



Bavarian State Ministry of the
Environment and Public Health



Bavarian Climate Programme 2020

May 2009

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Index

Bavarian Climate Programme 2020	3
Preamble	3
1. Climate Protection Policy – Basic Principles and Targets	4
1.1 Current Situation	4
1.2 National and International Climate Protection Goals G8 Summit	4
1.3 Bavarian Climate Protection Policy	4
2. Reduction of Greenhouse-Gas Emissions	6
2.1 Buildings	6
2.2 Transport	7
2.3 Renewable Energies	8
2.4 Climate-Friendly Generation of Electricity.	10
2.5 CO ₂ -Reduction in SMEs	10
2.6 Reduction and Absorption of Greenhouse-Gases in Other Sectors	10
2.7 Information, Advice, Environmental Education	10
3. Adaptation to Climate Change	12
3.1 Water Management	12
3.2 Agriculture and Forestry	12
3.3 Business/Tourism	13
3.4 Sustainable Urban Development	13
3.5 Nature Conservation	13
3.6 Public Health	14
3.7 Soil Protection and Georisks	14
4. Research and Development	15
4.1 Establishment of Interdisciplinary Research Networks	15
4.2 Other R&D Projects and Model Projects	16
4.3 Bavarian Programme for Participation in German Federal and EU Research Programmes	18
4.4 Reorganisation of the Schneefernerhaus Environmental Research Centre	18
5. International Climate Partnership	19
6. Demands on the German Government and the EU	19
Annex to the Bavarian Climate Programme 2020 Measures and Additional Funding for the Years 2008 to 2011	20

Bavarian Climate Programme 2020

Preamble

On April 24, 2007, the Bavarian Council of Ministers decided to update the Bavarian Climate Protection Programme launched in 2000 (and amended in 2003) into a "Bavarian Climate Programme 2020". It commissioned a cabinet committee to perform this task under the direction of the Bavarian Ministry of the Environment, Public Health and Consumer Protection (StMUGV). Other Ministries involved were the Bavarian Ministry of Economic Affairs, Infrastructure, Transport and Technology (StMWIVT), the Bavarian Ministry of the Interior (StMI), the Bavarian Ministry of Agriculture and Forestry (StMLF), the Bavarian Ministry of Sciences, Research and the Arts (StMWFK) and the Bavarian Ministry of Finance (StMF).

The "Bavarian Climate Programme 2020" will proactively complement and boost the efforts being undertaken on international and national level (Energy and Climate Programme of the German Federal Government and implementation laws, national climate protection programme), with a view to counteracting climate change and its consequences even more effectively. Even though Bavaria's share of global greenhouse-gas emissions is low, it must live up to its role model function. The only way to limit climate change as a global challenge is by non-EU industrial states also practising sustainable climate protection and emerging and developing countries also making a reasonable contribution to climate protection. However, climate protection and adapting to climate change also open up economic opportunities and avoid damage to the economy.

The Programme consists of a set of measures that were subjected to a cost/benefit analysis and reconciled with national measures, in order to use funds effectively and with maximum possible impact. They complement the ongoing measures of the

Bavarian Climate Protection Concept and should be seen as an action package for the next four years, after which time a decision will be taken regarding further measures.

Where this Programme refers to measures and objectives having financial impact, they can be implemented only in as much as funds and positions are provided for them in the state budget or by third-party financing institutions. The individual fields of action have to be coordinated with direct or indirect funding already available or planned elsewhere, in particular on the part of the Federal Government. The Bavarian funding schemes must start where gaps still exist and state funding appears both expedient and necessary.

The "Bavarian Climate Programme 2020" was developed jointly with the Bavarian Climate Council, which since April 2007 has also been advising the State Government on its climate policy and contributing its scientific experience.

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1. Climate Protection Policy – Basic Principles and Targets

1.1 Current Situation

Forecasts on the implications of climate change are alarming and testify to the urgent need for action. The Fourth Assessment Report of the “Intergovernmental Panel on Climate Change” (IPCC) of 2007 states in its Working Group reports that climate change is already much more advanced than previously assumed. Through the effect of human factors, greenhouse-gases in the atmosphere have reached concentrations that are unprecedented for the past millions of years. Carbon dioxide levels in particular have risen from 280 ppm before industrialisation (1750) to close on 380 ppm today.

It can be seen from the Working Group Three report that the concentration of CO₂ in the atmosphere should not under any circumstances be allowed to exceed 450 ppm, so that mean global warming can be limited to 2 to 2.4° C compared to the pre-industrial age. Nearly all scientists are unanimous that exceeding this level would increase the probability that the consequences could no longer be controlled. CO₂ emissions must reach their peak in the next few decades, then fall drastically and, according to forecasts, in 2050 be about 80 % lower for the industrial nations than in the year 2000. The time remaining for taking successful counter-action worldwide is very limited. From the perspective of the IPCC this is only feasible by radically changing the approach to energy production and consumption and by a new industrial revolution involving high investments.

The IPCC sees significant economic potential for reducing the emission of greenhouse-gases in the decades to come. However, it is vital to act quickly. Any delay in launching effective measures to reduce emissions will lead to significantly higher costs. The consequences for ecosystems and the global economy – for example, costs of damage caused by extreme climatic events or higher costs of adaptation measures – would be disastrous.

These propositions apply equally to the State of Bavaria. Owing to its geographical features, Bavaria, in particular, is especially affected by climate change. Regions that are particularly sensitive to climate change and extreme climatic events include the Alps, the central low mountain ranges as well as the big river valleys. In the last 100 years, the mean annual temperature in the Bavarian Alpine region increased by 1.5 °C, which is twice as much as the global average.

With a strong and innovative economy and an excellent record of competence in the environmental technologies, Bavaria is on the other hand very well placed for using the opportunities offered by climate protection worldwide to the benefit of economic development and jobs in Bavaria. Ambitious climate protection goals can only be achieved with the help of innovations, new technologies and high-tech solutions. This technological challenge offers a great opportunity for an export-oriented high-tech state like Bavaria and also a great chance for the Bavarian research landscape.

1.2 National and International Climate Protection Goals G8 Summit

At the Summit in Heiligendamm (on June 8, 2007) the Heads of Government of the G8 States agreed that halving greenhouse-gas emissions by the year 2050 should be seriously examined when defining a global target for emission reductions.

European Council

At its spring meeting in Brussels on March 8/9, 2007, the European Council discussed the “Action Plan for Climate Protection and Energy Policy” and adopted a package of measures with the following binding measures/targets by the year 2020:

- to reduce greenhouse-gas emissions by 20 % (with reference to 1990) or by 30 %, if other industrial nations undertake to achieve comparable emission reductions and the economically more advanced developing countries agree to make a contribution commensurate with their responsibilities and their respective capabilities,
- to increase the share of renewable energies in the total energy mix of the EU to 20%,
- to increase the share of biofuels in the total fuel market to 10 %,
- to improve energy efficiency by 20 % (referred to a development without additional measures).

Integrated Energy and Climate Programme of the German Federal Government

At the closed meeting of the German Cabinet at Meseberg on August 23/24, 2007, the German Government decided on key points for an integrated energy and climate programme. With a 29-point package of measures, it will set the course for reaching the climate goals in a continuous process up to the year 2020 and shaping the requisite measures cost-effectively.

