Bavarian State Government



Bavarian Climate Protection Program

An Integrated Climate Action Program: Climate Protection, Climate Change Adaptation, Climate Research



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The long version with all measures is available at: https://s.bayern.de/klimaschutzprogramm

Preface

Climate change has gone far beyond an abstract phenomenon, occurring only in remote, particular regions on earth. Its considerable effects are also being felt in Bavaria. Foresight indicates that this is only the beginning. There is reason to fear that the consequences of climate change will become more frequent and make themselves felt more dramatically. The second edition of the Bavarian Climate Report from 2021 projects a possible increase in Bavaria's mean temperature of up to 4.8 degrees Celsius by 2100 compared to the period from 1971 to 2000 if climate protection measures are not implemented. This would dramatically alter life for the people of Bavaria, and even more so for future generations.

We must not allow this to happen under any circumstances. To us, the goal of limiting global warming to a maximum of 2 degrees or preferably just 1.5 degrees defined in the 2015 Paris Agreement is an unmistakable call to action. Thus it is only logical that we, as one of the most advanced industrialized economies, commit to one of the most progressive climate protection goals: Bavaria's climate neutrality by 2040. We thereby intend to maintain Bavaria's high quality of life, safeguard it over the long term, and simultaneously serve as a role model regionally, nationally, and internationally. For the Bavarian State Government, this means we need to cooperate, organize, and join forces in discharging our responsibility. With this awareness, nearly 150 measures in five key spheres of activity have been agreed in an intensive interministerial coordination process. They form the operational foundation for the realization of our vital climate policy objectives.

Our comprehensive climate protection program is doubtlessly ambitious. It is based on the three central and proven pillars of Bavarian climate policy. The program encompasses climate protection measures to halt climate change, climate change adaptation measures to address it, and research measures to better understand climate change. Specific measures range from the sustainable conservation and expansion of forests, to a tenfold acceleration of charging station installation, to the expansion of the Schneefernerhaus environmental research station.

This brochure provides an overview of select current Bavarian climate policy measures.



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Preamble	8
Climate change in Bavaria	8
Basic principles of Bavaria's climate policy	9
Cornerstones of the Bavarian Climate Protection Program	11
Climate policy guidelines	12
Select, individual measures in five spheres of activity	14
Sphere of activity 1: Renewable energy sources and the electricity supply	16
State Agency for Energy and Climate Protection (LENK)	17
Hydropower plant subsidy program	17
Climate-neutral public administration	18
Energy rehabilitation of state buildings	18
Energy standard of government buildings	19
Funding of municipal climate protection and municipal climate change adaptation measures	19
Sphere of activity 2: Natural CO2 storage (forests, moors, water)	20
Private and corporate forest conversion offensive 2030	21
Moor master plan	22
Maintaining and developing floodplains and their ecological function	23
Strengthening the ecological function of watercourses and their climate resilience	24
Heavy rain – risk management – Bavaria-wide reference maps	24
Sphere of activity 3: Climate-friendly construction and architecture	26
"Stadt.Klima.Natur" environmental initiative	26
Climate protection through wood construction	27
Specialist consulting in the sustainability context	27
Climate protection through village renewal and municipal development	28
Increased use of recycled construction materials – Mission RC20/25	29
Sphere of activity 4: Smart, sustainable mobility	30
Incentives for the increased use of public transit services through an attractive annual ticket	
for students and trainees	30
Expansion of bicycle routes and bicycle traffic infrastructure	31
Installation of 70,000 electric vehicle charging stations by 2030	32
Fewer flights for the state government and its employees	32
Reactivation and maintenance of rural railway lines	32
Sphere of activity 5: Clean technology, climate research, and clean IT	34
Climate Center at the State Environmental Office (LfU)	34
Expansion of the Bavarian Climate Alliance	35
Joint climate change and health project in Bavaria (VKG)	35
Strengthening climate research and expanding the range of measurements	
of the Schneefernerhaus environmental research station on the Zugspitze	36
Green HospitalPLUS initiative	36

Preamble

Climate change in Bavaria

avaria on account of its geographical location is feeling considerable effects of climate change and its consequence even today. The region's average temperature has increased by two degrees in the last 70 years alone, and the impact is making itself clearly felt already. More and more hot days with temperatures above 30 degrees are being recorded than in the past - with a rising trend. On the other hand, the number of frost days when the low temperature is below the freezing point keeps decreasing, shortening Bavaria's winters by several weeks. Other effects pertain to water management concerns. While agriculture and forestry are suffering from droughts in many places, we are confronted by floods and heavy rainfall elsewhere. The dramatic consequences are all too familiar from the press. Bavaria's biodiversity is also impacted by climate change. Even now, well-known species are unable to handle the rising temperatures, and are going extinct or are threatened with extinction. Meanwhile even common species such as the skylark, grass frog, and yellowhammer are on the Red List. On the other hand, new species are moving in from other regions, bringing foreign pathogens and illnesses with them, even tropical diseases. Noticeable consequences of climate change in Bavaria today also include a longer period of high pollen concentration in the air as well as an increase in cardiovascular problems.

These effects are just the beginning. The full impact of climate change is illustrated particularly well by the Alps, a striking example of what the rest of the world is facing in terms of global warming. Over the last 100 years, the average annual temperature in the Bavarian Alps has increased at twice the global average. Thus one can assume that Bavarian glaciers will cease to exist in the next ten years. Even worse, 250 liters of glacier water are currently being lost every 30 seconds and will no longer be available as a water reservoir in times of drought. The temperature increase is also leading to a reduction in permafrost. This increases the risk of rockfalls and mudslides. The Technical University of Munich has calculated that more than 1,000 rockfalls in the Alps were caused by climate change in 2020 alone.

These developments clearly show that Bavaria is under climate stress. Letting things continue as they are over the next 20 years would result in further warming by an additional two degrees. The Bavarian Climate Report 2021 clearly presents the possible consequences of unimpeded climate change. In plain language, this means we as a global community are standing on the threshold of epoch-making changes. We can either understand this and act accordingly, or we will be faced with long-term consequences exceeding and exacerbating the known effects multiple times over. The IPCC expects further and as yet unknown impacts along with unforeseeable interactions and feedback effects.



Basic principles of Bavaria's climate policy

s Barack Obama once said: "We're the first generation to feel the impact of climate change. We're the last generation that can do something about it." He is probably right about that. Climate change and its consequences will be with us for a long time to come. We may however be the last generation that can actually do something about it. United in this awareness, the global community at the 2015 UN Climate Change Conference in Paris agreed on the legally binding target to keep global warming considerably below 2 degrees Celsius compared to pre-industrial values, and to make efforts to limit the temperature increase to 1.5 degrees Celsius above the pre-industrial level. Thus the worst effects of climate change and the dwindling of adaptation possibilities are to be avoided.

