Environmental Data

2019

STAATSMINISTERIUM
FÜR UMWELT UND
LANDWIRTSCHAFT

Freistaat
SACHSEN

Inhalt

Introduction

The environmental data brochure is published on an annual basis since 2010. It provides information on environment-related subjects such as energy, climate protection, soils, air, nature, as well as circular economy and environmental industries. One focus of this year's brochure is again placed on the impacts of climate change, because drought, extreme weather and pest infestation imply a multitude of challenges for agriculture and forestry, as well for the water sector. Rainfall shortage and high temperatures have caused significant crop losses, especially on the mainly sandy soils in the north and east of Saxony. Using scientific findings and research results is an important prerequisite for adapting the management of agricultural areas to the repercussions of climate change.

Storms, snow damage and droughts have caused a large amount of fallen timber in our forests. The high volume of fallen timber and the drought period resulted in a bark beetle calamity that is unprecedented in forestry history. The forest condition has significantly worsened and dropped to levels last seen in the early 1990s. Damage removal and forest restoration activities are a huge task for public authorities and forest owners.

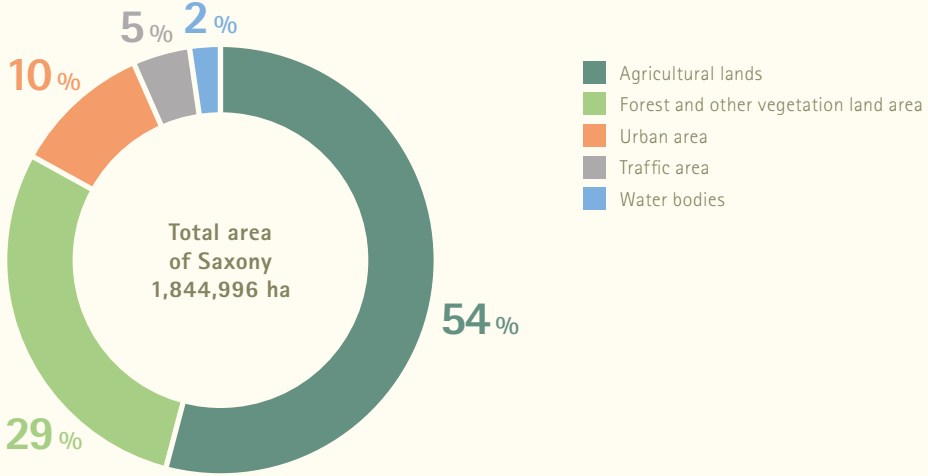
The reduction of nitrate loads in our soils and waters, further enhancement of renewable energies and reduction of air pollutants are ways to help save our natural resources. Results show that the environmental sector is on the right path, but further efforts are needed to meet the high requirements in nature conservation, environmental and climate protection. A lot of investments have been made in sewage treatment facilities in Saxony during the past decades. 98 percent of the existing treatment capacity of municipal sewage treatment plants has been built, restored or extended since 1991. This is another great success and a valuable contribution to the protection of the environment. Although the transformation towards a resource-optimized circular and recycling economy is far from being completed, the Saxon waste management sector has already changed to a resources and recycling economy.

Further information on environment subjects in Saxony are available on the Internet at **www.umwelt.sachsen.de.**

Land use

Land uses in Saxony are subject to dynamic change. The chart shows the situation in 2018, broken down by main types of land use. Agriculture is the dominating use, taking up 54 per cent of the territory. It still shows annual decrease due to new land consumption for urban and traffic use. The Free State of Saxony endeavours to reduce this new land consumption.