Under this package, the share of renewable energies in heat consumption is to be increased to 14 % and in the generation of electricity to 25–30 %. A major target is to raise the share of combined heat and power in the electricity produced. This share is to be doubled to 25 % by 2020.

In addition, significant reductions in emissions from buildings are to be achieved by continuing the energetic refurbishment programme and tightening the Energy Saving Regulation for buildings.

The regulatory measures are being implemented in blocks by way of individual laws. The second climate package was adopted by the German Federal Cabinet on June 18, 2008

1.3 Bavarian Climate Protection Policy

Under the current climate protection concept, the State of Bavaria pursues the goal of restricting the annual energy-related CO₂ emissions from a level of over 90 million tons at the end of the 1990s to 80 million tons by the year 2010. In 2004, energy-related emissions amounted to 82.8 million tons.

In Bavaria, the specific CO₂ emissions per capita are a good third lower than the nationwide average (Germany: just over 10 tons CO₂ per capita and year; Bavaria: less than 7 tons CO₂ per capita and year). This is largely due to the higher energy efficiency of the Bavarian economy, the higher shares of nearly all the renewable energies (except wind power) and the roughly twice as high input of almost CO₂-free nuclear energy to electricity generated in Bavaria.

The EU and the German Federal Government have agreed on ambitious climate protection targets. To ensure that these are reached, the framework conditions must be fixed accordingly on international as well as national level, for instance by boosting innovative and energy-efficient technologies or by promoting renewable energies. Market and price developments for raw materials and sources of energy also play an important role. The opportunities open to federal states (the Laender) for pursuing a climate protection policy of their own must always be viewed in the context of national and international concepts. They consist for the most part of supporting and complementary measures. The aim of the State Government is to effectively complement the measures undertaken by the Federal Government and the EU and simultaneously to maintain the top position reached to date and preserve Bavaria's exemplary character.

This applies in particular in the case of renewable energies and the development of adaptation strategies. In order to further enhance the role of renewable energies, their share in the consumption of primary energy is to be doubled by 2020. Therefore sustainable use of the development potential of the respective renewable energies has to be made (e.g. development potential of hydroelectric power: 10 %). Hereto, it is true to say that the federal authorities are responsible for the essential

framework conditions for realising the development potential. The target of doubling the share of renewable energies can be reached, if the Federal Government consistently pursues its goals.

Bavaria was, moreover, quick to appreciate the need to adapt to climate change. Examples of early action in this field include the introduction of a climate change factor in flood control measures, the forest redevelopment programme and the Bavarian storm warning system. The development of adaptation strategies as a major regional field of action is to be consistently pursued.

Bavaria's already strong position is to be further improved through the Bavarian Climate Programme 2020 with the following tangible goals:

Bavarian climate protection goals

To maintain its frontline position in climate protection; to retain its exemplary character

Reduction:

- To reduce annual energy-related CO₂ emissions to well below 6 tons per capita (subject to further use being made of nuclear energy),
- To increase energy productivity by 30 %,
- To double the share of renewable energies in final energy consumption to 20 %,
- To increase the share of renewable energies in electricity generated to 25 to 30 %,
- To exploit the potential for increasing electricity generated from hydro-electric power taking account of the concerns of water management and nature conservation,
- To increase the contribution of geothermal energy to 1 to 2 % of electricity generated and heat supplied,
- To increase the share of biomass in the production of primary energy to 8 %,
- To double the share of combined heat and power in the electricity produced (subject to future framework conditions on EU and Federal level),
- To reduce the share of fossil sources of energy in the electricity produced.

Adaptation:

To adapt all climate-sensitive and vulnerable areas in Bavaria in the best possible manner to the consequences of climate change by 2020.

The climate change policy of the Bavarian State Government pursues a holistic approach. The Bavarian Climate Protection Programme adopted in 2000 and amended in 2003 is based on scientific data and findings and focuses primarily on sectors where the greatest reductions in greenhouse-gas emissions can be achieved in a as cost-effective manner as possible. This holistic approach includes

international cooperations as well as cooperation schemes with social groups in Bavaria that are further developed under the Bavarian Climate Alliance. The alliances with the 'Bund Naturschutz' environmental organisation, the major Bavarian churches and, as the umbrella organisation of Bavarian counties, the Bavarian 'Landkreistag' are evidence of a successful, joint approach. These alliances are being continued and extended. Envisioned partners include, among others, the 'Bayerischer Gemeindetag' (local government organisation of Bavarian municipalities), the Association of Bavarian Districts, the 'Bayerischer Jugendring' youth organisation, the Bavarian branch of the Association of German Architects as well as the Bavarian Chamber of Architects and the Bavarian Society for the Protection of Birds. Within the scope of these alliances, broad sections of the population are to be made aware of the topic of climate protection in a "Bavarian Climate Week".

Measure: To extend the scope of the Bavarian Climate Alliance and the Environmental Pact of Bavaria

- New partners will be added to the Bavarian Climate Alliance. To this end, concrete agreements will be reached in each case.
- The "Bavarian Climate Week" will be organised jointly with the alliance partners, with a view to sensitising wide sections of the population to climate protection.
- Companies that have an exemplary record of conduct in the field of climate protection have the opportunity to join the Environmental Pact of Bavaria.

A key feature of the Bavarian Climate Programme is the preventive **dual strategy of "Reduction and Adaptation"** – reduction of greenhouse-gas emissions on the one hand, adaptation to the inevitable portion of climate change on the other. This dual strategy must be consistently pursued and integrated into all spheres of life and business.

2. Reduction of Greenhouse-Gas Emissions

Around three-quarters of greenhouse-gas emissions in Germany are from energy use. The production, conversion, transfer and use of energy are therefore central fields of action for climate protection. A climate-friendly energy supply also requires economical use of energy resources and thus helps to reduce the dependency on imports.

The best way to advance Bavaria's good status in climate protection is consistent saving of energy and even more efficient generation and use of energy. With a particular emphasis on buildings, transport as well as the generation and use of electricity, the State Government will therefore adopt additional or enhanced measures and initiatives. In addition, the other sectors and other greenhouse-gases mentioned in the Kyoto Protocol must also be considered. Here also, measures for reducing emissions are required.

The industry also has a vital function and can make a decisive contribution towards increased energy efficiency and a more rational use of energy through innovative drive and new technologies. In the world markets, companies can at the same time capitalise on the competitive edge acquired from reductions in costs and innovative products. The State will provide the required framework conditions to this end.

2.1 Buildings

The sector "Households and Other Users" is responsible for approximately 35 % of energy-related CO₂ emissions in Bavaria. Here lies the greatest potential for saving energy and reducing CO₂ emissions, which is also relatively economical to exploit.

The Bavarian State Government therefore welcomes the KfW bank funding programmes for low-energy construction and the energetic refurbishment of buildings that enable a more efficient use of energy. To generate greater savings in the building sector, the State Government will take steps extending beyond those already adopted and consistently pursue the existing measures.

2.1.1 State-Owned Buildings

In the construction of new buildings and the energetic refurbishment of existing buildings, the State of Bavaria sees itself as a role model and goes to great efforts to increase the energy efficiency of its own buildings. It therefore fulfils a model function in the reduction of greenhouse-gas emissions, which is to be intensified with a new investment programme:

Measure: Special programme for energetic refurbishment of state properties

A special programme for energy-efficient refurbishment of properties owned by the State is to boost rehabilitation measures substantially. The refurbishment measures apply to both buildings and technical equipment: In addition, the use of renewable energies is to be intensified.

