Environmental Data

2018

STAATSMINISTERIUM
FÜR UMWELT UND
LANDWIRTSCHAFT

Freistaat
SACHSEN

Contents

Preface

This annual environmental data brochure provides information on major environment-related subjects in Saxony such as energy, climate protection, soil, air, nature, as well as circular economy and environmental industry. The main emphasis of this year's brochure is placed on climate and nature conservation issues.

The continuous rise in average temperatures, the changes in snow and rainfalls, and the increasing occurrences of extreme weather events are clear signs of the climate change in Saxony. The related changes have far-reaching consequences for the environment, society and economy. In the light of the long dry period in 2018 with its resultant damages and nuisances, and despite the many climate change mitigation and adaptation steps taken by the Saxon state government, we see a still growing need for action, especially in terms of communication of knowledge to the public. The climate data plays a major part in this.

Another focus of the 2018 environmental data brochure lies on indicators in the fields of nature conservation and biodiversity. Safeguarding the variety of species is among the major challenges faced by the Free State of Saxony. Extensive preservation measures and conservative agricultural practices help endangered species recover or redevelop. Large-size conservation areas such as the nature and natural parks as well as the biosphere reserve are of special importance for this purpose, because they form the core areas of biodiversity protection in Saxony. Also, they fulfil critical social functions by maintaining landscapes and preserving cultural heritage.

The environmental data shows that the environmental situation in the Free State of Saxony has significantly improved in many areas since the beginning of the 1990s. Further challenges lie ahead of us, which we will continue to address and manage together with all of our citizens. Latest and further information on environmental protection issues can be found on the Internet at **www.umwelt.sachsen.de.**

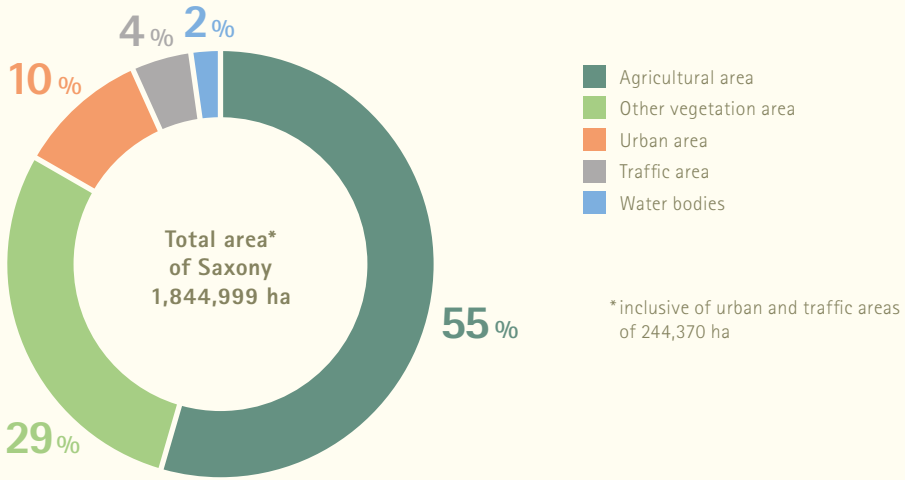
Thomas Schmidt
Saxon State Minister
for the Environment and Agriculture

Land use

Land use in Saxony is subject to dynamic change. This chart shows the situation in 2016, broken down by main types of land use. Agriculture is the dominating use, taking up 55 per cent of the territory. However, there is a continued downward trend in agricultural lands while urban and traffic areas tend to grow. The Free State of Saxony endeavours to reduce this way of new land consumption.

Important: Land uses as of 2016 cannot be compared with those from the past because of changes in the data basis, in the methodology for the calculation of each of the types of land use and in the geometries of the areas.

Land use in Saxony

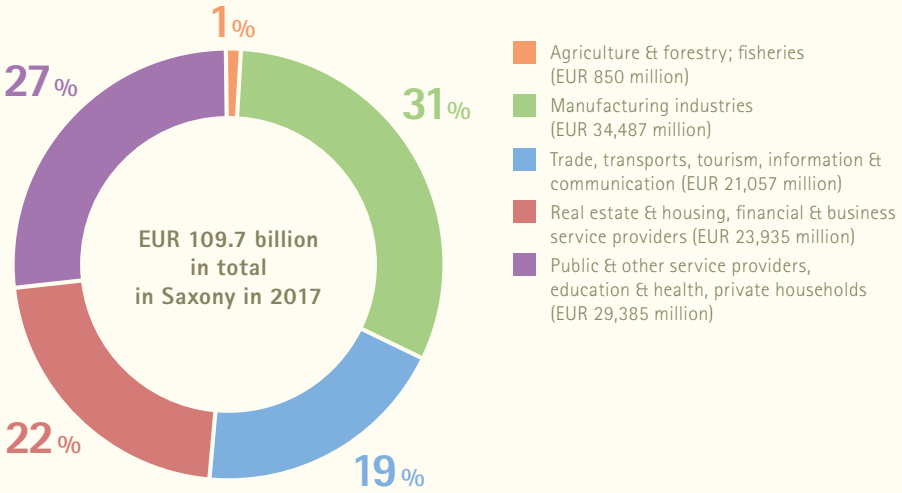


Source: Saxon State Office for the Environment, Agriculture and Geology (LfULG); based on the Statistical Office of the Free State of Saxony

Economic structure

Saxony is a modern and export-oriented industrial economy marked by the services sector and a comparatively strong manufacturing sector. Sunrise industries such as the environmental industry or information and communications technology play an important part for the economic development. The highly performing agriculture & forestry sector accounts for 0.8 per cent of the total gross value added. This presentation does not reflect its upstream and downstream importance, nor its significance for services of general interest.

