Senate Department
for the Environment, Transport
and Climate Protection

Berlin

Berlin: more climate-friendly

We are acting now!

BEK 2030

Berlin Energy and Climate Protection Programme 2030

Table of Contents

THREE QUESTIONS FOR:

Regine Günther

Regine Günther, Senator for the Environment, Transport and Climate Protection

1

It is one of Berlin's objectives to be climate-neutral by 2050. What exactly does this mean and how does the city want to get there?

It is our objective that Berlin's CO_2 footprint should no longer have a negative impact on climate and, by extension, on our livelihood. That is why this target has been incorporated into law: The Berlin Energy Turnaround Act stipulates that by 2020, we have to cut carbon emissions by 40 per cent relative to the base year 1990. This figure increases to 60 per cent by 2030 and to a minimum of 85 per cent by 2050. In addition, our aim is a total reduction of CO_2 emissions by 95 per cent. These milestones are our guidelines on the path towards climate neutrality. To achieve them, we are implementing a number of measures and strategies, among them the Berlin Energy and Climate Protection Programme (BEK 2030). This is how we are assuming responsibility for our contribution to global climate protection.

2

How does the BEK 2030 help to achieve these objectives?

The BEK 2030 is an integrated approach to climate protection as well as climate change mitigation in Berlin. We have defined a range of measures that can contribute to the achievement of our objectives. If implemented rigorously, some of these measures will directly reduce a substantial amount of CO_2 emissions, for example, the reduction of the energy consumption of buildings. However, it is just as important to encourage others to cut back on their CO_2 emissions. This is why we are forging alliances with partners in the business world and are supporting climate protection efforts in schools. Finally, there are measures that help us prepare Berlin for extreme weather events. The promotion of roof greening is a good example, because a green roof protects buildings against heat as well as cold. The Berlin Rainwater Agency is another important partner. It helps the administration as well as individual citizens to make efficient use of rainwater where it accumulates.

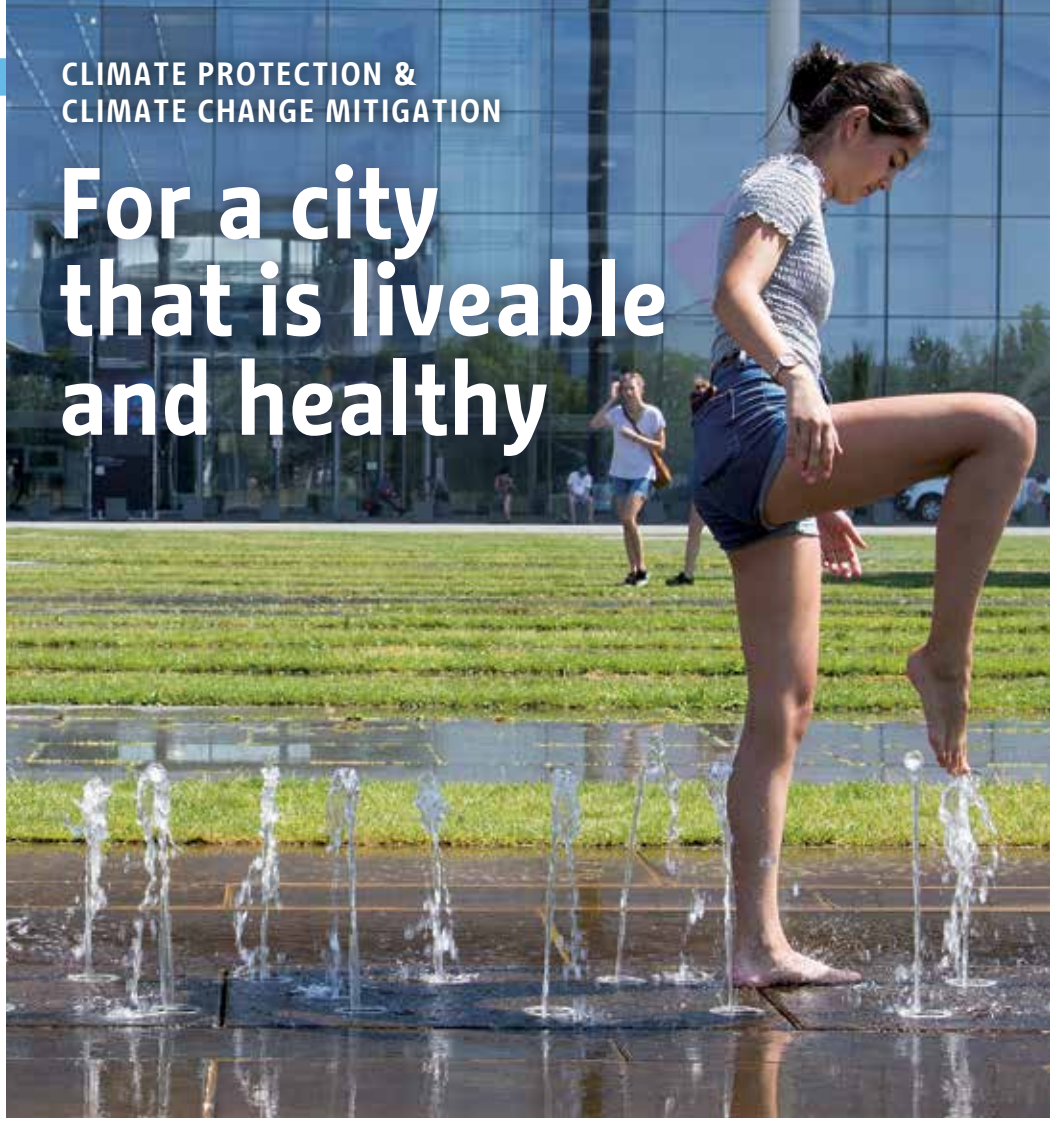
3

How can the citizens of Berlin contribute?

We already involved a great number of stakeholders when we developed the BEK 2030 and will continue to do so during the current realisation phase. In the field of action "Private Households and Consumption", we support private consumers in their homes as well as players such as Berlin's club owners in their efforts to act in a climate-friendly fashion. In addition, each and every one of us can contribute to climate protection through the choices we make with regard to shopping, travel and transport. As far as mobility is concerned, we are paving the way towards climate protection by expanding the network of cycle paths, busses and trains – and in doing so, we are emphasising accessibility. This will make it easier to leave the car in the garage and use public means of transport or a bike instead. Climate protection means actively shaping the future – that is why I am looking forward to implementing the BEK 2030 together with the citizens of Berlin.

Photo: Roland Horn

For a city that is liveable and healthy



Images from the summer of 2018 in Berlin: A girl tries to cool herself off at the fountain in front of the government building Paul-Loebe-Haus. The Prinzenbad, a municipal swimming pool, is overcrowded, and one can hardly see the grass for all the beach towels spread out on the banks of Lake Wannsee. The sun keeps on shining and shining – and not a single drop of rain materialises.

Man-made

Climate all over the world is changing. Median annual temperatures have been rising since the dawn of industrialisation. One of the main reasons for global warming is the growing density of greenhouse gases in the atmosphere of our planet. Two of the most widely known greenhouse gases are carbon dioxide (CO_2) and methane. These gases aggravate the greenhouse effect: a significant portion of solar radiation is not reflected back into the atmosphere from the earth's surface, but absorbed by it instead. As a result, global temperatures rise.