Bavaria stands by the Paris Agreement and is committed to contribute to its implementation. To put it differently, climate protection is a top issue for the Bavarian State Government. It concerns all of us and, aside from general economic and social conditions, is the key prerequisites for the quality of life and wealth of current and future generations. This makes it a primary element of Bavarian sustainability policy. Bavarian climate policy also contributes to the implementation of the global sustainability goals under the UN Agenda 2030, in particular UN sustainability goal 13 (climate protection measures). With this awareness, Bavaria has been successfully reducing greenhouse gas emissions for decades, serving as an international role model for adaptation to the unavoidable consequences of climate change as well as climate and energy technology research and development. The Bavarian Climate Protection Act establishes a legal framework for these actions. An ambitious climate program with five spheres of activity, effectively financed, complements the law with measures and ensures the realization of the defined goals. It holds all departments accountable for making their contribution on the way to climate neutrality for Bavaria.

The following central, fundamental beliefs ensure that the law and program are not going to stop at promising announcements, but that concrete and effective measures will be implemented:

- We have to take a two-pronged approach. One, we must adapt to changes that are already ongoing more quickly, protecting ourselves more effectively from the consequences of climate change. Two, efforts to slow climate change have to be intensified to maintain a climate that is conducive for humanity and nature.
- Climate policy is a team assignment that can only succeed as a joint effort, affects all aspects of daily life, and poses major challenges for all stakeholders. Society as a whole, companies, the state and municipalities, but also each individual must take action.
- A sustainable climate strategy demands the close coordination of climate protection law, the climate protection program, and financing. Each of these elements on its own would be unsuccessful and unsound. Only the complete package meets the requirements for sustainable climate policy.
- The state has to serve as a role model, and cannot impose one-sided standards on citizens that are not observed by the state itself. In this spirit, the Bavarian Climate Protection Act commits the Free State of Bavaria to make the Bavarian State Government climate-neutral by 2023 and the entire public administration by 2028. Measures for reducing energy

consumption, the efficient delivery, conversion, use, and storage of energy, the use of renewable energy and its procurement, and the sustainable management of forests, moors, and bodies of water are starting points.

- Municipalities play a key role in climate protection and climate change adaptation. Since they play numerous parts due to their manifold functions and have many possibilities for action, are in closest proximity to people's daily lives, and can therefore take practical action along with raising awareness, they face tremendous challenges. The Free State of Bavaria therefore supports Bavarian municipalities and other public bodies with their climate protection and climate change adaptation measures.
- Under no circumstances may climate protection become an elite project for the wealthy.

We cannot allow the ecological issue to become a social issue. Climate protection and wealth have to be organized jointly. This makes it all the more important to turn over a new leaf, and to realize our state s possibilities and opportunities, for example, with new technologies and alternative drive systems. Clean technology instead of rollback is the motto.

- Science is the benchmark and foundation. The better we understand climate change and its effects, the more effectively we can combat it and adapt to its consequences. This requires a broad base of expertise. The Bavarian Climate Council, the consortium of the Schneefernerhaus climate research station with its ten renowned German and Bavarian scientific institutions, the Bavarian Academy of Sciences and Humanities, and Bavarian universities and colleges therefore give direction to Bavaria's climate policy with their findings.
- Think global, act local. Climate protection is a clear priority in Bavaria and promising, efficient, locally effective possibilities exist. When unavoidable greenhouse gas emissions need to be compensated, this should happen here in Bavaria and not somewhere else in the world. That being said, Bavaria is involved in international bodies and partnerships, and wants to contribute to global climate protection with the transfer of climate policy know-how.

There are however limits on Bavaria's climate policy. The Free State can only realize the climate protection potential that exists. The relevant legislative competence in favor of climate protection, in particular to reduce greenhouse gas emissions from the energy sector, industry, transport, buildings, and agriculture, lies at the federal and European levels. Thus the greatest opportunities for action exist primarily within the public administration itself. Additional regulatory options pertain to including climate protection in appropriate state laws and exercising discretionary power and scope for judgment evaluation in enforcement, as well as creating independent offsetting rules for remaining greenhouse gas emissions to realize a climate-neutral public administration. Thus Bavaria demonstrates that effective climate protection is possible, even in a highly industrialized state, and leads by example. Nonetheless Bavaria wants to work constructively with the federal government and the EU within the scope of its possibilities, for example, by following the (further) development of legislation as well as support programs at the federal and EU levels, monitoring and supporting their implementation, and supplementing them flexibly with the state's own programs. This likewise applies to efforts to reduce greenhouse gas emissions and to adapt to the effects of climate change. Contributions to the ongoing development of federal and European climate policy are to be made as well with innovative ideas.

Cornerstones of the Bavarian Climate Protection Program

In awareness of limited legislative structuring options, the Bavarian Climate Protection Program is the heart of Bavaria's climate policy. It was prepared under the statutory mandate of Article 5(1), no. 1 of the Bavarian Climate Protection Act of 23 November 2020 (Law and Ordinance Gazette (GVBI) no. 29/2020 page 598) with the participation of all Bavarian State Government departments. The program considers the challenges posed locally by the global climate change phenomenon. It is dedicated to the efforts we must make to

- limit further global warming,
- effectively adapt to the consequences of existing warming, and
- better understand climate change and its consequences, and combat it more effectively going forward.

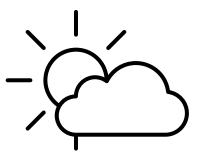
All of these efforts cannot be approached independently of each other. They are facets of one and the same coin and describe the three proven pillars of Bavarian climate policy:

- Reducing greenhouse gas emissions
- Adapting to the consequences of climate change
- Research and development

With the subtitle "Integrated Climate Action Program", the Bavarian Climate Protection Program takes this comprehensive approach into account. The program with numerous individual measures, assigned to five spheres of activity with regard to contents,

- renewable energy and electricity supply,
- natural CO₂ storage (forests, moors, water),
- climate-friendly architecture and construction,
- smart and sustainable mobility, and
- clean technology, climate research, and green IT,

is equally dedicated to the causes, effects, and further research of climate change. The program's measures are implemented by the departments with dedication within the limits of the available budgetary funds.





Climate policy guidelines

Climate protection in harmony with the targets of the Paris Agreement and the Bavarian Climate Protection Act requires fundamental adjustments. In this regard the Bavarian State Government has established the following six climate policy guidelines for action:

1. Climate change impact assessments become a binding part of all relevant submissions to the Council of Ministers with substantial effects on reaching the goals according to Article 2 of the Bavarian Climate Protection Act. This lends great weight to climate protection and climate change adaptation concerns in decisions of the Council of Ministers. Climate change impact assessment requirements are developed by the coordinating staff and submitted to the Council of Ministers for approval.

