conditions (in style of federal government)</li> <li>▪ Support the cooperation between research and companies</li> <li>▪ Support the open structure of Roadmap and ensure the continuous adaption</li> <li>▪ Implementation of company and research visits</li> </ul>	<p><b><u>Weakness-Threats strategies:</u></b></p> <ul style="list-style-type: none"> <li>▪ Improvement of public relations measures</li> <li>▪ Bundling of information, clear presentation of funding possibilities</li> <li>▪ Assistances of companies and research institutes in application</li> <li>▪ Web-based application procedures</li> <li>▪ Faster and lean application procedures</li> </ul>

**Figure 13: SWOT-analysis of RIS governance**  
Source: isw gGmbH

## 5.2 Needs for improvement

The significant weaknesses of the RIS governance can be noticed in visibility of the RIS process, in participation of companies and in the high administrative burden. The needs for improvement can be classified in 4 important categories: improvement of RIS governance process, improvement of tools and instruments, improvement of products and funding instruments and improvement of measures in public relations. Within this categories recommendations and measures could be identified in order to achieve an improved RIS governance.

The low participation and low interest of companies effects the insufficient use of funding programmes. One of the main reason is the increased expenditure in participation of RIS process itself. Furthermore the complex application process by Saxony-Anhalt prevented the submission of proposals. In order to encourage partners to participate on the process and to use the funding programmes, following **Improvements of RIS governance process** are necessary:

- Add-on further participants in the Lead Market Working Groups (e. g. enlarge current mailing-list)
- Implementation of fixed deadlines and competition procedures
- Assistance of companies and research institutes in application process
- Less bureaucratic burden by faster and lean application procedures

The existing research and innovation portal is a good fundament to drive the RIS governance process, to network and to identify research und innovation topics. The low rate of utilisation requires the **Improvement of tools and instruments**. Furthermore the application procedures for stakeholders should be design easier and clearer by digitalisation of the processes. The Improvement of tools and instruments is closely linked with the measures of public relations.

- Continuous maintenance and more topicality in research and innovation platform (e. g. linking to official research platforms)
- Implementation of a management tool (web-based) for call of proposals and central data management
- Bundling of information and clear presentation of funding possibilities

Another reason for the low use of funding is the deterioration of funding conditions. For this purpose **Improvements of products and funding instruments** have to put up for discussion. Companies and research institutes primarily use funding by federal government because of improved promotion rate and streamlined procedures.

- Improve funding conditions in style of federal government
- Possibilities to support transnational projects and partner consortiums
- Remove stricter rules on state aid and deminimis requirements, which constitute a burden to finance networks and projects

One of the most important and priority area is the **Improvement of measures in public relations**. The visibility and perceptibility of the RIS process and funding instruments should strengthen in order to acquire and encourage more partners, especially companies and SMEs.

- Implementation of public events to inform research institutes, universities, companies and clusters
- Implementation of individual discussions and company visits

- Preparation of information brochures and visual aids (using for clusters and networks)

### 5.3 Expectations to interregional learning

The Regional Innovation Strategy with focus on chemical related topics has been well established with the active work of the Lead Market Chemistry and BioEconomy. Several meetings with representatives from companies, research and administration have been organized to discuss thematic priorities of innovation funding in the next years. Based on an in-depth analysis and contribution from the relevant stakeholders the roadmap has been defined, that describes concrete measures for promotion of innovation in the chemical and BioEconomy sector. Priority areas are New polymer materials, Hydrogen economy, Coal Chemistry – CO<sub>2</sub> Economy, Fine and specialty chemistry and BioEconomy.

The funding programmes are open for applications of interested organisations, who can submit continuously their applications. First funding projects have been approved and are running. Due to delays in the programming process the funding programmes started with a delay, which now has to be caught up to be in line with the spending forecast.

Saxony-Anhalt is interested to learn from other regions how they are implementing their innovation funding. An important question is how to promote innovation of SME with little innovation orientation. The majority of companies in Saxony-Anhalt are small and medium sized with little own research capacity. Main drivers of innovation projects are research institutes like Fraunhofer or larger companies.

Furthermore, stricter rules on state aid and de minimis requirements constitute a burden to finance networks and clusters in the chemical sector. So Saxony-Anhalt is interested how other regions finance their network structures and dealing with these European common requirements.

ERDF funding from regional level competes with national innovation and research funding from the federal government. Due to the existing regulations for structural funds the ERDF funding is more complicated and less flexible for the applicants and users. Especially the rules for the reporting of eligible costs are disfavouring the structural funds programmes. The two principles cost based or effort based reporting are competing with each other. We would like to know how other regions experience this situation.

Funding of research infrastructure has become more difficult in the new structural funds programme period, which is focussing more on promotion of direct innovation projects. Nevertheless, the establishment or extension of research infrastructure is important for Saxony-Anhalt, which has a disadvantage due to missing larger private research and innovation capacity. It is interesting for us to see how this matter is handled in other regions.

A very important question for the Ministry of Economy of Saxony-Anhalt is how to organise an efficient implementation of the funding process. How can the ministry and the Development Bank Saxony-Anhalt together ensure a fast approval procedure and reduce administrative burdens for the application and reporting process for the companies? There are no specific calls with fix deadlines and organisations can submit their applications at any point of time. It is interesting to compare both approaches and discuss effective ways of reaching the target group and achieving high rate of participation.

Finally, Saxony-Anhalt wants to use the S3Chem project as platform for promotion of European innovation cooperation on the basis of identified research and innovation priorities in the partner regions. Therefore, it is important to exchange information about ongoing research and innovation activities, about the competences of innovation stakeholders and the scientific focus of research infrastructure. Bringing together regional stakeholders in joint study visits to the partner regions or during the dissemination events should be used intensively for networking.

**Essential questions and expectations to interregional learning:**

- How do you encourage companies, especially SME to participate on the process and to use funding programmes?
- How do you inform companies, universities and research institutes about the range of funding programmes?
- How can the ministry and the Development Bank Saxony-Anhalt together ensure a fast approval procedure and reduce administrative burdens for the application and reporting process for the companies?
- Do you have special web based tools or something accelerate proceedings for applications?
- How other regions finance their network structures and dealing with these European common requirements (e.g. deminimis)

## 6. Annex: Regional Stakeholders

### 6.1 Public Authorities

<p><b>Name of the Public Entity:</b> Ministry of Economy, Science and Digitalisation Saxony-Anhalt</p>
<p><b>Description of Main Competencies and Responsibilities / Role in RIS Implementation</b> (in headwords):</p> <p>The Ministry of Economy, Science and Digitalisation Saxony-Anhalt assume responsibility for the Office RIS and therefore the organisational and technical support. The office assists the Advisory Committee in their particular functions, coordinate and moderate the implementation of RIS Saxony-Anhalt, for example in the execution of working groups referred to the Lead Markets. At the same time the office RIS advice the government in order to develop the RIS Saxony-Anhalt. They conduct an active communication strategy (in- and outside) for the purpose of presenting Saxony-Anhalt as an attractive research-, innovation-, investment- and education location. Moreover, the office assume a coordinating function to professionalise further technology transfer if needed.</p> <ul style="list-style-type: none"> <li>• Support the Advisory Committee by preparation and follow-up meetings</li> <li>• Convocation and professional support of Lead Market Working Groups with representatives of research, science, clusters and networked innovation landscape (Definition of work processes and their realisation, propose of strategic projects in Lead Market Working Groups)</li> <li>• Development of measured quantities specialised up to Lead Market as well as the implementation of a monitoring and control system</li> <li>• Report to Advisory Committee</li> <li>• Initiation of further cross-innovation projects</li> <li>• Monitoring of topics</li> <li>• Coordinating and moderating function in order to professionalise and link further innovation/knowledge transfer systems</li> <li>• Development of the office RIS as an umbrella brand for the innovation location Saxony-Anhalt and purpose a strategic communication and public relation</li> </ul>
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**Name of the Public Entity:** Ministry of Finance Saxony-Anhalt

**Description of Main Competencies and Responsibilities / Role in RIS Implementation** (in headwords):

The Ministry of Finance Saxony-Anhalt takes the leadership of the development of OP ERDF. The content-related design was carried out in close partnership between the government, the parties represented in Parliament, the local authorities and the economic, social and environmental partners.

The Ministry of Finance Saxony-Anhalt is responsible for the management, control, audit of the OP ERDF and following tasks:

- inter-ministerial office in order manage the EU-structural funds (EU-administrative authority ERDF/ESF)
- EU-certifying authority ERDF/ESF
- EU-audit authority

Furthermore, the Ministry of Finance Saxony-Anhalt assume responsibility for the legal supervision of the Investment Bank Saxony-Anhalt, who works as a central financing and funding institution in Saxony-Anhalt.