The emission of greenhouse gases is chiefly caused by humans through the burning of fossil fuels such as coal, oil and natural gas, intensive agriculture and livestock farming and extensive deforestation. The rise in temperature causes glaciers and the polar ice caps to melt and irrigation patterns to change. As a result, we experience torrential rainfalls, rising sea levels and an increase in extreme weather events. Throughout the world, the first ten years of the 21st century count among the hottest since the beginning of systematic weather records.

EXPLAINED IN BRIEF: CLIMATE PROTECTION AND CLIMATE CHANGE MITIGATION

Climate Protection …

… is a term describing all measures directed at the limitation of global warming. These are mainly measures for the reduction of greenhouse gas emissions caused by humans.

Climate Change Mitigation …

… is the targeted approach to dealing with the impact of climate change. Mitigation and adaptation measures are developed, implemented and evaluated by taking potential risks into consideration.

To protect the climate and limit the dangers of climate change, we have to minimise the greenhouse effect. International cooperation has been promoted for several decades now in order to achieve this objective.

Global commitment

Since the mid-1990s, annual Framework Conventions on Climate Change have been held by the United Nations (UN). For the first time in 1997, at their convention in Kyoto, the parties committed to binding limits for the emission of CO_2. In 2015, a follow-up agreement was negotiated in Paris, which consequently became known as the Paris Agreement. The joint objective of this agreement is to limit the rise in median global temperature to below 2 degrees centigrade – if possible to below 1.5 degrees – relative to pre-industrialisation values. To achieve this target, the parties to the Convention committed to determine and implement national objectives for

Photos: Alina Fedorenko/dpa; Wolfgang Kumm/dpa; Paul Zinken/dpa

Hot summers, drought and incessant rain: the climate throughout the world is changing. The Federal State of Berlin gives clear precedence to climate protection with the Berlin Energy and Climate Protection Programme.

limiting the rise in temperature. Apart from agreeing on the joint two-degree objective, the states also acknowledged that the impact of climate change is already apparent today.

This implies that we also have to adapt to those consequences of climate change that can no longer be prevented. During the UN Framework Convention on Climate Change in 2018, which was held in the Polish city of Katowice, the parties continued to work towards concrete mitigation and adaptation objectives. The convention mainly focused on setting guidelines for the implementation of the stipulations of the Paris Agreement.

Climate protection in Germany

Even before the Paris Agreement was negotiated, Germany's federal government had already begun paving the way for a switch to a sustainable energy supply. The Climate Action Plan 2050 clearly refers to the objectives agreed upon in Paris and determines strategies for their implementation, which in turn lead to obligations for Berlin's state government. Germany's federal states as well as its cities and municipalities are required to contribute implementation strategies of their own.

Responsibilities for major cities

Major cities such as Berlin have special responsibilities with regard to climate protection. Throughout the world, cities cause about 70 per cent of greenhouse gas emissions. And they are particularly affected by climate change, because local warming is considerably higher than in the surrounding countryside, aggravated by factors such as the density of building structures, reduced condensation and the many barriers to air exchange. This phenomenon is also known as the urban heat island effect. In addition, heavy rains pose a greater danger to cities, since the amount of water that the waste water system can absorb is smaller and great amounts of water cannot drain off easily in a sealed area. Further challenges with regard to climate protection and climate change mitigation are increases in private transport as well as land usage and sealing. To meet these challenges, Berlin is in continuous dialogue with other cities. One of the aims of international and European city networks such as C40 Cities, the EU Covenant of Mayors and the Climate Alliance is to give a united voice to cities when it comes to climate protection.

Putting ideas into practice

Berlin is ready to meet the challenges of protecting the climate and driving climate change mitigation. It has set itself concrete targets to achieve these objectives by 2050. One step towards the achievement of these objectives is the BEK 2030, which was adopted in 2018 with a clear emphasis on Berlin's specific potentials and requirements. These targets were developed on the basis of scientific expertise, as well as contributions made by the public and a number of institutions that shape life in the city and were invited to participate. The scientific expertise is documented in the final report "Draft for a Berlin Energy and Climate Protection Programme (BEK)", published in 2015, and the concept "Adapting to the Impacts of Climate Change in Berlin (AFOK)". The core of the BEK 2030 is an integrated approach which addresses climate protection as well as climate change mitigation.

MAJOR CITIES ASSUME RESPONSIBILITY:

Berlin protects the climate

Berlin is a fascinating city as well as a laboratory for ideas and a leader in new technologies. For nearly 30 years, Berlin has worked for the creation of a just and liveable future for its citizens. In 1990, the city's government passed the Energy Conservation Act, which was succeeded in April 2016 by the Energy Turnaround Act (EWG Bln). The EWG Bln defines concrete targets for Berlin's path towards climate neutrality. Aside from milestones set for the reduction of CO_2 emissions, the act emphasises that the public sector should serve as a role model with regard to climate protection, and that the city's boroughs also have considerable responsibilities. Furthermore, the EWG Bln clearly stresses the importance of climate education and advocates the expansion of school education with regard to climate issues. The EWG Bln is the legal basis for the development of a Berlin Energy and Climate Protection Programme.

Building on experience

Berlin can build on many years of experience in climate protection. For instance, the Berlin ImpulsE programme has been running since 1995 (see info box).

On top of that, Berlin has been funding practical projects for the protection of the environment and the climate for more than 20 years with the support of the European Regional Development Fund (ERDF). The current Berlin Programme for Sustainable Development (BENE, see info box) has been supporting measures for the reduction of CO_2 emissions since 2015.

For example, BENE funded the Berlin branch of the local public broadcaster Rundfunk Berlin-Brandenburg (rbb), which has been supplied with energy by its very own cogeneration unit since 2018, reducing CO_2 emissions by 3,000 tons per annum. The BEK 2030 builds on experience such as this and continues on the way forward, always keeping an eye on the target.

LONG-TERM INSTRUMENTS OF CLIMATE PROTECTION IN BERLIN

The Berlin ImpulsE programme ... is the central information and education platform on energy efficiency run by the Senate Department for the Environment, Transport and Climate Protection. Its aim is to effectively promote climate protection in the city. The platform informs companies, public institutions and private households on how to reduce their own energy consumption. One focus of the programme is the mobilisation of energy savings potential in existing buildings.

BENE ... has been funding investments and projects that contribute to the reduction of greenhouse gases in both the commercial and public sectors since 2015. The main areas of focus are the increase of energy efficiency, the expansion of sustainable mobility and the creation of new green spaces. So far, over 38,000 tons of CO_2 emissions per annum have already been prevented through measures funded by BENE.

BEK 2030 – uniting for climate targets

Berlin wants to be climate-neutral by 2050. This requires the combined effort of all stakeholders in the city. The BEK 2030 sets forth roughly 100 measures for climate protection and climate change mitigation. The programme adopts a comprehensive approach that is based on practical measures, such as incentive programmes and the implementation of model projects, as well as overarching strategies, such as an improved supply of information on climate protection.