Land use in Saxony

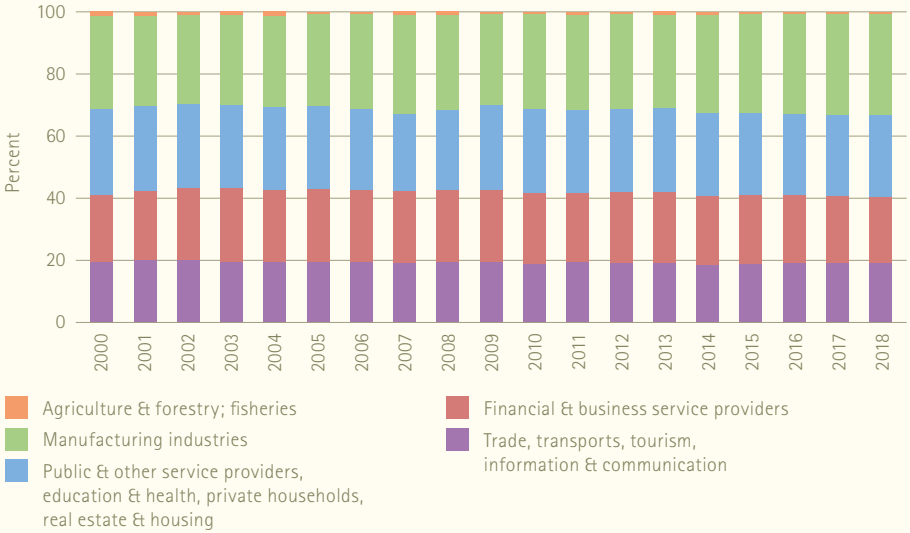


Source: Statistical Office of the Free State of Saxony

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 the information and communications technology play an important part for the economic development. A highly performing agricultural & forestry sector accounts for 0.8 percent of the total gross value added. This chart does not show its upstream and downstream importance, nor its significance for services of general interest.

Gross value added by economic sectors in Saxony

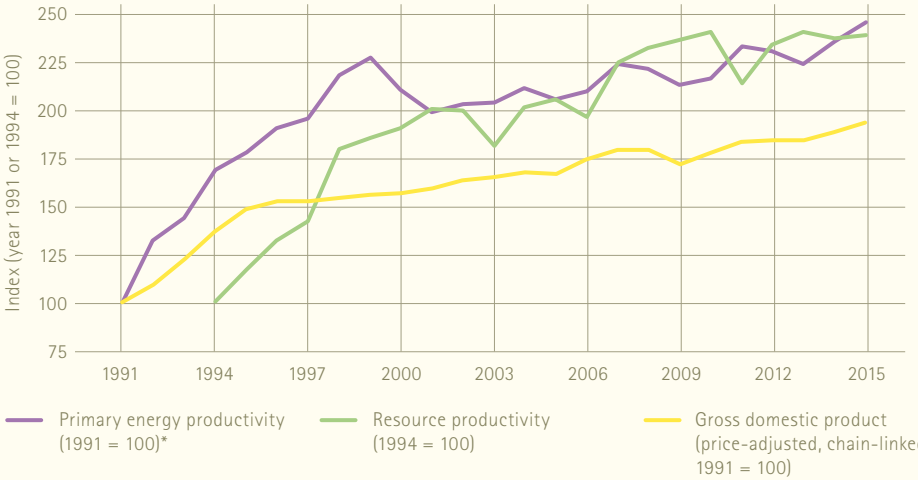


Source: Federal Regional Accounts as of August 2018/February 2019

Environmental performance metrics

Productivity indicators can be calculated for each resource by putting the resource or energy consumptions in relation to the economic performance. 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 showed a significant increase over the economic output. The productivity increases are partly well above federal German average. This leads to efficiency gains with a positive impact on the economic potential and the environmental situation.

Economic performance and productivities



* 2015: preliminary

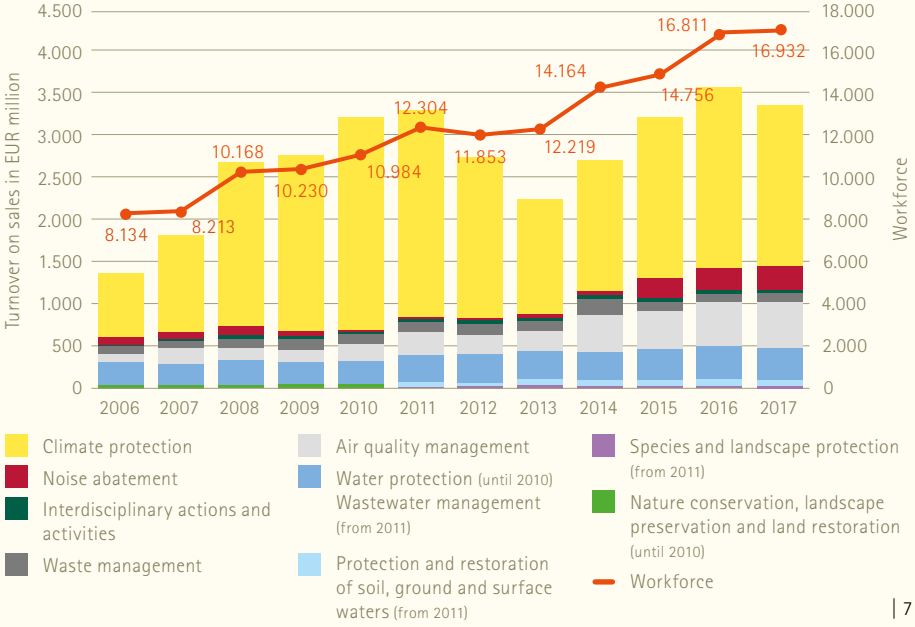
Source: Environmental Economic Regional Accounts of spring 2018; Federal Regional Accounts of November 2016/February 2017

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. Meanwhile, it employs almost 17,000 persons. Most segments in the environmental sector show a sustained positive trend in sales and employment, except for the years 2012, 2013 and 2017, which show decreases in the climate protection segment. Especially, the sales figures in noise abatement and air quality management have grown during the past few years.

