

# Report on the regional potential of Saxony (Germany)

## EMERGING INDUSTRIES

- Active Aging
- Sustainable Development / Green Economy
- Sustainable / Intelligent Mobility

## CROSS-CUTTING ISSUES

- Internationalization
- Technology & Knowledge Transfer
- Gender in Innovation, including diversity aspects

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| Partner organization: | <i>Saxony Economic Development Corporation</i> |
| Contact Person:       | <i>Lucia Bellora</i>                           |

## 1. Introduction

Saxony is a region situated in the Eastern part of Germany, at the borders to the Czech Republic and Poland. It has 4,05 million inhabitants (as at December 2012) and a GDP of 96,61 billion euros (in the year 2012), leading to a GDP per capita of roundabout 23,800 euros. 30,40% of the 2012 GDP is generated by exports.

One of the most peculiar characteristics of the Saxon economy is that it is based on a 93% share of small and medium sized enterprises (SMEs). This economic structure does not fully allow exploiting economies of scale and scope, thus hampering the innovativeness of firms. However, an active cluster policy carried out since 1999 allows alleviating this negative structural effect. Nevertheless, even if Saxony uses a set of proven and established instruments in cluster policy, there is a need for new cluster approaches that should be able to further promote the innovativeness and therefore the competitiveness of the Saxon SMEs. A stronger concentration on cross-industry and cross-border cooperation as well as on the strengthening of knowledge and technology transfer belongs to the core aspects of the new policies.

The traditional driving forces of the Saxon economy are the mechanical engineering and equipment as well as the mobility industry. In the last decades, some innovative industries came up as possible new cutting-edge areas. These are the microelectronics and ICT industry, the life sciences / biotechnology area, as well as the environmental and energy technology.

At the intersection of traditional and emerging industries, some promising areas are emerging. Thanks to the combination with mechanical engineering and equipment and with the mobility industry, microelectronics / ICT allows the development of intelligent production systems (factory 2.0) and intelligent mobility / logistics systems, respectively. A promising area at the crossing between life sciences / biotechnology and mechanical engineering and equipment is the area of health care technology, including innovative applications in the field of medical and pharmaceutical technology. Finally, the emerging industry of environmental and energy technology offers a variety of possible applications in the traditional areas of mechanical engineering and equipment as well as in the area of mobility. One prominent example of these applications can be seen in the light weight constructions area.

In all these industries, publicly or privately funded clusters can be found.<sup>1</sup> The mechanical engineering and equipment area offers numerous clusters, like for example AgroSax e.V. (an agricultural engineering cluster), ILS - Initiative Landtechnik Sachsen (one further agricultural engineering cluster), Gießereinetzwerk Leipzig e.V. (a foundry cluster), ICM - Institut Chemnitzer Maschinen- und Anlagenbau e.V. (a mechanical engineering and equipment cluster), IMPRO e.V. - Interessenverband Metall- und Präzisionstechnik Osterzgebirge e.V., (a precision technology cluster), Kompetenzzentrum Maschinenbau Chemnitz / Sachsen e.V. (a mechanical engineering and equipment cluster), MFD - Materialforschungsverbund Dresden e. V. (a material research cluster), Mechatronischer Maschinenbau (a mechatronics research and development cluster), POLYSAX Bildungszentrum Kunststoffe Bautzen e.V. (a plastics cluster), SACHSEN!TEXTIL (a textile cluster), INNtex e.V. - Innovation Netzwerk Textil e.V. (a textile cluster), and VEMAS - Verbundinitiative Maschinenbau Sachsen (a mechanical engineering and equipment cluster).

Similarly, in the area of mobility several clusters emerged in the last years, like for example AMZ - Automobilzulieferer Sachsen (an automotive cluster), AMZK - Automobilzulieferer Kunststofftechnik Sachsen (a cluster of automotive suppliers in the area of plastic technology), ASIS - Aerospace Initiative Saxony (an aerospace technology cluster), BTS - Verbundinitiative Bahntechnik Sachsen (a railway technology cluster), Netzwerk Logistik Leipzig-Halle e.V. (a logistics cluster).

The emerging industries show a small, but growing number of clusters and networks. In life sciences biosaxony e.V. (a life sciences cluster), HEALTHY SAXONY, a (a health care cluster), and VFG - Verein zur Förderung der Gesundheitswirtschaft in der Region Leipzig e.V. (a further health care cluster) are examples for these clusters and networks.