Comprehensive solutions …

Phasing out coal is an overarching target in the "Energy Supply" field of action. The overall objective is a significant decrease in the consumption of fossil fuels. In the "Buildings and Urban Development" field of action, the main target is the energy-efficient refurbishment of a growing number of buildings in a way that is also socially acceptable. The programme wants to support the quality of energy efficiency in existing buildings as well as in emerging new quarters. In addition, the energy efficient development of public buildings is intended to set an example. The Federal State of Berlin is developing new guidelines for this.

With regard to "Transport", the BEK 2030 strengthens public transport and improves the infrastructure for cyclists and pedestrians. Furthermore, the programme promotes electric mobility. The public vehicle fleet, used by the waste management department, the police, the public order office and others, will emit fewer pollutants and less noise in the future.

MAIN OBJECTIVES OF THE BERLIN ENERGY TURNAROUND ACT

- a minimum cutback on CO_2 emissions of 40 per cent by 2020, a minimum cut of 60 per cent by 2030 and an 85 per cent cut by 2050
- cessation of energy generation from hard coal by 2030
- further development of the agreements on climate protection with companies in the public sector
- Senate departments and borough administrations to be carbon-neutral by 2030

… and concrete measures

The "Economy" field of action focuses on energy efficiency and the switch to renewable energy sources in companies as well as the industrial sector. On top of that, the programme aims to expand climate protection agreements with companies.

The "Private Households and Consumption" field of action intends to actively promote climate-friendly action in private households, when shopping for food as well as when purchasing household appliances.

Further measures are required in the field of climate change mitigation in Berlin. Some of these measures are the establishment of a heat warning system, the deployment of resilient plants and the usage of rainwater.

Why do climate protection and climate change mitigation concern all of us?

Because a reversal of current climate trends may only be achieved by the joint commitment of all federal states and requires the sum of many contributions."

Frank Ackermann, Berliner Forsten, Forestry Office Grunewald

BEK 2030 – the tangible impact

In the BEK 2030, the Federal State of Berlin has set concrete targets for the reduction of CO_2 emissions and the adaption of the city to the effects of climate change. These objectives are based on the answers to two central questions: Which areas necessary for the supply of our city are responsible for which amount of CO_2 emissions? Which measures can reduce CO_2 emissions to what extent?

The greatest potential for CO_2 cutbacks has been identified in the "Energy Supply" and the "Buildings and Urban Development" fields of action, as well as in the transport sector.

At the same time, it is important to implement measures throughout all fields of action in order to achieve the objective of climate neutrality.

Future CO_2 emissions are influenced by the development of energy consumption, the phasing out of energy sources that cause high CO_2 emissions and the increase of the share of renewable energy sources. When it comes to the reduction of CO_2 emissions, efficiency is the key.

23

per cent of CO_2 emissions were caused by the transport sector in 2012. By 2050, Berlin will reduce CO_2 emissions by 69 per cent relative to the year 1990.

49

per cent of all CO_2 emissions in Berlin were generated by buildings in 2012. By 2050, these emissions will be cut by 84 per cent relative to the year 1990.

Saving energy

According to calculations made within the scope of the BEK 2030, the "Buildings and Urban Development" segment has major energy-savings potential. In the year 2012, the segment was responsible for roughly 59 per cent of all energy consumption. Effective energy-savings measures are the insulation of existing buildings against heat and cold, for example through the renovation of facades, windows and roofs, as well as the construction of new buildings with low energy consumption. Efficient heating, ventilation and cooling facilities also contribute to the reduction of a building's energy demands. The use of more efficient technology is significant in other areas of activity, too. Household appliances, power plant engineering in energy generation and the energy-efficient powering of vehicles are just a few examples.

The energy mix of the future

If all the measures of the BEK 2050 are successfully implemented, **Berlin's energy mix** will look completely different in 2050. While roughly half of all primary energy came from fossil fuels such as oil and coal in the year 2012, renewable energy sources and gases – including gases from renewable energy sources – are expected to dominate in the year 2050.

The share of renewable energies in final energy use is also meant to increase. The citizens of Berlin may contribute to the success of a climate-friendly energy supply themselves, for instance by entering into a contract on green power supply, by acquiring a solar-thermal system and by using a climate-friendly electric car.

EXPLAINED IN BRIEF

Primary energy is the energy contained in energy sources such as solar radiation. Primary energy is converted into **final energy**, for instance in power stations. Some energy is lost in the conversion process or in transmission, e.g. during the transport of power. The portion of energy that consumers can actually use is called **useful energy**.

Photo: Astrid Eckert/Photographie

78

per cent of CO_2 emissions caused by the capital city's business sector in the base year 1990 will have been cut by 2050.

Using energy from renewable sources

A **great share** of Berlin's energy supply from **renewable sources** is intended to be covered by solar energy and photovoltaic systems.

Apart from an expansion of its own renewable energy sources, Berlin has to find ways to store the excess electricity generated by wind power and solar systems. Excess electricity is generated, for instance, when the supply of electricity from solar systems exceeds demand on days with high solar radiation. This weather-dependent electricity supply needs to be connected to intelligent power and heat storage systems. Importantly, this will allow for the electricity to be used flexibly at a later point in time.

Berlin intends to accompany the shift to climate-friendly sources of its centralised structures of energy supply with a strengthening of **decentralised energy generation**. This will shorten the way to the consumer. Renewable energy sources such as solar systems can be attached directly to the building in which the energy is consumed. In order to ensure supply reliability, there will be a gradual transition phase, during which existing systems will be modernised and converted to emission-free generation.

Economic opportunities

The conversion of the energy supply systems, the adaptation to the impact of climate change and other climate protection measures cost money. Until the year 2021, Berlin intends to spend around 94 million euros within the scope of the BEK 2030 – and hopes to encourage private stakeholders to become involved as well.

This contribution to climate protection will also have an impact on the economy. Local value chains may be strengthened and jobs in Berlin safeguarded by renovation measures, the conversion of the energy-related infrastructure or educational campaigns.

In addition, today's investments in climate protection and climate change mitigation measures will cut future expenses caused by environmental damage and related health impairments.

All this demonstrates that a system of energy supply based on regional sources and independent of imports offers a high degree of supply reliability and a safe infrastructure.

90

per cent of Berlin's energy supply came from fossil fuels in 2012. By 2050, CO_2 emissions will have been cut by half. In 2050, renewable energy sources will dominate.

94

million Euros are going to be spent by the Federal State of Berlin within the scope of the BEK 2030 by 2021.

Climate protection in my eyes … makes sense from an economic point of view, is fun and boosts everybody's joie de vivre."

Prof. Dr Claudia Kemfert, head of the department Energy, Transport, Environment at the German Institute for Economic Research (DIW) and professor of Energy Economics and Sustainability at the Hertie School of Governance

OVERVIEW:

Climate protection and climate change mitigation in Berlin

In order to do exactly the right thing in exactly the right place, joint action is important. This is the approach of the BEK 2030 with its diverse fields of action.

More rain, greater benefit

Frequent heavy rainfalls are a major challenge for climate change mitigation in Berlin. Ways have to be found to make rainwater drain away more easily in the future – or to collect it and put it to use.

Protecting health

Increasing heat and new allergens can be health hazards. Within the scope of the BEK 2030, several strategies will be implemented to protect health.

More sustainable consumption

When they make sustainable consumption choices, private households directly contribute to a reduction in CO_2 emissions. This means that each and every individual can do quite a lot for a sustainable Berlin.