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**Name of the Public Entity:** Investment Bank Saxony-Anhalt

**Description of Main Competencies and Responsibilities / Role in RIS Implementation** (in headwords):

The Investment Bank (IB) Saxony-Anhalt is the central consulting-, financing- and development bank of Saxony-Anhalt responsible for public tasks. Ultimately, the Investment Bank Saxony-Anhalt accounts for the application, the processing and the audit of proofs of the use of public funds, which were grant within the Regional Innovation Strategy (RIS).

The range of tasks includes:

- Financing and promotional offers for corporate clients, private clients and public clients
- Wide range of products and services starting with classic grant funding, guarantees up to customized loan products

The focus of the funding is set on:

- business development
- municipal finance
- housing promotion
- culture/education/media/tourism
- agricultural-/environmental funding

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## 6.2 Networks and Clusters

<p><b>Name of the Organization:</b></p> <p>Cluster Chemistry/Plastics Central Germany                      cooperation network „Chemistry+”</p>	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Cluster mitte deutschland <small>Chemie / Kunststoffe</small></p> </div> <div style="text-align: center;">  <p>Chemie+ <small>Kooperationsnetzwerk</small></p> </div> </div>	
<p><b>Type of Organization:</b></p> <p><input type="checkbox"/> Informal network without legal personality</p> <p><input checked="" type="checkbox"/> Project-funded network / cluster without legal personality</p> <p><input type="checkbox"/> Member-funded network / cluster with its own legal personality</p> <p><b>Financing</b></p> <p><input type="checkbox"/> % of members fees</p> <p><input checked="" type="checkbox"/> % of public funding</p> <p><input type="checkbox"/> % incomes from services provided</p> <p><input type="checkbox"/> % other... (specify)</p>	
<p><b>Structure/Members:</b></p> <p>The founding partners of “Chemistry+” are 6 companies, one research institute and one university of applied science in Saxony-Anhalt. The isw institute is responsible for the organisation of this complex network. This platform is <u>open for new partners</u> at any time (non-discriminatory access). A network-board, consisting of network-speakers in the field of feedstock and research as well as company representatives are responsible for the strategic orientation and the expert input.</p>	
<p><b>Description of the Main Competencies / Fields of Activities (in headwords):</b></p> <p>The emergence of a new quality in connection to the structural chemistry industry with other industrial sectors should be reached through the joint development and implementation of new, effective business-models in the regional topics for the future.</p> <ol style="list-style-type: none"> <li>1. Use of renewable energies as raw material for the chemical industry</li> <li>2. Development of production-related industrial services as innovation drivers</li> <li>3. Technologies for the material utilisation of lignite as raw material for the chemical industry</li> <li>4. Sustainable and innovative chemical logistics</li> </ol>	
<p><b>Relevant Thematic Innovation Priority/Research Field:</b></p> <p><input checked="" type="checkbox"/> Special and Fine chemicals      <input type="checkbox"/> New polymer materials                      <input type="checkbox"/> Bioeconomy</p> <p><input checked="" type="checkbox"/> Hydrogen economy                      <input checked="" type="checkbox"/> Coal-related chemical industry, CO<sub>2</sub>-economy</p>	
<p><b>Contact Details:</b></p> <p>Name:                      Dr. Christoph Mühlhaus</p> <p>Position:                      cluster spokesman</p> <p>Address:                      Seebener Straße 22, 06114 Halle (Saale)</p> <p>Phone:                      +49 345/299 82 726</p> <p>Email:                      cluster-chemie-kunststoffe@online.de</p> <p>Website:                      <b>www.cluster-chemie-kunststoffe.de</b></p>	

**Name of the Organization:** BioEconomy Cluster/BioEconomy e.V.



**Type of Organization:**

- Informal network without legal personality
- Project-funded network / cluster without legal personality
- Member-funded network / cluster with its own legal personality

**Financing**

- % of members fees
- % of public funding
- % incomes from services provided
- % other... (specify)

**Structure/Members:**

Since 2012 the BioEconomy Cluster is a Leading Edge Cluster of the German Federal Ministry of Education and Research (40 million €). It is a registered organisation with 55 SME, 16 big-sized companies, 18 research institutes, 7 universities and 5 networks (status as of December 2016).

**Description of the Main Competencies / Fields of Activities** (in headwords): The focus of the leading edge cluster is on biomass that is not needed for the food and feed industries. In order to receive an efficient use of biomass by combined production processes and cascade utilisation, the development of the BioEconomy strategy is focused along the value-added chain on the following topics:

1. Wood as a raw material
2. Innovative bio-based materials made from wood
3. Bio-based chemistry from wood as a raw material
4. (Bio-)Energy from waste material

**Relevant Thematic Innovation Priority/Research Field:**

- Special and Fine chemicals
- New polymer materials
- Bioeconomy
- Hydrogen economy
- Coal-related chemical industry, CO<sub>2</sub>-economy

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**Name of the Organization:** HYPOS - Hydrogen Power Storage & Solutions East Germany e. V.



**Type of Organization:**

- Informal network without legal personality
- Project-funded network / cluster without legal personality
- Member-funded network / cluster with its own legal personality

**Financing**

- % of members fees
- % of public funding
- % incomes from services provided
- % other... (specify)

**Structure/Members:**

The “Hydrogen Power Storage & Solutions East Germany“ project initiated by the “Fraunhofer Institute for Mechanics of Materials IWM”, the “Industrial Initiative for Central Germany” and the “Cluster Chemistry/Plastics in Central Germany” is supported by the Federal Ministry of Education and Research (BMBF). It is a registered association with approx. 75 members consisting of 12 large sized companies, 35 SME and 28 research institutes (status as of November 2016).

**Description of the Main Competencies / Fields of Activities (in headwords):**

The objective is of HYPOS is to achieve system and network infrastructure innovations for the economic efficiency of safe and green hydrogen until 2022. It would be a revolution in the hydrogen industry if turning the electricity out of wind and solar power systems, which is only available very inconsistently, into hydrogen through particular chemical processes was possible. Thereby, saving and transporting it for on-going use is another essential condition being met. Then this “green” hydrogen shall serve as raw material for the chemical industry being basis for an extensive electro mobility as well as energy source for electricity and heating supply.

**Relevant Thematic Innovation Priority/Research Field:**

- Special and Fine chemicals       New polymer materials       Bioeconomy
- Hydrogen economy       Coal-related chemical industry, CO<sub>2</sub>-economy

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**Name of the Organization:** ibi - Innovative Lignite Integration in Central Germany (ibi 2.0)



**From Mining To Refining**  
Innovative Process Technology

**Type of Organization:**

- Informal network without legal personality
- Project-funded network / cluster without legal personality
- Member-funded network / cluster with its own legal personality

**Financing**

- % of members fees
- % of public funding (until 2014)
- % incomes from services provided
- % since 2014 no financing

**Structure/Members:**

In the Innovative Lignite Integration in Central Germany (ibi) 12 institutions, consisting of 10 companies, 2 universities have come together to develop the material use of lignite. It was a project-funded network of the Innovative Regional Growth Cores (BMBF) from 2010 until 2014. Now the partners collaborate in ibi 2.0 as an informal network without legal personality.

**Description of the Main Competencies / Fields of Activities (in headwords):**

The project "ibi" stand up for an innovative and modern material use of lignite in consideration of the local structures. In this context the processing steps by coal deposit, the extraction and separation up to the material use of lignite (extraction, catalytic decomposition and gasification) were analysed. The next step (ibi 2.0) is the establishment of the technologies at pilot and demonstration scale at the chemical site in Leuna. In this process the economic efficiency and the technical functionality of the elements of the lignite-based added value can practically be proved in an industrial environment. The pilot projects include research proposals like a large-scale pilot plant of gasification and catalysis, the development of an innovation and technology centre of carbon chemistry and a detailed examination of arising CO<sub>2</sub>-emissions with regard to a material use of lignite at the chemical site.