Source: Statistical Office of the Free State of Saxony

Sales volume and persons employed in the environmental sector

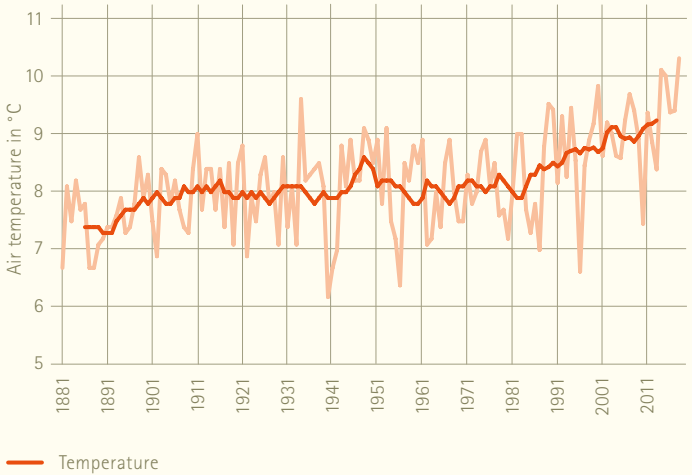


Climate trends in Saxony

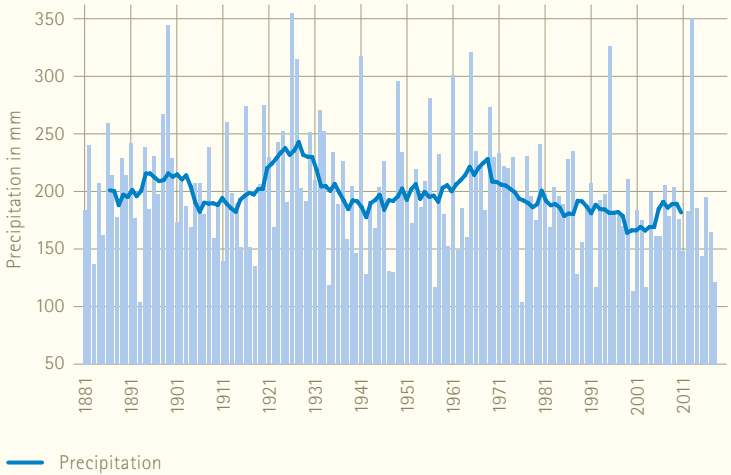
The charts show the annual mean air temperatures and precipitation totals for vegetation period I (April to June) in Saxony during the period from 1881 to 2018. The 11-year running average allows for better illustration of the long-term trend as it is less dependent on year-to-year variations. Air temperature over time is a highly suitable curve for representing the climate change. Higher temperatures lead e.g. to longer growth periods and are accompanied by more frequent occurrences of weather extremes (e.g. heat waves, droughts) and the risks associated therewith. Since 1971, every decade has been warmer than the decade before, and since the late 1980s / early 1990s, there has been a striking accumulation of warmest years in Saxony. 2018 was the warmest year ever recorded since measurement started in 1881.

Precipitation is very heterogeneous both in space and time, compared with the temperature graph. Lower precipitation amounts 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. Since 1971, every decade has been drier than the one before. Saxon farmers can count on improved 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 and crop rotations.

Annual mean temperature in Saxony, 1881–2018
(11-year running average)



Precipitation in vegetation period I (April to June) in Saxony, 1881–2018 (11-year running average)



Source: Saxon State Office for the Environment, Agriculture and Geology (LfULG), German Weather Service (DWD), 2019

