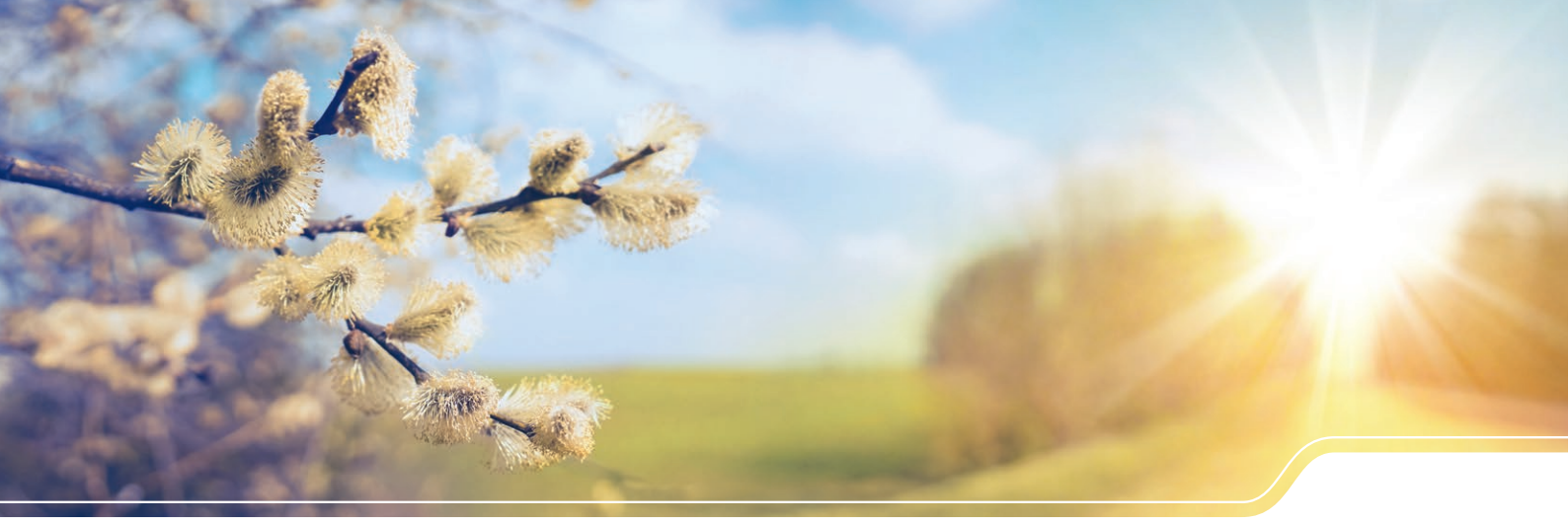


Environmental data

2020

LANDESAMT FÜR UMWELT,
LANDWIRTSCHAFT
UND GEOLOGIE

Freistaat
SACHSEN

Contents

Foreword

The environmental data that is published annually provide information on the most important Saxon environmental topics such as climate protection, soil, air, nature as well as recycling and environmental management. There have been positive developments in many of the areas of environmental protection highlighted in this brochure. However, there are also current challenges that immediately face us, such as adaptation to climate change or the preservation of biodiversity, which become visible from the available environmental data.

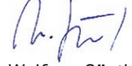
The continuing rise in average temperatures, changes in precipitation levels and increasing numbers of extreme events are clear signs of climate change in the Free State of Saxony. The concomitant changes have far-reaching consequences for the environment, society and the economy.

Information with the aid of environmental data and targeted knowledge transfer are essential prerequisites to ensure the success of the measures already initiated for climate protection and adaptation to climate change.

The expansion of renewable energies is indispensable to ensure the climate goals are reached. Geothermal energy can play an increasingly important part in the heating sector.

In recent years, storms, snowfall and drought in the forests have led to an extremely high incidence of damaged wood. This has caused a bark beetle calamity on a scale previously unknown in forest history. As a result, the condition of the forests has deteriorated considerably and has fallen to a percentage level similar to that seen at the beginning of the 1990s - albeit triggered by a different set of causes.The preservation of biodiversity is one of the greatest challenges facing the Free State of Saxony today. Through the designation of protected areas, near-natural forest restructuring and sustainable, nature-conserving agriculture, the endangered species can stabilise and recover. I am convinced that citizens' commitment and a policy that sets out the framework can further stabilise the good environmental status already achieved and successfully meet the ecological challenges of our time.