**Relevant Thematic Innovation Priority/Research Field:**

- Special and Fine chemicals
- New polymer materials
- Bioeconomy
- Hydrogen economy
- Coal-related chemical industry, CO<sub>2</sub>-economy

**Contact Details:**

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 Website: [www.ibi-wachstumskern.de](http://www.ibi-wachstumskern.de)

**Name of the Organization:** Competence and transfer network “Polymer-based lightweight Saxony-Anhalt”



**Type of Organization:**

- Informal network without legal personality
- Project-funded network / cluster without legal personality
- Member-funded network / cluster with its own legal personality

**Financing**

- % of members fees
- % of public funding (in application)
- % incomes from services provided
- % % other... (specify)

**Structure/Members:**

The competence and transfer network “Polymer-based lightweight Saxony-Anhalt” is a new cooperation network, which actually is in application. RKW Sachsen-Anhalt e. V. and POLYKUM e.V. are responsible for the organisation. In order to promote research and development projects, innovation processes should be stimulated by two “transfer scouts” especially in direct communication and result-orientated contacts to local supra-regional scientific competences have to be connected.

**Description of the Main Competencies / Fields of Activities (in headwords):**

The function of this establishment is the networking of all relevant companies and research institutions in the country for the implementation of innovation projects in form of R&D projects in the areas of:

- Process development (thermoplastic bound of fibre plastic composites, Surface functionalisation of polymers, rubber-nanoparticle composite, thermosetting plastics)
- Product development/design (lightweight construction modules, InterieurDesign GreenCabin, etc.) and
- Component safety and quality (material and component testing, ageing behaviour of components, Tolerability of manufacturing defects).

**Relevant Thematic Innovation Priority/Research Field:**

- Special and Fine chemicals     New polymer materials     Bioeconomy
- Hydrogen economy     Cole-related chemical industry, CO<sub>2</sub>-economy

**Contact Details:**

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**Name of the Organization:** High Performance Centre for research and innovation in the region Hal-le/Leipzig



**Type of Organization:**

- Informal network without legal personality
- Project-funded network / cluster without legal personality
- Member-funded network / cluster with its own legal personality

**Financing**

- % of members fees
- % of public funding
- % incomes from services provided
- % financed by the "Fraunhofer-Gesellschaft", states of Saxony-Anhalt and Saxony, companies

**Structure/Members:**

The competence centre "Chemical and Biosystems Technology" should be viewed as a long-term establishment and as a "umbrella brand" for scientific and economic fortification of Halle Region. 3 project alliances with 20 individual projects and 6 joint projects are currently being implemented or planned (status as of September 2016). In 2017 the preparation of participation in the excellence initiatives of the Federal Ministry of Education and Research is planned. A board of directors, consisting of the institute's directors of "Fraunhofer" and the "Martin Luther University" is formed for the management of the centre. Further components of the organisation are the office, the industrial and the scientific Advisory Board.

**Description of the Main Competencies / Fields of Activities (in headwords):**

The aim of this centre is to investigate and optimize process chains of the plastics processing, chemical, biotechnological and biomedical industry. A particular focus is the support of innovation by SMEs and the deepening of cooperation between scientific institutions in the region with local businesses. The centre is intended to reflect the entire process chain from extraction to marketing of chemical raw materials and bio-based materials. The thematic focus is set on Polymer chemistry, Plastics processing, Chemical and process engineering, Fine chemistry, BioEconomy, Agrochemical sector, Medical technology and biomedical technology and Biotechnology and Biosystems technology.

**Relevant Thematic Innovation Priority/Research Field:**

- Special and Fine chemicals       New polymer materials       Bioeconomy
- Hydrogen economy       Coal-related chemical industry, CO<sub>2</sub>-economy

**Contact Details:**

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## 6.3 Industry

<b>Name of the Company:</b> ChiroBlock GmbH	
<b>Indicators Employment / Turnover</b>	
Number of Employees: 1-20	<u>Relevant Category:</u> <input checked="" type="checkbox"/> < 10 <input checked="" type="checkbox"/> 10 to 49 <input type="checkbox"/> 50 to 249 <input type="checkbox"/> > 250
Turnover €/a: 1,3 Million Euro (2015)	<u>Relevant Category:</u> <input checked="" type="checkbox"/> max. 2 Mio. € <input type="checkbox"/> max. 10 Mio. € <input type="checkbox"/> max. 50 Mio. € <input type="checkbox"/> more than 50 Mio. €
<b>Description of Main Competencies / Fields of Activities</b> (in headwords): <ul style="list-style-type: none"> <li>• MoleculeFactory: Custom Synthesis Service of small, new and complex molecules (e.g. reference standards, research reagents, impurities, building blocks)</li> <li>• ReDesignFactory: Route Scouting, Design and Optimisation for already known molecules towards a more efficient, environmentally friendly or simply faster synthesis</li> <li>• IP-Factory: own in-house research on mostly chiral building blocks (e.g.: beta amino acids, beta amino alcohols, fluoro substituted glucose donors)</li> </ul>	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input checked="" type="checkbox"/> Special and Fine chemicals <input checked="" type="checkbox"/> New polymer materials <input type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy Service provider for outsourcing challenging small scale synthesis of sophisticated, complex molecules.	
<b>Contact Details:</b> Name: Dr. Volkmar Wendisch, Dr. Oliver Seidelmann Position: Managing Director Address: Andresenstraße 1A, 06766 Wolfen, Germany Phone: 03494 - 638323 Email: contact@chiroblock.de Website: <a href="http://www.chiroblock.de">www.chiroblock.de</a>	

<b>Name of the Company:</b> Global Bioenergies GmbH	
<b>Indicators Employment / Turnover</b>	
Number of Employees: 68 (2014)	<u>Relevant Category:</u> <input type="checkbox"/> < 10 <input type="checkbox"/> 10 to 49 <input checked="" type="checkbox"/> 50 to 249 <input type="checkbox"/> > 250
Turnover €/a: 1,3 Million Euro  (total turnover Global Bioenergies S.A.)	<u>Relevant Category:</u> <input checked="" type="checkbox"/> max. 2 Mio. € <input type="checkbox"/> max. 10 Mio. € <input type="checkbox"/> max. 50 Mio. € <input type="checkbox"/> more than 50 Mio. €
<b>Description of Main Competencies / Fields of Activities (in headwords):</b> <p>Global Bioenergies S.A., founded during October 2008 in Evry, is in the process of becoming an industrial group. The Company currently has three subsidiaries. Wholly-owned Global Bioenergies GmbH is a German-registered company based in Leipzig. Its initial role is to build, then operate the industrial-scale demonstrator at the Leuna refinery. Its focus will then shift to specialized engineering services in gas fermentation. IBN-One, IBN-Two, IBN-n, which will operate the isobutene process, are expected to be its first customers.</p>	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input type="checkbox"/> Special and Fine chemicals <input checked="" type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy <p>Global Bioenergies was founded in 2008 with a unique goal – to develop a process converting renewable resources (sugar, crops, agricultural and forestry waste) into isobutene, one of the main petroleum derivatives. For two years, Global Bioenergies has been working intensively on the industrialization of its process for the organic production of isobutene. First, a pilot plant was set up at the European Center for Agricultural Industries of Pomacle-Bazancourt. This was put into operation in 2014 and is now fully operational. With the construction of an industrial demonstration facility at the petrochemically integrated site Leuna (near Leipzig) in Germany, the next phase is now starting. The isobutene process is the Company's most advanced program. It is pursuing two other programs studying compounds in the same family:</p> <ul style="list-style-type: none"> <li>• butadiene, a 10 million tonne market. This program is being conducted in conjunction with Synthos, an industrial group that is one of Europe's leading rubber producers.</li> <li>• Propylene, an 83 million tonne market.</li> </ul>	
<b>Contact Details:</b> Name: Thomas Buhl Position: Head of Business Development Address: Deutscher Platz 05, Deutschland - D- 04103 Leipzig Phone: +33 1 64 98 20 50 Email: thomas.buhl@global-bioenergies Website: <a href="http://www.global-bioenergies.com">www.global-bioenergies.com</a>	

<b>Name of the Company:</b> IFC Composite GmbH	
<b>Indicators Employment / Turnover</b>	
Number of Employees: 40	<u>Relevant Category:</u> <input type="checkbox"/> < 10 <input checked="" type="checkbox"/> 10 to 49 <input type="checkbox"/> 50 to 249 <input type="checkbox"/> > 250
Turnover €/a: 5 Million Euro/a	<u>Relevant Category:</u> <input type="checkbox"/> max. 2 Mio. € <input checked="" type="checkbox"/> max. 10 Mio. € <input type="checkbox"/> max. 50 Mio. € <input type="checkbox"/> more than 50 Mio. €
<b>Description of Main Competencies / Fields of Activities (in headwords):</b> <ul style="list-style-type: none"> <li>• development and manufacturing of structural components made from fiber composite</li> <li>• automobile industry, end customers also include companies from the fields of motor sports, the military, wind power and sport</li> <li>• IFC Composite GmbH has developed into the innovative leader for automotive lightweight design thanks to its continuously new, innovative technologies and products.</li> <li>• Its focus, in addition to optimizing design, is on using new materials, including renewable raw materials</li> </ul>	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input type="checkbox"/> Special and Fine chemicals <input checked="" type="checkbox"/> New polymer materials <input type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy <ul style="list-style-type: none"> <li>- light construction</li> <li>- glass fibres</li> </ul>	
<b>Contact Details:</b> Name: Matthias Voigt Position: Head of Development Address: Jacob-Uffrecht-Straße 2, 39340 Haldensleben Phone: +49 3904 7 25 06 141 Email: matthias.voigt@ifc-composite.de Website: <a href="http://www.ifc-composite.de">www.ifc-composite.de</a>	

