



Regional Climate Change
Adaptation Programme
Dresden Region

Managing risks, seizing opportunities

The Dresden region faces up to
climate change

ABRIDGED VERSION

DRAFT

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The Regional Climate Change Adaptation Programme for the Dresden Region

The predictions and recommendations for action in this publication are based on the work of the Regional Climate Change Adaptation Programme for the Dresden Region. This programme comes under the framework of the model project REGKLAM (Development and Testing of an Integrated Regional Climate Change Adaptation Programme for the Dresden Region) funded by the Federal Ministry of Education and Research (BMBF). REGKLAM brings together regional actors from the fields of politics, administration, business and science.

At the end of 2013 a detailed climate adaptation programme for the Dresden region will be drawn up. Other regions can thereby benefit from the experiences made and adapt measures to meet their own requirements.

I. Adaptation instead of indecision: Strategies for climate change – from the region, for the region

The climate is changing – and even faster than scientists have previously suspected. This means that we must today meet the challenges of climate change at all levels of society. However, we do not yet know how seriously the repercussions will affect various areas of work and life.



The *Regional Climate Change Adaptation Programme for the Dresden Region* can provide some answers. Created by actors from the region, the aim is to prevent climate change from negatively impacting Dresden and surroundings as well as identifying the potentials offered by climate change. The programme is intended to be a role model for other regions in Germany.

The *Regional Climate Change Adaptation Programme for the Dresden Region* draws on the work of the *German Adaptation Strategy (DAS)* and the *Adaptation Action Plan (APA)* of the Federal government's *Adaptation Strategy to Climate Change*. It also incorporates useful concepts and measures developed by the Free State of Saxony to deal with climate change and adaptation.

II. The climate is changing: Climate change in the Dresden region

The changing climate is perceptible – even in our region

Global climate change is already having a real impact in the Dresden region. Today we can point to shifts in average temperatures, rainfall and the frequency of extreme weather events. The Elbe valley and adjacent areas are the most strongly affected by climate change. Rising spring and

summer temperatures could become a particular problem in the densely built-up districts of Dresden. However, in the upper regions of the Erzgebirge mountain range the warmer seasons will remain tolerable.

Rising temperatures in the Dresden region

Climate parameters	1961-1990 (observed mean value)	2021-2050 (change compared to mean value)	2071-2100 (change compared to mean value)
Temp: summer half-year (in degrees Celsius)	13.9	+0.5 to +1.1	+1.1 to +3.1
No. of warm summer days (max. temperature ≥ 25 °C)	31.4	+6.3 to +13.3	+13.1 to +26.6
No. of hot days (max. temperature ≥ 30 °C)	5.4	+1.8 to +3.7	+3.5 to +11.9
No. of tropical nights (min. temperature ≥ 20 °C)	0.7	+0.2 to +1.3	+0.5 to +8.1

Source: Christian Bernhofer, Jörg Matschullat, Achim Bobeth (2012) (Ed.) Klimaprojektionen für die REGKLAM-Modellregion Dresden. Publikationsreihe des BMBF-geförderten Projektes REGKLAM – Regionales Klimaanpassungsprogramm für die Modellregion Dresden, Heft 2, 112 S.

The climate parameters are based on a mean year of each designated time period in the Dresden region. The predicted values have been derived from various models and future scenarios.

Climate change has repercussions

Climate change can present risks as well as opportunities depending on the specific location and perspective. But one thing is clear: the region can only exploit these potentials and avoid dangers if it quickly adapts to climate change. A recent study by the Federal Environmental Agency has confirmed that the economic, social and ecological benefits will greatly exceed the costs *if* sensible adaptation measures are implemented.

We must constantly strive to increase our pool of knowledge if we wish to tackle risks appropriately; and thus climate change and adaptation must become topics of study in higher learning and training institutes. Experts and decision-makers must clearly comprehend the changing climate and what the consequences of this will be. It is only with such insight that they can find the right solutions at the right time, and revise their decisions when necessary.

Not only a changing climate

Climate change occurs over a long period of time, during which the social and economic framework conditions are also in flux. Thus it is essential that future scenarios combine predictions on climate change with shifting demographic and economic factors.

population of the entire region will shrink by 5.7 percent by the year 2025. One consequence of this will be decreased revenues for the Free State of Saxony and its municipalities: the total revenue for the Saxon government will sink in real terms by approx. 3 billion euros. This highlights the importance of setting priorities for regional climate change adaptation measures and utilising synergies.