Current and further information on the topic of the environment is available on the Internet at **www.umwelt.sachsen.de.**

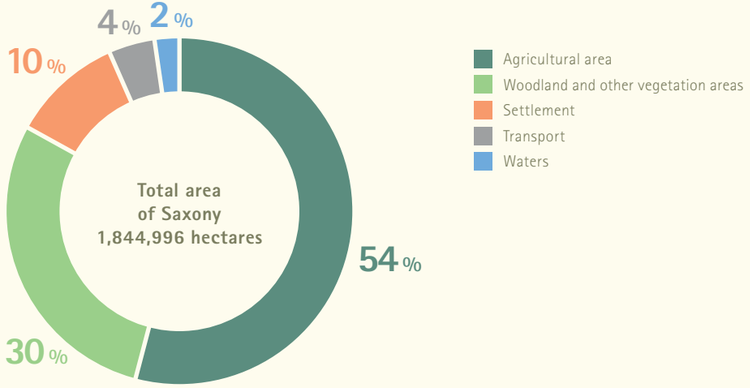


Wolfram Günther
Saxon Minister of State for Energy, Climate Protection, Environment and Agriculture

Land use in Saxony

Changes in land use in the Free State of Saxony are dynamic. The percentages for the main land use types in 2018 are shown here. Agricultural land accounts for the highest share with 54 % of the total area. We continue to see a decline here in favour of the new use of land for settlement and transport, currently accounting for almost 14 % of land use. The Free State of Saxony is endeavouring to reduce this new use of land.

Land use in Saxony

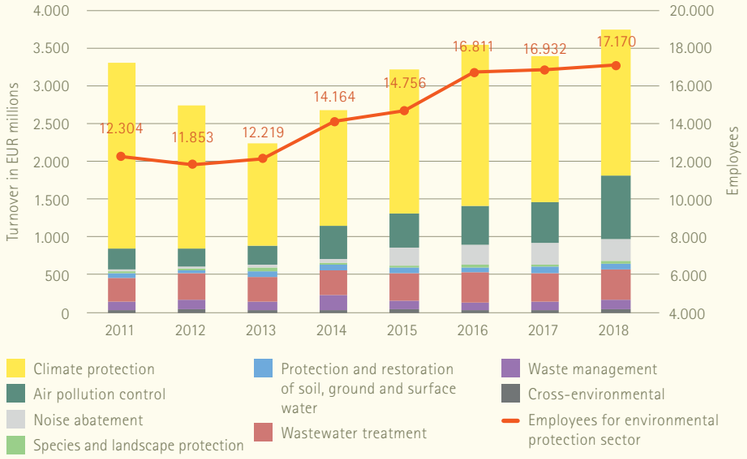


Source: State Statistical Office of the Free State of Saxony

Environmental economy

In recent years, the environmental economy has become an integral part of the overall economy in Saxony. More than 17000 staff members are now employed in this section. For most environmental economic sectors a continuing positive trend in turnover and employment can be observed. The years 2012, 2013 and 2017 were exceptions. In these years there have been declines in the area of climate protection. In recent years, sales have increased, especially in the areas of noise abatement and air pollution control.

Turnover and employees for environmental protection sector in Saxony



Source: State Statistical Office of the Free State of Saxony

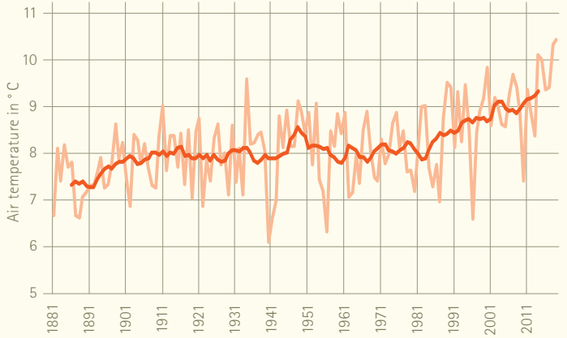
Development of climate conditions in Saxony

The graphs show the annual mean values of air temperature and the precipitation totals in the vegetation period I (April - June) in the Free State of Saxony from 1881 to 2019. A better representation of the long-term trend is achieved by the eleven-year moving average because it is less dependent on individual years.