<b>Name of the Company:</b> Linde AG, division Linde Gas	
<b>Indicators Employment / Turnover</b>	
Number of Employees: 388 (total 2016)	<u>Relevant Category:</u> <input type="checkbox"/> < 10 <input type="checkbox"/> 10 to 49 <input type="checkbox"/> 50 to 249 <input checked="" type="checkbox"/> > 250
Turnover €/a: 117,2 Mio. EUR (total 2016)	<u>Relevant Category:</u> <input type="checkbox"/> max. 2 Mio. € <input type="checkbox"/> max. 10 Mio. € <input type="checkbox"/> max. 50 Mio. € <input checked="" type="checkbox"/> more than 50 Mio. €
<b>Description of Main Competencies / Fields of Activities</b> (in headwords):	
The Group comprises three Divisions: Industrial Gases & Healthcare, Engineering and Gist	
<b>Relevant Thematic Innovation Priority / Research Field:</b>	
<input type="checkbox"/> Special and Fine chemicals <input type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input checked="" type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<b><u>Engineering:</u></b>	
<p>Linde Engineering operates fully equipped research and development centres with extensive laboratories and pilot plants and numerous research and development partnerships with universities, research facilities and industrial partners. Larger pilot plants are normally operated on-site by the industrial partners (including Linde Gas) and are often integrated into commercial process plants, enabling new technologies to be tested under realistic conditions. Innovation and R &amp; D initiatives:</p> <ul style="list-style-type: none"> <li>• Linde pilot reformer</li> <li>• Environmentally friendly hydrogen from biomass</li> <li>• Separation plants for inert gases</li> <li>• α-SABLIN® - Oligomerization of ethylene to linear α-olefins (LAO)</li> <li>• Compact membrane reformer for hydrogen generation</li> <li>• Heat exchanger for swimming applications</li> <li>• LAO-OP - Selective trimerization of ethylene to 1-hexene</li> </ul>	
<b><u>Gas:</u></b>	
<ul style="list-style-type: none"> <li>• Hydrogen as a supply of energy and reservoir for energy</li> <li>• thermic storage</li> </ul>	
<b>Contact Details:</b>	
Name:	Andreas Dietrich
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<b>Name of the Company:</b> MIBRAG GmbH	
<b>Indicators Employment / Turnover</b>	
Number of Employees: 3100 (2015)	<u>Relevant Category:</u> <input type="checkbox"/> < 10 <input type="checkbox"/> 10 to 49 <input type="checkbox"/> 50 to 249 <input checked="" type="checkbox"/> > 250
Turnover €/a: 395 Million Euro (2015)	<u>Relevant Category:</u> <input type="checkbox"/> max. 2 Mio. € <input type="checkbox"/> max. 10 Mio. € <input type="checkbox"/> max. 50 Mio. € <input checked="" type="checkbox"/> more than 50 Mio. €
<b>Relevant Thematic Innovation Priority / Research Field:</b>	
<p>The company MIBRAG is exploiting and refining brown coal in Saxony-Anhalt and Saxony. The company is operating at two surface mining in Profen and near Leipzig. Additionally, the MIBRAG is operating two power plants for the cogeneration of heat and power.</p>	
<b>Description of the Main Competencies / Fields of Activities (in headwords):</b>	
<input type="checkbox"/> Special and Fine chemicals <input type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input checked="" type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<p>The major innovative field covered by the MIBRAG is the process of refining brown coal. MIBRAG is cooperating with the TU Bergakademie Freiberg, the University Merseburg and other industrial partner for new, innovative, environmental sound and efficient processes for refining brown coal. This cooperation is established in the framework of "Innovative Brown Coal Integration" (ibi).</p>	
<b>Contact Details:</b>	
Name: Maik Simon Position: Head of public relations Address: Glück-Auf-Straße 1, D-06711 Zeitz Phone: +49 3441 684-255 Email: maik.simon@mibrag.de Website: <a href="http://www.mibrag.de">www.mibrag.de</a>	

<b>Name of the Company:</b> Miltitz Aromatics GmbH	
<b>Indicators Employment / Turnover</b>	
Number of Employees: 21-50	<u>Relevant Category:</u> <input type="checkbox"/> < 10 <input checked="" type="checkbox"/> 10 to 49 <input type="checkbox"/> 50 to 249 <input type="checkbox"/> > 250
Turnover €/a: between 1-5 Million Euro	<u>Relevant Category:</u> <input type="checkbox"/> max. 2 Mio. € <input checked="" type="checkbox"/> max. 10 Mio. € <input type="checkbox"/> max. 50 Mio. € <input type="checkbox"/> more than 50 Mio. €
<b>Description of Main Competencies / Fields of Activities (in headwords):</b> Miltitz Aromatics GmbH is an independent German company, specialised in synthesis of chemical materials used in flavour and fragrances as well as in the fine chemistry.	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input checked="" type="checkbox"/> Special and Fine chemicals <input type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input checked="" type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<b><u>Fine chemicals:</u></b> <ul style="list-style-type: none"> <li>• excellent cluster BioEconomy: EffiMat - Multifunctional substitution materials for resource-efficient material concepts</li> <li>• HYPOS: FRAGRANCES - Advanced resource application for the production of odoriferous and aromatic substances as well as other fine chemicals by using sustainable synthesis gas</li> <li>• KataPlasma – hydroformylation with homogeneous catalysts supported on plasma-functionalized materials</li> <li>• Stereo-Red – Stereoselective reductions for fine chemicals with improved sustainability</li> </ul>	
<b>Contact Details:</b> Name: Dr. Stefan Müller Position: CEO Address: Wofatitstraße, 06803 Bitterfeld-Wolfen Phone: + 3493 76155 Email: info@miltitz-aromatics.de Website: <a href="http://www.miltitz-aromatics.de">www.miltitz-aromatics.de</a>	

<b>Name of the Company:</b> Organica Feinchemie GmbH	
<b>Indicators Employment / Turnover</b>	
Number of Employees: about 90 (2017)	<u>Relevant Category:</u> <input type="checkbox"/> < 10 <input type="checkbox"/> 10 to 49 <input checked="" type="checkbox"/> 50 to 249 <input type="checkbox"/> > 250
Turnover €/a: 12,24 Million Euro (2015)	<u>Relevant Category:</u> <input type="checkbox"/> max. 2 Mio. € <input type="checkbox"/> max. 10 Mio. € <input checked="" type="checkbox"/> max. 50 Mio. € <input type="checkbox"/> more than 50 Mio. €
<b>Description of Main Competencies / Fields of Activities (in headwords):</b> <p>ORGANICA offers the transition of the research and development up to the production of fine chemicals on a larger production scale. Three fully equipped R&amp;D labs are available for the process development. The following scale-up can be carried out either in the available kilo or the pilot's plant. With the help of the available multipurpose plant high-quality organic intermediates can be produced in multi-tons. The high flexibility in the pilot's plants and multipurpose plant allows a qualitatively high-quality conversion in time of the production campaigns for our customers. The company is producing fine chemicals and dyes.</p>	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input checked="" type="checkbox"/> Special and Fine chemicals <input type="checkbox"/> New polymer materials <input type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy <ul style="list-style-type: none"> <li>• Fine chemicals, e.g.: Amines, Alcohols and phenols, Aminoalcohols, Carboxylic acids, Sulfonic compounds and Urea compounds</li> <li>• Dyes Functional dyes and Solar dyes</li> </ul>	
<b>Contact Details:</b> Name: Dr. Jörg Blumhoff Position: Managing Director Address: Kunstseidestraße 5, 06766 Bitterfeld-Wolfen, Germany Phone: +49-3494-63-6215 Email: jbl@organica.de Website: <a href="http://www.organica.de">www.organica.de</a>	