2. Climate check for government funding guidelines

A climate check is performed by the department in charge for all funding guidelines that are relevant and appropriate for climate protection and climate change adaptation and come into force, for the first time or in an amended version, on or after 1 January 2023. Climate check requirements are prepared by the coordinating staff and approved by the Council of Ministers.

For new funding guidelines with the stated goal of reducing greenhouse gas emissions, climate protection contributions (CO_2 equivalents in tons per year) or other appropriate indicators are taken into account in the review of grant prerequisites and in establishing funding amounts. To the extent possible, planned/realized greenhouse gas reductions are recorded and evaluated in the application process and in the review of reports on the expenditure of funds.

Starting in 2025, the State Chancellery and state ministries report annually on the greenhouse gas emission reductions realized through the funding guidelines prepared by them with the objective to reduce greenhouse gas emissions, and report these in the Bavarian State Government's climate report.

3. Climate-neutral public administration: priority for emission reductions

The need to offset greenhouse gas emissions of the state government and public administration is continuously reduced. The goal is to effectively reduce the public administration's greenhouse gas emissions in the period from 2023 to 2028. Emission reduction programs with target trajectories and measures are being prepared to this end by the State Chancellery and departments.

The state government aims to reduce the need for offsetting measures as much as possible over the long term, and to primarily make the public administration climate-neutral through emission reductions.

Remaining offsetting measures will be realized mainly through high-quality climate protection measures in Bavaria and the Free State of Bavaria's partner regions.

4. Climate protection and climate change adaptation for public contracts

Climate effects are taken into account in planning for the awarding of public contracts by the public administration to ensure that projects are climate-adapted, future-oriented, and sustainable.

In particular, the greenhouse gas emissions produced during the entire life cycle of a contractual object shall be considered in the award procedure. This applies to the extent they are significant, generally recognized calculation tools (of the Federal Environmental Agency, for example) are available for the product group in question, and the market can provide corresponding data sets.

Requirements to take climate effects into account in the awarding of public contracts are prepared by the coordinating staff and submitted to the Council of Ministers for approval.

5. Improving climate resilience – consistently alleviating risks for nature and society through climate change adaptation

Bavaria's climate change adaptation strategy is being implemented and readjusted as needed to make Bavaria climate-proof.

Concrete, measurable targets and verifiable measures in all spheres of activity help us comprehensively and consistently adapt to the consequences of climate change and reduce risks for nature and society.

Regular monitoring of climate change effects and climate change adaptation measures provides information about Bavaria's actual climate resilience and indicates the need for readjusting the measures.

6. Climate protection and climate change adaptation in European and international cooperation

Climate protection and climate change adaptation are becoming central dimensions of the engagement of Bavarian representatives in international formats and networks, and at the EU level.

International climate cooperation is systematically expanded, in particular with regions that are Bavaria's partners and where climate protection and climate change adaptation are expected to effectively benefit from Bavarian technical and solution expertise.

All Bavarian government commissions with foreign partner regions are being assigned their own climate protection sphere of activity.

The Bavarian State Government's climate policy guidelines are defined in concrete terms by the coordinating staff, and are enacted and updated by the Council of Ministers. They form the framework for implementing the measures described below in all spheres of activity.

Select, individual measures in five spheres of activity





Sphere of activity 1: Renewable energy sources and the electricity supply

Our use of energy plays a key role in surmounting the challenges of climate change. We need to

- minimize energy consumption through frugal and efficient use, and
- convert the energy supply into a system that produces minimal CO₂ emissions by replacing fossil fuels with clean energy sources.

The solution is obvious: the most environmentally and climatefriendly energy is energy that is not consumed at all. It does not have to be produced nor transported. Accordingly, the goal is to increase Bavaria's primary energy productivity and considerably reduce primary energy consumption. Intelligent energy saving measures aimed at reducing energy consumption and lowering the associated costs can produce

quick results. New technologies in particular make it possible to obtain a greater benefit from the same amount of energy.

Major progress has been made in the use of renewable energy, especially regarding electricity production. Bavaria already holds a leading position here nationwide thanks to considerable efforts over the last few years. The proportion of renewable energy out of total electricity production was 52.3 percent in 2020. This means it doubled since 2010, but remains well below the target of 100 percent. Bavaria is Germany's leader in the use of photovoltaics, hydropower, and geothermal energy by consistently utilizing its favorable natural conditions. In 2018 Bavaria once again placed first among Germany's states in the production of electricity from bioenergy. We want to maintain and expand this leading role. The further development of sustainable forms of energy is therefore viewed as a fundamental obligation. It is to be advanced in all areas and sectors. We are presenting a selection of measures below.



State Agency for Energy and Climate Protection (LENK)

There is no doubt that the energy transition needs to proceed quickly. The greater the social acceptance of measures to combat climate change and the engagement of all social, economic, and political groups, the more likely this is to succeed. This is LENK's main concern. In order to help key target groups reach important milestones on the way to successfully realizing the energy transition, LENK wants to use existing structures and bundle resources to strengthen the link between political strategy and practical implementation. Projects, information campaigns, and events are being carried out. LENK is also engaged in other activities. It is assisting the State Statistical Office



From wind power to the organization of the climate-neutral state government: LENK is involved in a broad range of energy transition and climate protection topics.

with recording greenhouse gas emissions for the public administration and all of Bavaria, and helping with the preparation and implementation of a long-term monitoring concept. With the awareness that not all greenhouse gas emissions can be avoided, LENK is tasked with preparing rules and standards for additional public administration investments in offsetting measures. Based on the quality criteria established in these rules and standards, LENK shall evaluate the measures and report to the public administration. The rules and standards are to be completed by 2024 at the latest.

Hydropower plant subsidy program

Next to photovoltaics, hydropower is Bavaria's leader for electricity production using renewable energy. The advantages are readily apparent: Unlike other renewable energy sources, most hydropower plants predictably supply electricity year round. Therefore, they make a significant contribution to the security of supply. The greenhouse gas emissions from electricity production using hydropower are also extremely low. That is why hydropower plants are already being subsidized under the Renewable Energies Act (EEG). However, field reports on the EEG have shown that additional economic incentives may be required in spite of EEG subsidies, especially for

> Hydrodynamic screw: Fish-friendly hydropower technology for small developed water volumes; often used to exploit residual water.

smaller hydropower plants, in order for comprehensive refurbishments to be completed. This is where the hydropower plant subsidy program launched in 2021 comes in. It is intended for the operators of existing plants and aims to create incentives for investments in retrofitting, recommissioning, and the new construction of replacement plants, where applicable in conjunction with structural-technical measures for ecological improvements, and to increase the electricity production of these hydropower plants by at least 10 percent.