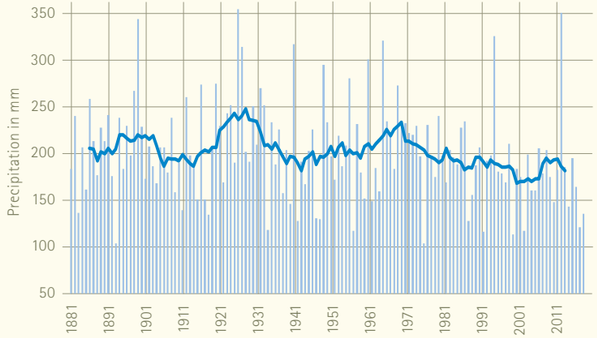
An appropriate representation of climate change is made possible by the development of air temperature over time. Among other things, higher temperatures lead to longer growing seasons and are accompanied by weather-related extremes (e.g. heat, drought) and the associated risks. Since 1971, every decade has been warmer than the previous one and since the end of the 1980s/beginning of the 1990s there has been a conspicuous accumulation of the warmest years in Saxony. 2019 was the warmest year since the recording of data began in 1881.

The precipitation is very heterogeneous in its spatiotemporal occurrence compared to the temperature. A decrease in the amount of precipitation in the vegetation period I slows down the growth process of the plants and increases the risk of crop failures. Particularly in combination with rising temperatures, this increasingly impacts upon the agriculture sector, among other things. Since 1971 every decade has been drier than the previous one. Saxony's farmers can adapt to the changing conditions by means of improved water management. The measures range from the choice of variety and type of fruit to adapted methods of tillage and fertilisation and the irrigation of certain crops and crop rotations.

Annual mean temperature in Saxony, 1881 – 2019
(eleven-year rolling average)



Precipitation in the vegetation period I (April until June) in Saxony, 1881 – 2019 (eleven-year rolling average)

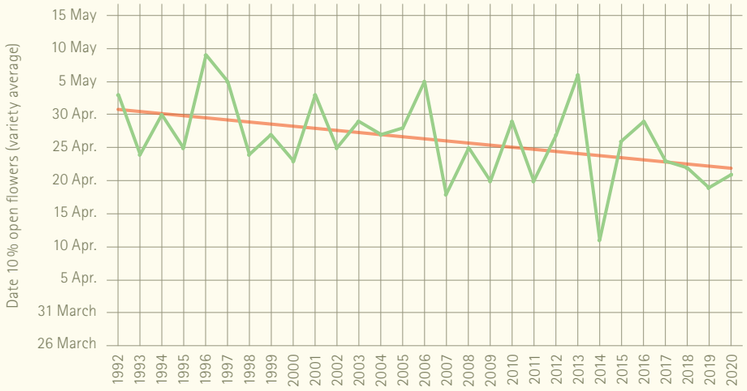


Source: Saxon State Office for the Environment, Agriculture and Geology, German Weather Service (DWD), 2020

Start of fruit blossoming

The beginning of fruit blossoming is marked by the day when about 10 % of the flowers are open. In the case of the representation selected here, the average of all the varieties considered is calculated. The beginning of flowering also marks the start of the fruit development and thus the decisive phase of vegetation for fruit growing. At the same time the beginning of flowering is an indicator of climate change. The State Office for Environment, Agriculture and Geology (LfULG) data shown here reveal a weak trend towards earlier flowering and thus a longer vegetation period. This improves the overall cultivation possibilities for plants with high heat requirements, while at the same time reducing the risk of damage from late frost.