<b>Name of the Company:</b> ROMONTA Bergwerks Holding AG	
<b>Indicators Employment / Turnover</b>	
Number of Employees: 21-50	<u>Relevant Category:</u> <input type="checkbox"/> < 10 <input checked="" type="checkbox"/> 10 to 49 <input type="checkbox"/> 50 to 249 <input type="checkbox"/> > 250
Turnover €/a: 25-50 Million Euro (2014)	<u>Relevant Category:</u> <input type="checkbox"/> max. 2 Mio. € <input type="checkbox"/> max. 10 Mio. € <input checked="" type="checkbox"/> max. 50 Mio. € <input type="checkbox"/> more than 50 Mio. €
<b>Description of Main Competencies / Fields of Activities (in headwords):</b> <p>ROMONTA is the world's largest producer of crude montan wax, with a nearly 100-year-old tradition of lignite upgrading. The fossil wax is extracted from bitumen-rich lignite, coming from our own open-cast mine in Amsdorf. Its special characteristics make montan wax an important raw material for many branches of industry. This has enabled montan wax products from Amsdorf to maintain their position in the world market despite the development of countless new types of synthetic waxes.</p>	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input type="checkbox"/> Special and Fine chemicals <input type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input checked="" type="checkbox"/> Hydrogen economy <input checked="" type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy <p>The alliance forming the regional growth core 'Innovative Lignite Integration in Central Germany' (ibi) is based on an innovation forum of the same name, which received funding from the Federal Ministry of Education and Research (BMBF) from 2008 to 2009.</p> <p><u>The first lignite chemical park by 2020:</u> The shared business goal of the Leuna-based alliance is to develop new technologies to produce basic chemicals from lignite for the chemical industry, along the entire value-added chain (a lignite chemical park). The alliance's strength lies in the expertise of its partners, which extends across every stage of the operation, and the greater cost-efficiency achieved, compared with specialisation in single, isolated stages such as extraction or gasification.</p>	
<b>Contact Details:</b> Name: Dipl.-Ing. Jörg Abraham Position: Head of Marketing, Research and Development Address: Chausseestraße 1, 06317 Seegebiet Mansfelder Land OT Amsdorf Phone: +49 (0) 34601 400 Email: joerg.abraham@romonta.de Website: www.wachs-und-mehr.de	

<b>Name of the Company:</b> TOTAL Raffinerie Mitteldeutschland GmbH	
<b>Indicators Employment / Turnover</b>	
Number of Employees: 689	<u>Relevant Category:</u> <input type="checkbox"/> < 10 <input type="checkbox"/> 10 to 49 <input type="checkbox"/> 50 to 249 <input checked="" type="checkbox"/> > 250
Turnover €/a: 5 Billion Euro (2015)	<u>Relevant Category:</u> <input type="checkbox"/> max. 2 Mio. € <input type="checkbox"/> max. 10 Mio. € <input type="checkbox"/> max. 50 Mio. € <input checked="" type="checkbox"/> more than 50 Mio. €
<b>Description of Main Competencies / Fields of Activities (in headwords):</b> <p>The TOTAL refinery at Leuna is one of the most modern refineries in Europe. The product range includes, in particular, gasoline, diesel, fuel oil, liquefied petroleum gas, naphtha, aviation fuel, bitumen and methanol. The refinery is also Germany's largest producer of methanol, an important raw material for the chemical industry. State-of-the-art processing technologies as well as the economical handling of raw materials, energy and water ensure that the refinery is operated in an environmentally compatible manner. The refinery relies on an energy-saving processing of crude oil.</p>	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input type="checkbox"/> Special and Fine chemicals <input type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input checked="" type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<p>Innovation plays a pivotal role in the solar energy and biomass segments, where the development and commercial scale-up of promising techniques enables us to offer efficient solutions that can supplement fossil fuels. Our involvement in photovoltaic solar energy and bioenergy is supported by:</p> <ul style="list-style-type: none"> <li>• A sustained commitment to R&amp;D;</li> <li>• Long-term partnerships with world-leading laboratories and research institutes;</li> <li>• A network of start-ups with specialized expertise in these areas.</li> </ul>	
<b>Contact Details:</b> Name: Dr. Willi Frantz Position: General Manager Address: Maienweg 1, 06237 Leuna, Phone: + (49) 34 61 48 10 82 Email: kommunikation-trm@total.de Website: <b>www.total.de</b>	

<b>Name of the Company:</b> Trinseo Deutschland GmbH	
<b>Indicators Employment / Turnover</b>	
Number of Employees: 2300 (2015)	<u>Relevant Category:</u> <input type="checkbox"/> < 10 <input type="checkbox"/> 10 to 49 <input type="checkbox"/> 50 to 249 <input checked="" type="checkbox"/> > 250
Turnover €/a: 4 Billion US-\$ (2015)	<u>Relevant Category:</u> <input type="checkbox"/> max. 2 Mio. € <input type="checkbox"/> max. 10 Mio. € <input type="checkbox"/> max. 50 Mio. € <input checked="" type="checkbox"/> more than 50 Mio. €
<b>Description of Main Competencies / Fields of Activities (in headwords):</b> <p>Trinseo Germany GmbH is a medium sized enterprise and a leading global materials company and manufacturer of plastics, latex and rubber, dedicated to collaborating with customers to deliver innovative and sustainable solutions. Trinseo's technology is used by customers in industries such as home appliances, automotive, building &amp; construction, carpet, consumer electronics, consumer goods, electrical &amp; lighting, medical, packaging, paper &amp; paperboard, rubber goods and tires.</p>	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input type="checkbox"/> Special and Fine chemicals <input checked="" type="checkbox"/> New polymer materials <input type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<b>Contact Details:</b> Name: Ralf Irmert Position: Managing Director Address: Werk Schkopau, PF 1265, 06202 Merseburg Straße E 17, 06258 Schkopau, Deutschland Phone: +49 3461 49 6950 Email: cig@trinseo.com Website: <a href="http://www.trinseo.com">www.trinseo.com</a>	

<b>Name of the Company:</b> Zellstoff Stendal GmbH	
<b>Indicators Employment / Turnover</b>	
Number of Employees: 576 (2014)	<u>Relevant Category:</u> <input type="checkbox"/> < 10 <input type="checkbox"/> 10 to 49 <input type="checkbox"/> 50 to 249 <input checked="" type="checkbox"/> > 250
Turnover €/a: 420 Million Euro (2014)	<u>Relevant Category:</u> <input type="checkbox"/> max. 2 Mio. € <input type="checkbox"/> max. 10 Mio. € <input type="checkbox"/> max. 50 Mio. € <input checked="" type="checkbox"/> more than 50 Mio. €
<b>Description of Main Competencies / Fields of Activities (in headwords):</b> <p>Zellstoff Stendal GmbH is the largest and technically most advanced manufacturer of NBSK (Northern Bleached Softwood Kraft) market pulp in Central Europe. Beside this Zellstoff Stendal operates the largest biomass power plant in Germany with a power performance of 135 MW. The power demand of the mill is generated by its own production process and the surplus power is fed into the grid around the clock.</p>	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input type="checkbox"/> Special and Fine chemicals <input type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input type="checkbox"/> Cole-related chemical industry, CO <sub>2</sub> -economy	
<p>In addition to the core business of market pulp production, they produce significant quantities of renewable electricity, heat and power in a combined heat and power generation plant. About 50% of the wood fed into the mill becomes kraft pulp. The remaining 50% is converted to a biofuel known as black liquor, and is burned together with i.e. bark and branches in our modern recovery boiler to make power. More specifically, lignin and hemi-cellulose are extracted from wood fibre, which becomes a source of fuel in our boiler to make steam which in turn is used to generate electricity. As a renewable resource, wood is considered carbon neutral and energy produced from wood is therefore labelled 'green' as opposed to the 'brown' energy produced from non-renewable coal, for example.</p>	
<b>Contact Details:</b> Name: André Listemann, Adolf Koppensteiner Position: Managing Directors Address: Goldbecker Str. 1, 39596 Arneburg Phone: +49 (0)39321 55-0 Email: info@zellstoff-stendal.de Website: <a href="http://www.zellstoff-stendal.de">www.zellstoff-stendal.de</a>	