Climate-neutral public administration

In order for the state to credibly call for the implementation of climate protection measures, it has to lead by example. In awareness of their leadership role, the agencies and institutions of the direct public administration therefore intend to become climate-neutral by 2028, the State Chancellery and state ministries even in 2023. Greenhouse gas emissions are to be avoided wherever possible. To this end, the greenhouse gas emissions of the individual departments first need to be determined, including subordinate agencies and institutions. The potential for emission reduction measures then has to be ascertained, and finally, these measures need to be implemented by the respective departments. Only the remaining, unavoidable residual emissions can be offset with suitable climate protection measures starting in 2028. Here projects in Bavaria take precedence over foreign projects, which are to be implemented in Bavarian partner regions where possible. The offsetting measures shall meet the quality requirements defined by LENK.



Use of renewable energy in government construction projects: Combination of photovoltaics with green roofs on a building on the Garching research campus.



Special program for the energy rehabilitation of government buildings: State Finance Office and State Building Authority Würzburg, co-financed by the European Union out of the European Regional Development Fund (ERDF).

Energy rehabilitation of state buildings



Buildings account for around 40 percent of energy consumption and about one third of all CO_2 emissions. Even though the Free State with around 5,100 heated buildings only owns a small share of Bavaria's total building stock, it serves as a role model here as well. Based on the current energy mix, the annual final heat energy consumption of state properties corresponds to about 470,000 tons of CO_2 emissions per year, harboring tremendous energy saving potential.

Therefore, the energy rehabilitation of government buildings is to be consistently pursued. This includes, for example, improving the building envelope and converting to renewable energy. To complement the rehabilitation measures already being carried out, the special program for the energy rehabilitation of government buildings of the Bavarian State Ministry has been providing additional funds for highly energy-efficient individual measures since 2008. Maximum CO₂ reduction is the main selection criterion. This successful program needs to be strengthened and made permanent.

Energy standard of government buildings

Progressive, sustainable energy standards are applied for all government construction measures, including renovations as well as new construction, in part to reduce the public administration's greenhouse gas emissions to the greatest possible extent. According to the ambitious energy standards for government construction measures passed by the state government in July 2011, new administrative buildings have to be constructed based on the passive house standards on principle.

Select special buildings such as museums are also realized according to this high-efficiency standard. Legal requirements for the energy quality of the building envelope are also exceeded for all other government constructions projects – both in new construction and in existing buildings.



High-efficiency energy standards for government buildings: House of Bavarian History Regensburg, museum in the passive house standard.

Funding of municipal climate protection and municipal climate change adaptation measures

Municipalities play a leading role in climate protection and adaptation to the consequences of climate change because they are closest to citizens and thus receive special attention as role models. Therefore, efforts of municipalities to protect the climate and integrate climate change adaptation measures are to be permanently supported. Initially, what are called climate change adaptation managers are to provide information about municipal adaptation concepts, both within the administration and externally, and ensure the acceptance and understanding of the municipalities. Plans are also in place to

- continue funding municipal climate protection concepts,
- fund investment projects to reduce greenhouse gas emissions as well as demonstration projects and pilot projects regarding climate protection and managing the effects of climate change,
- deliver comparable (climate) data broken down by regions to determine the current state and target state, saving time and personnel capacities,
- deliver regionalized (energy) data in the Energy-Atlas Bavaria, and
- implement the project "Hitzeschutz in einer Gesundheitsregionplus (HitziG)" (Heat Protection in a Health Region), in which a heat coordinator is implemented in a health region office who coordinates measures to protect the population against heat-related damage to health.



Sphere of activity 2: Natural CO2 storage (forests, moors, water)

arbon sinks play an important role in the global warming context since they have the ability to absorb man-made CO_2 emissions from the atmosphere, thereby weakening the greenhouse effect. However, there is also the risk of CO_2 escaping from carbon sinks if basic conditions change, accelerating climate change. Special attention therefore has to be paid to protecting these sinks, such as forests, moors, and soils.

Our forests currently cover more than one third of the state's area. They define Bavaria's image and are indispensable for people, nature, and the economy. Forests store large amounts of carbon, protect valuable resources, produce wood as an environmentally friendly raw material, provide recreational areas outside our door, and help with climate protection and species conservation. In this period of climate change, these valuable benefits need to be protected and improved. Necessary climate protection steps have to be taken, since forest conservation as such is already becoming a challenge in some warm, dry regions. Our forests make the effects of climate change visible and tangible for everyone. Forests are vulnerable and already suffering massively from climate change in many places. Our job and obligation is to conserve our forests, adapt as well as possible, and hand over viable forests to generations that come after us.

Moors store more carbon dioxide than any other ecosystem on earth – about six times as much per hectare than forests, for example. Intact moors therefore slow climate change. Simply put, moor protection is climate protection because moors are truly multitalented. They store large amounts of carbon, slow down water during floods, harbor a variety of species with special adaptations, and serve as habitats for threatened animals and plants. Bavaria is among Germany's states with the most moorland and wants to protect these precious habitats even more effectively.

Water protection is closely linked to the conservation of carbon sinks. It is the most fundamental basis of life. Water forms the foundation of our ecosystem and is essential for forests, moors, and soils to fulfill their carbon storage function in the first place. Rivers and lakes are also habitats and sources of nutrition and energy. However, the amount of water available in Bavaria is shrinking. Scenarios show that climate change is leading to worsening droughts in Bavaria on the one hand and the increasing threat of heavy rainfall events on the other hand. Climate change adaptation, sustainability, and water security primarily require sweeping changes in thinking (improving water management, using soil water stores,



Sponge City principle). The Free State of Bavaria is tasked with implementing effective countermeasures for climate change adaptation with regard to water, for example, in order to safeguard the drinking water supply, ensure sustainable agricultural irrigation, protect people from flooding, and minimize other negative consequences. Soils and water are features of land use. Therefore, few sectors are as directly affected by the consequences of climate change as agriculture and forestry. At the same time, agriculture itself makes a considerable contribution to greenhouse gas emissions. It therefore needs to be an important part of the solution as well. Even though food production without any CO₂ emissions at all is impossible, limiting emissions as far as possible has to be the goal. New directions for agriculture to meet its responsibility are to be set through intensified research of climateadapted and climate-friendly agriculture, by further increasing funding for organic farming in Bavaria, by developing a moor farmer program and a funding program for topsoil conservation and build-up, and by launching a consulting initiative to reduce greenhouse gases in cattle farming. A selection of key measures is provided below.