Average start of apple blossoming in Dresden-Pillnitz district 1992 to 2020

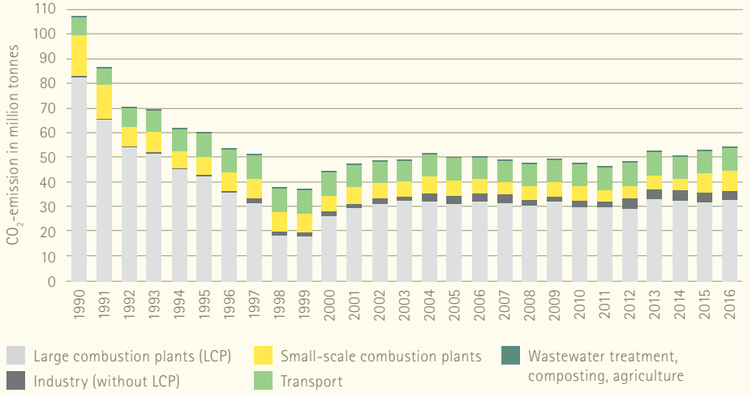


Source: Saxon State Office for the Environment, Agriculture and Geology

Trend of CO_2 emissions

Carbon dioxide emissions account for more than 90 % of the total anthropogenic greenhouse gases, which accelerate climate change through their accumulation in the atmosphere. Large combustion plants (large industrial plants for the production of electricity and heat) remain the main source of pollution. The decline in the 1990s was aided by the closure of many plants. The increase in the early 2000s can be traced back to the new power plant units. Since 2002, carbon dioxide emissions have levelled out at a stable level.

Trend of CO_2 emissions in Saxony from 1990 to 2016

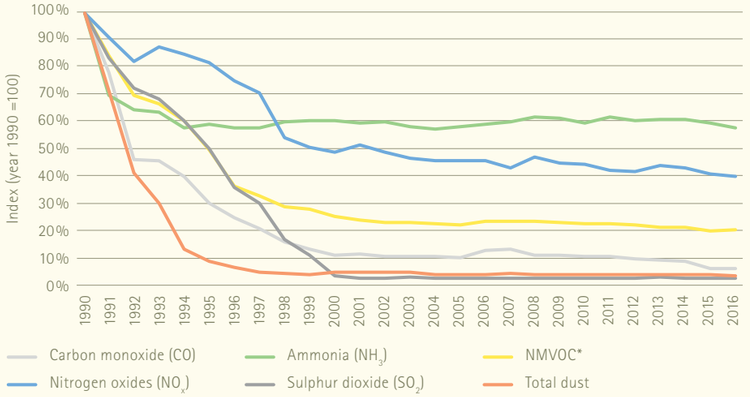


Source: Saxon State Office for the Environment, Agriculture and Geology

Air pollutants – Emissions

Air pollutants can cause a variety of negative effects on humans and the environment. Between 1990 and 2016, emissions of air pollutants in the Free State of Saxony decreased considerably. This is mainly due to the economic restructuring process in East Germany in 1990's. It has not been possible to identify any relevant reduction effects in recent years. Emissions of ammonia and nitrogen oxides remain at high levels.

Emissions of air pollutants in Saxony



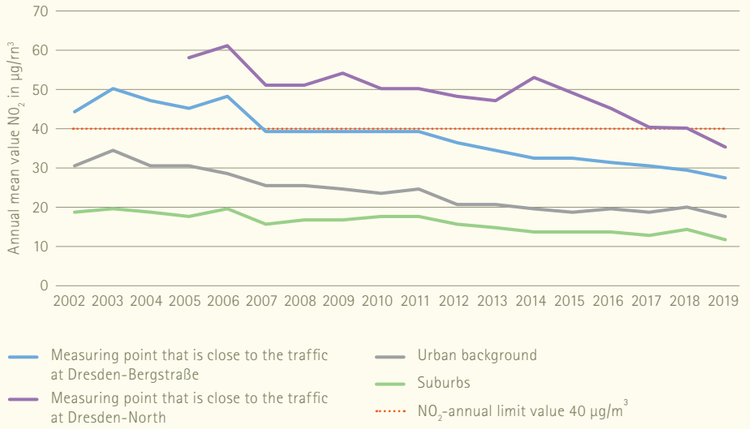
* Volatile organic compounds excluding methane

Source: Saxon State Office for the Environment, Agriculture and Geology, emission register

Air pollutants – Immissions

Measurements are taken at sites with different pollution situations to assess the air quality. The graph shows an example of nitrogen dioxide (NO_2) pollution in the Dresden conurbation. The highest concentrations occur - depending on the traffic volume - at measuring points that are close to traffic. In urban background locations - away from the main roads - the NO_2 concentrations decrease. The pollution levels are lowest on the outskirts of towns/cities and in rural areas. Overall, the pollution levels have been gradually decreasing over the past 15 years.