Corporate drivers

Berlin's corporate sector plays a major role in climate protection. Utilities companies, the housing industry and many state-owned enterprises have already committed to contribute to the achievement of Berlin's climate protection objectives.

Developing quarters

Energy-efficient refurbishments and high standards for new buildings make buildings a significant component on the way towards climate neutrality.

Redesigning mobility

The BEK 2030 plans comprehensive measures for the mobility of citizens: the expansion of cycle paths and public transport networks, more car and bike sharing offers and investments in electric mobility.

The energy of the future

In future, the capital's energy will be supplied from climate-friendly centralised and decentralised renewable sources. To achieve this, the supply infrastructure will be expanded and modernised.

Enhanced greenery

One important climate change mitigation measure is the preservation of Berlin's green areas and the enhancement of their quality. Activities are directed at making existing greenery more resilient as well as creating new green spaces.

Photo: katatonia82/iStock

On the road to a sustainable neighbourhood

The funding project "renovation management" in "Green Moabit" shows how to implement climate protection in one's own neighbourhood. In the densely developed district of Moabit West, a future-oriented neighbourhood that is adapted to climate change is being developed.

The work of the renovation management team is based on the district development concept "Green Moabit". Over a period of three years, climate-friendly projects will be implemented. The main targets are a more efficient use of resources and a reduction in CO_2 emissions. Thus, the concept and the renovation management programme will contribute to the achievement of the climate objectives of the Federal State of Berlin and, at the same time, improve the quality of local life.

Comprehensive measures

The use and expansion of existing potentials for climate protection and climate change mitigation is the key to integrated, energy-related district development in quarters such as Moabit. Comprehensive measures are being adopted. In the "Transport" field of action, examples are the expansion of the cycling infrastructure and the establishment of an adapted bike sharing system.

With regard to the "Water" field of action, the measures will relieve the waste water system through the use and drainage of rainwater.

Roughly 82 per cent of emissions in the quarter are caused by the commercial sector. Consequently, "Green Moabit" also aims to improve the energy efficiency of companies. For instance, one local company has optimised its compressed air supply and the lighting of its warehouses.

In addition, Moabit's business network holds regular "Green Moabit" meetings to support companies on their way to an energy-efficient operations.

The renovation management team also organises events for private owners that discuss objectives and the potentials for the energy-efficient development of residential properties.

Support for an energy-efficient district development

As a laboratory for sustainable renovation strategies, "Green Moabit" is an inspiration for other energy-related district development projects. The city's neighbourhoods have great potential for the saving, decentralised generation and effective usage of energy. One example for this is the building of local heat networks. Consequently, one important objective of the BEK 2030 is to support the energy-efficient development of urban quarters. In future, a service centre will offer support in the planning and implementation of such projects.

The Berlin district of Moabit West is characterised by residential and commercial areas. The creation of a sustainable neighbourhood is the objective of the project "Green Moabit".

Photos: Archiv STATTBAU GmbH; Arno Burgi/dpa; Photostudio Ludwig/Ludwig Niethammer

Investment in renewable energy sources: within the scope of the BEK 2030, the roof areas of public buildings will be used to install additional solar systems.

Energy of the future

The measures of the BEK 2030 pave the way towards a climate-friendly centralised and decentralised supply through renewable energy sources. By 2050, roughly half the electricity and heat used in Berlin are intended to come from renewable energy sources. This will be a major contribution to the reduction of CO_2 emissions. The first steps have already been taken: Berlin ceased to use brown coal in 2017. The city plans to phase out hard coal as well until 2030. At present, investigations are being made into possibilities for transforming the remaining power stations.

The "Masterplan Solarcity"

Solar energy plays a special role in the city's energy turnaround, since it is a particularly clean form of energy. For this reason, the Federal State of Berlin is developing a "Masterplan Solarcity". In the long-run, one quarter of Berlin's electricity supply is intended to be covered by solar power. This will turn the Federal State of Berlin into a role model. It is one of the targets of the BEK 2030 to install solar systems on all suitable roof areas of state-owned buildings by 2030. The public utility company Berliner Stadtwerke (BSW), which supplies Berlin's households with locally generated green electricity, is an important partner in the realisation of this project.

Rooftop energy

Around 85 per cent of Berlin's inhabitants live in rented flats. To create opportunities for them to actively take part in the energy turnaround, the BEK 2030 specifically supports tenant electricity projects. Tenant electricity means that the electricity is generated on-site, either by solar systems installed on the roof or through a cogeneration unit in the basement, and fed directly into the electricity network of the residential building. Any excess energy is fed into the city's electricity network.

How does one pave the way towards a climate-friendly neighbourhood?

"With regard to this, climate protection and climate change mitigation may ideally complement one another. For instance, a decentralised supply helps to use energy efficiently and flexibly. The ratio of developed and undeveloped areas has to be balanced as well. However, the most important factor is that all stakeholders act in concert."

Dr Jörg Lippert is a special representative of the executive board and head of the technical department of BBU e. V., the Berlin-Brandenburg Association of Housing Corporations

Ecological is economical

Renewable energies such as solar power will increasingly contribute to the economy.

Thus far, Berlin's economic development has mainly been driven by the IT and creative sectors as well as the building industry. However, the implementation of the urban energy turnaround in particular creates business opportunities. The use of innovative technology, especially in the energy-efficient refurbishment of buildings and renewable energy sources, spawns new services and business areas. This not only creates new jobs, but new opportunities to add value as well.

Energy efficiency in enterprises

The BEK 2030 also aims to utilise potentials for the improvement of energy efficiency in the business sector, where energy consumption could be cut by five to ten per cent. The workplaces of employees are one field of action. A campaign is aiming to encourage employees to act more conscientiously in the workplace.

Climate protection in my eyes … is both an obligation and an opportunity. A city such as Berlin in particular may generate many positive effects for society, the economy and urban development through climate protection."

Prof. Dr Bernd Hirschl, member of the Climate Protection Council of the Federal State of Berlin

Technology is becoming increasingly complex and many skilled professionals lack sufficient know-how even today. Consequently, education and professional development in schools, training organisations and universities is one of the focal points of the BEK 2030.