2.1.2 Municipal Building

To optimise the energy consumption in municipal buildings the following measures are adopted in addition to the funding schemes offered by the Federal Government

Measure: CO₂ reduction in municipalities

- The "CO₂ reduction programme for municipal properties" focuses with increased means on energy management and optimised running of municipal and church properties in terms of energy efficiency (including feasibility studies as a basis for low-energy contracting).
- The existing scheme that has for years focused on „municipal energy-saving concepts“ will be evaluated and further developed where required.
- The municipalities will receive support for participating in the "European Energy Award" in order to identify and exploit potential for boosting energy efficiency.
- Municipalities, local industry and citizens have joined up to develop a host of cooperative tools for climate protection, for example their own local Agenda 21. In doing so, they continue to receive support from the State.

2.1.3 Existing Residential Buildings

A large share of some 1.84 million residential buildings built up until 1978, with approximately 3.82 million housing units in Bavaria, are today still in need of energetic refurbishment. The thermal energy consumption in these buildings is particularly high. With some 15.6 million tons of CO₂ emissions per annum, residential buildings built before 1979 already generate approximately half of the CO₂ emissions in the sector "households and other users". By applying cost-efficient measures, the energy consumption in this sector can be reduced, thus exploiting a high CO₂ avoidance potential.

The Federal Government has issued appropriate funding programmes for the energetic refurbishment of residential buildings through the KfW bank. Bavaria was the state with the most applications filed in 2006.

2.1.4 Social Infrastructure

A large section of the social infrastructure such as schools, day care facilities and school gymnasiums urgently requires refurbishment for a more efficient use of energy. In some cases, there is a substantial investment bottleneck, especially in the municipalities. Bavaria will therefore be participating in the Federal-State-Municipal Investment Pact for energy-efficient refurbishment of social infrastructure, planned by the Federal Government, and assume its share in the three-way split of the financing. This amounts to a Bavarian share of 14.9 %.

Measure: Participation in the "Federal-State-Municipal Investment Pact for Energy-Efficient Refurbishment of Social Infrastructure"

The State of Bavaria will participate in the infrastructure programme of the Federal Ministry of Transport, Building and Urban Development (BMVBS) for the next 5 years.

2.2 Transport

The Bavarian Government is committed to pursuing a climate-friendly development of transport and to increase the share of public transport. The goal must be to increase energy efficiency in transport in a sustainable manner in order to substantially reduce the emission of climate gases and ensure that mobility in passenger and goods traffic is maintained.

2.2.1 Individual Transport

Road transport plays a key role, because it is responsible for most of the CO₂ emissions caused by transport.

Measures at the Source

The Bavarian State Government therefore supports the introduction of ambitious and realistic average emission limits for cars of 120 g CO₂/km as from 2012, in compliance with the concepts of the European Union, by stipulating differentiated limiting values which take into consideration such parameters as vehicle weight, for example. However, the Bavarian Government rejects an undifferentiated limit because it cannot achieve a maximum reduction regarding the small and medium class vehicles that dominate Europe's roads. The Bavarian Government will engage in intensified dialogue with the Bavarian automotive manufacturers on this issue and put a stronger emphasis on the topic of climate and environmental protection.

Measure: To strengthen climate protection in cooperation with the automotive industry

- Greater priority awarded to climate protection by the Bavarian Innovation and Cooperation Initiative for the Automotive Component Suppliers' Industry (BAIKA),
- The Allianz Bayern Innovativ initiative: CO₂ reduction – a key topic in the Automotive Cluster.

Measures in Road Transport Infrastructure

With regard to climate protection it is essential that pollution from transport remains at a level as low as possible. This means that all malfunctions and hindrances in the flow of traffic must be reduced to a minimum through optimised road network and traffic management measures (steady traffic flow). Through infrastructure planning, road construction can contribute decisively towards climate protection.

Measure: To develop telematics and traffic guidance systems

15 new traffic management systems are planned, predominantly in conglomerations, as well as the provision of additional large-scale variable traffic guidance systems extending across the borders to other federal states and countries. In future, the experiences gathered in traffic management schemes on federal highways for reducing pollution will also be used for state roads, especially with regard to transit through towns.

In addition, the following measures are also to be carried out:

- **Use of new information and communication technologies**
Free-flowing traffic and avoidance of private traffic by applying new media technologies, e.g.
 - Project "Cooperative Traffic Management (KOOV)" in the Munich area
Sustainable improvement in mobility in the highly urbanised region of Munich; time and operating cost savings for road users.
 - Traffic Information Agency of Bavaria (VIB)
Improved preparation prior to and reliable information during the trip ("door to door routing"); avoidance of diverted and undirected traffic; substantial fuel savings
 - Construction-site management systems on motorway sections
Reducing traffic jams, free-flowing traffic management at construction sites
- **Requirement-based road development**
The construction of bypasses and requirement-based extension of highly frequented sections of the federal and state road network also lead to an improved traffic flow and consequently to a reduction in the consumption of energy as well as reduced emissions caused by traffic.

2.2.2 Public Transport

The specific CO₂ emissions from buses and trains are lower than those from individual traffic. The State Government therefore continues to pursue its policy of boosting public transport. Additional climate protection can be achieved through an increased shift from individual transport to public transport and greater occupancy of the vehicles in public road and rail transport.

2.3 Renewable energies

Bavaria has awarded top priority to renewable energies for many years. In Bavaria these energy sources account for some 8 % of the energy supply (in terms of primary energy consumption) which is decisively more than the German average (approx. 6 %). It is the goal of the Bavarian State Government to double this share by 2020. By then, the share of renewable energies in final energy consumption is to be increased to 20 %.

In its efforts to advance climate protection and secure the energy supply (energy mix) on a broader basis, the Bavarian Government will further increase the use of renewable energies in Bavaria.

A significant increase in the share of renewable energies can only be accomplished with further substantial investments and public funding. The additional measures planned by the State Government should focus on areas where further stimuli can be expected to have a maximum impact, with regard to the regional development potential and cost effectiveness. The key fields that emerge in Bavaria are biomass, hydro-electric power and geothermal energy. Furthermore, information and consulting activities are also to be intensified.

Biomass

The technical potential of biomass in Bavaria is up to 15 % of the current primary energy consumption. Intensified use of biomass is additionally backed by the following measures:

- **Beacon projects close to the market**
The Competence Centre for Renewable Resources is the nucleus for a range of activities that are creating a host of synergy effects. The interaction among the different players with a strong public image is having a particularly positive impact on the use of biomass. Priority is awarded to the following measures:
 - Development of a model region in the area surrounding the Competence Centre for Renewable Resources in Straubing (focusing on research, development, market-significant implementation, information),
 - Use of biogenetic fuels and other renewable energy sources at Munich airport,

- Setting up a model plant using fast-growing fuel plants.
- **Financial support for investments**
Besides the choice of energy source, special attention is to be directed to the efficiency of the resources and to an optimised degree of utilisation, as well as climate relevance and sustainability. Investments in these sectors are particularly expedient and productive. Emphasis is placed on efficiency-boosting measures and start-up funding for projects entering competition such as, for example
 - Biomass thermal power plants and the development of biomass local heating networks, as well as low-capacity heating systems using wood chips,
 - Enhanced waste-heat recovery from biogas plants,
 - Use of biogenic fuels in Bavarian agricultural and forest farming as well as in vehicles of the state administration.
- **Biomass research**
Selective research undertaken today is the key for penetrating the markets of tomorrow. Based on the heterogeneity of biomass as an energy source, both in production and in its exploitation, it is necessary in research to concentrate on sustainable and climate-compatible future-proof fields. For a strategic alignment and sustainable use of renewable resources, research will be intensified particularly in the following fields:
 - Studies to provide an optimised exploitation and planting mix for a climate-friendly supply of energy, in keeping with the requirements of the food and timber supply, which also secures the functions of natural space and the high quality of the environment for water bodies, soil and nature protection (biodiversity, landscape, recreation value) and clean air,
 - Material flow balance, use, climate relevance, water regime, humus balance of the individual crops used for resources as well as fuel treatment methods and pilot plants for blade crops, corn and recycled fuels,
 - Networking of research in the field of bio-fuels; developments for biomass liquefaction including bio refinery as well as process optimisation in bio-gas use.