Gross value added by economic sectors in Saxony

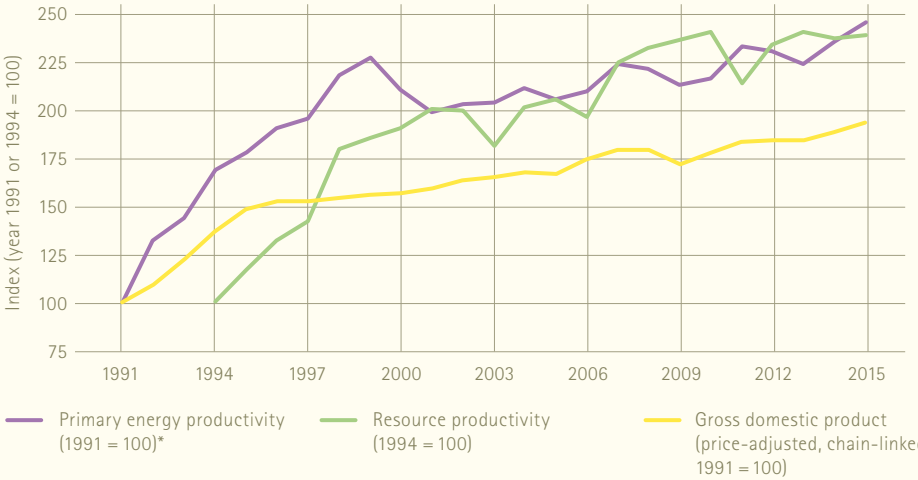


Source: Working Group "Regional Accounts" as of August 2017/February 2018

Productivities

Productivity indicators can be calculated for each resource by putting the resource consumption or energy consumptions in relation to the gross domestic product. The higher the indicator values, the lower the resource input required to achieve the economic performance. The Saxon economy is more and more successful in decoupling economic growth from resource consumption. Both the energy productivity and the resource productivity values showed a significantly higher growth than the gross domestic product. The productivity indicators achieved increases that are partly well above the federal German average. This leads to efficiency gains having a positive impact on the economic potential and the environmental situation in general.

Economic performance and productivities



* 2015: preliminary

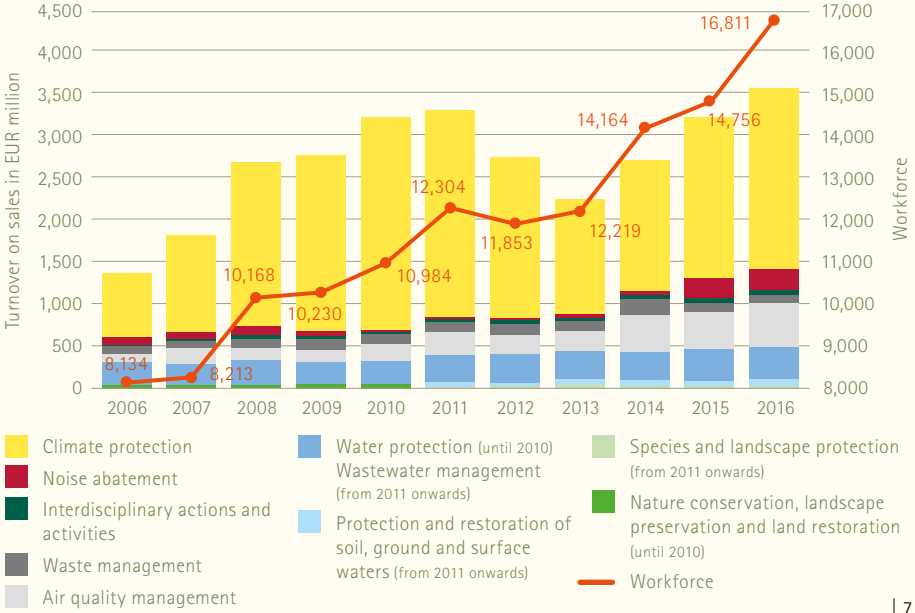
Source: Green Economy Regional Accounts – as of spring 2018, General Regional Accounts – as of November 2017/February 2018

Environmental sector

The environmental sector in Saxony has grown during the past few years to become a solid pillar of the Saxon economy as a whole, employing meanwhile almost 17,000 persons. Most segments in the environmental sector show a sustained positive trend in sales and employment. However, between 2012 and 2014, this trend was overlapped by the sales decrease in climate protection, which is the largest segment of the environmental sector. In 2015, sales volumes started to grow again also for this segment.