Trends can be reliably forecasted by extrapolating from currently available datasets. The resident

Uncertainties demand flexible adaptation

Science is able to make realistic forecasts about the changing climate. Yet uncertainties remain due to the many dynamic factors involved. Thus while it is regarded as certain that temperatures are going to rise, reduced rainfall in summer is viewed as likely but still not known for sure. For example, our region may experience wetter summers because of its location at the intersec-

tion between southern Europe, with its dry summers, and a much wetter northern Europe.

It makes sense to concentrate on adaptation steps which are beneficial today, which will be useful in the near future or at least contain options for adaptation later – regardless how strong or weak the climatic changes.

Monitoring climate change

Our knowledge base of climate change is growing. But will the assumptions we hold today still be true in ten years? What specific repercussions can we expect? Are we planning the correct adaptation strategies, and which of these are to be

given priority? How can we keep a lid on the costs of essential adaptation steps? The answers to these questions can only be given by a targeted, intelligent and interlinked monitoring system.

III. Tackling climate change: The Dresden region in action

Goals of climate change adaptation

The local population of the Dresden region should enjoy high living standards in the years to come as well as profiting from a competitive business sector. With this in mind, we can formulate the main requirements of adaptation to climate change as follows:

1. Maintain healthy and attractive conditions for life and work.
2. Seize economic opportunities, minimize risks.
3. Preserve natural resources.

1. Maintain healthy and attractive conditions for life and work

What the future may hold:

Summers are getting warmer. Residents in densely built-up areas are going to suffer increasingly under the intense heat load, impairing their physical performance and in some circumstances even their health. Those with allergies or heart problems, the elderly and children are particularly susceptible to excessive heat, but also those

working primarily outdoors. At the same time new demands will be placed on healthcare infrastructures.

But supply problems and rising costs may also affect other primary infrastructures such as for water supply and removal, energy supply and transportation.

What we can do:

Create green and compact cities

The climate-adapted city is the green city. Municipalities as well as private and public landowners must ensure sufficient provision of green spaces with foliage that offers cooling during hot weather and which can withstand extended periods of heat and drought.

Undeveloped sites should be extended and transformed into green spaces wherever possible. Creativity is required to make our cities and towns greener. For example, companies can turn some of their commercial and industrial land into green spaces, while transport infrastructure, facades and rooftops can be planted with foliage.

Municipalities can orient themselves towards the concept of the "compact city within the ecological network", i.e. a city in which the green spaces are connected by corridors, and yet where one still finds compact, densely built-up residential areas. Those living in such compact towns and cities will profit from shorter commutes to work and for other activities, and thus will more often leave the car at home – an additional boon to environmental and climate protection by reducing CO₂ emissions while also lowering infrastructural costs.

The compact city in the ecological network

Dresden – “the compact city in the ecological network” – is a strategic development model for the Saxon capital. The areas highlighted in green represent diverse green spaces which either already exist between highly developed areas or which are in planning.

Image: City of Dresden, 2012



Adapt buildings

Public agencies and the building sector should work to increase property owners' and tenants' awareness of climate change adaptation, informing them about the various options for adaptation. Those working in the building sector as well

as property owners can choose from a wide range of positive steps in climate protection and adaptation, such as the intelligent planning of new buildings and the introduction of adaptation measures when renovating older buildings.

Climate protection and adaptation go hand in hand

One goal while renovating the offices of the Leibniz Institute of Ecological Urban and Spatial Development (IOER) was to protect the climate. The result: energy consumption has dropped by 84.5 percent, which translates into 587.000 kWh per year. For comparison, one kWh is sufficient to run a computer for around five hours.