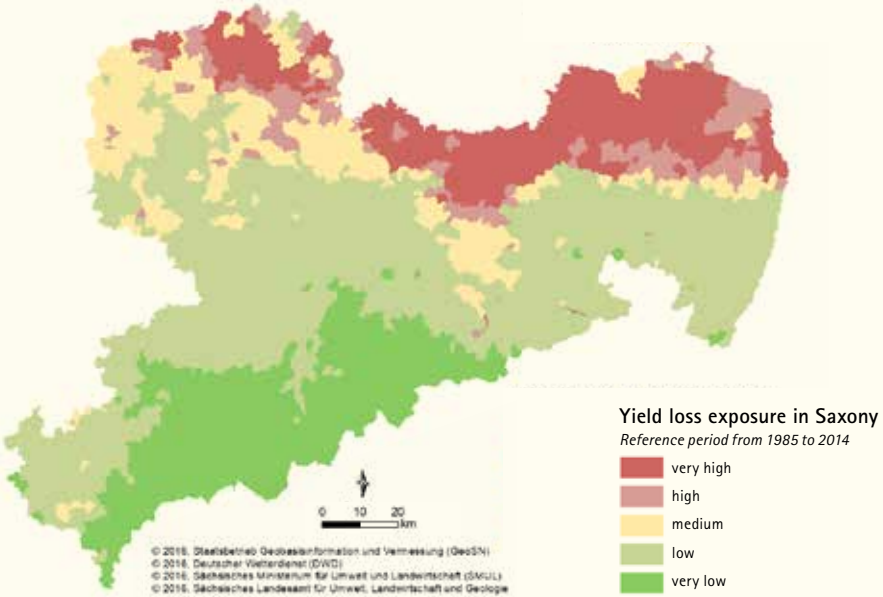
Yield loss exposure in agriculture

If the water supply from rain and soil water is not sufficient from spring to June, agricultural producers are exposed to a higher risk of crop loss. The map shows the current distribution of yield loss exposure across Saxony, based on the soil map BK50 and a long time series of climate data (1985 to 2014).

The north with its mainly sandy soils shows very high and high exposure. Towards the south, there is a gradual decrease in exposure due to high water storage capacities of soils in the loess area and high precipitation in the Erzgebirge mountains. The exposure to yield loss in Saxony is expected to further increase in the future as a result of the changes in climate.

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

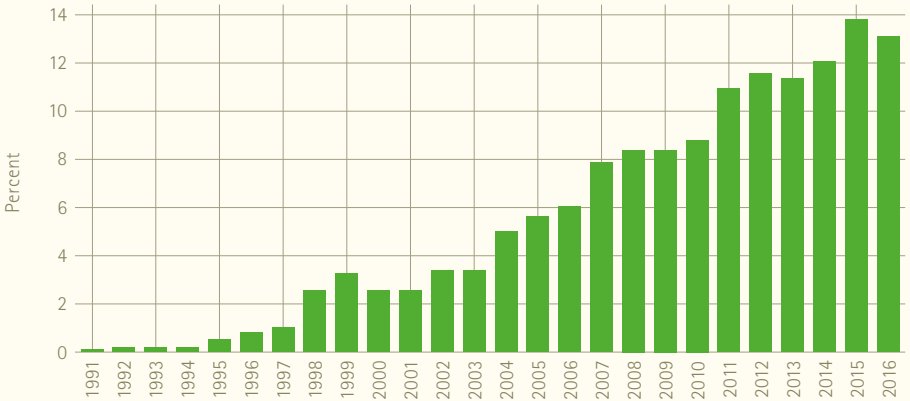
Yield loss exposure in Saxony



Renewable energies

In addition to higher energy efficiencies and higher energy savings, Saxony places a focus on the enhancement of renewable energies in its endeavour to design the energy supply of the future. This contributes to protecting resources and the climate. Good progress has been made since the mid-1990s. In 2016, renewable energies accounted for more than one eighth of Saxony's gross power generation. The existing energy resources and the potentials for their increased use in Saxony show differences. Biomass accounts for the largest share, closely followed by wind power. Photovoltaics follow in third place. Water power and other energy resources are of minor importance.

Share of renewables in gross power generation

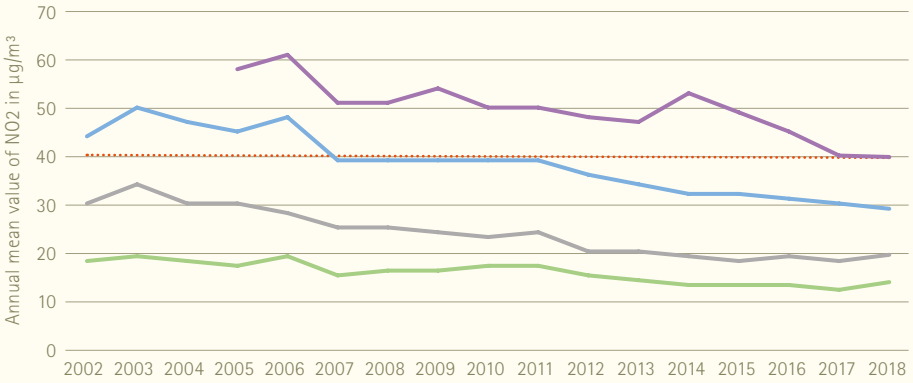


Source: Saxon State Ministry of Economic Affairs, Labour and Transport

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 by way of example. Highest concentrations are rcorded 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 (urban setting). The lowest levels are 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 limit for the annual mean value was met for the first time in all monitoring points across Saxony.