Immissions of air pollutants in Saxony

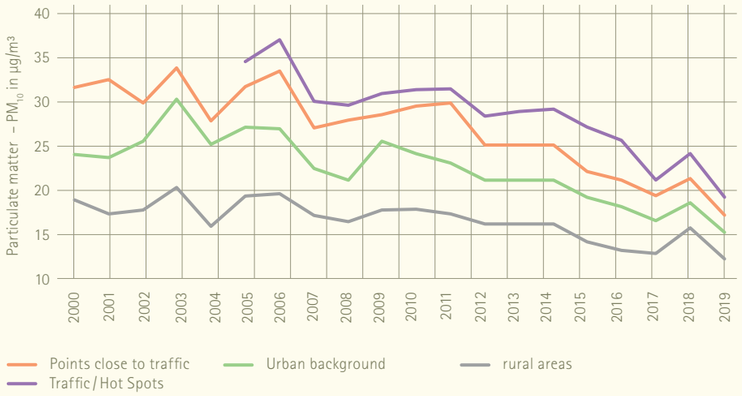


Source: Saxon State Office for the Environment, Agriculture and Geology

Particulate matter

The most important sources of particulate matter are combustion processes and road traffic. Since particulate matter particles can be transported in the atmosphere over long distances, the measured concentrations are not only caused by Saxon sources. Meteorological conditions strongly influence particulate matter concentrations and are also the cause of fluctuations between years. Data on annual area averages reveal a gradual, small decrease in concentrations since 2000.

Area-related annual mean values of PM_{10} concentration in Saxony

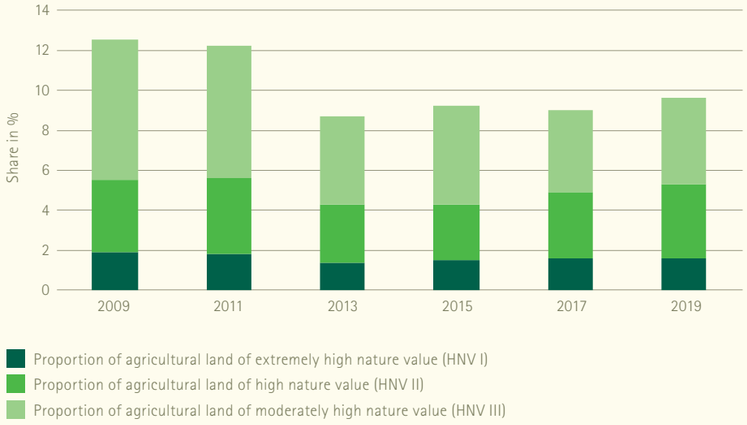


Source: Saxon State Office for the Environment, Agriculture and Geology

Agricultural land of high nature value

In the agricultural landscape, near-natural landscape elements and extensively used areas are of outstanding importance in ensuring biological diversity. The indicator balances the share of agricultural land with High Nature Value (HNV) in the total agricultural area. A long-term survey can reveal the effects of fundamental changes in the use and structure of the landscape (e.g. through intensification) on biological diversity. In 2009, Saxony's share was at around 12 %, already below the target value of 19 % set for Germany for 2015. From 2009 to 2013 it fell significantly once more by about 1/3 to below 9 %. Starting from this low level, there have been signs of a slight upward trend since 2013.

Agricultural land of high nature value



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

FFH species and habitats in Saxony

In accordance with the reporting periods 2001-2006 and 2007-2012, the Free State of Saxony was also able to complete the six-yearly report from 2013-2018 on the status of FFH species and habitats in 2019.

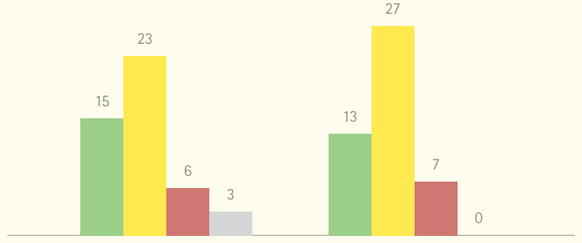
Compared to 2001-2006, the last two reports include data from nationwide uniform monitoring. For this reason they are directly comparable.

Compared to the 2007-2012 reporting period, the number of habitat types classified as insufficient and poor has increased slightly, while habitats classified as good have decreased. The change in the Saxon FFH species (groups) reveals a similar pattern, although the number of species classified as favourable has improved.