## 6.4 Science

### Universities

<b>Name of the Research Institution:</b> Hochschule Anhalt – University of Applied Sciences	
<b>Number of Researchers:</b> -	
<b>Type of Institution</b>	<b>Research Category</b>
<input checked="" type="checkbox"/> University <input type="checkbox"/> Research Institute <input type="checkbox"/> Research and Centers for Development, that are operated by industrial enterprises	<input checked="" type="checkbox"/> Basic Research <input type="checkbox"/> Industrial Research <input checked="" type="checkbox"/> Experimental Research
<b>Description of Main Competencies / Research Areas (in headwords):</b> <p>Anhalt University of Applied Sciences makes a noteworthy contribution to scientific, technical and economic development in the region and also uses research results in its teaching. The establishment and development of the LIFE SCIENCES Competence Centre as part of the competence network for application- and transfer-oriented research (KAT), and of the Center of Life Sciences, represented an important step in terms of raising the institution's profile and concentrating on key areas of focus.</p> <p>The Center of Life Sciences, founded as an interdepartmental and inter-site research institute, provides the means for interdisciplinary processing of even complex research.</p> <p>The research potential of the Anhalt University of Applied Sciences is augmented by the capacities of the 12 affiliated institutes linked to the university by cooperation agreements</p>	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input type="checkbox"/> Special and Fine chemicals <input type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<p>The research profile of the Anhalt University of Applied Sciences is defined by the</p> <ul style="list-style-type: none"> <li>• LIFE SCIENCES key competence area</li> </ul> <p>and the other key research areas</p> <ul style="list-style-type: none"> <li>• Renewable Energy Sources</li> <li>• Engineering Sciences</li> <li>• Architecture and Design</li> <li>• Economics</li> <li>• E-learning</li> </ul>	
<b>Contact Details:</b> Name: Prof. Dr. Jörg Bagdahn Position: President Address: Hochschule Anhalt Präsidium, PF 1458, 06354 Köthen Phone: +49 (0) 3496 67 1000 Email: praesident@hs-anhalt.de Website: <a href="http://www.hs-anhalt.de">www.hs-anhalt.de</a>	

<b>Name of the Research Institution:</b> Hochschule Magdeburg-Stendal – University of Applied Science	
<b>Number of Researchers:</b> -	
<b>Type of Institution</b>	<b>Research Category</b>
<input checked="" type="checkbox"/> University <input type="checkbox"/> Research Institute <input type="checkbox"/> Research and Centers for Development, that are operated by industrial enterprises	<input checked="" type="checkbox"/> Basic Research <input checked="" type="checkbox"/> Industrial Research <input type="checkbox"/> Experimental Research
<b>Description of Main Competencies / Research Areas (in headwords):</b>	
<p>The research profile at the Magdeburg-Stendal University of Applied Sciences is characterised by future-oriented research and development activities tailored towards key markets in the state of Saxony-Anhalt and the requirements of regional businesses and institutions. To this end they implement a large number of innovative research and development projects in the fields of engineering, economics, public health, communications and the social sciences. By concentrating specific skills in a number of competence centres they are able to take a holistic, cross-disciplinary approach to research themes.</p>	
<b>Relevant Thematic Innovation Priority / Research Field: (selection):</b>	
<input type="checkbox"/> Special and Fine chemicals <input checked="" type="checkbox"/> New polymer materials <input type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<b>Functionally Optimised Lightweight Construction / Renewable Materials</b>	
<ul style="list-style-type: none"> <li>• Lightweight construction with fibre-reinforced plastics</li> <li>• Intelligent hybrid construction</li> <li>• Adhesive technology</li> <li>• Numerical simulation (FEM)</li> <li>• Mechanical materials characterisation</li> </ul>	
<b>Contact Details:</b>	
Name:	Prof. Dr.-Ing. Harald Goldau
Position:	Vice-Rector for Research, Development and Technology Transfer
Address:	Breitscheidstr. 2, 39114 Magdeburg
Phone:	+49 (0) 391 886 41 05
Email:	pro_forschung@hs-magdeburg.de
Website:	<a href="http://www.hs-magdeburg.de">www.hs-magdeburg.de</a>

<b>Name of the Research Institution:</b> Martin-Luther-University Halle-Wittenberg	
<b>Number of Researchers:</b> .....	
<b>Type of Institution</b>	<b>Research Category</b>
<input checked="" type="checkbox"/> University <input type="checkbox"/> Research Institute <input type="checkbox"/> Research and Centers for Development, that are operated by industrial enterprises	<input checked="" type="checkbox"/> Basic Research <input type="checkbox"/> Industrial Research <input checked="" type="checkbox"/> Experimental Research
<b>Description of Main Competencies / Research Areas (in headwords):</b> <p>The Martin-Luther-University Halle-Wittenberg is a University in Saxony-Anhalt covering the scientific fields of humanities, medicine and natural sciences. The MLU has identified four main research fields:</p> <ul style="list-style-type: none"> <li>• Materials science - Nanostructured materials</li> <li>• Biosciences - Macromolecular structures and biological information processing</li> <li>• Enlightenment - Religion - Knowledge</li> <li>• Society and culture. Diffusion - Experiment - Institution</li> </ul>	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input checked="" type="checkbox"/> Special and Fine chemicals <input checked="" type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<p>The Martin-Luther-University is furthermore cooperating and participating in several research projects, e.g. special research areas funded by the German research organisation DFG or research cluster. Three research activities are:</p> <ul style="list-style-type: none"> <li>• German Center for Integrative Biodiversity Research (iDiv)</li> <li>• SFB-Transregio 102 (Polymers under multiple constraints)</li> <li>• Spitzencluster BioEconomy – Value Addition by Biomass</li> <li>• Leibniz-WissenschaftsCampus Halle:</li> </ul> <p>The ScienceCampus Halle was founded in 2011 to strengthen and support plant and agricultural science research and teaching in the Halle region and to further expand the existing research and teaching cooperation between the participating institutions in the field of plant-based bioeconomy. It is committed to application orientation and the transfer of knowledge and technology.</p> <p>The ScienceCampus Halle receives financial support by the European Union, the Land of Saxony-Anhalt and the Leibniz Association.</p>	
<b>Contact Details:</b> Name: Prof. Dr. Michael Bron Position: Vice-Rector Research and young academics Address: Martin-Luther-Universität Halle-Wittenberg, Prorektorat für Forschung und wissenschaftlichen Nachwuchs, 06099 Halle (Saale) Phone: +49345 55 21450 Email: michael.bron@rektorat.uni-halle.de Website: <a href="http://www.uni-halle.de">www.uni-halle.de</a>	

<b>Name of the Research Institution:</b> Otto von Guericke University Magdeburg	
<b>Number of Researchers:</b> about 1700 scientific employees	
<b>Type of Institution</b>	<b>Research Category</b>
<input checked="" type="checkbox"/> University <input type="checkbox"/> Research Institute <input type="checkbox"/> Research and Centers for Development, that are operated by industrial enterprises	<input checked="" type="checkbox"/> Basic Research <input type="checkbox"/> Industrial Research <input checked="" type="checkbox"/> Experimental Research
<b>Description of Main Competencies / Research Areas (in headwords):</b> <p>The internationally networked research areas of the Otto-von-Guericke-University Magdeburg are in the fields of neurosciences and the dynamic systems and find their roof structures in the science campus Centre for Behavioural Brain Sciences and the Centre for Dynamic Systems. The research campus STIMULATE combines the activities of medical research and development. The focus of the faculty of medicine is in the fields of immunology and molecular medicine of inflammation and is bundled in the health campus immunology, infectiology and inflammation.</p>	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input type="checkbox"/> Special and Fine chemicals <input type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input checked="" type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<p><u>Automotive:</u> The University of Magdeburg occupies a leading position in the field of automotive research and is actively involved in shaping this sector. In addition to basic research, there is a strong application-oriented research orientation.</p> <p><u>Renewable energy:</u> At the University of Magdeburg, researchers are working intensively to promote the necessary redesign of the energy sector. Above all, the OVGU is a scientific pioneer in interdisciplinary wind energy research.</p> <p><u>Dynamic Systems and Biosystems Engineering (CDS):</u> Scientists from the Otto-von-Guericke-University Magdeburg and the Max Planck Institute for Dynamics of Complex Technical Systems want to decipher and delineate complex dynamic systems within the framework of the research focus of the Otto von Guericke University Magdeburg with the participation of five faculties. Important key technologies are mathematical modeling and simulation, optimization, experimental planning, control and regulation. The objectives are, among other things, personalized medicine, vaccine production in cell cultures or the production of biopolymers.</p>	
<b>Contact Details:</b> Name: Prof. Dr. rer. nat. Monika Brunner-Weinzierl Position: Vice-Rector for Research, Technology and Equal Opportunities Address: Universitätsplatz 2, 39106 Magdeburg Phone: +49 391 67 24003 Email: monika.brunner-weinzierl@med.ovgu.de Website: <a href="http://www.uni-magdeburg.de">www.uni-magdeburg.de</a>	