Impact of air pollutants in Saxony



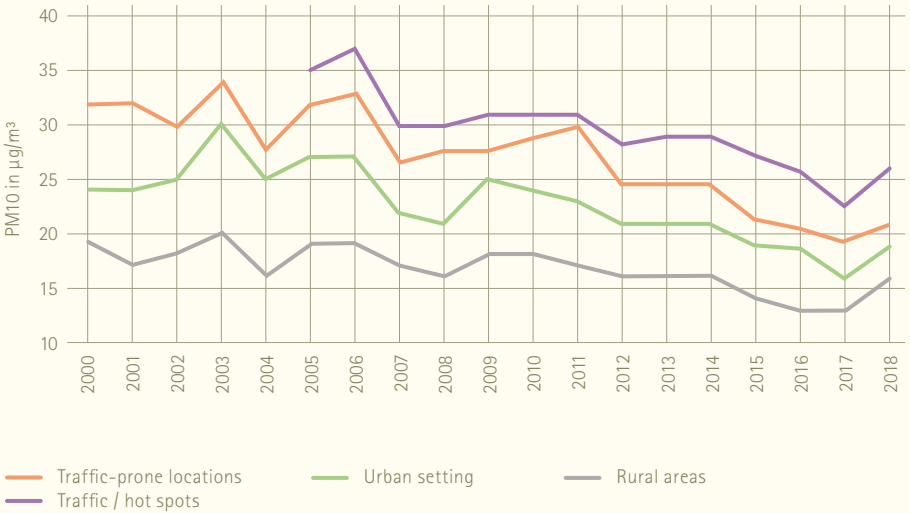
Source: Saxon State Office for the Environment, Agriculture and Geology (LfULG)

Particulate matter (PM)

Combustion processes and road traffic are the major emission sources for atmospheric particulate matter (PM). As PM can travel long distances in the atmosphere, the measured concentrations are not limited to Saxon sources. Meteorological conditions have a strong impact on the levels of particulate matter in the atmosphere and also are the cause for interannual fluctuations. The data of the regional annual mean values shows a gradual and minute decline in concentration levels from 2000.

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

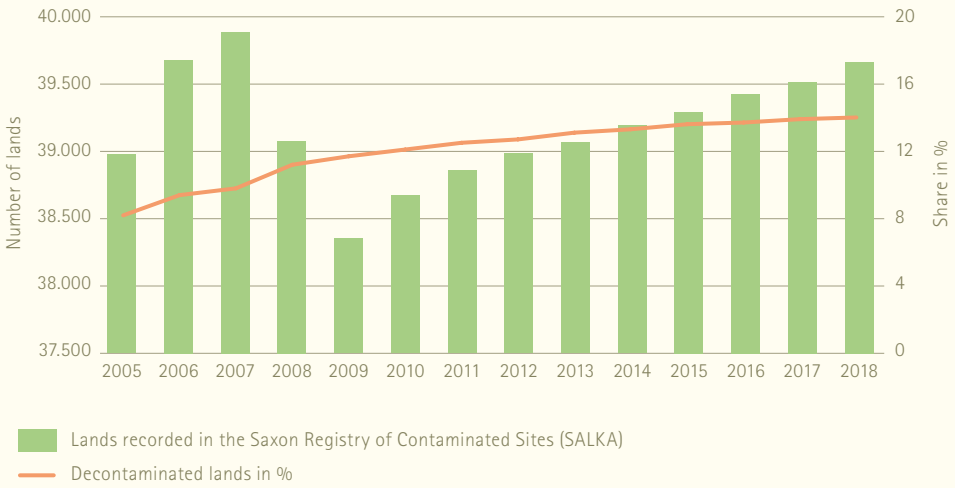
Area-related annual mean PM10 levels in Saxony



Decontamination of lands

The Saxon Registry of Contaminated Sites contains 28,438 sites covering 39,663 lands. The total number of lands has remained almost unchanged over the past few years. Continuous investigations are performed to either confirm the suspected contamination or to prove the absence of any contamination according to the specific 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. Accordingly, there is an equivalent continuous reduction in the number of lands on which further measures (exploration or decontamination) are required or are already under way.