Measure: "Bio-energy for Bavaria"

To expand the use of biomass as a renewable source of energy:

- Beacon projects in the area of Straubing and at Munich airport, among others,
- Investment funding for biomass plants, use of bio-fuels by the state administration,
- Research programme "Biomass and Climate",
- Information initiative "Biomass is more" (see Ch. II.7.2).

Hydro-Electric Power

Bavaria's hydro-electric power potential is already being exploited to a large extent. The generation of electricity from hydropower can, however, be enhanced by building new facilities and improving the efficiency of the power plants. Already at the end of 2006 the Bavarian Government negotiated a key-point agreement with the hydropower companies for a sustainable use of hydropower. The set goal is an improved coordination of the use of hydropower with the concerns of water management and nature conservation.

Companies operating the large hydropower plants shall to this end, under the initiative of the State Government, prepare an updated appraisal of the development potential arising from, for example, modernisation and new plants, and look into possibilities for the implementation thereof in cooperation with the State Government. The goal is to exploit the full development potential of hydropower.

Geothermal Energy

In Bavaria, and especially in Southern Bavaria, favourable conditions exist for hydrothermal energy utilization in deep geothermal wells. For climate protection the goal is therefore the best possible exploitation of the geothermal energy potential in Bavaria. This also demands, in addition to the generation of electricity from geothermal energy which is already supported through the Renewable Energy Act, maximum utilisation of the energy for heating purposes. The efficiency of geothermal heating systems is, however, encumbered with high investment costs, especially with regard to the heat distribution network. Besides this, it is also evident that an optimum heat consumption density cannot always be expected for geothermal energy within the radius of the geothermal well. Contrary to the generation of electricity, there is no correspondingly high federal funding available for geothermal heat supply. This gap is to be closed with a regional programme.

Measure: New funding programme for geothermal energy in Bavaria

Funding programme (possibly low-interest LfA state development bank loan) for investments in geothermal energy – focusing on heat distribution.

Measure: Bavarian climate protection loan programme for best-practice measures in SMEs

Support and funding of measures for CO₂ reduction that can be amortised within a few years.

2.4 Climate-Friendly Generation of Electricity

Thanks especially to nuclear power and hydropower, in Bavaria merely 20% of electricity is generated in power plants that run on fossil fuel. To reach the ambitious climate protection goals it is, however, a prerequisite that the operating times of existing nuclear power plants are extended. Even massive efforts to save energy and boost efficiency, and the development of renewable energies, will in the foreseeable future not be able to adequately close the gap emerging after a pull-out from nuclear energy – leaving an impact on the climate. Bavaria therefore supports the lifting of the existing operating-life restrictions at federal level. In the event of an operating life extension, a defined investment volume for the sector of renewable energies, energy efficiency and energy research is to be fixed (agreement with the energy industry).

The CO₂ reduction potential in Bavaria is therefore considerably lower than in the Germany-wide electricity mix with a fossil fuel share of 60 %, nevertheless there is still potential for improvement through a more efficient generation of electricity in Bavaria. Bavaria is a region where state-of-the-art and highly efficient power plant technology is developed, manufactured and used.

2.5 CO₂ Reduction in SMEs

In small and medium-sized commercial and industrial enterprises (SMEs) there is a high potential for improvement with regard to the efficient use of energy and therefore for a reduction in CO₂ emissions. These measures are frequently amortised within a few years. The eco-loan programme of the LfA is to be extended to support measures for CO₂ reduction in SMEs. It is the set goal to reduce the emission of CO₂ with the lowest possible means. To begin with, the SMEs are to be offered consultation services. From the guides on energy efficiency for industry and trade, prepared by the Environment Agency of Bavaria (LfU), a catalogue of measures for CO₂ reduction is being prepared. The LfU will intensify its climate and energy-efficiency information service for companies at its information centre for environmental management and consistently update the best-practice examples.

2.6 Reduction and Absorption of Greenhouse-Gases in Other Sectors

Agriculture and forestry offer many possibilities for absorption and avoidance of carbon dioxide and other greenhouse-gases on their cultivated areas of land and in animal husbandry. With climate-friendly farming methods and structural improvements, including instruments for land consolidation, among others, it is possible to further enhance the energy efficiency of agricultural and forest farming and reduce the emission of greenhouse-gases. With the help of advisory services, more low-emission animal husbandry systems are being launched.

Through improved feeding and organic fertilizer management as well as optimised performance in cattle farming, it is possible to reduce emissions in the animal husbandry sector. Optimising and minimising the use of nitrogen fertilizer in farming as well as the further development of extensive eco-farming of land help to further reduce the emission of greenhouse-gases. The cluster initiative Forest and Wood will be consistently pursued with a view to sustainable mobilisation of potential benefits in the exploitation of forests and a climate-oriented intelligent use of timber. Research work in the energy crops sector is to advance planting methods with new plant species for generating resources from plant crops.

2.7 Information, Advice, Environmental Education

Effective climate protection demands knowledge and awareness of the interrelations and opportunities in as wide a section of the population as possible. A comprehensive and well-structured information service, which also takes into account the specific regional circumstances, is therefore essential for successful implementation of energy and climate goals. Whereas regulatory measures and the possibilities for financial support on a broad scale are first and foremost a responsibility of the Federal Government, offering information and advice is an important task at state level. In addition to a large number of information, advisory and education activities, which have been conducted for years now, the State Government will develop further measures within the framework of the Climate Programme, especially in the following fields:

2.7.1 Building Sector

With the focus on energy-saving in buildings, addressing a particularly wide field of parties, investors and users.

Measure: Information campaign for saving energy in buildings

- Setting up an area-wide and local network of contact persons for energy-efficient building and refurbishment measures at the district administrations,
- Information initiative in connection with the new requirements of the Energy Saving Regulation (e.g. Energy Pass also for existing buildings; operation of an information bus for a Bavaria-wide, on-the-spot advisory service on energy saving and renewable energies, with building and heating as a core theme),
- Expansion of the Internet site "Building and Energy", including among other things a continuous updating of best-practice examples.

2.7.2 Biomass

In Bavaria biomass provides the greatest potential for renewable energy that can be exploited in the medium term. Many potential investors and users are very much in need of information and advice on the comparatively new technologies in this sector. Additional information activities are to accelerate the development and expansion of use.