Private and corporate forest conversion offensive 2030

Our 2.6 million hectares of forests are fascinating habitats and economic areas for people, animals, and plants. They are also our most important carbon sink and produce the most environmentally friendly of all raw materials, domestic wood. Permanent conservation, adaptation to climate change, and sustainable management by around 700,000 forest owners is therefore a key objective of the state government for the nearly 70 percent of Bavaria's forests that are in private hands or owned by municipalities. Implementation is ongoing and needs to be accelerated



Climate-stable, multifunctional forests and nearnatural rivers are green infrastructure for people, nature, and industry. going forward. The annual forest conversion area is to increase from an average of 6,000 to 12,000 hectares, and the afforestation area is to double from 50 to 100 hectares. The forest conversion offensive 2030 approved by the state government in 2017 bundles proven and new measures and offers of the Bavarian Forest Administration for forest owners, and creates attractive basic conditions. Measures range from consulting, training, and continuing education offers to practice-oriented research projects to attractive funding options.

To ensure that state forests, accounting for around 30 percent and managed by Bavarian State Forestry, can also do their part for climate protection and future generations, their management is conservative and forward-looking in line with the legal mandate to serve as a role model. They are also actively restored in case of damage. A key forestry objective for the future of climate change is to convert forests with



Helping people help themselves: Government consulting provides a basis for forest owner decisions and measures.

a high concentration of spruce to mixed forests. Where possible, they should contain at least four different (economically relevant) tree species (four-tree concept). Forest conversion is being accelerated from the previous 7,000 to currently 8,000 hectares of forest per year at the same time. Adapted hoofed game stocks are another basic prerequisite for the conservation and protection of tree species that are urgently needed for stable future forests. Hunting is therefore essential for forest conversion as well.

Moor master plan

Moors are indispensable for climate protection and the climate neutrality objective. Protecting these precious habitats therefore became the object of the moor master plan initiated in 2018. Nature, climate, water, soil, agriculture, and forestry are the pillars of this cross-departmental master plan "Bavarian Moors". It contains elements such as improving the knowledge base, implementing innovative pilot projects, and the following additional modules with a broad impact:

- The moor wilderness program aimed at protecting near-natural moors and accelerating the restoration of degraded, unused moors
- The moor farmer program focusing on moor-friendly agricultural use, including the development of new forms of use such as paludicultures
- The moor forestry program with the moor-friendly management of our moor forests, in particular 149 projects for the restoration of peat bogs and transition peat bogs in state forests by 2030.

All three programs include measures that enable broad-based realization and continued agricultural and forestry use. Ongoing activities under the "Bavarian Moors" master plan link climate protection with nature, water, and soil conservation issues. They are coordinated by the "moor hub" consisting of three state authorities, the State Environmental Office (LfU), Regional Office for Agriculture (LfL), and Regional Office for Forests and Forestry (LWF). Thus the rehydration and restoration of moors is to be considerably intensified, making an important contribution to the state government's climate protection goals.



The rehydration and restoration of moors is to make an important contribution to the state government's climate protection goals.



Maintaining and developing floodplains and their ecological function

Floodplains are habitats defined by water dynamics, with frequent flooding and changing groundwater levels. Therefore, floodplains support the climate change adaptation of ecosystems and species as well as climate protection. Floodplains make a substantial contribution to natural water detention during floods. They are also helpful in droughts by slowly releasing stored water during dry periods. Since intact floodplains also serve as important refuges for numerous species dependent on wetlands, natural floodplains contribute to biodiversity at the same time. Near-natural riparian strips and broader watercourse development corridors are key elements of floodplain development and an important tool for alleviating diffuse water pollution (nutrients and harmful substances, for example). Floodplains are also indispensable for climate protection since the soils and plants store large amounts of climate-damaging carbon



Near-natural floodplains

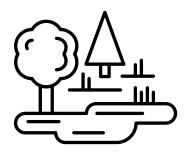
dioxide. Bavaria wants to protect these valuable ecosystems. The goal is to preserve and restore Bavaria's floodplain landscapes and their ecological function, promoting water detention and biodiversity. Restoration measures, including dike relocations, are to be initiated and supported to this end.



Strengthening the ecological function of watercourses and their climate resilience

Climate change affects various parts of the water supply as a whole the interactions of precipitation, evaporation, and runoff - and therefore surface water and groundwater in particular. Our society is facing growing challenges due to the increase in extreme weather events, such as heavy rain and flooding as well as heat waves, protracted dry spells, and droughts. The resilience of natural communities in standing and flowing bodies of water to the consequences of climate change (such as low water, higher water temperatures) plays a prominent role. Near-natural maintenance and redesign or restoration make significant contributions to the function and biodiversity of aquatic ecosystems.

Riparian strips are a key element for further improving the protection of watercourses against the ingress of substances and for their near-natural development. With the implementation of the popular petition on biodiversity "Save the Bees" in Bavaria, these may no longer be used for agriculture and horticulture over a width of five meters. Even more can be achieved for bodies of water with wider riparian strips: As a blue-green band, they become valuable corridors of biodiversity in and on the watercourse, and simultaneously increase climate resilience. Additional ecosystem benefits and the social function of watercourses for people (recreation, experiencing the attractiveness of near-natural bodies of water) are reinforced in Bavaria's



watercourse action program 2030 with supplementary measures in the course of hydraulic engineering projects.

Heavy rain - risk management - Bavaria-wide reference maps

Often accompanied by severe thunderstorms, heavy rain can cause great damage that, especially in contrast to river flooding, is difficult to predict in terms of timing and geography. Effective heavy rain risk management at the municipal level is needed. This is where the HIOS research project comes in (HIOS – Hinweiskarte Oberflächenabfluss



und Sturzflut – storm water runoff and flash flood reference map). It studied possibilities for the efficient and reliable modeling of heavy rainfall events. Among other things, a Bavariawide map is to be created from the project data, providing initial indications of areas with elevated hazards due to storm water runoff and flash floods. With the future flood check, Bavarian water management intends to provide municipalities with individual advice regarding the hazards of river flooding and flash floods. Information on the climate-sensitive management of precipitation water and dealing with high groundwater levels in urban land use planning was also prepared.

On 1 June 2016, water overflows the dike in Simbach am Inn



Sphere of activity 3: Climate-friendly construction and architecture



ities are known as heat islands. Their prevailing average temperature is up to 10 degrees higher compared to the surroundings. This elevated temperature has various reasons: Streets and buildings store a lot of heat. People and vehicles produce additional heat. Rainfall percolation is poor, reducing evaporation and the resulting cooling of the air. This problem is growing continuously due to climate change. Underlying projections in the Bavarian Climate Report indicate that heat waves will increase. More and more people are also moving to urban areas. However, heat poses a health hazard, especially for older and ill people as well as young children. Bavaria's cities therefore need to become greener.

That means more trees, grass, plants and more bodies of water. The urban microclimate has to be improved. Construction as such has to be made climate-friendly at the same time. Naturally this means the energy rehabilitation of buildings on the one hand, but also the sustainability of buildings on the other hand.