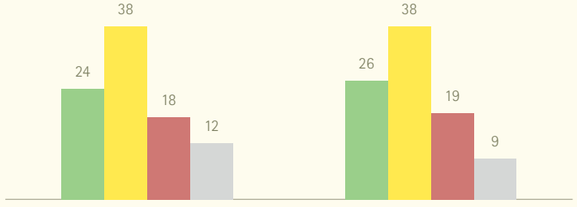
At a federal level, the Saxon habitat types currently have around 15 % unfavourable ratings, the species by way of a comparison are average.

Despite the good rating compared to the other federal states, around two thirds of all species and habitat types in Saxony are still in an unfavourable or poor condition. However, through nature conservation projects and close cooperation with associations and volunteers, measures are being taken to ensure the protection and conservation of Saxony's FFH areas.

Conservation status of the 47 FFH habitat types in Saxony



Conservation status of the 92 FFH species (groups) in Saxony



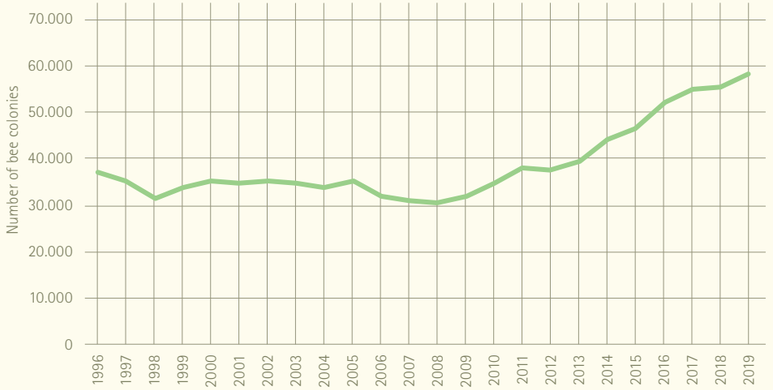
Favourable | Unfavourable, insufficient | Unfavourable, poor | Unknown

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

Bee colonies in Saxony

A continuous increase in the number of bee colonies kept in Saxony has been observed in recent years. In 2019, 7,481 beekeepers and 58,367 bee colonies were registered by the Saxon Animal Disease Fund. This positive development is mainly due to the acquisition of new beekeepers and intensified public relations work. Around 80 % of domestic crop and wild plant species depend on insect pollination, a significant proportion of which is performed by honey bees. In addition to producing honey and beekeeping products, beekeepers and their colonies thus make an important contribution to preserving the natural environment.

Bee colonies in Saxony

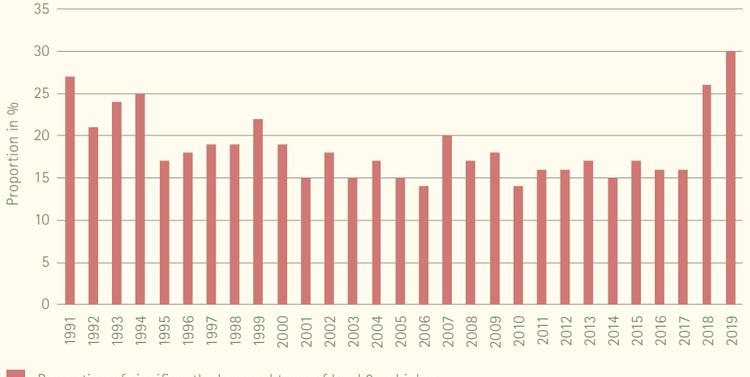


Source: Saxon Animal Disease Fund

Forest conditions

The proportion of significantly damaged trees in relation to the sample trees assessed in the forest condition survey is an important indicator in assessing the vitality of the forests. This indicator fell between 1991 and 2003, mainly due to the reduction in sulphur dioxide emissions. Since then, fluctuations in values have been caused more by weather and biotic damage factors. The levels are still too high. In 2018 and 2019, weather extremes such as storms and major drought as a result of climate change and the resulting mass propagation of harmful organisms such as the European spruce bark beetle, led to a very sharp increase in the proportion of significantly damaged trees from 16 per cent in 2017 to 30 per cent in 2019.