Image: Leibniz Institute of Ecological Urban and Regional Development



Combat sewer flooding

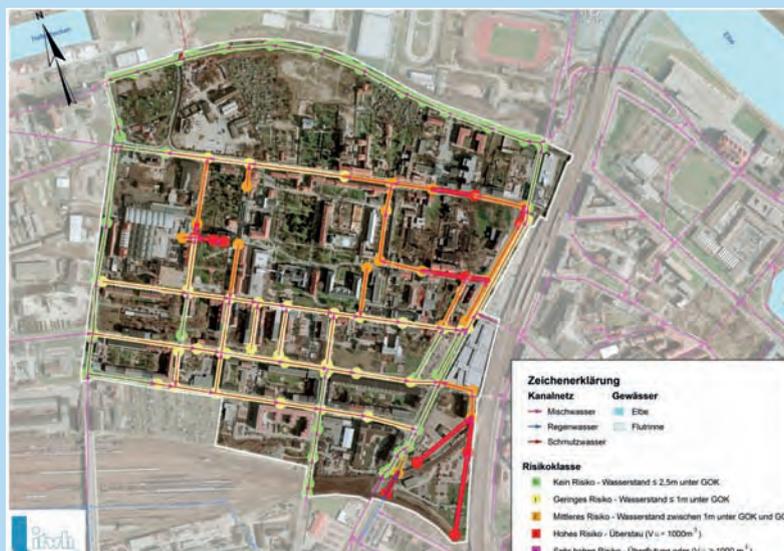
Planning authorities and wastewater companies must take account of the likely rise in the number of violent rainstorms in their water management plans. They must obtain data to indicate which

areas of their municipality face the greatest threat of drain flooding during torrential rain. Depending on the local conditions, various practical and sensible preventative steps can be taken.

Dealing with hotspots

Risk of sewer flooding in Dresden-Friedrichstadt: the red and pink markings indicate areas with a high or very high danger of flooding during heavy rainfall.

Image: Institute for Technical and Scientific Hydrology Ltd.



Protect health

Companies can design workplaces to safeguard the health and efficiency of workers even during spells of extreme heat. Child daycare centres and schools should take account of rising temperatures when drawing up their daily timetables.

Kindergartens and schools should also play an active role in the education of children – and their parents – about the repercussions of climate change and the impact on their personal behaviour.

Develop warning systems

Warning systems are vital for effective health protection. They should, for example, provide a constant stream of information about changing

temperatures, about which allergens are currently being dispersed and whether there is an increased danger of infection (e.g. by tick bites).

Special measures required for social welfare and healthcare facilities

Rising temperatures are a particular problem for urban areas as they lead to the increased probability of strong heat build-up. In terms of danger to health this will prove an acute problem for retirement homes, medical clinics or kindergar-

tens, as the old, the sick and the very young are especially susceptible to extreme heat.

Thus it is necessary to adapt buildings and the design of public spaces to climate change.

2. Seize economic opportunities, minimize risks

What the future may hold:

Dresden and its surroundings form one of eastern Germany's largest and most dynamic economic regions. Is climate change likely to bring any advantages to companies in the Dresden region? Certain business sectors could enjoy rising demand and a burgeoning marketplace.

Adaptation to climate change can prove a lucrative field for innovative and flexible firms, for

example in environmental technologies. However, through its negative impact on production, working and living conditions, climate change can also undermine the regional economy.

Companies must be aware that production conditions can deteriorate through climate change, whether as a result of heat and aridity, dust pollution or extreme weather events.

What we can do:

Raise awareness, inform and advise companies

The industrial, commercial and agricultural sectors must comprehend the urgent need to adapt to climate change. However, a national survey of German businesses from 2010 revealed that around 70 percent of companies in the manufacturing sector were unconcerned with the issue of climate change.

Scientific institutes, chambers of commerce, consultancies and public agencies must develop practical resources such as databanks of measures and guidelines for adaptation. Actors from the worlds of politics and business must together strive to expand networks that foster the exchange of know-how and experience on climate protection and adaptation.

Secure production conditions

In order to avoid economic disadvantages it is important to anchor climate change adaptation within business management. Scenario analyses can assist firms in the planning of adaptation strategies in both the short and long term.

Depending on the business sector and location, some positive measures can be, for example, to improve solar protection as well as rainwater retention, install an emergency energy supply,

check the tolerance of essential equipment against dampness, heat and fine dust particles, plan for an enlarged refrigeration capacity or expand storage facilities. But useful measures can also be undertaken which do not require a major upheaval – for example, by relocating servers, production equipment or hazardous materials to areas of the building which are less vulnerable to flooding or overheating.

Climate-friendly cooling

Before constructing their new production hall, W & S Feinmechanik GmbH installed a pebble-bed accumulator under the floor, providing the building with a cheap and energy-saving form of air conditioning.