Measure: Information campaign "Biomass is more"

- Initiative for more advisory services on energy from biomass, extended to include the topic "fast growing fuel plants – timber from the fields",
- Special exhibition on climate protection through biomass (Competence Centre for Renewable Resources in Straubing), travelling exhibition on the efficient use of biomass for energy,
- Setting up a specialised advisory network for energy from biomass,
- Information campaign on "E85" as a motor fuel blend of 85 % ethanol.

2.7.3 Energy Efficiency Measures in Private Households and Businesses

In private households and in the commercial sector, there are other important ways to save energy in addition to building and heating technologies, such as lighting systems, air conditioning, electrical domestic appliances, process heat, process engineering or car pools. More information is to be provided on efficiency measures in these consumer fields.

Measure: Information campaign on energy efficiency in private households and businesses

- New funding scheme for regional energy consulting agencies (2–3 for each administrative district), mostly organised by the municipalities, with the aim of encouraging local helpdesk initiatives and set up regional networks,
- Strengthening the Bavarian Energy Forum (Bayern Innovativ GmbH, Nuremberg) as network node of the Bavaria-wide information and advisory service; development of the forum's project and campaign work by offering energy technology transfer/ information in the fields of energy saving, improvement in energy efficiency and use of renewable energies,
- Information initiative on saving electricity in cooperation with the German electrical and electronic manufacturers association (ZVEI), target groups being manufacturers and users.

2.7.4 Environmental and Consumer Education

Climate protection can only become effective if it is accepted and lived by citizens as an important part of their daily life and conduct. The aim of environmental and consumer education is therefore to provide the consumer with the necessary knowledge, critical awareness and the ability to make the right decisions based on facts, thus creating a greater sense of responsibility for independent action taking into account the impact of climate change. Self-guided learning and action must start at an early age, with children and young people, and must continue and be encouraged on a lifelong basis.

Measure: Climate protection in environmental and consumer education

- To intensify the Bavaria-wide network of non-school environmental education institutions (establishments under the umbrella brand "Environment Education in Bavaria") and expansion of the services offered in the field of climate protection,
- To implement Bavaria-wide model projects for networking, bundling and communicating measures with regard to climate protection,
- To interlink the existing networks for environmental and consumer education,
- To develop the partnership and cooperation with competent partners (including municipalities and companies).

3. Adaptation to Climate Change

Bavaria was quick to recognise that climate change could not be faced solely by reducing greenhouse-gases. A substantial part of Bavaria's climate protection programme therefore focuses on developing and implementing regional strategies in all sectors in order to adjust to the unavoidable effects of climate change within the scope of the national adaptation strategy.

This line of action is confirmed by a study on "Climate Adaptation in Bavaria 2020" commissioned by the State of Bavaria with the University of Bayreuth. The aim was to illustrate the potential impact of climate change in Bavaria so that suitable preventive measures could be introduced to limit negative developments and new positive developments could be identified in good time. The study clearly revealed that the economic, ecological and social impact of climate change would continue to increase.

3.1 Water Management

The most serious direct and indirect implications of climate change for society are expected in the water sector. In the context of water management, climate change therefore calls for integral adaptation measures in the following sectors:

3.1.1 Basic Principles, Monitoring and Warning Services

The KLIWA Project (Climate change and its consequences for water management) must be expedited with regard to low water levels and dry spells. The monitoring of climate change-related changes in water balance variables must be intensified. In order to be able to respond quickly to very dry periods, a low-water information service must be set up.

3.1.2 Flood Control

Floods are a threat to human life and housing, commercial and industrial properties, as well as motor vehicles, causing so-called intangible costs for such eventualities as production shortfalls, disaster relief missions, clearance work, etc. The increasing risk of flooding is equivalent to a Bavaria-wide damage potential of over € 25 billion.

Measure: To adapt the Flood Control Action Programme 2020

The Flood Control Action Programme 2020 must be dynamically adapted to climate change, in particular by taking it into account in the dimensioning of flood control systems (climate change factor), by increased wide-scale flood-water retention, by reducing residual risks in flood control systems exposed to a risk of overflow and by keeping emergency overflow facilities clear for storage capacities above the scope of regular flood management.

3.1.3 Drought and Dry Spells

Measure: To take precautions against drought and dry spells

The existing regional and foreseeable seasonal imbalance in the distribution of precipitation in Bavaria calls in particular for an increase in secure supplies of drinking water on local and regional level by networking plants or through alternative water production facilities ("second pillar"), especially in those parts of Franconia and of the Upper Palatinate Forest and Bavarian Forest that have water shortages; sustainable protection of usable groundwater resources and sensitive surface water bodies; updating thermal load plans and drawing up low-water management plans.

3.1.4 Cross-Sectoral Measures

Pressure caused by drought and flooding requires the protection of water resources and a more integrated management. It is particularly important in this respect to secure potential large-scale retention areas for flood control, higher low-water levels and drinking water supplies. Provision for many of these measures should be made in rural areas to further the regeneration of groundwater through water retention in rural areas and measures for draining developed areas (percolation, unsealing).

3.2 Agriculture and Forestry

Over 80 % of land is devoted to agriculture and forestry, so these sectors are among those most affected by climate change. As a result of increasing storms and periods of drought, an annual damage potential of up to € 850 million is predicted for Bavaria. The development and implementation of suitable adaptation strategies in all spheres of agricultural and forestry production is a major challenge for securing the economic efficiency of these economy sectors (sales volume € 58 billion/ annum) and for the cultivation of our countryside and its ecological functions. The "Weihenstephan Declaration on Forests and Forestry in Climate Change" of July 18, 2008 marked the very first time in Germany that a joint platform had been created with all the forest associations and organisations in a state.

Action is required mainly in order to limit damage in the various production sectors, develop a sustainable forest, protect biological diversity and make careful use of the resources water and soil.

Measure: Forest redevelopment programme

Of the total of approx. 260,000 ha of spruce that are acutely endangered in both private and communal forests, about 100,000 ha will be converted into climate-tolerant mixed forest by 2020.

Measure: To protect mountain forests

Through intensive care and redevelopment of forests to be protected, combined with effective regulation of hoofed game, mountain forests and their vital protective functions are sustainably stabilised for the substantial climate change occurring in the Alpine region. A state-wide information system will facilitate targeted responses in regional risk areas.

3.3 Business/Tourism

For tourism, and especially for travel offers involving a nature experience, climatic conditions play a major role. While the discussion on potential climate changes has in the meantime also reached the tourism operators and customers, it is not usually a primary consideration in decisions about the type of holiday and the destination; the main criteria continue to be quality, attractiveness, service and price.

In the medium to long term, the tourist industry will have to face considerable challenges. Both the infrastructure and the development and marketing of tourist offers must be adapted to the circumstances. It is first and foremost up to the businesses to develop additional innovative and top-quality offers in good time and to improve the quality of existing alternatives. This calls for massive investment to secure tourism as a significant economic factor in Bavaria. The State Government will investigate whether any government funding is necessary and possible for Bavaria to maintain its position as a top tourist destination even under changed framework conditions.

3.4 Sustainable Urban Development

Sustainable urban development requires integrated planning, with the aim of reducing the amount of land used, creating compact housing units with cost-effective forms of construction and housing development, introducing traffic-calming measures in residential areas and making rational use of energy by means of adapted urban concepts. Urban concepts that reduce traffic and maintain the balancing functions of unsealed areas by restricting soil sealing make a major contribution to reducing CO₂. By

developing and adopting energy-optimised concepts for urban development and urban renewal, it is possible to set the course for subsequent energy consumption of buildings already on local planning level. In particular, the impact of building development on the microclimate can also be controlled, thus minimising the energy expended for the air-conditioning of buildings (avoidance of heating effects). Such energy-optimised concepts and the maintenance of the ecological balancing functions of unsealed areas will be an increasingly important instrument also for taking account of the no longer reversible consequences of climate change at the planning stage. Sustainable and hence future-oriented urban development concepts that protect the climate must therefore be encouraged and supported.