Number and percentage of decontaminated lands

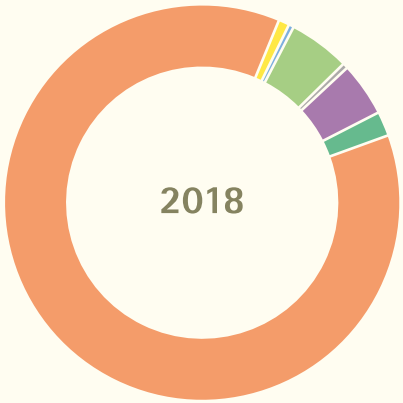


Source: Saxon State Office for the Environment, Agriculture and Geology (LfULG)

Municipal sewage treatment plants

A lot of investments have been made in sewage treatment facilities in Saxony during the past decades. 98 percent of the treatment capacity of municipal sewage treatment plants have been built, restored or extended since 1991. Almost all plants include at least a biological sewage treatment step. This ensures 95-percent elimination of the chemical oxygen demand (COD), as well as phosphorus and nitrogen removal rates of 89 percent or 80 percent, respectively.

Current status of municipal sewage treatment plants



Current status of sewage treatment plants

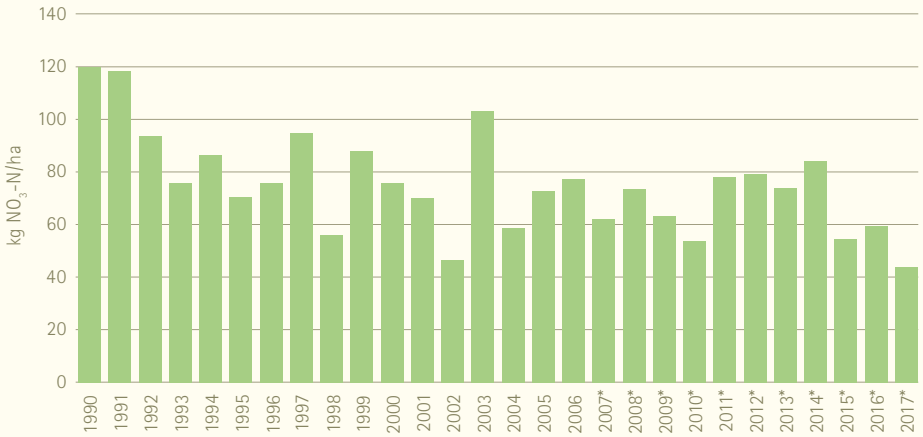
- Mechanical treatment (0.001%)
- Mechanical biological treatment (MBT) (5%)
- Mechanical biological treatment with phosphorus removal (0.06 %)
- Mechanical biological treatment with nitrogen removal (4%)
- Mechanical biological treatment with nitrogen removal without denitrification (2%)
- Mechanical biological treatment with phosphorus and nitrogen removal (89%)
- Mechanical biological treatment with phosphorus and nitrogen removal without denitrification (1%)

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

Residual nitrates in soils

The chart illustrates the development of residual nitrate levels in agriculturally used soils as determined in depths from 0 to 60 cm during the annual autumn sampling campaigns. The values result from approximately 1,000 permanent test sites (approx. 870 since 2007). The observation of nitrate levels in the autumn season is indicative of the nitrogen leaching potential of soils in winter. Soluble nitrate nitrogen levels should be kept as low as possible to avoid the contamination of water bodies. The annual fluctuations are impacted by differences in temperature and precipitation conditions, and are also dependent on crop type, soil type and type of post-harvest soil cultivation.

Residual nitrates in soils



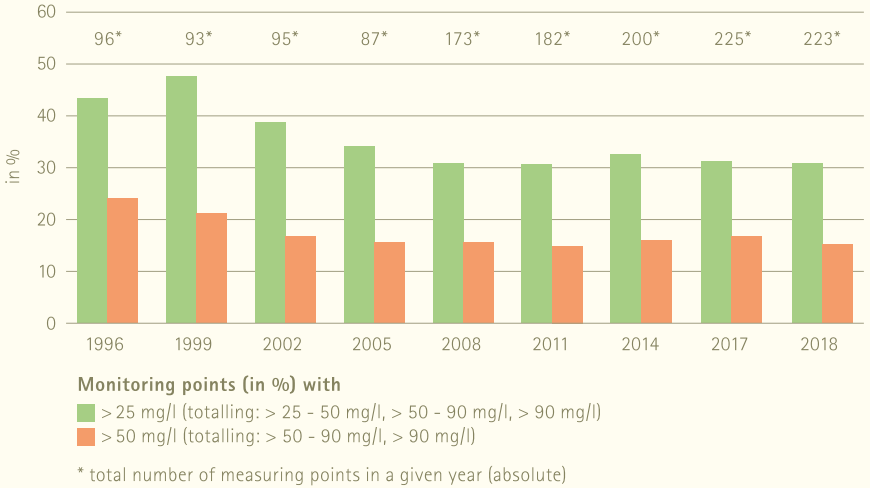
* since 2007: lands outside of water protection areas only