<b>Name of the Research Institution:</b> University of Applied Sciences Merseburg	
<b>Number of Researchers:</b> .....	
<b>Type of Institution</b>	<b>Research Category</b>
<input checked="" type="checkbox"/> University <input type="checkbox"/> Research Institute <input type="checkbox"/> Research and Centers for Development, that are operated by industrial enterprises	<input checked="" type="checkbox"/> Basic Research <input type="checkbox"/> Industrial Research <input checked="" type="checkbox"/> Experimental Research
<b>Description of Main Competencies / Research Areas (in headwords):</b> <p><i>HoMe</i> places its main emphasis on applied research, development, and continuing education. Our departments have established and developed their competences over several years. Thus, <i>HoMe</i> has become an attractive partner for companies both within and beyond the region. <i>HoMe</i> aims at integrating our students into research through specific research projects. We thus enable our students to create their own networks with potential employers. Our research principles are based on the profile of <i>HoMe</i>, on our close co-operation with companies within and outside the region, and on the development of innovative products and processes through inclusion of our students.</p>	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input checked="" type="checkbox"/> Special and Fine chemicals <input checked="" type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input checked="" type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy <p>The Senate's Commission on Research and the Transfer of Knowledge has acknowledged the following research focuses:</p> <ul style="list-style-type: none"> <li>• Chemistry/Synthetic Materials,</li> <li>• Trendsetting processes and technologies,</li> <li>• Telecommunications, signal processing, and micro-electronics,</li> <li>• Automation of technical processes, buildings and environment as well as systems modeling,</li> <li>• Fluid flow machines,</li> <li>• Sensor technology and material diagnostics.</li> <li>• Process management and innovative information systems</li> </ul>	
<b>Contact Details:</b> Name: Prof. Dr. rer. pol. Dirk Sackmann Position: Vice-Rector for Research, Transfer of Knowledge and Start-ups Address: Eberhard-Leibnitz-Str. 2, 06217 Merseburg / Deutschland Phone: +49 3461 46-2903 Email: prorektorat.forschung@hs-merseburg.de Website: <a href="http://www.hs-merseburg.de">www.hs-merseburg.de</a>	

## Scientific and Research Institutes

<b>Name of the Research Institution:</b> Fraunhofer Centre for Chemical-Biotechnological Processes CBP (as part of the Fraunhofer IGB)	
<b>Number of Researchers:</b> 391 total employees Fraunhofer IGB	
<b>Type of Institution</b>	<b>Research Category</b>
<input type="checkbox"/> University <input checked="" type="checkbox"/> Research Institute <input type="checkbox"/> Research and Centers for Development, that are operated by industrial enterprises	<input type="checkbox"/> Basic Research <input checked="" type="checkbox"/> Industrial Research <input type="checkbox"/> Experimental Research
<b>Description of Main Competencies / Research Areas</b> (in headwords):	
<p>The Fraunhofer Center for Chemical-Biotechnological Processes CBP focuses on the development of sustainable processes along the entire value creation chain for the manufacture of products on the basis of renewable resources. The aim, working on the principle of a biorefinery, is the integrated and cascading material-energetic utilization of, as far as possible, all the substances derived from plant biomass.</p>	
<b>Relevant Thematic Innovation Priority / Research Field:</b>	
<input checked="" type="checkbox"/> Special and Fine chemicals <input type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input checked="" type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<p><u>Chemical processes:</u> This field of work focuses on the process-technological development of chemical processes to produce biobased basic and fine chemicals for further processing in the chemical, pharmaceutical or food industries.</p>	
<p><u>Downstream Processes:</u> The field of downstream processing includes the development of processes for separating product mixes and is naturally closely interrelated with the other areas at the Fraunhofer CBP.</p>	
<p><u>Processing of raw materials:</u> The focus in the field of raw materials processing is on the pulping of raw materials containing lignocellulose and their fractionation into their basic chemical components lignin and sugars or fibers. (Organosolv technique to investigate and develop processing and fractionation technologies)</p>	
<p><u>Biotechnological processes:</u> The use of renewable raw materials by employing enzymatic synthesis of biobased chemicals and the fermentative production of biocatalysts or other metabolic products, for example organic solvents and acids, are objectives defined by the working group "Biotechnological Processes".</p>	
<b>Contact Details:</b>	
Name:	Gerd Unkelbach
Position:	Head of Fraunhofer CBP
Address:	Am Haupttor (Gate 12, Building 1251), 06237 Leuna, Germany
Phone:	+49 3461 43-9101
Email:	gerd.unkelbach@igb.fraunhofer.de
Website:	<a href="http://www.cbp.fraunhofer.de">www.cbp.fraunhofer.de</a>

<b>Name of the Research Institution:</b> Fraunhofer IMWS, Institute for Microstructure of Materials and Systems	
<b>Number of Researchers:</b> > 200 Employees	
<b>Type of Institution</b>	<b>Research Category</b>
<input type="checkbox"/> University <input checked="" type="checkbox"/> Research Institute <input type="checkbox"/> Research and Centers for Development, that are operated by industrial enterprises	<input type="checkbox"/> Basic Research <input checked="" type="checkbox"/> Industrial Research <input type="checkbox"/> Experimental Research
<b>Description of Main Competencies / Research Areas</b> (in headwords):	
<p>The Fraunhofer Institute for Microstructure of Materials and Systems IMWS is a methodologically oriented Fraunhofer Institute in the disciplines of materials science and materials engineering. The Fraunhofer IMWS is the contact for all questions by industry and contracting authorities concerning the microstructure of materials and systems - with the aim of increasing material efficiency and cost-effectiveness as well as saving resources. The work of Fraunhofer IMWS aims to identify faults and weaknesses in materials, components and systems on the micro- and nanoscale, to elucidate their causes and to offer solutions for the customer. The industrial clients of the institute are among others from microelectronics and microsystem technology, photovoltaics, plastics technology, chemical industry, power engineering, automotive engineering and aircraft construction.</p>	
<b>Relevant Thematic Innovation Priority/Research Field:</b>	
<input checked="" type="checkbox"/> Special and Fine chemicals <input checked="" type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input checked="" type="checkbox"/> Hydrogen economy <input checked="" type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<p><u>Micro-electronic:</u> Analysis of the characteristics of microelectronics and microsystem technology and thus increase the reliability and performance of, for example, computer chips and sensors.</p> <p><u>Plastics:</u> Exploring new potentials for the use of polymers - for example as light construction materials for the automotive and aviation industries, in efficient tires or as plastics from renewable raw materials.</p> <p><u>Surfaces:</u> This field of research regard several question: How well are materials of medical technology and biotechnology? How can cosmetic care products be improved? What can materials made from natural materials do?</p> <p><u>Photovoltaics:</u> Improving technologies from wafer production to module production and developing new materials to make photovoltaics more cost-effective, more efficient and more reliable with high levels of competences.</p> <p><u>Fluorescent materials:</u> Works on the latest generation of lighting technology and improve the reliability, efficiency and colour stability of LEDs.</p>	
<b>Contact Details:</b>	
Name: Prof. Dr. Ralf B. Wehrspohn Position: Head of Institute Address: Walter-Hülse-Str. 1, 06120 Halle (Saale) Phone: +49 345 5589-100 Email: ralf.b.wehrspohn@imws.fraunhofer.de Website: <a href="http://www.imws.fraunhofer.de">www.imws.fraunhofer.de</a>	