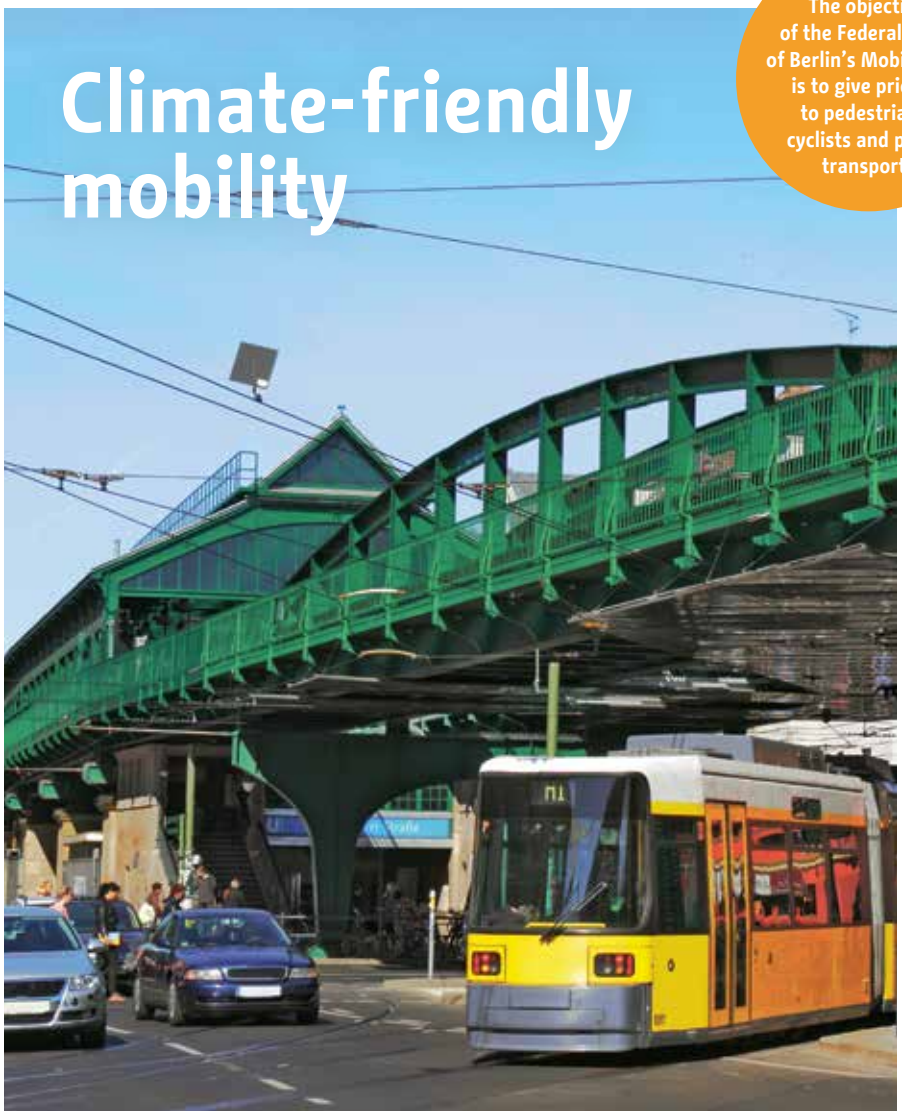
Sustainable innovation

Within the scope of climate protection agreements with the Federal State of Berlin, companies commit to implementing climate protection measures. One focal point in this regard is waste management. For instance, Berlin's public waste management agency Berliner Stadtreinigungsbetriebe (BSR) recycled 76,000 tons of organic waste in 2017. 69,000 tons of this waste were converted to biogas in a fermentation facility and in turn used as fuel to power BSR's fleet of vehicles. Fermentation residues were used as fertiliser in farming. Overall, this helped BSR to cut CO_2 emissions by more than 9,000 tons. In future, further climate protection agreements with other enterprises will be concluded to enable further CO_2 reductions.

Start-ups are also working on new products for the realisation of the energy turnaround. Thus far, young entrepreneurs involved in climate protection in Berlin have mostly developed innovations in the area of solar power. For example, transparent solar membranes turn windows into micro power stations – or electric vehicles recharge themselves with the help of integrated solar cells.

Climate-friendly mobility

The objective of the Federal State of Berlin's Mobility Act is to give priority to pedestrians, cyclists and public transport.



One of the core objectives of the BEK 2030 is the improved sustainability of urban mobility. In the medium to long term, the streets of Berlin are intended to become cleaner, quieter, safer and more climate-conscious. The BEK 2030 aims to make walking and cycling more attractive as well as to strengthen public transport. In addition, car and bike sharing offers are to be expanded.

A major step on the way is the Berlin Mobility Act, which was passed by Berlin's House of Representatives in June 2018. The BEK 2030 and the Berlin Mobility Act are closely linked. The act is the first piece of legislation in Germany to give precedence to cyclists, pedestrians and public transport in traffic management. During the first phase of the implementation, cycling will be the main focal point. The budget for the expansion of the existing infrastructure amounts to about EUR 200 million. Among other things, the funds will go towards the construction of express cycling lanes as well as bicycle paths and stands. Safety will be enhanced by the restructuring of particularly dangerous crossroads. Another major target is the expansion of public transport, for instance through the construction of new tram lines and better connections for suburban areas. The buses of the city's public transport agency Berliner Verkehrsbetriebe (BVG) are to be powered by electricity from renewable sources by 2030.

Case study "Flotte Kommunal"

The model project "Flotte Kommunal" (municipal fleet) proves that innovative mobility projects can be implemented within a relatively short timeframe. The borough offices for Lichtenberg and Spandau began to provide the free service in the summer of 2018. From October 2018 until December 2020, citizens will be able to book the bikes online, pick them up at public buildings and use them for up to three days. The BEK 2030 will finance the project for three years, in collaboration with the Berlin branch of the German Cyclists' Federation (ADFC) as the organising partner.

Lichtenberg is one of Berlin's first city boroughs in which the local authority has developed its own mobility concept. "We knew that we needed climate-friendly mobility offers that were located near people's homes, in order to reduce emissions and motivate citizens to leave their private cars behind," says Kirsten Schindler, representative for climate protection at the borough mayor's office in Lichtenberg. "More sharing offers will definitely be the concept of the future."

Senate sponsors cargo bikes

In 2018, Berlin's Senate passed a funding programme for cargo bikes. They are practical and protect the environment. Owing to high demand, the funding programme will be continued in 2019.

The project "Flotte Kommunal" (municipal fleet) started in the summer of 2018.

Raising awareness for climate protection in everyday life

Climate protection efforts need to include the young. This is why more and more schools and other educational institutions in Berlin are imparting knowledge about climate protection. If climate protection is to be sustainable in every regard, it is essential to raise awareness at an early stage in life.

Everyday life also provides many easy opportunities to save energy and improve the climate balance. And this is beneficial for the bank balance as well: through the use of thermostats or the insulation of doors and windows, heating costs may be cut. It is not always necessary to keep a flat at a permanent 24 degrees Celsius all the way through winter, when lowering the room temperature by just one degree reduces heating costs by six per cent.

Early practice

The framework curriculum for Berlin-Brandenburg stipulates that the topics climate protection and climate change mitigation should be taught in Berlin's schools. The city's administration funds school projects on the issue to support the schools' commitment to the topics. Many schools participate in the competition "Berliner Klima Schulen" (Berlin climate schools), which primarily recognises climate protection activities. Schools that implement their own climate protection plan on top of that are awarded the label "Berliner Klima Schule". The elementary school Mühlenau in the Borough of Steglitz-Zehlendorf has been awarded the label every year since 2012. "Our school has a long tradition with regard to climate protection and our students are great at implementing this," says Kerstin Litti-Vosskamp . The science teacher presides over the school's bi-annual climate convention. The convention discusses current projects and new topics pertaining to climate protection which the students want to become involved in.