Cool Silicon (a cluster operating in the area of energy efficiency in microelectronics), OES e.V. - Organic Electronics Saxony e.V. (an organic electronics cluster), Nano-CC-UFS - Nanotechnologie-Kompetenzzentrum "Ultradünne funktionale Schichten" (a nanotechnology cluster), Nano for Production (one further nanotechnology cluster) as well as Silicon Saxony e.V. (microelectronics cluster) are examples for clusters and networks in the field of microelectronics / information and communication technology.

Finally, the emerging industry of environmental and energy technology is represented by several networks and clusters like for example BDZ e.V. - Bildungs- und

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<sup>1</sup> The clusters and networks mentioned reflect the situation as at July 2013. We do not claim to provide a complete overview of clusters and networks in Saxony. We rather restrict ourselves on providing examples.

Demonstrationszentrum für dezentrale Abwasserbehandlung (a sewage water treatment cluster), EESA - Erneuerbare Energien Sachsen (a renewable energy cluster), Energy Saxony (an energy technology cluster), GKZ - Geokompetenzzentrum Freiberg e.V. (a civil engineering geology cluster), Netzwerk Energie & Umwelt e. V.- (an energy and environment cluster) as well as Saxutec e.V. - Sächsischer Verein für internationalen Umweltschutz und Umwelttechnik (an environmental technology cluster).

Most of the above mentioned clusters, both from traditional and from emerging industries, have members from research and development institutions, thus facilitating the transfer of knowledge and technology. The Saxon research and development landscape encompasses highly excellent universities, but also numerous (industrial) research institutes that develop cutting-edge solutions for future markets.

## **2. Emerging industries**

The Central Europe project CluStrat provided the opportunity to analyze the level of development and the potentials of the three emerging industries the project consortium has agreed on as subject of analysis, i.e. “active aging”, “green economy / sustainable development”, and “sustainable / intelligent mobility”. Each of the next three sections addresses one of these industries from the Saxon perspective.

### **3.1 Active aging**

“Active aging” is an emerging industry with a high relevance for Saxony. The specific branches that are of particular importance to Saxony in this field are:

- biotechnology, especially core (red) biotech, diagnostics, and environmental biotechnology;
- pharmaceutical industry;
- medical technology, especially lab and measurement technology, diagnostics, equipment for doctor’s offices, hospitals, and rehab clinics;
- plant construction for the medical equipment industry;
- related areas at the intersections to the machinery and plant engineering industry as well as to the information and communication technology industry and to the field of micro-technology;
- related services.

Saxony has a particularly strong research competence in the different above mentioned fields. The knowledge and technology transfer offers vast opportunities.

The clusters and networks in the “active aging” area operate in a development stage that requires increased cooperation with transnational partners in order to mutually profit from market opportunities and to allow the transfer of knowledge and technology among the partners. Therefore, there is a need for further fostering the systematic, continuous, and iterative search for ad-hoc cooperation with transnational partners in order to fill the missing links in the value chains and to identify the future market demand. Especially the field of medical technology could be one area considered more in detail during the CluStrat project.

### **3.2 Green economy / sustainable development**

“Green economy / sustainable development” is an emerging industry that plays a primary role in the Saxon economy. The specific branches that are of particular importance to Saxony in this field are:

- power generation, especially solar industry, wind energy, geothermal energy, and biomass;
- energy storage;
- energy efficiency technology;
- recycling management, water and wastewater technology, especially mine rehabilitation, recycling, water and wastewater management;
- light weight constructions;
- related areas at the intersections with the automotive, railway, aerospace, and building industry;
- related service providers, especially planning, consulting, measurement technology, and analytics.

The light weight constructions field is one of the areas with the highest R&D capacity and the highest potentials for cross-fertilization. In this area, there is a need for strengthening the ongoing dialogue between different regional and transnational stakeholders from research and practice in order to identify further emerging application fields and new knowledge and technology transfer opportunities. The light weight constructions could be therefore in the focus of the CluStrat project.

### **3.3 Sustainable / intelligent mobility**

“Sustainable / intelligent mobility” is an emerging industry that plays a primary role in the Saxon economy. The specific branches that are of particular importance to Saxony in this field are:

- logistics, especially transportation / warehousing, manufacturers of transportation vehicles, mail order companies;
- automotive, railway, and aerospace industry;
- light weight constructions for the application areas of the automotive, railway, and aerospace industry;
- electric mobility;
- related services.

As already mentioned, the light weight constructions field is one of the areas with the highest R&D capacity and the highest potentials for cross-fertilization.