Source: Statistical Office of the Free State of Saxony

Workforce & sales volumes in the environmental sector

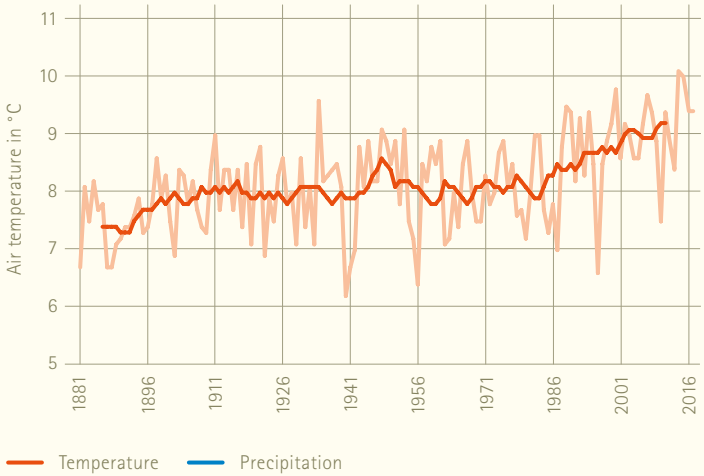


Climate trends in Saxony

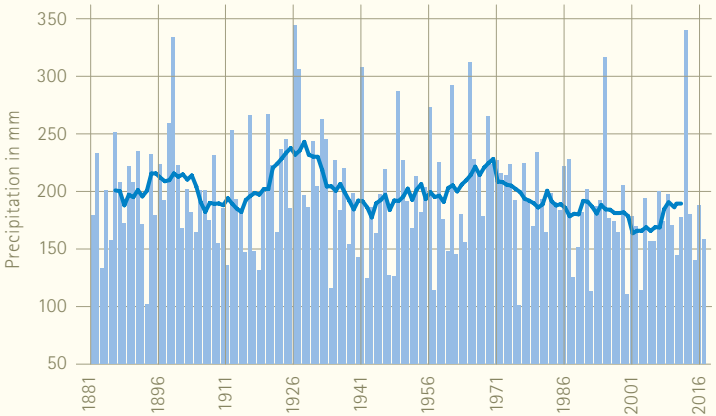
The charts show the annual mean air temperatures and precipitation totals for vegetation period I (April to June) in Saxony during the period from 1881 to 2017. The 11-year running average allows better illustration of the long-term trend as it is less dependent on year-to-year variations. The air temperature over time curve is a highly suitable form of representation of the climate change. Higher temperatures lead e.g. to longer growth periods and more frequent occurrences of weather extremes (e.g. heat waves, droughts) with associated risks. From 1971 to 2010, every decade was warmer than the decade before, and the past two decades saw a striking accumulation of warmest years in Saxony. The year 2017, although cooler than the record years of 2014 and 2015 due to local weather conditions, is among the 10 warmest years since the first measurements in 1881.

Precipitation over time is rather heterogeneous both in space and time, compared with the temperature graph. Lower precipitation volumes in vegetation period I slow down the growth of plants and increase the risk of crop loss. This has a growing impact e.g. on agriculture, especially in conjunction with rising temperatures. From 1971 until 2010, every decade was drier than the one before. Saxon farmers can rely on better water management strategies for adaptation to these changing conditions. Such strategies include the selection of appropriate varieties or field crops, adapted soil cultivation and fertilisation methods, and irrigation in certain crops, as well as crop rotations.

Annual mean temperature in Saxony, 1881 – 2017
(11-year running average)



Precipitation in vegetation period I (April to June) in Saxony, 1881–2017 (11-year running average)

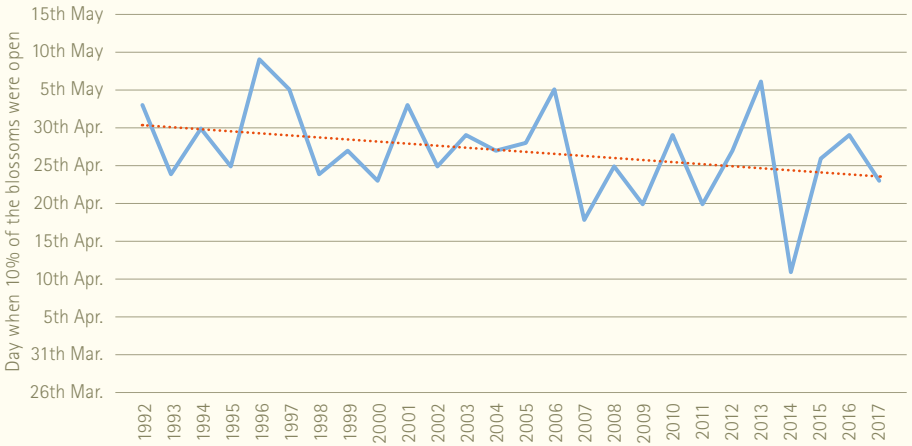


Source: LfULG, German Weather Service (DWD) – as of 2018

Start of fruit-tree flowering season

The start of the fruit-tree flowering period is marked by the day on which approximately 10% of all blossoms are open. The chart is based on the average calculated from all considered fruit varieties. The start of flowering is also the start of fruit development and thus the critical vegetation phase in fruit growing. The flowering date is indicative of the climate change. The data shown in this brochure shows a slight trend towards earlier blossoms and thus towards a longer vegetation period. This trend means a general improvement in the cultivation potentials of thermophilic plants. In spite of earlier flowering, exposure to late frost damage is the same, because statistics show a similar shift towards earlier occurrence of late frost events.