Image: Technische Universität Bergakademie Freiberg



Foster competitive advantages through innovative adaptation

Companies must show flexibility and innovative strength if they wish to successfully adapt to the repercussions of climate change. Those which prepare in good time for change can enjoy a real competitive advantage, for example through the development of new technologies and services, or the refashioning of product portfolios. The efficient consumption of resources not only contrib-

utes to climate protection but also lowers expenditure.

When offering loans to firms in the commercial sector, banks should consider whether the planned investment will respect the demands of climate protection and adaptation.

Strengthen locational factors for agriculture and forestry

Favourable sites for agricultural production support regional competitiveness and generate vital ecosystem services. In their land use plans, municipalities and local authorities must therefore earmark land which is particularly suited to agricultural usage, thereby protecting these areas from development.

Farmers must focus more strongly on sustainability in order to secure their own future, and thus

should place greater importance on this topic in their professional education and further training. Integrated and ecological farming will help to increase sales and raise incomes.

The structure of forests must be carefully designed to take account of the forecasted climate changes. Tree species should be planted which can better withstand longer periods of drought and higher average temperatures.

3. Preserve natural resources

What the future may hold:

Climate change will have a direct impact on the water balance, on water bodies, on soils as well as on biological diversity, and thus presents challenges for the preservation of natural resources.

It is clear that competition for these basic resources, which are essential for life, will increase. For example, the economic demand for the continued development of land conflicts with the necessity of expanding open and green spaces to improve the urban climate as well as the preser-

vation of protected biotopes and productive farmland.

The water supply also faces a number of challenges: longer dry spells in the summer months will be accompanied by a higher frequency of extreme weather events such as cloudbursts and hail. Heavy downpours may occur at unusual times of the year, while the rainfall intensity could increase by up to 30 percent.

What we can do:

Use land sustainably

Planning authorities at the regional and state level, as well as the municipalities, must create the right framework to help reduce land consumption and better protect land of climatic, ecological and agricultural value from development. Towns, cities and municipalities must promote the redevelopment of older residential areas rather than allocating new sites for development.

In order to ensure the sustainable use of land, municipalities or regions must assume responsibility for contiguous agricultural and forested areas as well as protected land.

Brownfield sites in cities and their surroundings represent a huge development potential. For example, they can be turned into green spaces that fulfil various functions simultaneously.

Integrated commitment: More green for Dresden-Gorbitz

Green spaces are particularly vital to residential areas as they ensure a more pleasant climate while also capturing rainwater runoff. Private land-owners also have a role to play here.

In the future residents can take a stroll on green land where 300 cars previously parked: In the Dresden district of Gorbitz the Eisenbahner Housing Cooperative (EWG) is

unsealing these parking spaces. 5,000 trees and shrubs are being planted, funded by an intervention compensation scheme run by Dresden's city council.



Image: Landschaftsarchitektur-Büro Grohmann

Restructure land use, improve environmental quality

Any functional restructuring or consolidation of the landscape should ensure an optimal use of land in terms of ecological and economic criteria while taking care to minimize risks. The aim of such restructuring should be to treat diverse agricultural and forestry tasks, as well as the natural

environment and its habitats, not as separate components but as an interlinked whole. Regional plans should therefore take better account of the links and interactions between undeveloped land and land used for agriculture.

Safeguard the water supply

In the future water companies and dam authorities must more closely monitor the reservoir system in order to quickly detect any impact that climate change has on water quality and then

develop adaptation measures. Improvements must also be made in the monitoring and protection of groundwater.

Working in tune with nature

At Castle Wackerbarth, where the vineyards extend to around 100 hectares, the cellar master believes that in agriculture you just have to live with uncertainty. He sees rising temperatures in this northerly, and thus cooler, wine-growing region as an opportunity - if extreme weather events do not become too frequent. The art consists in taking the right action to meet the challenges of diverse meteorological phenomena.

Image: Staatsweingut Schloss Wackerbarth



Interventions in the natural environment must be adequately compensated

The State of Saxony and the municipalities must take care to avoid unnecessary interventions in the natural environment; and those interventions which are unavoidable – for example if new build-

ings are needed – must be adequately compensated. At the same time the demands of climate protection and adaptation to climate change must be respected.

Better protection and interlinking of sensitive ecosystems

Nature protection agencies must foster the natural adaptive powers of nature reserves and protected biotopes, for example by better defending vulnerable ecosystems against environmental pollution so that they can overcome the challenges of climate change.

habitats can be enlarged and connected to new potential green spaces.