<b>Name of the Research Institution:</b> Fraunhofer Institute for Factory Operation and Automation IFF	
<b>Number of Researchers:</b> 176 (2014)	
<b>Type of Institution</b>	<b>Research Category</b>
<input type="checkbox"/> University <input checked="" type="checkbox"/> Research Institute <input type="checkbox"/> Research and Centers for Development, that are operated by industrial enterprises	<input type="checkbox"/> Basic Research <input checked="" type="checkbox"/> Industrial Research <input type="checkbox"/> Experimental Research
<b>Description of Main Competencies / Research Areas</b> (in headwords): <p>Technology partners for manufacturers, our researchers research and develop technologies, systems and products from the idea to the start of production – and implement them in practice collaboratively.</p> <p>Priority is given to new methods and technologies of digital engineering and their extensive use in the development, production and operation of products and manufacturing systems. This is the basis for the institute's development of innovative solutions in its fields of research: "smart work systems", "resource efficient production and logistics" and "convergent supply infrastructures" In the process, the researchers rely on their expertise in robotic, measurement and testing, process engineering in manufacturing and logistics, technology-based assistance and qualification.</p> <p>Their Business Units are:</p> <ul style="list-style-type: none"> <li>• Biosystems Engineering</li> <li>• Logistics and Factory Systems</li> <li>• Material Handling Engineering and Systems</li> <li>• Measurement and Testing Technology</li> <li>• Process and Plant Engineering</li> <li>• Robotic Systems</li> <li>• Virtual Engineering</li> <li>• Elbedome 2.0 Office</li> </ul>	
<b>Relevant Thematic Innovation Priority / Research Field:</b> <input type="checkbox"/> Special and Fine chemicals <input type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input type="checkbox"/> Cole-related chemical industry, CO <sub>2</sub> -economy <ul style="list-style-type: none"> <li>• Ressource efficient production and logistics</li> <li>• convergents infrastructures</li> <li>• Digital Engeneering and Industry 4.0</li> <li>• Smart Work Systems</li> </ul>	
<b>Contact Details:</b> Name: Univ.-Prof. Dr.-Ing. habil. Prof. E. h. Dr. h. c. mult. Michael Schenk Position: Head of the Institute Address: Sandtorstr. 22, 39106 Magdeburg, Phone: +49 391 4090-470 Email: michael.schenk@iff.fraunhofer.de Website: <b>www.iff.fraunhofer.de</b>	

<b>Name of the Research Institution:</b> Fraunhofer Pilot Plant Centre for Polymer Synthesis and Processing PAZ	
<b>Number of Researchers:</b> 30-50	
<b>Type of Institution</b>	<b>Research Category</b>
<input type="checkbox"/> University <input checked="" type="checkbox"/> Research Institute <input checked="" type="checkbox"/> Research and Centers for Development, that are operated by industrial enterprises	<input type="checkbox"/> Basic Research <input checked="" type="checkbox"/> Industrial Research <input type="checkbox"/> Experimental Research
<b>Description of Main Competencies / Research Areas (in headwords):</b>	
<p>For ten years, the Fraunhofer Pilot Plant Center for Polymer Synthesis and Processing PAZ, has operated in the ValuePark® Schkopau performing polymer synthesis and processing procedures on an industrial-orientated scale. The technical possibilities as well as the concentration of resources in both polymer synthesis and processing that can be found at the Pilot Plant Center offer unique selling points on the R&amp;D market. It is a joint initiative of the Fraunhofer Institute for Applied Polymer Research IAP in Potsdam-Golm and for Microstructures of Materials and Systems IMWS in Halle.</p>	
<b>Relevant Thematic Innovation Priority/Research Field:</b>	
<input type="checkbox"/> Special and Fine chemicals <input checked="" type="checkbox"/> New polymer materials <input type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<ul style="list-style-type: none"> <li>• polymer synthesis and processing</li> <li>• scale-up semi-industrial standards</li> <li>• the biggest non-industrial polymer synthesis facility in Europe</li> <li>• flexible synthesis plants</li> <li>• complete development chain: from material design to tested prototypical components</li> <li>• pre-serial production of components</li> <li>• improvement of efficiency with industrial-scale processes</li> <li>• replacement of oil based by nature based polymers</li> </ul>	
<b>Contact Details:</b>	
Name: Prof. Dr.-Ing. Michael Bartke Position: Director Address: Value Park A 74, 06258 Schkopau Phone: +49 3461 2598-120 Email: michael.bartke@iap.fraunhofer.de Website: <a href="http://www.polymer-pilotanlagen.de">www.polymer-pilotanlagen.de</a>	

<b>Name of the Research Institution:</b> Fraunhofer Research Centre for Silicon Photovoltaics CSP	
<b>Number of Researchers:</b> 68	
<b>Type of Institution</b>	<b>Research Category</b>
<input type="checkbox"/> University <input checked="" type="checkbox"/> Research Institute <input type="checkbox"/> Research and Centers for Development, that are operated by industrial enterprises	<input type="checkbox"/> Basic Research <input checked="" type="checkbox"/> Industrial Research <input checked="" type="checkbox"/> Experimental Research
<b>Description of Main Competencies / Research Areas</b> (in headwords): Fraunhofer CSP is working to provide alternative energy at the same price as conventional electricity. To achieve this, they bundle the know-how of two institutes in Halle (Saale): The Fraunhofer CSP advises and provides scientific know-how as well as technical high-tech equipment for services.	
<u>Technologies</u> <ul style="list-style-type: none"> <li>• Production of single crystals and multicrystalline ingots</li> <li>• Process for the production of glasses for up-conversion and down-conversion</li> <li>• Pilot line for the production of solar modules</li> </ul>	
<u>Evaluation, diagnostics, characterization</u> <ul style="list-style-type: none"> <li>• Fault and defect localization in solar cells and solar modules using optical, spectroscopic, thermal and electrical methods</li> <li>• Microstructure assessment of defects and materials by means of electron microscopy, chemical and electrical methods</li> <li>• Trace analysis of silicon materials, process and auxiliary materials</li> <li>• Characterization of solar modules according to IEC standards and accelerated tests</li> </ul>	
<b>Relevant Thematic Innovation Priority/Research Field:</b>	
<input type="checkbox"/> Special and Fine chemicals <input type="checkbox"/> New polymer materials <input type="checkbox"/> Bioeconomy <input checked="" type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<ul style="list-style-type: none"> <li>• PV recycling</li> <li>• Crystallization technology</li> <li>• Silicon wafer</li> <li>• Module technology</li> <li>• Reliability of solar modules and systems</li> <li>• Diagnostics of solar cells</li> </ul>	
<b>Contact Details:</b>	
Name: Prof. Dr. Ralf B. Wehrspohn Position: Director (Temporarily) Address: Walter-Hülse-Straße 1, 06120 Halle Phone: +49 (0) 345 5589-100 Email: ralf.b.wehrspohn@imws.fraunhofer.de Website: <a href="http://www.csp.fraunhofer.de">www.csp.fraunhofer.de</a>	

<b>Name of the Research Institution:</b> Max Planck Institute for Dynamics of Complex Technical Systems Magdeburg	
<b>Number of Researchers:</b> 240	
<b>Type of Institution</b>	<b>Research Category</b>
<input type="checkbox"/> University <input checked="" type="checkbox"/> Research Institute <input type="checkbox"/> Research and Centers for Development, that are operated by industrial enterprises	<input checked="" type="checkbox"/> Basic Research <input type="checkbox"/> Industrial Research <input type="checkbox"/> Experimental Research
<b>Description of Main Competencies / Research Areas</b> (in headwords):	
<p>At present 240 employees are working at the institute in Magdeburg. Their main research activities are focused on the analysis and optimization of highly complex processes in chemical and biological engineering, on questions of systems biology and systems theory, and their mathematical foundations, as well as on modern methods of computer simulation.</p> <p>The aim is to develop mathematical methods to control and optimize technical systems, to model complex processes in chemical and biological engineering, to analyze the foundations and the dynamics of chemical reaction and separation processes in order to design and optimize modern, efficient and sustainable processes.</p>	
<b>Relevant Thematic Innovation Priority/Research Field:</b>	
<input type="checkbox"/> Special and Fine chemicals <input type="checkbox"/> New polymer materials <input checked="" type="checkbox"/> Bioeconomy <input type="checkbox"/> Hydrogen economy <input type="checkbox"/> Coal-related chemical industry, CO <sub>2</sub> -economy	
<p>Current research projects focus, for example, on the following fields: design and operation of chemical reactors and energy converting processes, optimization of bioprocesses for manufacturing vaccines, improvement of processes capable of isolating and purifying fine chemicals and pharmaceuticals, in silico optimization and control of complex technical and bioprocesses, and analysis of molecular networks in biological systems. Applications cover:</p> <ul style="list-style-type: none"> <li>• the synthesis, analysis and control of chemical reactors and energy conversion processes</li> <li>• separation processes</li> <li>• the collection of thermodynamic and kinetic data</li> <li>• the design and optimization of bioprocesses</li> <li>• biomedical applications</li> <li>• the analysis of molecular networks in biological systems</li> </ul>	
<b>Contact Details:</b>	
Name:	Prof. Dr.-Ing. Kai Sundmacher
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Website:	<a href="http://www.mpi-magdeburg.mpg.de">www.mpi-magdeburg.mpg.de</a>

## 7. Bibliography

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Ministerium für Finanzen des Landes Sachsen-Anhalt: Operationelles Programm für den Europäischen Fonds für regionale Entwicklung (EFRE) des Landes Sachsen-Anhalt 2014 – 2020, Stand: 19.12.2014.

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