Wood is a natural raw material in Bavaria and each cubic meter stores one ton of CO_2 . Bavaria already has a higher wood construction ratio that Germany's average today. Wood needs to be duly prioritized as a construction material to continue binding as much carbon as possible in wood products over the long term. This construction material makes an active contribution to climate protection that simultaneously benefits all forest owners. Since the wood for one wooden house built in Bavaria grows back in just 40 seconds, the conditions are favorable. We are presenting a selection of measures below.

"Stadt.Klima.Natur" environmental initiative

Climate change adaptation is a central challenge for urban development today. Answers have to be found for heavy rainfall events, flooding, heat waves, droughts, and declining biodiversity. Raising awareness of possibilities for action among all planning and construction stakeholders is important to counteract the effects of climate change. Potential solutions lie in local rainwater management and complex green spaces in conjunction with multifunctional land use. Measures encompass buildings, open spaces, streets, urban districts, entire cities, and the interplay with the surrounding areas. They have numerous different benefits, ranging from the better handling of heavy rainfall events to saving and conserving water resources, shading and cooling hot cities, and simultaneously improving livability and people's quality of life

and living conditions. The Ministry of the Environment launched the "Stadt. Klima.Natur" (City.Climate.Nature) environmental initiative to promote urban climate change adaptation by strengthening the green and blue infrastructure. It also informs and networks various stakeholders on the way to a livable city of the future in cooperation with the Ministry for Housing, Urban Development and Building. Information on tools, data sets, consulting offers, funding options, and practical examples is available at www.stadtklimanatur.bayern.de





Climate protection through wood construction

Wood construction is climate protection. Building with wood not only binds large amounts of CO_2 over the long term, but also reduces energyinduced CO_2 emissions. Once again the state is leading by example. Wood is to be clearly prioritized as a building material in government construction projects under consideration of the material-specific technical and structural requirements as well as the usage-specific and functional basic conditions.

Under the Bavarian wood construction subsidy program, multi-story residential buildings and municipal buildings are subsidized when they are constructed with a substantial proportion of wood and actively bind CO₂. Active climate protection as the program's foundation aims to reduce energy-induced CO₂ emissions and to bind carbon over the long term.

Further information: www.stmb.bayern.de/buw/ bauthemen/gebaeudeundenergie/ foerderprogramme/bayfholz

Specialist consulting in the sustainability context

From multi-story residential buildings and municipal day-care centers to agricultural buildings or adding floors to existing buildings – through Bavaria's specialist consulting on wood construction, every builder has access to a free, unbureaucratic, professional initial consultation on modern wood construction. Further information: www.fachberatungholzbau-bayern.de

Another consulting service related to climate protection is offered by the Information Center for Energy Efficiency and Sustainability (Beratungsstelle für Energieeffizienz und Nachhaltigkeit – BEN) of the Bavarian Chamber of Architects, subsidized by the free state. It offers integrated consulting encompassing single property rehabilitation measures, available at no charge. Technical support is offered to all construction stakeholders. Further information: www.byak.de/planen-undbauen/beratungsstelle-energieeffizienzund-nachhaltigkeit.html



Climate protection through village renewal and municipal development

Vibrant municipalities and villages are the backbone of rural areas, home to 60 percent of Bavaria's people. In cooperation with political representatives, citizens, and other stakeholders, villages and municipalities are to be strengthened as attractive, vibrant living spaces with future viability. Equivalent living conditions are to be promoted and safeguarded. The required measures include

- space-saving village and municipal development in line with climate protection, focusing on internal development and urban center revitalization,
- raising awareness among municipal representatives and citizens regarding topics such saving energy, producing and using renewable energy, and alternative forms of living instead of residential areas with single family homes,

- revitalizing vacant structures (reduction of gray energy),
- granting a funding bonus to municipalities exhibiting a special commitment to internal development and municipal climate protection,
- increasing funding for the energy rehabilitation of private and public buildings in village renewal by up to 20,000 euros, and
- establishing decentralized energy generation plants and distribution networks (local heating networks) as well as avoiding long traffic routes by providing basic services locally.



Bavaria's rural regions play a crucial role in climate protection and climate change adaptation.





Increased use of recycled construction materials - Mission RC20/25

The demand for construction materials in Bavaria is high and the supply of mineral primary raw materials is limited. Mineral construction and demolition waste is also Bavaria's largest waste stream with around 50 million tons per year. Processing in recycling plants allows this waste to be used in above and below-ground construction as recycled construction material. Well monitored recycled construction materials are considered equivalent in quality to primary construction materials in their respective field of application after successful testing and certification. In the interest of environmental protection and resource conservation as well as the security of supply, these recycled construction materials of monitored and certified quality should be used where possible. With "Mission RC20/25 -Bayern baut auf Umweltschutz!" (Mission RC20/25 - Bavaria builds on environmental protection), the Free State of Bavaria wants to increase the proportion of construction waste

processed in recycling plants by 20 percent by 2025. Returning building elements as well as construction and demolition waste to the construction industry cycle is to be intensified. Product cycles will be closed and resourced conserved.

Planned action items include

- expanding the public sector's leadership by example through the preferred use of recycled construction materials, to the technically and economically feasible extent, in the free state's construction projects, including the implementation of pilot projects by individual departments,
- appealing to Bavarian municipalities to also prefer the use of recycled construction materials and to promote recycled construction materials in the urban development context,

- public relations and networking by founding a Bavarian recycled construction material alliance, developing tools for builders, and taking recycled construction materials into account in training and continuing education,
- establishing a Bavarian ideas competition for the sustainable use of building elements and recycled materials in the construction sector through the Bavarian Resource Efficiency Center (Ressourceneffizienz-Zentrum Bayern – REZ),
- a Bavarian initiative at the federal level for standardized quality criteria for recycled construction materials, with the establishment of a product status also at the European level, explicitly anchoring recycled construction materials in the Standard Services Book for the Building Trade (STLB-Bau), and including recycled construction materials in funding programs of the Reconstruction Loan Corporation (KfW).

Sphere of activity 4: Smart, sustainable mobility

obility is a fundamental human need. It enables social participation and economic exchange, safeguards employment and wealth. Especially for a large state such as Bavaria, mobility is a central issue. Its current embodiment is not sufficiently climate-friendly. The transport sector accounts for nearly 30 percent of the nation's final energy consumption, 90 percent of which is crude oil based. Greenhouse gas emissions in Germany's transport sector with 162 million tons of CO₂ equivalents in 2018 were close to the 1990 level (163 million tons of CO₂ equivalents).

That corresponds to around 19 percent of Germany's total greenhouse gas emissions.