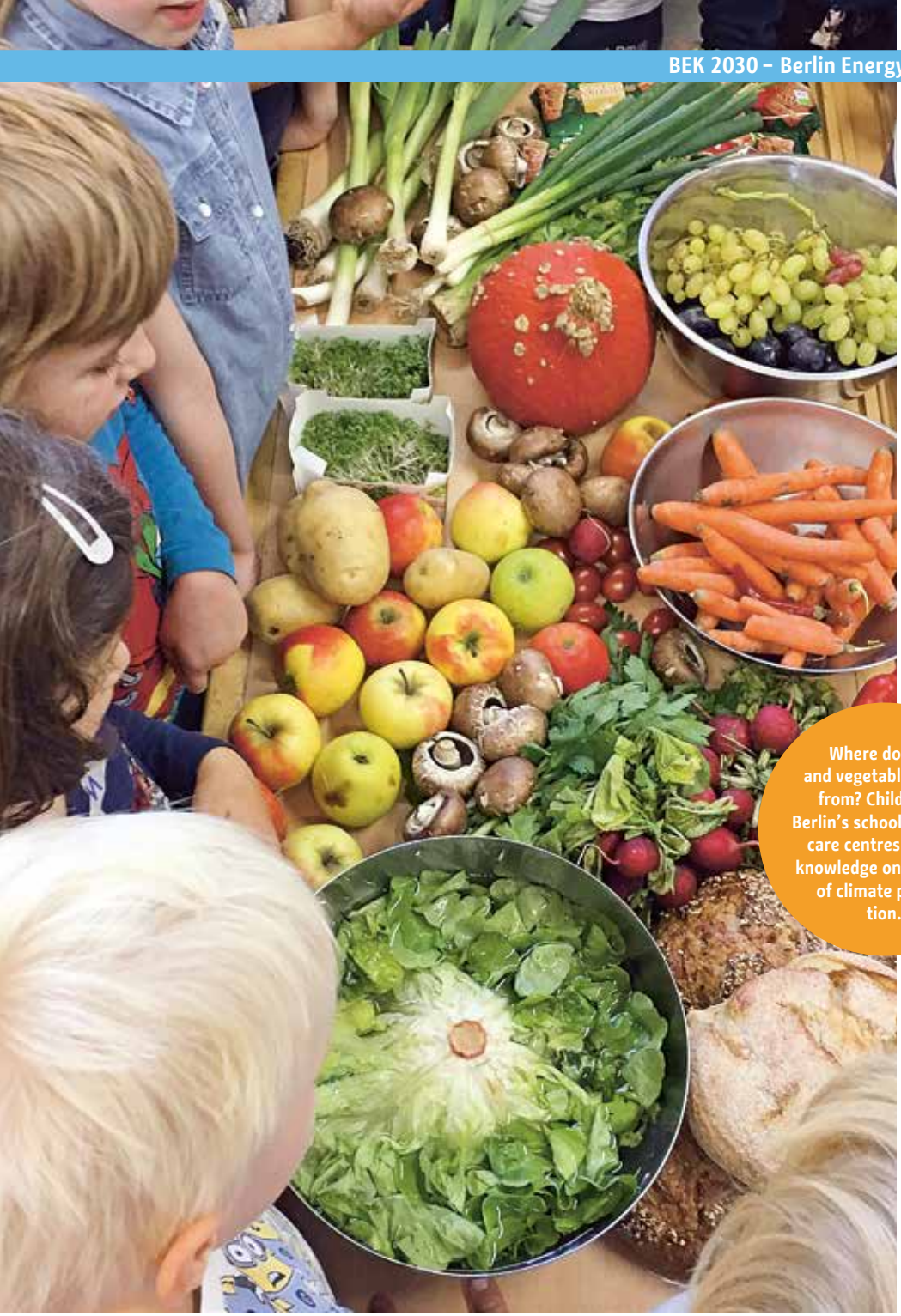
Children demonstrate great interest

"We primarily focus on issues that are close to the students, such as nutrition or how they make their way to school. But apart from this, I keep being surprised at how great an interest of their own the students show," Litti-Vosskamp explains. Other schools which are awarded the label regularly, for example the secondary school Robert-Havemann-Gymnasium in the borough of Pankow, focus on a scientific approach. The school has founded the energy centre Energiezentrum Pankow (EPZ), where energy-related experiments are performed. In addition, there is a learning workshop, in which the students are able to work on solar-powered cars among other things. Another school that has been awarded the label "Berliner Klima Schule" is the Heinrich-Mann-Schule in the Berlin Borough of Neukölln. This school attends to the responsible use of

EVERYBODY CAN CONTRIBUTE

- Do household appliances really work efficiently? With the help of an inexpensive electricity measuring device, the actual power consumption may be monitored.
- Cheaper devices often consume more power. Higher operating expenses can quickly annihilate the savings on lower purchasing prices. Those who make a greater initial investment save in the long run.
- Food and beverages from regional sources shorten the way to the consumer. And eating less meat substantially reduces CO_2 emissions – on top of being beneficial to health.
- The ingredients of many cleaning products are bad for the environment. Household remedies can be a better choice. For instance, vinegar essence can be a substitute for cleaning agents that are not easily degradable.
- Rather than keeping windows at a constant tilt, it is better to ventilate intensively for a few minutes. This prevents the escape of too much heat.
- Plastic bags may be substituted by reusable textile bags. And instead of using throw-away coffee-to-go-cups, tea or coffee may be carried in thermos flasks or mugs. And if the latter are made of sustainable raw materials, they are even more environment-friendly.
- Electronic devices on stand-by consume electricity as well. It is better to switch off laptops and TVs completely.

Photos: Carina Kaiser/dpa; clubliebe e.V./Karoline Kohle



Where do fruit and vegetables come from? Children in Berlin's schools and day care centres acquire knowledge on the topic of climate protection.

resources in everyday life. The school building has undergone an energy-efficient renovation and the pupils regularly take part in climate protection projects. These projects deal with issues such as sustainable clothing or nutrition. Since climate protection is a task for all generations, the Federal State of Berlin also promotes learning about energy and climate protection in day care centres. This is meant to raise awareness of the issue among children between the ages of four and six.