Forest conditions

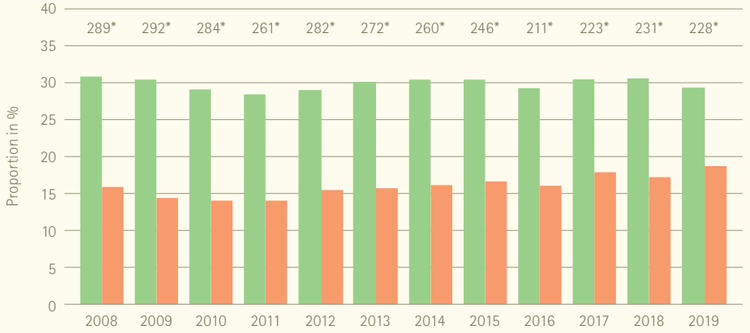


Source: Saxon State Ministry for Energy, Climate Protection, Environment and Agriculture, Forest Condition Reports of Saxony; Staatsbetrieb Sachsenforst - SBS

Nitrate in groundwater

High nitrate levels in groundwater have negative effects. For instance, ecosystems can be over-fertilised or human health can be negatively affected. The figure shows the proportion of measuring points in the overview of the groundwater quality monitoring network (UEB) with exceedances of more than 25 mg/l nitrate (threshold value of the EC Nitrate Directive) or more than 50 mg/l (threshold value of the Groundwater Ordinance and measure value of the EC Nitrate Directive). Since 2008, the number of measuring points where threshold values have been exceeded has risen slightly.

Nitrate in groundwater



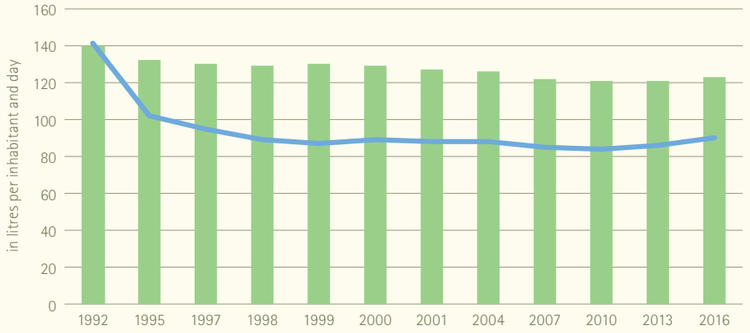
* Proportion of measuring points

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

Water consumption

The specific water consumption of households and small businesses in the Free State of Saxony fell sharply, particularly in the 1990s, due to the introduction of water-saving technology, metering of consumption and cost-covering water prices. In recent years there have been only minor fluctuations. In 2016, the specific water consumption levels in Saxony, at 90 litres per inhabitant and day, remained at a very low level compared to the national average of 123 litres per inhabitant and day..

Water consumption

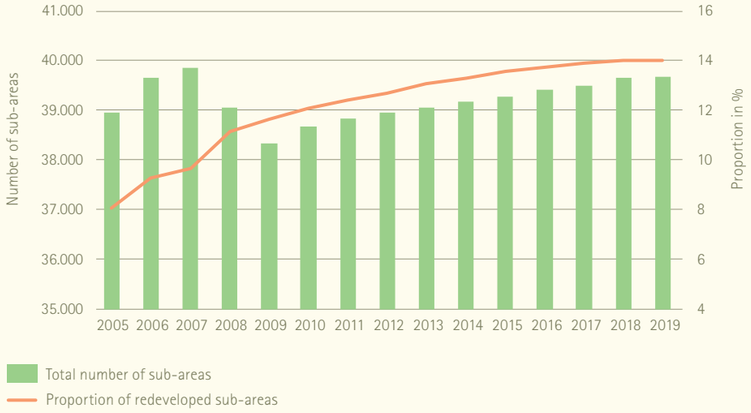


Source: State Statistical Office of the Free State of Saxony, Federal Statistical Office

Redeveloped partially contaminated sites

A total of 28,389 sites with 39,679 sub-areas are registered in the Saxon register of contaminated sites. The total number of sites and sub-areas has remained virtually unchanged in recent years. The suspicion of a hazard is confirmed or eliminated depending on the use by means of the investigations that are continuously conducted. If there is no need for action for the examined areas with confirmed suspicion of hazard and based on their current use, the areas remain in the register. The successful management of contaminated sites can be seen above all in the increasing number of redeveloped sub-areas compared to the number of sub-areas in total.