Mobility in general and logistics in particular are a promising field for transnational integration and for the joint transnational development of competences.

Both logistics and light weight constructions could be subject to consideration during the CluStrat project. A regular networking with cross-border partners in these fields should allow identifying thematic fields for a long-term cooperation.

## **3. Cross-cutting issues**

CluStrat provided the opportunity to analyze the level of development and the potentials of the three cross-cutting issues the project consortium has agreed on as subject of analysis, i.e. “gender in innovation, including diversity aspects”, “internationalization”, and “knowledge and technology transfer”. Each of the next three sections addresses one of these issues from the Saxon perspective.

### **3.1 Gender in innovation, including diversity aspects**

The gender issue is recognized in the Saxon region. The main focus lies in the facilitation of the career entrance and the following career by women. Related measures are systematically implemented both in the public and in the private sector, leading to above-average women employment rates in Saxony. Gender is also an issue taken systematically into account for several types of public products or services offered in Saxony. The private industry sectors,

however, is mostly based on B2B-relations, i.e. the gender issue is not so much in the focus as it would be for more end-consumer-oriented economies.

Since several years, the City of Dresden implements a gender mainstreaming approach that can be considered as a best practice. This approach has been summarized and presented through various documents. Therefore, it guarantees a good transferability of results to other institutions, like for example cluster organizations. The City of Dresden developed a so-called gender-check. This is a precise checklist including the description of a process to ascertain that each project carried out by the City of Dresden identifies the gender-relevant effects and implements adequate measures to minimize differences in conditions for women and men as users of public goods.

### **3.2 Internationalization**

Internationalization is one of the key cross-sectoral issues for Saxony. Due to the predominance of SMEs enterprises in the Saxon economy, there is a strong and widely perceived need to achieve growth by selling products and services abroad and by cooperating with foreign partners in order to overcome the already mentioned lack of economies of scale and scope. Especially the proximity to the Czech Republic and to Poland encourages cross-border cooperation.

The Free State of Saxony provides a good internationalization support to single firms and clusters. From the point of view of the available instruments, there is a very efficient structure in place. Thanks to the AWIS (Außenwirtschaftsinitiative Sachsen, i.e. the Foreign Trade Initiative of Saxony, whose members are the Saxon Chambers of Crafts, the Saxon Chambers of Industry and Trade, the Saxon Ministry for Environment and Agriculture, the Saxon Ministry for Economic Affairs, Labour and Transport, the Saxon State Chancellery, the Association of the Saxon Economy, and the Saxon Economic Development Coordination), precise guidelines define and coordinate for all foreign trade actors the policy and activities for Saxony (e.g. target markets, target industries). From the point of view of the funding, the Sächsische Aufbaubank (Development Bank of Saxony) provides various funding opportunities, especially for the participation to trade fairs abroad.

The cooperation with actors abroad can be fulfilled on the firm or on the cluster level. A best practice example on cluster level in Saxony is provided by the Silicon Saxony that cooperates with the “Point-One” cluster, centered around Eindhoven (Netherlands), the “Minalogic” cluster, centered around Grenoble (France), and the “DSP Valley” cluster, centered around Leuven (Belgium) to join knowledge and capabilities in order to generate innovative solutions

in the area of energy efficient ICT. They do not intend to build a meta-cluster but rather to build a thematic alliance around the emerging issue of energy efficient ICT. The goal of Silicon Europe is to secure Europe its position as the world's leading center for energy efficient electronics. To achieve this goal, the clusters pursue three objectives: (1) promotion of micro- and nanoelectronics as Key Enabling Technology for the traditional industry, unlocking new solutions for the major societal challenge on energy efficiency; (2) securing the knowledge available in the clusters; (3) opening up new markets and boosting competitiveness especially of SMEs by improving innovation and technology transfer from research to market, and by developing an internationalization strategy inside and outside Europe. The involved clusters will jointly implement an entire value chain for different micro- and nanotechnology application fields.

Beside the above described, positive conditions, there is still an improvable export rate in Saxons firms. Therefore, the thematic ad-hoc partnerships that have been argued for already in the section on the emerging industries have to be designed under these premises as cross-border networks and partnerships. As a consequence, the cross-cutting issue of internationalization should be in the focus of CluStrat. Suitable instruments are B2B-meetings, fora, workshops and other instruments that are implemented to inform potential internationalization actors, bring potential partners together and allow the identification of joint themes.