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

Nitrates in groundwater

High nitrate loads in groundwater have negative impacts. For instance, they can cause eutrophication of ecosystems or be detrimental to human health. The chart shows the percentages of monitoring points within the surveillance monitoring network that recorded nitrate levels in excess of 25 milligrams per litre (precautionary limit value laid down in the EC Nitrate Directive) or 50 milligrams per litre (threshold value of the Groundwater Directive and action value in the EC Nitrate Directive), respectively. Since 2008, the percentage of monitoring points measuring excessive levels has remained almost unchanged. Starting in 2006, the monitoring network was adjusted to meet the requirements of the EC Water Framework Directive (WFD). Therefore, a direct comparison between the periods before 2006 and after 2006 is not possible.

Nitrates in groundwater

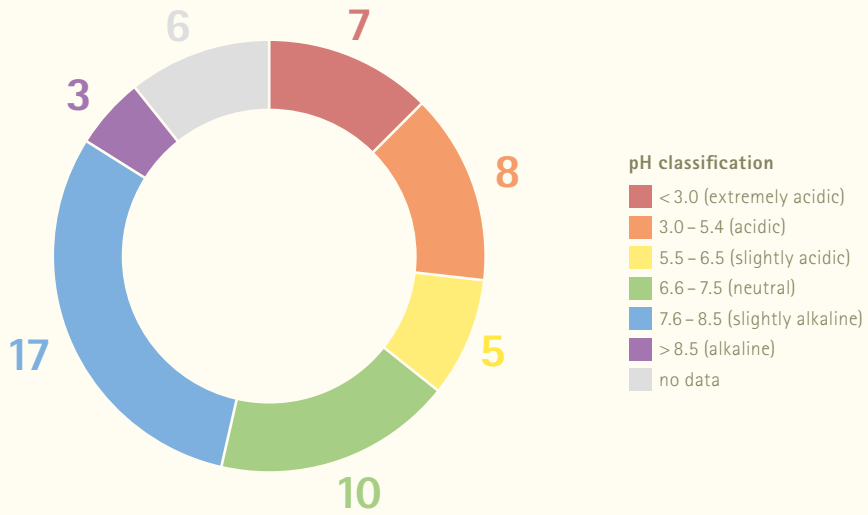


Source: Saxon State Office for the Environment, Agriculture and Geology (LfULG)

Degree of acidity of post-mining lakes

Saxony looks back on more than 150 years of lignite mining. The rehabilitation of former mining areas is a huge challenge. Abandoned opencast mines are flooded with water to form artificial lakes. Often, the resultant post-mining lakes carry acid, iron and/or sulfate loads as a result of previous pyrite weathering reactions. As a whole, however, there is a trend towards better lake water qualities. 56 artificial post-mining lakes covering a surface area of more than 10 hectares were analysed, more than half of which were found to be in a neutral or slightly alkaline or slightly acidic condition in 2015.

Number of post-mining lakes in Saxony by degrees of acidity

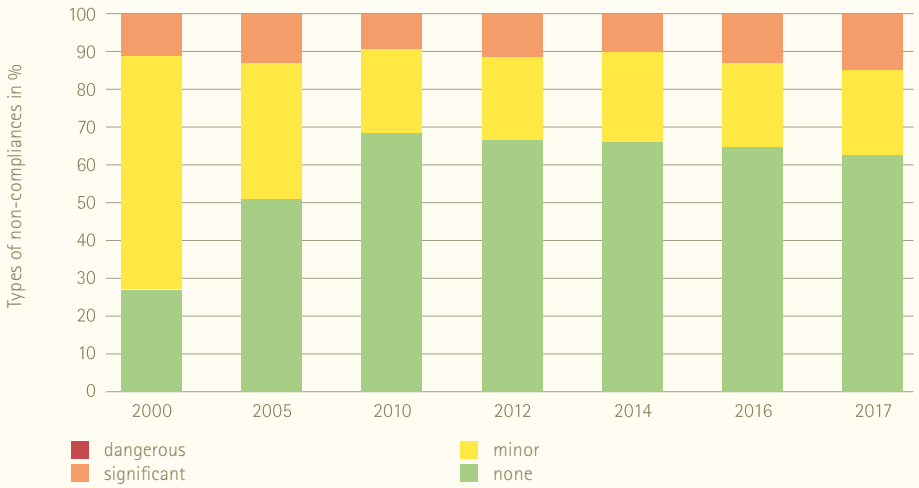


Source: Saxon State Office for the Environment, Agriculture and Geology / Lausitzer und Mitteldeutsche Bergbauverwaltungsgesellschaft mbH