Average apple flowering date in Dresden-Pillnitz between 1992 and 2017

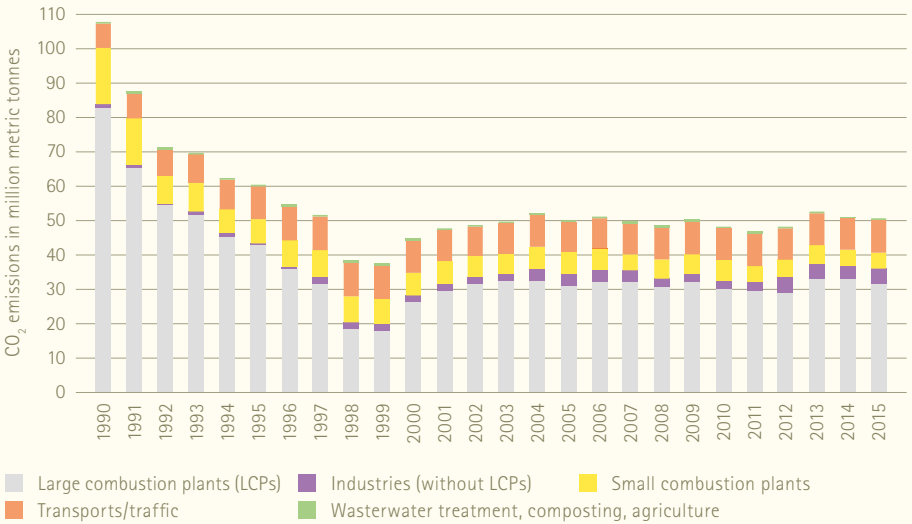


Source: Saxon State Office for the Environment, Agriculture and Geology (LfULG)

CO_2 emissions

Carbon dioxide emissions contribute to more than 90% of total greenhouse gases, which accumulate in the atmosphere and thus accelerate the climate change process. Large combustion plants (large-sized industrial facilities for power and heat generation) are the main emitters of CO_2. The shutdown of many plants contributed to the downward trend recorded in the 1990s. The increase at the beginning of the 2000s is due to the commissioning of new power plant blocks. Since 2002, carbon dioxide emissions have reached stable levels.

CO_2 emissions in Saxony between 1990 and 2015



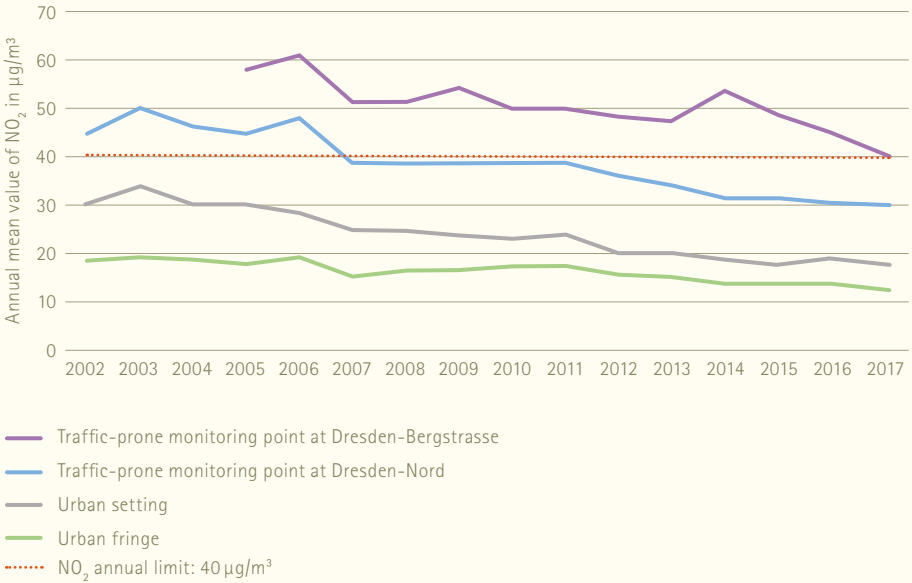
Source: LfULG

Air pollutants – impacts

Air quality assessments are made on the basis of recordings from measuring locations in different settings. The chart indicates the nitrogen dioxide (NO_2) levels in the agglomeration of Dresden. Highest concentrations are recorded in traffic-prone monitoring points – depending on the given traffic load. There are falling NO_2 levels in urban areas away from the main roads. The lowest levels were found at the urban fringe and in rural areas. On a whole, air pollutant loads have decreased gradually over the past 15 years. In 2017, the NO_2 annual mean limit value was met for the first time in all monitoring points across Saxony.