Spatial planners can draw up systematic guidelines for the interlinking of protected areas by means of green corridors. In this way natural

One of the most important tasks in nature protection against a backdrop of climate change is the planning and realization of a well-functioning biotope network that permanently connects the natural habitats of animal and plant species with one another.

IV. In the Dresden region and elsewhere: Consolidate, increase and apply knowledge

Generate and provide access to knowledge

Now and in the coming years the Saxon Government will have the task of collecting and evaluating data to ensure the timely forecasting not only of climate change but also social, demographic and economic trends. Universities and research

institutes must provide knowledge on climate change, they must develop feasible adaptation strategies and they must foster innovation. The State's research policy must support these tasks.

Teaching the facts

If we wish to take an active part in preparing for change then we must be as well informed as possible. Schoolchildren should learn how best to safeguard their well-being against the repercussions of climate change and how to preserve our natural resources. A study conducted by the Consumer Protection Agency has shown that such topics have until now scarcely been dealt with in Saxony's schools.

However, it is also vital to provide public agencies, municipalities and companies with training and information on climate change. Only thus can they take sufficient account of these changes in their plans and decisions. Politicians and the municipalities have the responsibility of informing the public about the repercussions of climate change, thereby strengthening their sense of personal responsibility.

Exploit synergies, avoid conflicts

In order to exploit synergies and avoid conflicts it is necessary that climate protection and adaptation be handled together rather than separately. This is particularly true of the building industry.

regime must play a much bigger role in the education and training of planners, architects and construction engineers. Many more experts must be trained in climate adaptation in order to provide specialist know-how to property developers.

And yet it is precisely in the building industry that huge opportunities reside in the coordination and implementation of climate protection and adaptation measures. Thus the twin topics of climate protection and adaptation to the new climate

Certificates and seals of approval issued for high quality, environmentally-friendly construction must increasingly recognise the demands not only of climate protection but also climate adaptation

A change of climate in schools

As part of the seminar series "Saxony in Climate Change", climate experts and other speakers are welcomed into Saxony's schools to talk about climate change. In 2010/2011 this venture was recognized as a UN "Education for Sustainable Development" Decade Project.

Image: Haus der Kongresse für Umwelt-Bau-Verkehr Dresden e. V.



Good examples as role models and stimulus to action

In the Dresden region there already exist initiatives on climate change adaptation. One of the most prominent of these is the "Environmental Alliance Saxony", a voluntary agreement between the Saxon State Government and local companies with the goal of fostering environmentally-friendly business development. Climate adaptation is a frequent topic of discussion in this initiative.

One concrete result of the agreement is the *Ökoprofit* project, supported by chambers of commerce, the Saxon government and municipalities. It will provide a firm foundation for climate change adaptation measures in the years to come.



A park avoids flood damage and creates recreational space

With the "Windberg Park", the city of Freital has managed to kill several birds with one stone: While meeting the demands of the flood safety concept devised by Saxony's Reservoir Administration (LTV), it has created green space, improved the microclimate and at the same time increased recreational value.

The green space concept was jointly developed by the LTV, the district council office (Landratsamt) and the municipalities. The project is co-funded by the Saxon government, the City of Freital and the Federal government through its urban development programme.

Image: City of Freital



V. An action programme for the Dresden region: The main points at a glance

The Climate Change Adaptation Programme for the Dresden region has given the starting shot: politicians, decision-makers and actors from all areas of society are called upon to actively promote adaptation to climate change.

State and municipal authorities have to set up the necessary framework conditions. Alongside climate protection, adaptation to climate change must be firmly anchored in municipal decision-making.

Regardless of their field of work everybody is called upon to play their part in dealing with climate change, whether entrepreneur or scientist, conservationist or house owner, from pressure group to individual citizen.

Top priority should be given to adaptation measures that are certain to have a positive effect, regardless of how the climate will actually develop in coming years. For example, someone who insulates their house against heat and cold saves energy costs today, while also safeguarding against the likely climate changes of tomorrow.

Municipalities that work to extend green spaces are improving the quality of life for their citizens now and ensuring a better microclimate at the same time. That will also prove a real boon in the face of higher temperatures in the years to come.

Perhaps our greatest challenge is to leave behind no ecological and economic burdens for coming generations to deal with, thereby reducing their scope for positive action. Thus climate change-adaptation serves to boost sustainability.