3.5 Nature Conservation

Through loss of land, more intensive use, fragmentation of living space, development of water bodies and drainage, nature has already for decades been exposed to severe adverse effects. Climate change has introduced another category of exposure that will particularly affect the Alps, the higher altitudes of the central low mountain ranges as well as wetlands and floodplains. Vital ecosystem functions, like the protective function of mountain forests or the marshland acting as water retention basins and CO₂ sinks, will be seriously influenced. Due to the many diverse effects of climate change, there is increasing risk of species being lost. On their own, the climate-related losses of species that are being predicted for flora and fauna in the next few decades are estimated in Germany at 5 to 30 %. There is a risk that ecosystems will no longer be able to perform their services for mankind (soil fertility, self-purifying capacity of water bodies, filters for the air, base materials for medical drugs, foods, etc.) on the current scale.

To maintain their functions, ecosystems will in future need even more support by nature conservation measures. Areas will have to be reserved for this purpose. Sufficiently large habitats must be provided to protect domestic and, especially in Bavaria, endemic species. Newly arrived species can help to maintain ecosystems, but they can also pose a risk and therefore need to be observed closely.

The natural range of many species will shift, which means that networking of habitats must be increased. The functional diversity of ecological systems is a key factor in maintaining biodiversity and simultaneously serves to reduce the impact of climate change. Maintaining this diversity is active climate protection and far more cost-effective than technical measures. These targets should therefore be considered in all spheres of policy-making. On

April 1, 2008, for instance, the Bavarian Council of Ministers tasked the Bavarian State Ministry of the Environment, Public Health and Consumer Protection and the relevant competent departments with the implementation of the strategy to preserve biological diversity in Bavaria (Bavarian Biodiversity Strategy) with the participation of the organisations concerned.

Measure: Special programme to stabilise genetic diversity and ecosystems

- Networking of habitats with a view to creating opportunities for animals and plants to migrate,
- Intensive networking of BayernNetzNatur projects with the European ecological network of 'Natura 2000' protected areas (FFH-designated areas and bird sanctuaries),
- Reduction of the fragmenting and barrier effect of transport routes, river constructions and land used intensively for agriculture or forestry,
- Increasing niche and structural diversity in the regular landscape by means of a local biotope network supported by agro-environmental programmes of StMUGV and StMLF,
- Securing and developing areas of state-wide significance (nature conservation areas, protected landscape components, etc.) as core areas, network axes and stepping-stone biotopes,
- Targeted measures to protect particularly endangered species,
- "Ecological Alpine Cooperation" Bavaria/Salzburg/Tyrol/Vorarlberg within the scope of the Nature Conservation and Landscape Management Protocol of the Alpine Convention.

Since floodplains and marshland are important carbon sinks, but depending on how used also release many climate-relevant gases, particular attention must be devoted to these types of biotope.

Measure: Precautions for preserving natural carbon sinks and improving the local climate

- To preserve and renature floodplains,
- To renature on a priority basis 50 areas of marshy ground from the Bavarian moor and marshland development concept up to 2020,
- To promote climate-friendly agricultural use of moorlands incl. re-conversion of arable land into waterlogged grasslands again,
- To improve the microclimate in large built-up areas, to maintain and improve green spaces in towns and cities as well as fresh-air corridors, like for example meadows and valleys.

3.6 Public Health

The Bavarian population is exposed to climate change in many different ways:

- More heat waves can be expected in summer, which will lead to an increase in the death rate. Older citizens and people in need of care as well as people suffering from cardiovascular disorders are particularly hit.
- Exposure of the population to UV-A and UV-B rays will increase. This is especially true in the case of Bavaria where people have settled at higher altitudes up to Alpine levels and due to its special topography with lakes and mountains offering high leisure value. This augments the risk of skin cancer.
- As the water bodies grow warmer, the natural micro-organism populations in waters can multiply. This can lead to human infections. Overall, a deterioration in the quality of bathing water is conceivable.
- Rising air temperatures encourage the spread of ticks and infectious diseases not previously encountered; an increase in allergic complaints is to be expected.

Many of the negative effects of global warming on human health can be reduced by appropriate preventive measures and often avoided entirely.

Measure: Heat-wave warning system

Heat-wave warning system: Since July 2007, public health offices, governments, radio and television stations and residential nursing homes have been receiving regional warnings and forecasts of hot weather directly from the German Weather Service.

3.7 Soil Protection and Georisks

Special precautions for soil protection are necessary in particular to maintain the filter and buffer function of soils, to protect against groundwater pollution and to preserve the production capacity of areas used for agriculture and forestry. Adaptation strategies must be explored and developed, especially with a view to counteracting a possible increase in incidents triggered by erosion, the release of CO₂ as a result of the decomposition of organic substances (reduction of humus levels), possible changes in the water balance of soils and to control acidification. These measures also include the development of soil-preserving methods of treatment and the growing of plants that are adapted to local conditions, as well as defining criteria, which provide for the sustainable cultivation of renewable raw materials.

Geological risks like slope movements, land slides, mudstreams, rockfalls or rockslides have always posed a latent danger to life, property and

infrastructure especially in the Alpine regions. Due to the higher frequency of extreme weather conditions associated with climate change, it is expected that georisks will increase in future.

Measure: Programme to control georisks

- To extend the Georisk Database existing for the Bavarian Alpine region to cover the whole of Bavaria, thus boosting prevention and enhancing security,
- To produce overview maps, like those prepared as a pilot project for the Oberallgäu region, for the whole of the Bavarian Alpine region in order to precisely assess hazards,
- To investigate hazards posed by rockfalls at the perma frost border by drillings and measurements on top of Zugspitze mountain.

4. Research and Development

Research and development are the basis for developing sound strategies for adaptation, damage prevention and anticipatory action. In the field of climate research and climate impact assessment, extensive research activities are being conducted in Bavaria, which can also boast a wide range of competences. Nevertheless, in certain areas there is need for specific research. Basic findings gained from climate research must be examined for their impact on Bavaria and be turned into forecasts specific to the region, paying particular attention to Bavarian features like the Alpine region.

It is also important to pool and network the expertise available at universities, non-university institutions, state agencies and relevant companies, placing greater emphasis on a cross-discipline approach. Moreover, research and development assignments as well as model projects addressing specific practical issues must be proactively implemented in various sectors.

In the process, research projects planned in Bavaria are to be designed and implemented in close concurrence with EU and Federal German programmes, in order to avoid duplication and parallel work on the one hand and, on the other, to be able to use all current know-how and working results for Bavarian climate research – and the adaptation strategies developed from them – as efficiently as possible.

4.1 Establishment of Interdisciplinary Research Networks

An appropriate and tried-and-tested instrument for pooling competences across departmental and institutional borders is provided by interdisciplinary research networks, in which – depending on the particular subject – industry is also involved. Due to the complexity and broad scope of issues addressed, the cooperation networks cover not only basic research, but also application-oriented research. The potential for know-how transfer and exporting technology is taken into account in all projects and issues addressed.