Inspections of facilities for handling water hazardous substances

In 2017, approximately 4,200 inspections were carried out in installations handling water hazardous substances in Saxony. During the past few years, the proportion of initial inspections has gone down in favour of re-inspections. The number of compliant installations increased during previous years and has reached a high level. The percentage of facilities with significant non-compliances increased by 14 percent from prior years. Dangerous non-compliances across all inspections were found to exist in the per-thousand range only. On a Germany-wide scale, initial inspections in Saxony give a higher number of compliant installations and a considerably lower number of significant non-compliances than in other German states.

Plant inspection in Saxony

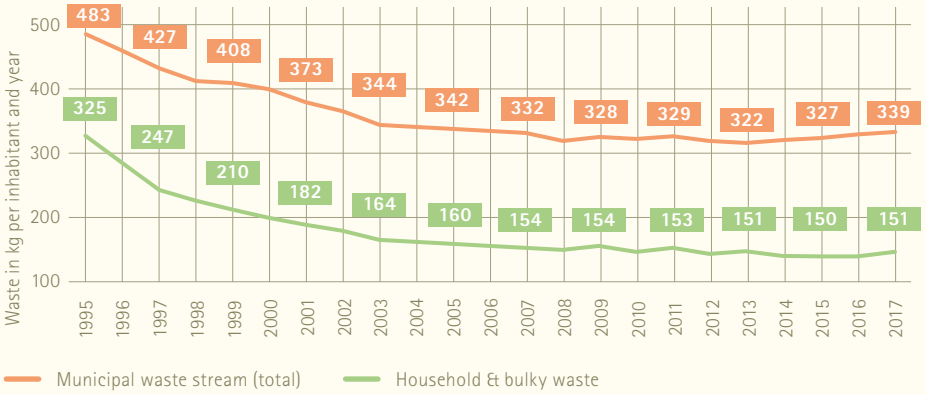


Source: Saxon State Office for the Environment, Agriculture and Geology (LfULG)

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 wastes 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 four years is mainly due to the improved selective collection of biowaste.

Municipal per-capita waste stream from private housholds

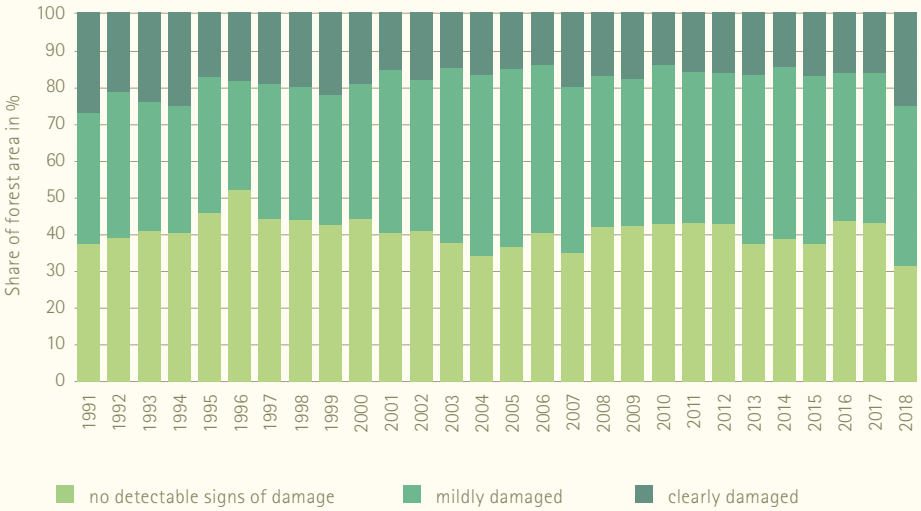


Source: Saxon State Office for the Environment, Agriculture and Geology (LfULG)

Forest condition

Forest damage area is a significant indicator for assessing the vitality of forests. The percentage of forest areas with higher damage decreased between 1991 and 2003 mainly because of the reduction in sulfur dioxide emissions. Since then, the variations in forest damage have shown a higher degree of dependence on weather. They remain at excessively high levels. Damages differ by tree species and forest growth areas in Saxony. There is trend towards less damage in coniferous tree species and higher damage in deciduous tree species. The striking increase from prior year in 2018 is mainly due to storms and droughts and related secondary damage incurred in 2018.

Forest condition



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

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