Source: LfULG

Impact of air pollutants in Saxony

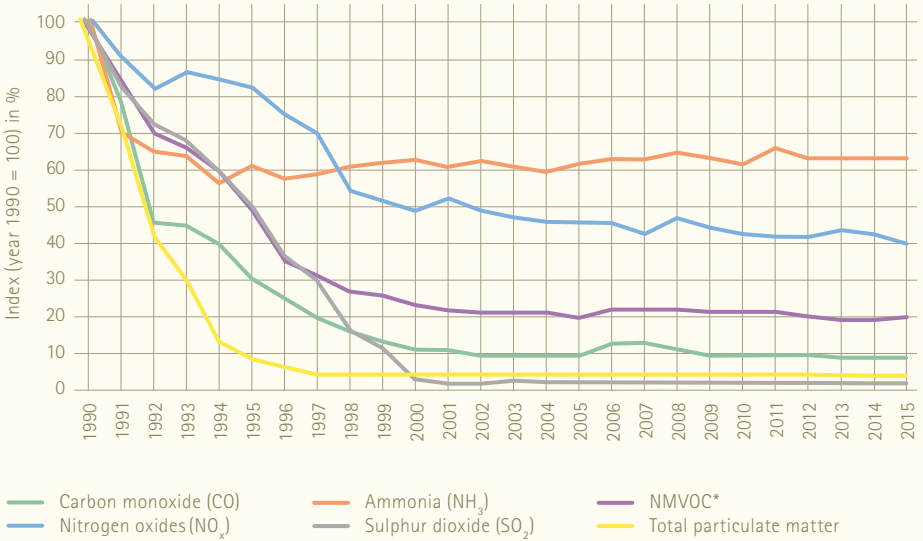


Air pollutants – emissions

Air pollutants can trigger a variety of negative impacts on human health and environment. Air pollutant emissions in Saxony have dropped considerably since 1990. This is mainly due to the restructuring of the east German economic landscape during the 1990s. Relevant reductions have no longer been observed over the past few years. The levels of emission of ammonia and nitrogen oxides are still high.

Source: LfULG

Air pollutant emissions in Saxony

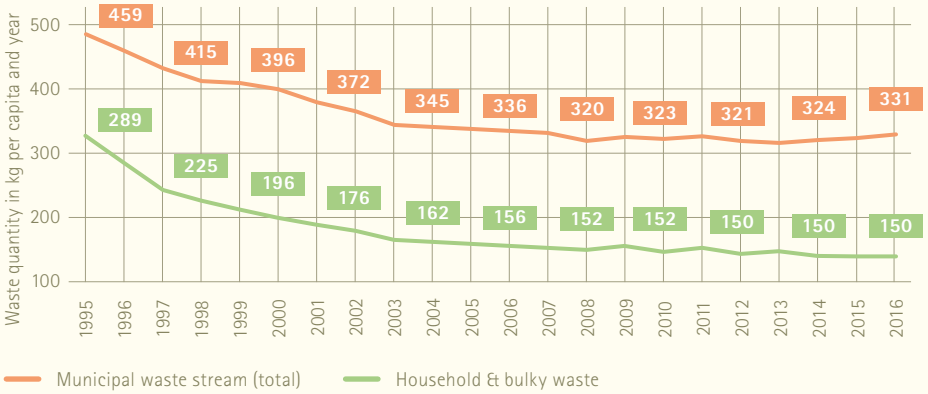


* non-methane volatile organic compounds

Municipal waste

Household goods for private consumption are produced by the use of energy and resources and discarded at the end of their service lives. The municipal waste stream and the collected quantities of household & bulky waste show a downward trend throughout the period under review and almost constant levels during the past ten years. This is based on a variety of contributing factors, such as low-waste consumption, further use of second-hand goods, as well as waste collection and fee systems following the cost-by-cause principle. The slight increase in municipal waste from households during the past three years is mainly due to the improved selective collection of biowaste.

Per-capita municipal waste stream from private housholds

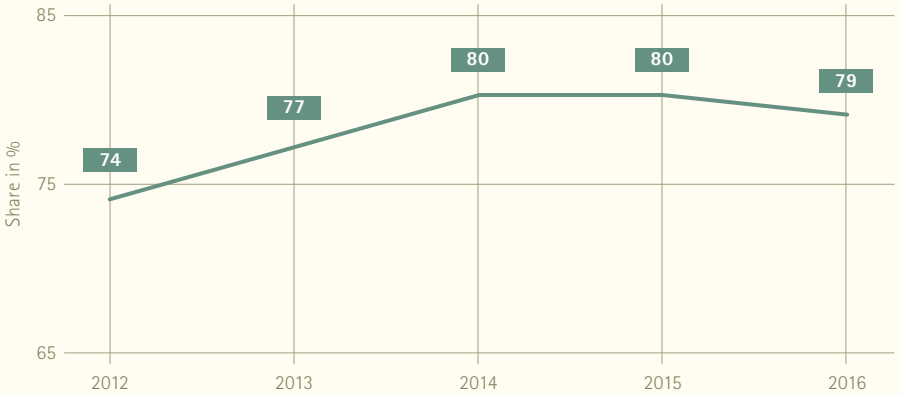


Source: LfULG

Municipal waste

Most of the household waste in Saxony is recovered. The major part of the separately collected paper, glass, plastic, and biological wastes are recovered by recycling. Other waste such as bulky wood is converted to energy in waste-to-energy (WtE) plants. The ratio of municipal waste recovered for recycling and WtE was 79% in 2016.