Number and proportion of redeveloped contaminated sub-areas

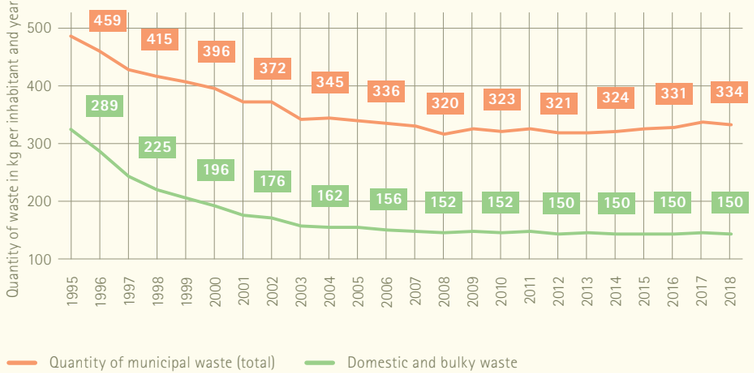


Source: Saxon State Office for the Environment, Agriculture and Geology

Settlement waste

Goods for the household are produced using energy and raw materials and disposed of as waste at the end of their useful life. The quantity of municipal waste and the quantity of household and bulky waste disposed of reveal a declining trend over the entire period under review. The levels have been virtually constant over the past 10 years. Factors contributing to this include: low levels of waste consumption, re-use of used goods and waste collection and waste charging systems based on the polluter pays principle. The slight increase in the volume of municipal waste from households since 2015 is due in particular to the improved separate collection of bio-waste.

Waste generated by households

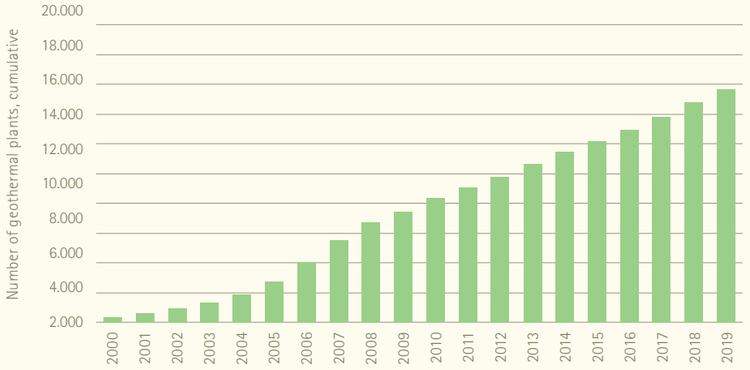


Source: Saxon State Office for the Environment, Agriculture and Geology

Geothermal energy

Geothermal energy is a renewable energy source the use of which can make a significant contribution towards achieving climate protection goals against the background of the energy revolution. Near-surface geothermal energy is used in the Free State of Saxony for heating and cooling buildings as well as for water heating in e.g. single and multi-family homes, office buildings, schools and day-care centres. At the end of 2019, 15,664 geothermal energy plants with a total capacity of around 185 megawatts (thermal) were in operation in Saxony. The growth rates in recent years have amounted to around 900 new installations per year. The most common forms of use in Saxony are geothermal probes (about 90 %), followed by ground collector and well systems. By virtue of the existing plants, over 40,000 tonnes of CO_2 emissions are avoided in Saxony every year.

Development of the total number of geothermal plants in Saxony (cumulative)



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

The topics of the brochure on the Internet:

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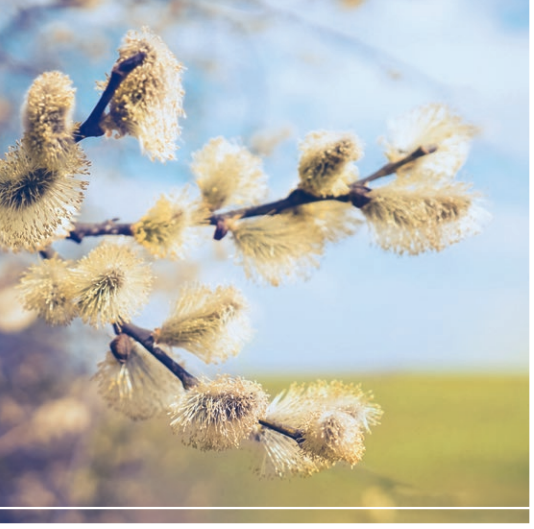
www.landwirtschaft.sachsen.de

www.geologie.sachsen.de



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