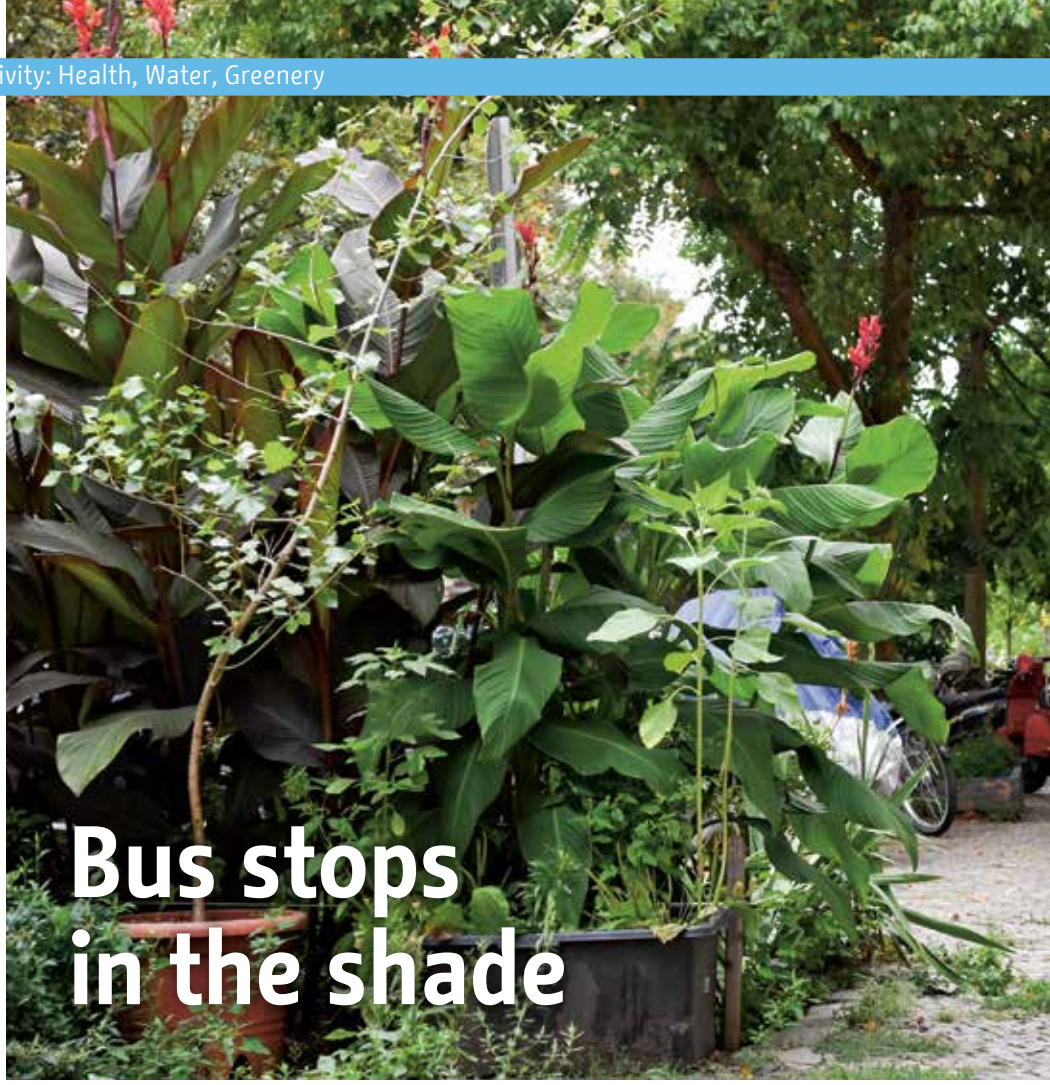
Comprehensive advice offers

Adults are offered advice that focuses on everyday life. Day-to-day life provides a lot of potential scope for more climate-friendly action. One example is advice on energy savings. Consumers are given hands-on support in finding climate-friendly ways to use energy. The BEK 2030 wants to expand and link targeted consultation services for different population groups. In November 2017, a round table was initiated to achieve this end. Its members are representatives of the administration, associations and companies that offer consultation services on energy efficiency. It is their task to enable individual and practicable consultation on climate protection issues for different target groups, for instance the owners of detached and semi-detached houses. Family homes, particularly those on the outskirts of Berlin, are mostly located in old buildings with limited energy efficiency due to poor insulation and outdated heating systems.

Consequently, the BEK 2030 embarked on a model project in city quarters with a large proportion of detached and semi-detached houses in 2019. Energy consultants advise the citizens of Berlin on potential energy savings, renovation measures and possible funding. To make customised advice possible, the experts personally inspect the buildings.

Climate protection in my eyes … is an integral part of life, which does not end when the night begins. It is necessary to understand the impact one's own actions have on the environment, climate and other people – in order to reduce adverse effects to a minimum."

Konstanze Meyer, head of the Clubmob initiative that promotes sustainability in Berlin's club scene.



Bus stops in the shade

Ms Moll is on her way to the doctor's. She is not as steady on her feet as she used to be. Step by careful step, she makes her way to the bus stop. It is hot in Berlin, not a spot of shade far and wide. The sun burns down mercilessly on the few seats at the bus stop. It won't be long before Ms Moll collapses …
Scenarios like this have almost become a daily routine by now. This is why the BEK 2030 contains concrete measures for climate change mitigation to make the life of Berlin's citizens more comfortable.

Health and heat provisions

Heat can be a burden for the body's circulatory system, the heart or the respiratory tract, especially when it comes to the elderly and the infirm. Owing to demographic change, more and more people are likely to be affected by this. But young people also have difficulty sleeping at night or concentrating by day when it is hot. On top of that, higher UV radiation levels increase the risk of skin cancer – and longer flowering periods may also prolong the pollen season, aggravating the risk of allergies.
Prof. Dr Christian Witt is the head of the unit for acute pneumology at Berlin's renowned Charité hospital. He investigates the impact of air pollution and climate change on people's health. "A greater number of people have to be hospitalised when the temperatures are higher," says Dr Witt. Symptoms include coughs and a decline in general fitness. The duration of hospital stays can be cut by air conditioned rooms. Consequently, the need for heat protection in buildings via insulation or shade management is growing, and is of particular importance when these buildings are utilised for health care.
Because of this, Berlin wants to develop an early warning system for heat. This system will enable the uninterrupted communication of warnings to facilities such as old people's and nursing homes, child care facilities, hospitals, social ser-

HANDLING RAINWATER

- **9,725 kilometres** is the length of the canal network for the drainage of waste water maintained by Berlin's public water agency Berliner Wasserbetriebe (BWB). The network is subdivided into mixing and separating systems.
- **4,403 kilometres** of waste water systems are dedicated to sewage water, **1,928 kilometres** to mixed water and **3,324 kilometres** to rainwater. In addition, there are a great number of special underground waterways and buildings.
- **52.8 per cent** of Berlin's entire surface area has a drainage infrastructure, with separating systems taking the lion's share.
- **Rainwater Discharge Regulation**: As of 2018, construction projects may only discharge as much rainwater into the drainage network or the city's water bodies as would drain away from the developed plots in their "natural" state.

Photos: Jens Kalaene/dpa; Berliner Wasserbetriebe/Benjamin Pritzkuleit

Trees and plants provide shade for citizens on hot days. In future, resilient plants will be of crucial importance.

vices and similar institutions. The issue of climate change should also play a greater role in the education and further job training of the caring professions. Monitoring routines in nursing need to be adapted.

More green spaces

Green spaces and reflecting building materials help mitigate the heat in the city. Within the scope of the funding programme "1.000 Grüne Dächer" (1,000 green roofs), as many existing buildings as possible will receive green roofs. An expansion of the network of drinking fountains in squares and parks is also being planned. More green spaces in the city also help with other aspects of climate change mitigation. Meadows, fields, allotments and parks are not only sources of cool and fresh air – they also relieve the waste water system in the event of heavy rain because they provide drainage areas. The condensation of water cools down the surrounding air. However, green spaces suffer in extreme heat and humidity. Thus, choosing the right plants becomes important. While they have to be suitable for their surroundings, they should not constitute new risks for allergy sufferers. Another target is a more intensive tree care. For every tree cut down in the city, at least one new tree should be planted.

Rainwater usage

Dr Darla Nickel sees positive trends with regard to rainwater. The graduate engineer for technical environment protection is the head of Berlin's Rainwater Agency. The agency was founded in May 2018 and helps the city in its efforts to adjust rainwater usage to the impact of climate change. In dealing with districts, planners and investors, Darla Nickel notes that interest in the subject has increased. Public awareness of the issue has also been boosted by legislative action such as the Berlin Rainwater Discharge Regulation (see info box above).