Recovered municipal waste from households in Saxony



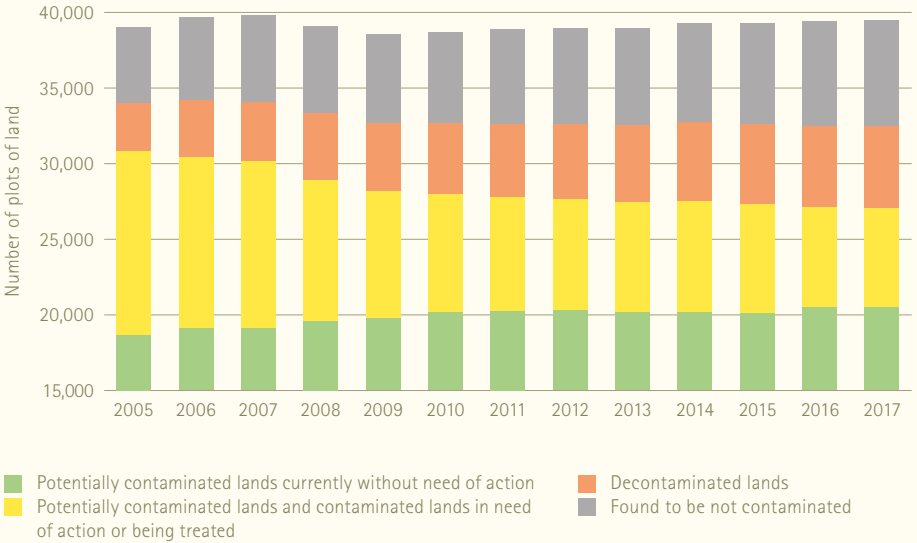
Source: LfULG

Number and percentage of decontaminated lands

The Saxon Registry of Contaminated Sites contains 28,427 sites covering 39,513 lands. The total number of lands has remained unchanged over the past few years. Continuous investigations are performed to either confirm the assumed contamination or to prove the absence of contamination depending on a given land use. Lands showing low contamination levels remain in the registry, but there is no need of action in the light of the current use of the site. The progress made in decontamination can be seen from the increasing number of decontaminated lands. On the other hand, there is an equivalent continuous reduction in the number of lands on which further measures (exploration or decontamination) are required or already under way.

Source: LfULG

Lands recorded in the Saxon Registry of Contaminated Sites

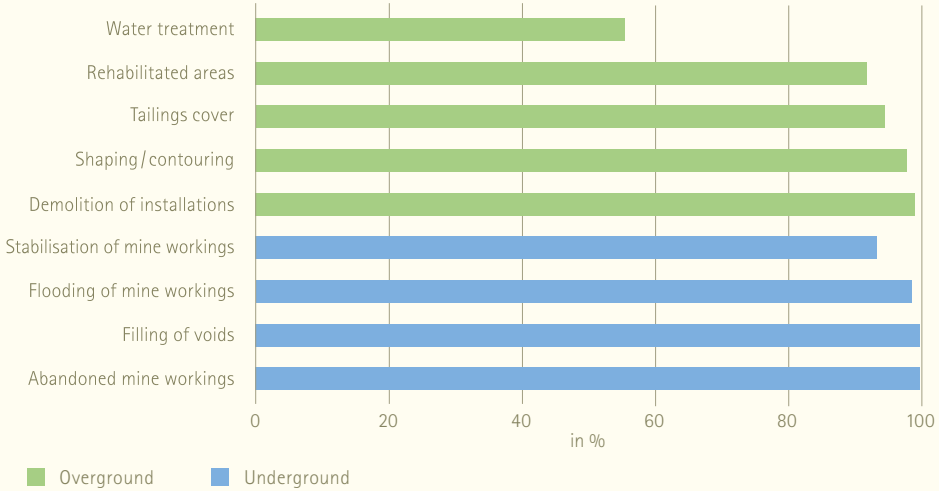


Mining impacts

The uranium mining-site rehabilitation programme is a huge task. Uranium ore was extracted in various regions in Saxony until the early 1990s, causing increased radiation exposures in certain regions. Rehabilitation by Wismut GmbH has made good progress. More than 90% of the overground and underground rehabilitation measures have been completed. Water treatment in all Wismut sites will take a long time until final completion. Rehabilitated dumps and settling facilities will be monitored in the long run.