The following three interdisciplinary research networks have been set up with experts from science and industry:

4.1.1 Bavarian Research Cooperation “Impact of Climate on Ecosystems and Climatic Adaptation Strategies” (BayFORCAST)

Knowledge of how regional ecosystems react to climatic changes is currently rudimentary. The cooperation network will therefore explore the

ecological implications of climate change and their natural compensation possibilities. The basis will thus be created for efficient strategies to minimise damage and for social adaptation to inevitable developments, e.g. in the field of public health or land use. Studies will cover ecosystems, where strong reactions to climate change are expected and which in Bavaria are both economically relevant and significant in terms of size, such as the large forests of the central low mountain ranges and the Alps as well as land used for agricultural purposes, in particular in the floodplains.

Measure: Research Cooperation BayFORCAST
Impact of climate on ecosystems and climatic adaptation strategies

4.1.2 Bavarian Research Cooperation “Technologies Safeguarding Resources” (BayFORREST)

In an application-oriented cooperation project involving science and Bavarian SMEs, various approaches will be adopted to significantly increase the efficiency of resources and energy in the participating companies and hence substantially reduce the energy needed. The cooperation network concentrates on sectors of importance to Bavaria with a strong presence of SMEs.

Measure: Research Cooperation Technologies Safeguarding Resources (BayFORREST)
To increase the efficiency of resources and energy in SMEs

4.1.3 Research Network “Power Plants for the 21st Century” (KW 21)

In the light of the need to secure a guaranteed supply of energy and to renew over half of the existing power plants in the next 15 years, the development of new technologies for fossil-fired power plants is an urgent and highly topical matter. The aim of the research network of power-plant manufacturers and scientific institutions is to improve the technology of thermal power plants with a view to improving their degree of effectiveness (efficiency) thus reducing climate-relevant emissions. Moreover, energy analyses and strategies are developed in the network from a financial, economic and ecological perspective.

Measure: Research Network “Power Plants for the 21st Century”
To increase the efficiency of thermal power plants and so reduce climate-relevant emissions

4.2 Other R & D Projects and Model Projects

In addition, individual research & development projects and model projects are in progress that are addressing specific practical issues. In the next few years, there will be need for research on the following priorities in particular:

4.2.1 Agriculture and Forestry

Agriculture and forestry are particularly exposed to the challenges of climate change. An agricultural research enterprise should deliver significant information and advice for use in practice. Issues addressed include, among others, plant cultivation, nutrient and water balance, soil treatment, precision farming, erosion avoidance and investigation of genetic resources under climate stress.

In order to redevelop forests, climate-adapted recommendations of tree species are needed. For this purpose, the site maps available throughout Bavaria will have to be speedily revised. The forestry management and conservation concepts on prevention and damage control must be adapted to the rapidly changing climatic conditions. Especially forested areas at high altitudes are at particular risk due to climate change and can no longer fulfil their protective functions. Trees at risk must be identified, so that the resources required for their care and remediation can be allocated as required.

The increased and new incidence of economically significant pests (e.g. bark beetle and oak processionary moth) calls for an improvement in current preventive and control strategies.

Measure: Agriculture and Forestry Research Programme

- To operate an agricultural research enterprise,
- To adapt existing site maps and make recommendations for tree species,
- To identify climate-related trees at risk in mountain forests,
- To take preventive measures against pests in the forest.

4.2.2 Environment and Public Health Regional Climate Scenarios, Water Balance Models – KLIWA

Data available on future global climate developments are the result of model calculations with global climate models. These models describe the most important physical events of climate relevance in the atmosphere, the oceans and on the Earth's surface and can simulate how the climate will develop. The model runs are based on specific emission scenarios for the development of such climatic factors as

greenhouse-gases, which among others produce bandwidths for the future development of climate. For climate scenarios on regional scale the data of global models must be regionalised, so that they can then be further processed as input for further steps like modelling the water balance with the necessary resolution.

Measure: KLIWA – Climate Change and Consequences for Water Management (continuation of the project)

- To further develop dynamic regional climate models with a view to improving the assessment and regionalisation of the future climate,
- To select/evaluate appropriate regional climate scenarios,
- To select standard scenarios for the Bavarian administrative bodies.

Ecosystem and the Alps

On the strength of the basic scientific premises provided by the BayFORCAST Research Network, concrete adaptation strategies have to be developed for the fields of ecosystems, soil protection and natural hazards. For the Alpine regions, special strategies will have to be pursued on the basis of the findings of the INTERREG IIIB Project “Climate Change, Impacts and Adaptation Strategies in the Alpine Space” (ClimChAlp).

Measure: Research Programme Climate Adaptation Ecosystem and the Alps

- To develop adaptation strategies for the fields of ecosystems (conservation of nature and species, biodiversity), soil protection and natural hazards,
- Follow-up project of ClimChAlp (e.g. development of climate and environmental indicators, dealing with natural Alpine hazards).

Health Consequences of Climate Change in Bavaria

Due to the impacts to be expected from global warming (higher mortality rate following heat waves in the summer, increase in allergic complaints, spread of infectious diseases, higher risk of skin cancer), research activities and the development of prevention and adaptation strategies must be intensified in the light of the anticipated consequences for public health.

Measure: Research Programme “Public Health Consequences of Climate Change in Bavaria”

Perspectives, development of preventive strategies and counter-measures.

4.2.3 Climate and Environmentally Compatible Technological Development

Research & development is the key to sustainable supply of energy. Only in this way will the necessary technologies be available for more efficient use of today’s sources of energy and for opening up new sources, based on open and unbiased energy research on both national level and within the scope of international cooperation. Special account must be taken of the fact that efficient research capacities cannot be developed in a short time. Energy research therefore needs clear and reliable long-term targets and framework conditions. Research into energy must consider cost-effectiveness, environmental compatibility and availability. Investments must also be made in fields of research, in which it may take years or even decades to produce marketable techniques and which therefore entail higher risks of success.

Owing to its overriding importance, encouraging and facilitating energy research and development is primarily a responsibility of the Federal Government and the EU. The Laender are expected to take action in those sectors where they can complement national measures with regard to aspects of particular regional interest. EU support should, in turn, focus primarily on supraregional issues. Key measures undertaken by the Bavarian State Government include:

Measure: Energy Technology Cluster

To promote selected cooperation projects of companies and scientific institutions participating in the Energy Technology Cluster.

Measure: Hydrogen/fuel-cell development

To continue the “Hydrogen Initiative in Bavaria” in parallel with hydrogen and fuel-cell activities and as an intermediary for Bavarian companies coordinating access to EU and German programmes.

Efficiency of Energy and Resources

In order to boost climate protection in a sustained manner, it is necessary to increase the efficiency of energy and resources. To this end, innovative strategies for the efficient generation and use of energy are to be developed in collaboration with Bavarian industry in pilot and demonstration plants. Selected examples of such strategies will demonstrate how major contributions can be made in cutting CO₂ levels. In addition to the production of fuels from renewable energies, the CO₂-neutral production of hydrogen, separation of CO₂ in the power-plant sector and efficient solar power plants, energy efficiency is also to be increased by means of innovative light-weight designs in motor vehicles.

Measure: Pilot technology development project for the efficient generation and use of renewable energies and fossil sources of energy

- To produce BtL and hydrogen fuels from biomass residues,
- CO₂ separation and sequestration,
- Innovative photovoltaic and solar thermal plants,
- Innovative light-weight designs for motor vehicles.