Thus it is apparent that mobility needs to change. Bavaria is therefore setting the direction for climate-friendly transportation. The car state needs to be become an electromobility, public transit, rail-based public transit, and bicycle state where fossil fuel burning mobility is a thing of the past by 2035. Bavaria is well on its way. The number of electric vehicle registrations has tripled since 2019 and Bavaria is Germany's number one state for charging stations and charging points. We want to expand and strengthen this position. Rural mobility also needs to be improved, since mobility is not an urban privilege. It has to be equally guaranteed everywhere in Bavaria. Measures in this sphere of activity include the following among others:

Incentives for the increased use of public transit services through an attractive annual ticket for students and trainees

Public transit is climate protection par excellence. Using buses and trains saves 15 million tons of CO₂ nationwide per year, approximately equal to a large city's emissions. To continue realizing the tremendous climate protection potential of public transit services, an association-wide annual ticket is to be introduced in the high-capacity transport associations at 365 euros for students and trainees. This is aimed at getting younger passengers to use public transit, reducing the use of motorized private transport. The ticket has already been introduced in the following transport associations on 1 August 2020: Großraum Nürnberg (VGN) and Mainfranken (VVM) as well as the Münchner

> An attractive annual ticket creates an incentive for the increased use of public transit services.

Verkehrs- und Tarifverbund (MVV) and Regensburger Verkehrsverbund (RVV). It was expanded to the Augsburger Verkehrs- und Tarifverbund (AVV) and Verkehrsverbund Großraum Ingolstadt (VGI) in August 2021. An evaluation of the pilot project and review of the expansion to other regions and entitlement groups is planned for the winter of 2023/2024.





Expansion of bicycle routes and bicycle traffic infrastructure

Riding a bicycle is mobility without greenhouse gases. It's quiet and saves space. These positive effects can be magnified with the timely expansion of bicycle infrastructure such as bicycle routes and parking. The conceptual design of a Bavaria-wide everyday bicycle traffic network is decisive for the bicycle traffic infrastructure. A corresponding network design has already been coordinated at the municipal level. The new construction or expansion of bicycle routes along streets and apart from them is also planned. Bicycle express routes along with innovative and inter-community bicycle routes are to be established as well. In general, parking violations on bicycle routes and footpaths in particular are to be sanctioned more heavily, and electromobility is to be further expanded with electric subcompacts. The "Radoffensive Klimaland Bayern" (Climate State Bavaria Bicycle Offensive) was launched back in December 2021. Implementing select projects has commenced in the meantime.





Expanding existing routes makes riding a bicycle more attractive.

Installation of 70,000 electric vehicle charging stations by 2030

According to estimates, electric cars have a 30 to 40 percent climate advantage over conventional vehicles depending on kilometers traveled over the life of the vehicle. Yet many buyers shy away from acquiring an electric vehicle. This is due to the fear that the necessary charging infrastructure is lacking. The installation of publicly accessible charging infrastructure in Bavaria has therefore been subsidized since 2017. A new funding program "Öffentlich zugängliche Ladeinfrastruktur für Elektrofahrzeuge in Bayern 2.0" (Publicly Accessible Charging Infrastructure for Electric Vehicles in Bavaria 2.0) was launched on 1 November 2021, and a new funding program "Nicht öffentlich

Fewer flights for the state government and its employees

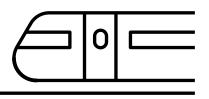
Flying is the most climate-damaging form of mobility. While flights are quasi unavoidable for many destinations due to large distances, more environmentally friendly alternatives by train or bus often exist within Germany and also Europe (express or night trains, for example). Many flights for work reasons can also be eliminated with videoconferencing. In awareness of the state's responsibility to lead by example, departments are therefore responsible for raising zugängliche Ladeinfrastruktur für Elektrofahrzeuge in Bayern" (Non-Publicly Accessible Charging Infrastructure for Electric Vehicles in Bavaria) was initiated in May 2022. Charging points not accessible to the public in the hotel and gastronomy sector were also supported. 1,500 prominently visible charging stations are to be installed at all government agencies as well. Further measures are being reviewed.



The project owner, Bayern Innovativ GmbH in Nuremberg, practices sustainable electric mobility.

awareness among business travelers and their supervisors that they should continue reducing business trips to the essential minimum, avoid flying, and prefer the use of other, more environmentally friendly means of transport. For all unavoidable business flights, the State Agency for Energy and Climate Protection (LENK) has been selecting and procuring corresponding certificates to offset the resulting CO_2 emissions centrally for the departments since 2020.

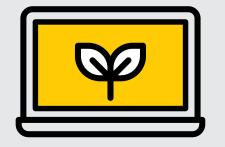
Reactivation and maintenance of rural railway lines



Public transit offers are often discussed primarily for urban centers. To provide equivalent living conditions in rural areas, attractive public transit structures have to be created there as well. Therefore, the goal is to permanently maintain or reactivate secondary lines. The state government's deliberations are aimed at improving the basic financial conditions for maintaining the infrastructure of railway lines that are not federally owned. A model is also being discussed that additionally offers the booking of transport complementing public transit services for routes that do not yet reach the required potential of 1,000 passengers (1,000 passenger kilometers per kilometer of route length).



Sphere of activity 5: Clean technology, climate research, and clean IT



t some point, climate protection leads to the central, fundamental problem: It isn't free, and old ways sometimes lead to dead ends since much that is familiar is already changing, will change, and has to change. For climate protection in Bavaria, we intend to view this challenge as an opportunity. We want to preserve what is established and proven, complementing this with the implementation of innovative new findings and developments, even when this means leaving the comfort zone on occasion. If we fail to do this, the topic will catch up with us elsewhere and with twice the impact.

Not just since the coronavirus pandemic, we know that science provides the best foundation to develop the strategies needed for implementation to address complex, global phenomena. That is why we are counting on the innovative capacity and abilities of Bavarian companies and research institutions with regard to climate protection. They create efficient economic cycles, new efficiency and energy saving approaches, new drive technologies, digital innovations for resource efficiency, and other climate

innovations. Some are already being used extensively, others are in the trial phase, and yet more are still in the scientific development phase. Bavaria is open to technology and therefore wants to forgo bans as far as possible, create incentives, and give all innovative approaches a chance with appropriate basic conditions. Examples of specific measures are described below.

Climate Center at the State Environmental Office (LfU)

The Climate Center at the State Environmental Office serves as the central source of information and point of contact for questions about climate change, its consequences, and adaptation in Bavaria, and shows what can be accomplished with ambitious climate protection. This task is realized in numerous projects. Examples include the setup, implementation, and further development of Bavarian climate change effect and adaptation monitoring to describe the impacts of climate change along with adaptation activities in Bavaria, and the operation of a Bavarian climate information system (BayKIS), a central information platform for climate development, effects, adaptation, and protection in Bavaria, providing the interested public, technical authorities, municipalities, and undertakings with data and information on climate fundamentals

and climate change on an IT-based platform. The Climate Center also supports Bavarian municipalities, districts, and companies in the climate change adaptation process with discussion events and the "Stadt.Klima.Natur" (City.Climate. Nature) environmental initiative. It serves as the first point of contact when stakeholders in municipalities, water management, companies, or civil society require information for adaptation to the unavoidable consequences of climate change that are already occurring today. The Climate Center funds and supports research projects in the fields of climate change and health, among other things in the joint project "Klimawandel und Gesundheit in Bayern" (Climate Change and Health in Bavaria).