Source: Wismut GmbH – as of 2017

Status of uranium mine rehabilitation at the sites of Wismut GmbH in Saxony*



* as referred to the sites under the control of Wismut GmbH in Saxony

Nature conservation

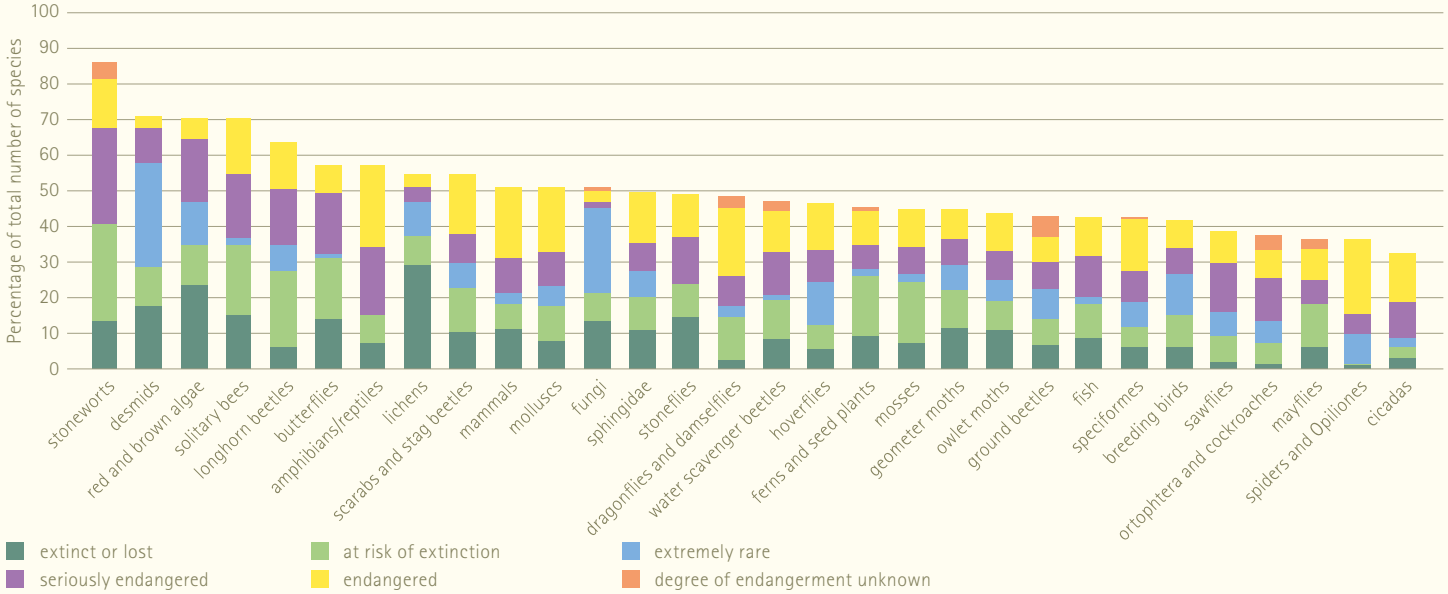
Saxony is rich in animal and plant life. There are natural occurrences of approximately 30,000 animal species, 6,500 fungal and lichen species, and 3,300 plant species including higher algae (excluding introduced species and micro-organisms). Their habitat conditions are impaired by various factors so that many species are endangered, threatened with extinction, or extinct. Various groups of algae, solitary bees, longhorn beetles, butterflies as well as amphibians and reptiles are especially endangered.

On the other hand, we see positive developments such as the first proven occurrences of the Alcathoe bat or the sighting of species such as the wildcat and the occurrence of the plant species downy woundwort, blue hair grass and rubus constrictus (blackberry). Furthermore, the quality of many watercourses has improved over the past few years allowing more demanding species to colonize rivers and streams. Thanks to the improved air quality, epiphytic moss and lichen species were able to recolonize and spread in the country.

Climate change is an additional factor for changes in fauna and flora. Certain thermophilic species can benefit from the climate change and become established or spread in the Saxon territories. The higher number of extreme weather events (e.g. long drought periods and heavy rainfalls) accompanying the climate change, on the other hand, represents an additional threat to other species.

Source: LfULG

Degree of endangerment of indigenous animal and plant species in Saxony (selected groups of species)