Waste and Sewage Management

Waste and sewage management also has considerable climate-protection potential, which needs to be exploited more forcefully in the future. Possible savings in the energy required by sewage plants (electricity, heat) are to be revealed in demonstration projects. The opportunities for producing hydrogen in large-scale sewage treatment plants will also be examined and demonstrated in a practice-oriented manner. Waste management has enormous climate protection potential in the fields of energy (highly efficient refuse incineration plants) and raw materials. Improved use of materials, material recycling and efficient input of resources all contribute to reducing CO₂ levels. Greater use should be made of these approaches by focusing waste-management measures on climate protection.

Measure: Climate protection through waste and sewage management

- To reduce greenhouse-gas emissions by waste-management measures (development and practical trials,
- To use potential savings in the energy needed by sewage plants,
- To increase the energy efficiency of thermal waste treatment plants (district cooling project),
- Hydrogen technology in large-scale sewage treatment plants.

4.3 Bavarian Programme for Participation in German Federal and EU Research Programmes

The research programmes of the EU (7th Research Framework Programme) and of the German Federal Government provide substantial funding for the field of climate research. Bavarian scientists are to make extensive use of these programmes. Furthermore, current knowledge and research results from German and EU projects are to be used as efficiently as possible in addressing issues and strategies to be developed in Bavaria. Funds are provided for the required cofinancing to support involvement in Federal German and EU research programmes. As a result, scientists at universities and research institutions in Bavaria will be able to participate in the programmes and can benefit from German and EU funding. The Bayern FIT Alliance for Research, Innovation, Technology adopted on July 9, 2008 by

the Bavarian Council of Ministers also pursues similar aims.

This special support programme opens the door to intensive use of German and EU programmes and avoids parallel support on state level.

Measure: Bavarian Programme for Participation in German Federal and EU Research Programmes

4.4 Reorganisation of the Schneefernerhaus Environmental Research Centre

The reorganisation of the Schneefernerhaus Environmental Research Centre (UFS) is an important contribution to applied climate research. The aim is to systematically develop the UFS into an internationally networked centre for climate and altitude research, in particular for the development, demonstration and operation of innovative technologies for validating satellite data, observing the climate and atmosphere as well as for early detection of natural hazards. The UFS will then be in a position to assume a leading role in scientific R&D programmes and networks in Europe (e.g. 7th EU Research Framework Programme and the joint EU and ESA Initiative "Global Monitoring for Environment and Security (GMES)").

Measure: Reorganisation of the Schneefernerhaus Environmental Research Centre

- To replace the roughly 30 year-old cableway with a state-of-the-art, low-maintenance "research cableway",
- To add scientific instruments to the basic equipment.

5. International Climate Partnership

Bavaria pursues a holistic approach in its climate policy. This also includes international cooperation schemes, for example in the field of climate protection cooperation among selected regions, which have joined the Montreal Convention of 2005. Climate protection is a global responsibility and must be tackled on a global scale.

In a climate partnership between Bavaria and a third-world nation or a region specially threatened by climate change, Bavaria's international environmental initiatives will focus on a key area. The aim of the partnership is to help reduce the consequences of climate change on local level. Town twinning schemes could act as role models and be used to establish links. The difficult balance between industrialised and developing nations could be assisted in an exemplary manner by the concrete commitment of all social groups involved in the partnership. Hardly any public funds would be needed to achieve this goal. Rather, projects complying with the Clean Development Mechanism (Kyoto Protocol) and "climate-neutral" projects should focus primarily on this model region. Experience gained from such cooperation will form the basis for further partnerships.

6. Demands on the German Government and the EU

In Germany, the essential legislative competence for climate protection and energy issues lies with the German Federal Government and the European Union. However, as a German federal state and EU region, Bavaria must seek to influence German and EU policies. Key demands on the German Government and the EU for a sustainable climate protection policy include:

- To use the bridging function of nuclear energy for the further development of renewable energies:

From a climate protection perspective, it is beneficial to replace electricity generated from nuclear power with only CO₂-free energy resources like renewable energies wherever possible. By extending the term, it would be possible to gain the time needed to expedite the development of renewable energies in terms of their efficiency and cost-effectiveness. To this end, an agreement must be reached with the energy industry, fixing a specific investment volume for the fields of renewable energies, energy efficiency and energy research in the event of the term being extended. The volume of this investment, which would amount to billions, could be based proportionately on the additional profits

gained after depreciation and additional investments in safety.

- To boost research into nuclear fusion as a new, safer and environmentally compatible form of energy generation; at the same time, the development of an innovative technology will be encouraged.
- To consistently implement the resolutions of Meseberg:
In particular, it is important to ensure that a coherent overall concept is pursued that takes account of the cumulative impact of individual measures and facilitates their implementation in as cost-effective a manner as possible. The concept must also be socially compatible and should not unreasonably burden the citizen.
- Consistent provisions for implementing the EuP Directive (Ecodesign Directive), in particular introduction of a more forceful energy efficiency initiative along the lines of the top runner model.
- To introduce a "climate bonus" for energy-efficient new buildings and energetic refurbishment measures on buildings. Bavaria has already submitted an appropriate bill to amend the Income Tax Act (Printed Paper 444/08 dated June 20, 2008), which provides for substantial tax relief for owner-occupied and rented residential property.
- Speedy implementation of the support announced years ago for risk coverage in the case of geothermal borings.
- To include air traffic in the European emissions trading scheme independently of competitive interests.
- To harmonise energy taxation in the EU.
- To abolish the EU-wide compulsory set-aside of farmland.
- Forest-owner-friendly implementation of the sink option under Art. 3.4 of the Kyoto Protocol and commitment to recognition of wood as a product for storing carbon in the follow-up agreement to the Kyoto Protocol.
- To make part of the income received from emissions trading available for adaptation measures.

Annex to the Bavarian Climate Programme 2020 Measures and Additional Funding for the Years 2008 to 2011

Measures/Programmes	Funding (€ million)
Reduction of greenhouse-gas emissions	223
Energetic refurbishment of state-owned buildings	150
Federal-State-Municipal Investment Pact for the energetic refurbishment of social infrastructure (Bavarian share)	30
Use of heat from geothermal energy (Bavarian Funding Programme)	12
Programme "BioEnergy for Bavaria"	16
Boosting the Climate Alliance, reduction of CO ₂ on municipal level (municipal properties and churches), European Energy Award®	6
Funding Programme: Reduction of CO ₂ Emissions especially in SMEs	9
Adaptation to Climate Change	84.7
Forest redevelopment programme	15
Protection of mountain forests	7.5
Adaptation of the Flood Control Action Programme 2020	50
Further measures/strategies for adapting to climate change	12.2
Research and Development	42.3
Reorganisation of the Schneefernerhaus Environmental Research Centre	6,1
Interdisciplinary research networks	9
R&D and model projects	24.9
Bavarian Programme for Participation in German Federal and EU Research Programmes	2.3
Total	350

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Impressum

Herausgeber Bayerisches Staatsministerium für Umwelt und Gesundheit (StMUG)
Rosenkavalierplatz 2, 81925 München

Internet www.umweltministerium.bayern.de
E-Mail poststelle@stmug.bayern.de
Stand Mai 2009

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Gedruckt auf Papier aus 100 % Altpapier



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