Expansion of the Bavarian Climate Alliance

The Bavarian Climate Alliance represents the understanding of climate protection as a joint (global) task. The Bavarian State Government and all alliance partners have agreed on this in a charter and committed to the goal of greenhouse gas neutrality in Bavaria. Future expansion of the Bavarian Climate Alliance and its activities is planned. All organizations engaged in climate protection who want to contribute to climate neutrality in Bavaria as state-wide multipliers are asked to joint this partnership between the state and civil society. The annual Climate Week as the primary activity is to be continued and expanded in the region.

Joint climate change and health project in Bavaria (VKG)

Climate change and health problems are often complex. Effectively networking various disciplines is therefore important and is realized in the joint project. The focus is on the possible influence/consequences of climate change and climate change adaptation measures on human health. Health protection measures and health measures for adaptation to climate change are to be developed and interdisciplinary research is to be conducted in the area of climate change and health. Examples of research fields include

- climate-dependent, physical effects such as temperaturerelated morbidity and mortality (for example, protecting people in nursing homes during heat waves),
- effects of UV radiation (for example, skin cancer prevention in the climate change context),
- climate-dependent effects of aeroallergens (pollen) and aerosols (for example, interactions of chemical atmospheric aerosols with pollen and changes in their pathogenicity),
- microbiological, virological, and vector-borne infections in the context of climate change (for example, infections carried by the Aedes mosquito as the vector, causing dengue fever or chikungunya fever) for the modeling of projections and development of adaptation concepts.



Strengthening climate research and expanding the range of measurements of the Schneefernerhaus environmental research station on the Zugspitze

Ten globally renowned research organizations founded a "virtual institute" as a consortium at the environmental research station. They have coordinated their scientific programs with each other and rented laboratories and measurement terraces required for their research at the environmental research station. Closely linked with international networks,



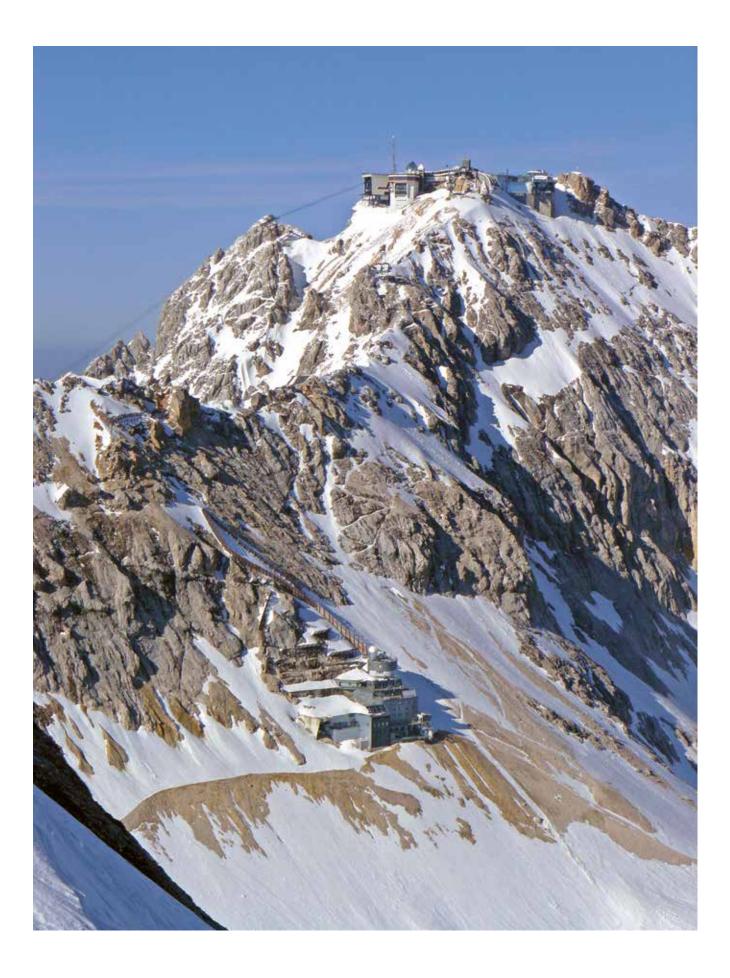
the collected data and findings also help with monitoring global climate protection agreements and improving current climate projections. The environmental research station is available to other institutions as a research platform as well. A 100 m² laboratory can be used for various scientific purposes by alternating users, provided there is no interference with ongoing activities. The center of internationally recognized scientific excellence is to be maintained and expanded going forward.



The Schneefernerhaus environmental research station on the Zugspitze

Green HospitalPLUS initiative

The healthcare sector produces about five percent of greenhouse gas emissions. Hospitals with their high consumption of energy and materials account for a significant share of that. That is why the Green Hospital initiative was launched back in 2011. As a contribution to Bavaria's energy transition, energy efficiency was the initial focus. Ecological optimization measures were implemented in the course of this initiative and their practicability was studied, among other things with the new construction of the Lichtenfels clinical center. In 2019, the Green HospitalPLUS initiative was launched as a further development and consistent expansion of this approach. The Green HospitalPLUS initiative is designed as a sustainability tool for Bavarian hospitals, based on three equal pillars: Energy – Environment – People. Even more so than before, hospitals are to be motivated to permanently anchor sustainability in hospital operations. Establishing long-term, dynamic sustainability infrastructures in hospitals and appointing persons responsible is therefore at the core of all the pillars. In addition to a comprehensive catalog of measures, important elements of the initiative include the development of a self-analysis tool to determine the state of sustainability efforts and possible improvements, and a best practices database documenting the various measures for improving sustainability in hospitals. Hospitals that meet the corresponding requirements can be awarded the Green HospitalPLUS designation or the preliminary designation of a best practice hospital.







Climate neutrality in Bavaria by 2040. To get citizens excited about this shared goal, the Bavarian State Ministry of the Environment and Consumer Protection launched the campaign "Klimawandel meistern – Wir treffen uns bei Null" (Mastering climate change – we meet at zero). From saving electricity at home to climate protection in your wardrobe – in cooperation with partners of the Bavarian Climate Alliance, the campaign identifies ways to gradually integrate climate protection into everyday life. Directly on site with offers for young and old, or online at:

www.klimawandel-meistern.de

and on our Instagram channel @klimawandelmeistern.

www.klima.bayern.de

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