If we are clear-sighted in our actions then we can maintain – and perhaps even strengthen – our region's great locational advantages. In order to be successful we must act now rather than later. The Regional Climate Change Adaptation Programme is one mainstay in this effort.

If we want to maintain healthy and attractive living and working conditions, seize economic opportunities, minimize risks as well as preserve the natural environment and its resources for the years to come, then it is vital that we begin at once to tackle the following tasks:

1. **Keep track of climate change and its repercussions in the region by means of a targeted and intelligent monitoring network:** Such a system is currently being developed for the whole of Saxony. It must be up and running as soon as possible and tailor-made for the information requirements of regions and municipalities.
2. **Strengthen climate change adaptation; climate protection and adaptation should be considered together and not in isolation:** Climate protection and adaptation are not mutually exclusive. It is vital that our political leaders and the public at large understand the necessity of tackling these tasks together.
3. **Create compact cities and towns; develop and link green spaces into networks:** Urban developers and planners face the challenge of creating compact and green cities simultaneously. All those involved must collaborate closely to ensure that this challenge is successfully met.
4. **Adapt buildings to cope with the impact of climate change:** Some appreciation of the necessity of climate change adaptation is required before investments will be made in the adaptation of buildings. One incentive can be the issuing of certificates and seals of approval that raise the market price of climate-adapted buildings while assuring owners and tenants of the future value of these measures.
5. **Improve absorption of rainwater; reduce sewer flooding:** Cities, towns and municipalities must pinpoint drains which are frequently flooded in order to make necessary improvements in the infrastructure.

6. **Healthcare's warning systems, infrastructure and information services must be updated and linked into networks:** Climate change can undermine our health. The public must therefore be better informed, particularly those in high risk groups. Warning systems must be put in place. Social welfare and healthcare facilities should set up networks in order to ensure that healthcare provision is sufficient to meet rising demand.
7. **Raise companies' awareness of the issues and provide them with information:** The targeted supply and exchange of information must foster the wider awareness of the advantages and disadvantages of climate change. Some companies have already introduced concrete adaptation measures. Others can learn from their experience, and thus it is vital that chambers of commerce and other professional bodies give their backing to this knowledge transfer. "Ökoprofit" can support this process.
8. **Identify risks and opportunities in industry and commerce at an early stage:** Today's business decisions that focus on the long-term must already take account of climate change. Companies should examine whether climate change can offer new opportunities. The economic attractiveness of a location can only be preserved if risks and opportunities are identified in good time.
9. **Targeted development of locational advantages in agriculture and forestry; improve cultivation methods:** Against a backdrop of climate change, farmers and foresters must make the right decisions regarding the selection of seed, crop rotation and cultivation methods. In this they are supported by modern systems of analysis that can appraise the likely outcome of these decisions.
10. **Improve the base conditions for sustainable land use and strengthen soil protection by the functional restructuring of the landscape:** Several different measures are necessary in order to secure agricultural production over the long term and preserve protected areas. Two of these are the functional restructuring of the landscape and the adaptation of cultivation methods. Land use and soil protection must not be handled separately but in combination.
11. **Avoid interventions in the natural environment, use compensation to support climate change adaptation:** Interventions in the natural environment must be reduced to an absolute minimum, particularly in the case of ecosystems that are strongly affected by climate change. If such actions are unavoidable then compensatory schemes should aim to foster climate change adaptation.
12. **Improve the protection and interconnection of ecosystems:** Natural and semi-natural ecosystems are threatened by climate change. Thus they must be specially protected and linked to one another in order to create larger habitats.
13. **Increase knowledge and provide targeted education; create and expand regional networks:** There is still a general lack of understanding of climate change and its repercussions. Support is required for initiatives that aim to remedy this. New ways of supplying information and training must be developed and implemented. Closer collaboration must be fostered between the worlds of politics, business, civil society, education and science.
14. **Develop flexible adaptation measures which bring benefits today:** Adaptation should not always be oriented towards an uncertain future. Instead, priority should be given to measures which have some practical application today and which do not have to be corrected under the conditions of climate change.
15. **Act to create exemplary projects and measures that can be easily copied:** The climate change adaptation programme for the Dresden region encompasses a range of exemplary measures to combat climate change. Such good examples must be fostered. They encourage and stimulate individuals, companies and public bodies to action.

Imprint

**Managing risks, seizing opportunities
The Dresden region faces up to climate change**

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