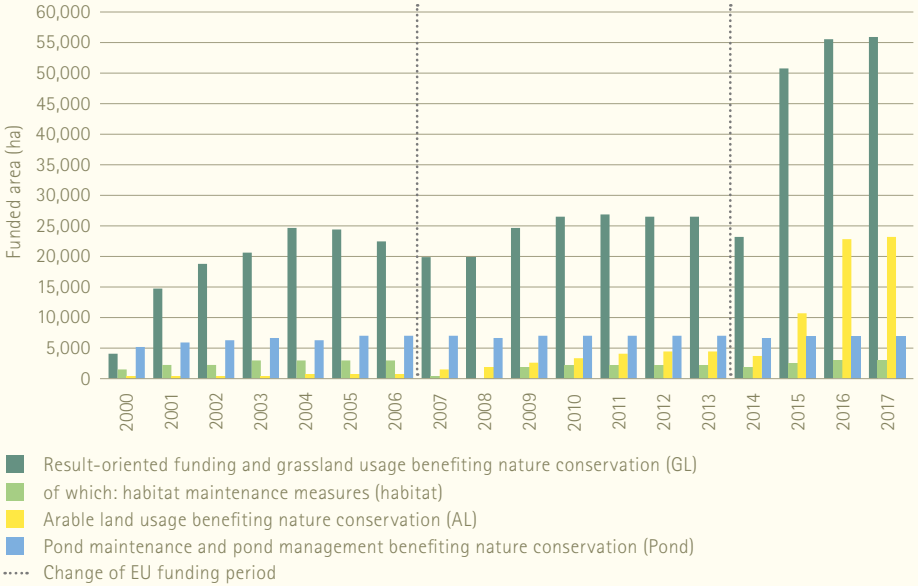


Conservative agriculture

The Free State of Saxony supports manifold measures and specific management methods on agricultural lands to meet nature conservation and landscape preservation requirements. One of many examples is the introduction of nature conservation measures on arable lands (e.g. areas or strips of set-aside land), which are highly important for habitat linkage and wildlife corridors and often form buffer zone elements with adjacent habitats. Saxony's agriculture thus is an indispensable partner in nature conservation and preservation of landscapes.

Source: LfULG

Area-related nature conservation measures

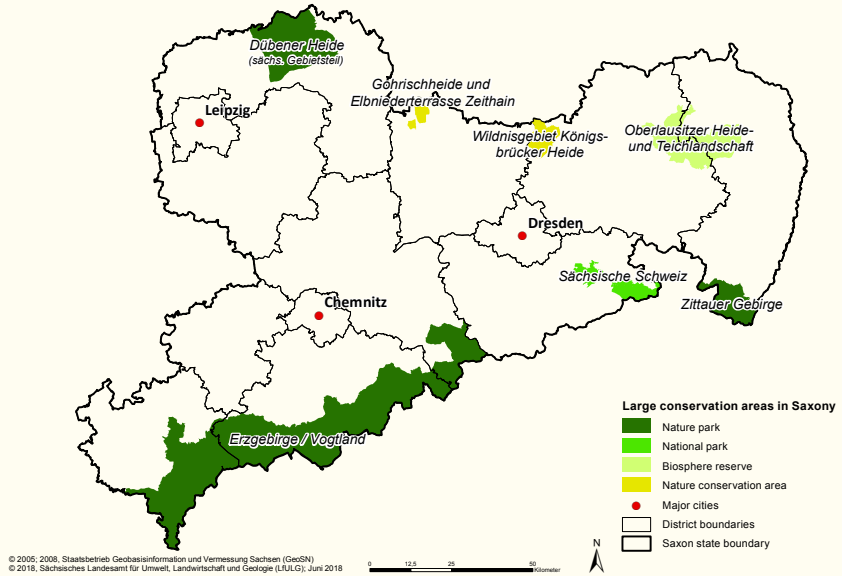


Large conservation areas

The map shows Saxony's large conservation areas (national park, nature park and biosphere reserve) and two large-size nature conservation areas under protective administration by the Saxon state government. The typical feature of those areas is that they cover a wide coherent space and have the character of a nature conservation or landscape protection area. They can be used for tourism or economic purposes, depending on their specific category. Large conservation areas are intended to protect and develop near-natural landscapes or cultural landscapes with manifold land uses while maintaining the diversity of species and habitats.

Source: LfULG

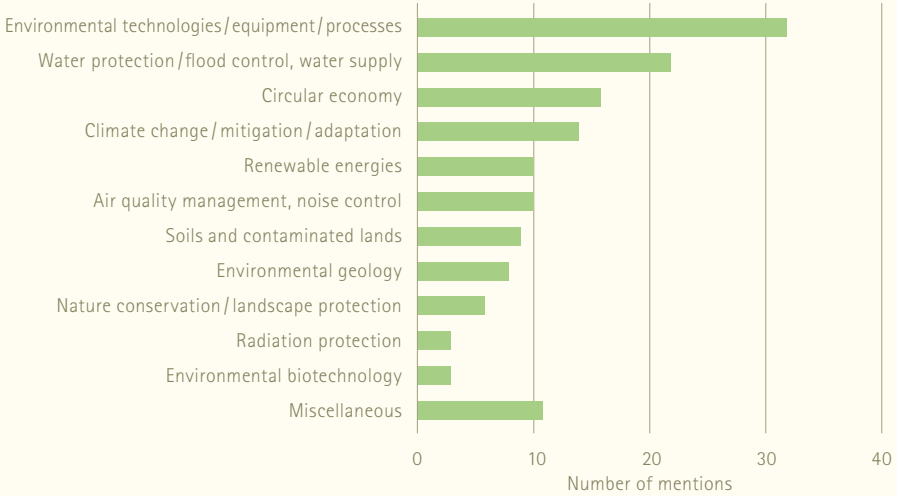
Location of large conservation areas



Environmental research

Saxony has a a wide variety of environmental research institutions. More than 50 entities such as universities, institutions of higher education, other public research facilities, and companies or networks are active in the various fields of environmental research. The research activities of said institutions or companies are focused on almost all urgent environmental issues. The main focus lies on the subject areas "water protection/ flood control, water supply", "circular economy" and "climate". A special priority of environmental research in Saxony is the development of innovative environment-related processes and technologies.

Main research topics



Source: Wirtschaftsförderung Sachsen GmbH, Brochure "Environmental Research in Saxony"

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