### **3.3 Knowledge and technology transfer**

Knowledge and technology transfer is a further major issue for Saxon firms. There are three major peculiarities for the knowledge and technology transfer landscape in Saxony. First, there are numerous players in the area (e.g. transfer institutions, clusters, regional development agencies, Chambers of Industry and Trade, Development Bank). Second, Saxony shows an outstanding research landscape, i.e. very solid offers in terms of knowledge and technology that could be transferred into practice. However, at the same time, there is a limited capacity of the firms in Saxony to absorb the knowledge and technology transferrable. This is due to the fact that our economic landscape is primarily based on SMEs firms that usually do not have the necessary capacity in their R&D departments to look for new opportunities arising from research results. Third, based on the experience in the former German Democratic Republic, Saxony locates numerous useful industrial research institutes, i.e. application-oriented research institutes. These are usually highly motivated to cooperate with firms on concrete issues to be solved (including feasibility studies, etc.).

Clusters and networks are highly related to the issue of knowledge and technology transfer. How this relation can be designed is shown by a best practice case. A team of researchers began its basic research into organic electronics in the Nineties at the Technical University of Dresden. Applied research was then undertaken by the Fraunhofer Institute for Photonic Microsystems, with a number of successful start-ups emerging from this line of research in and around Dresden in recent years. The researchers succeeded in adapting organic semiconductors for use in a wide range of products, thereby creating the basis for innovative applications in displays, lighting, and photovoltaic. This development was also the basis for the creation of Europe's most important cluster for the development of organic semiconductors, Organic Electronics Saxony e.V. (OES). This cluster now covers the entire value chain of organic electronics, from basic research to its numerous applications.

Partnership with firms and clusters abroad are usually, implicitly or explicitly, an instrument of knowledge and technology transfer.

#### **4. Conclusions for pilot development**

The emerging industry of "active aging" profits in Saxony already from a good starting position. However, there are still parts of the value chains that are missed as well as chances to increase the competitiveness of the players. The missing links and competences in the value chains can only be gained by enhancing the cooperation with proper partner regions and their clusters and firms.

Based on the industry structure, the Karlovy Vary Region (represented by PP4 in the project) could be a suitable partner. The integration of the activities of the Karlovy Vary and Saxon region could be triggered by a forum as the basis to define a path for a thematic cooperation. Cluster and network members from research institutions of both regions should be involved in order to safeguard the ongoing identification of emerging issues and future market demand. In particular, this cooperation could happen along the value chain, i.e. having partners from Saxony offering medical technology and knowledge that could help the Karlovy Vary region presenting themselves in a more competitive way on the market for spa products and services.

Therewith, the measures would address both the internationalization and the knowledge and technology transfer with the aim to increase the performance of the addressed emerging industry clusters and networks.

The area of light weight constructions is an area in an advanced research stage characterized by a wide range of potential applications across different traditional industries. Thus, the

dialogue between different players from research and practice should be enhanced in order to identify further emerging application fields. Dealing with the light weight constructions field would offer the opportunity to cover two of the three emerging industries in focus (“sustainable development / green economy” and “sustainable / intelligent mobility”). Based on our experience gained in several expert workshops, Clusterland Upper Austria Ltd. (PP2 in the project) could represent a proper partner for the cooperation since it offers a comparable stage of development in the light weight constructions industry. The transnational cooperation should pursue the goal to identify new knowledge and technology transfer opportunities as well as cross-fertilization possibilities on the basis of a regular exchange of experiences. This exchange of experiences requires regular mutual trade missions as well as B2B matchmaking events. Therewith, the measures address both the internationalization and the knowledge and technology transfer with the aim to increase the performance of the addressed emerging industry clusters and networks.

The area of mobility in general and of logistics in particular is a further promising field for the transnational integration and for the joint transnational development of competences. Based on the experiences gained through a bilateral CluStrat expert workshop, the Polish partners (represented by PP13 in the project’s pilot actions) have good prerequisites to be our partners in mediating cooperation between relevant clusters and networks in our regions. Systematic, regular, mutual and / or joint trade missions and proper matchmaking events are measures that enable the transnational integration of the activities of Saxon and Polish clusters and networks. Therewith, the measures address the internationalization of networks and clusters with the aim to increase the performance of the emerging industries.

All the above mentioned proposals have to be implemented at the level of concrete firms participating to the different offered events or measures. Clusters and networks are important partners, since they are mediators between firms in Saxony and firms in other regions. However, the concrete benefit should already be tangible at the level of the single firm.