According to Ms Nickel, the prevalence of developed areas in the city is the biggest problem in relation to rainwater. In the event of heavy rains, the waste water system is not always able to absorb the huge volumes of water. As a result, rain and sewage water are forced to the surface and flow into rivers and lakes, polluting them. One possible solution is the decentralised usage of rainwater, in which rain should drain away or be collected and used in the location where it falls. Darla Nickel explains that possible measures include the deployment of "green roofs, percolation troughs or the utilisation of the water in gardens and toilets". These ideas are easy to realise, especially in new housing developments. In addition, the graduate engineer recommends the desealing of areas: "If inner courtyards or backyards are covered by base plates, these should be removed so the water can drain off. This is a great help and easy to implement for each and every property owner."

The great task of climate change mitigation cannot be mastered by politicians and administrators alone. Citizens should get active as well. The city's greenery, health and rainwater are important areas of activity, where solutions can interlock.

Ms Moll returns from her doctor's appointment and sits down on the bench at the bus stop. She fills her flask with water from the drinking fountain next to the bench and takes a swig. Gratefully, she glances up at the crown of the chestnut tree. It is one of the many trees planted by the Federal State of Berlin within the scope of the BEK 2030. Not least to provide her with shade.

Why do climate protection and climate change mitigation concern all of us?

Every one of us feels the impact of climate change: more frequent heavy rains, long periods of drought and heat. Berlin needs to adapt to prevent consequential damage. It starts with a different approach in dealing with rainwater."

Dr Darla Nickel, head of Berlin's Rainwater Agency

The economy

Businesses play an active role in implementing the measures of the BEK 2030. They invests in climate protection and climate change mitigation, to the benefit of their owners as well as their employees.

Making a real difference together

Diversity makes Berlin the great city it is. When all stakeholders act in concert, they can achieve the objective of climate neutrality.

Politics

The public sector and its institutions provide the framework for climate change and climate change mitigation. They generate stimuli and support other stakeholders.

Berlin ...

... provides information and advice on ways to lead a more sustainable life.
... requires and provides energy for change in the city.
... offers opportunities to participate in climate protection.
... is a role model in the use of new technologies.
... supports private initiatives in the saving of energy.
... creates a modern infrastructure that serves climate protection.
... actively paves the way to climate neutrality.

Society

All of Berlin's citizens are asked to act in a more sustainable fashion. Everybody can contribute to making the city liveable and building a better future.

Science

Berlin's scientific institutions and businesses are progressive. They drive change forward through their adoption of new technology and business models.

Photo: Jotily/iStock

diBEK – Monitoring the objectives of the BEK 2030

diBEK is the digital monitoring and information system of the Berlin Energy and Climate Protection Programme 2030. It is where all the data on the implementation of the measures of the BEK 2030 converges. The system has two functions: on the one hand, it creates transparency because everybody can access the data and view the results via the website dibek.berlin.de. Secondly, the impact of the BEK 2030's measures is critically evaluated by diBEK. This is crucial for the success of the BEK 2030, since continuous monitoring and evaluation ensures that the implemented measures contribute to the achievement of the objectives in the best way possible. In addition, the system will allow for innovations to be integrated in the right places.

A wealth of data

diBEK is a huge collection of data, and its website is the display case where all the data is presented. The system monitors the implementation of climate

Kickoff

In April 2016, the Berlin Energy Turnaround Act (EWG Bln) is passed. The act's target is climate neutrality in 2050. The EWG Bln is the basis for sustainable and strategic climate protection policies.

Two-degree limit

With the Paris Agreement of December 2015, the UN commits to limiting global warming to below two degrees Celsius.

40 per cent

The climate protection objective for 2020 is cutting Berlin's total CO_2 emissions by at least 40 per cent, relative to the base year 1990.

1st stage

In January 2018, the Berlin House of Representatives passes the BEK 2030. It paves the way for the city to become climate neutral.

60 per cent

In 2030, CO_2 emissions in the capital will have declined by 60 per cent relative to 1990. Many measures of the BEK 2030 will have been implemented, for instance in the fields of action energy supply and transport.

The end of coal

In 2030, Berlin will have stopped using hard coal. The city won't have used brown coal since 2017.

CO_2-neutral

True to their motto "CO_2-neutral administration", the senate and borough administrations operate in a completely carbon-neutral way by 2030.

MILESTONES ON THE WAY TOWARDS CLIMATE NEUTRALITY

2015 2020 2025 2030 2035

protection as well as climate change mitigation measures. "In addition, we integrated our reporting on climate impact, which we have been steadily expanding since 2014, into the system," says Astrid Endler.
As a representative of Berlin's administration, the biologist was involved in the development of diBEK and is now coordinating its continuation.

Many useful graphs

Networking is a major part of this work, since a lot of data is not directly collected by Berlin's administration but by other institutions. For example, information and data collected by Germany's central climate and weather monitoring agency Deutscher Wetterdienst (DWD) and the statistical office of Berlin-Brandenburg complement the data contributed by Berlin's administration. A wealth of information may be found on diBEK's website. Topical data on Berlin is presented under the headings Klimaschutz (climate protection), Klimafolgen (climate impact) and Klimaanpassung (climate change mitigation). In addition, one may dig deeper to find specific information and planned measures, grouped under the different fields of action. Illustrative graphs are provided alongside much of this information. Information on the target scenarios is in many cases supplemented by descriptive graphs as well, including explanations on the yardsticks by which the achievement of objectives is measured. However, Astrid Endler states that there is a great amount of data she and her colleagues could use in monitoring, which is not being collected yet. For instance, a classification of the deployments of emergency doctors and fire fighters would be helpful. Was their deployment heat-related? Was the rescue team called because a district needed help fighting the impact of heavy rain? Negotiations are currently underway with a great number of agencies that might collect data such as this.

2050

Climate-neutral

In 2050, Berlin has mostly achieved climate neutrality. The city's emissions no longer have a negative impact on the climate, and while a climate impact can be felt, it is tolerable. The consumption of primary energy in public buildings has declined by 80 per cent.

Hard figures, soft factors

With regard to all of the three areas **climate protection**, climate impact and climate change mitigation, there are hard as well as soft factors.
As far as climate protection is concerned, there are set targets for the reduction of CO_2-emissions. In the "Energy Supply" field of action; it can thus be clearly measured whether these objectives are achieved or not. This can easily be monitored and presented. However, outcome measures on soft factors such as consulting on energy savings and educational initiatives are a bit more difficult. These are not easy to measure and present in concrete figures and charts.
The same is true of the area **climate change mitigation**. For example, it is not possible to quantify the precise effects of a small measure such as the creation of a new green space. How can its contribution to the reduction of noise levels be quantified, or the exact improvement in condensation that ensues from it? It is possible, however, to document routines in nursing or the de-sealing of areas. How effective the implemented measures are may only be known with hindsight, for instance when the amount of property damages resulting from heavy rain events declines.
However, when it comes to **climate impact monitoring**, it is possible to mostly rely on hard figures again. In this segment, climate development and those consequences of climate change that have already become apparent can be assessed on the basis of concrete figures.
The monitoring is intended to make the learning processes of the stakeholders in the city and the implemented changes visible. Every measure implemented within the scope of the BEK will make diBEK grow in turn. Or, as Astrid Endler puts it: "It is a dynamic system."

Photo: iStock/almoond

2040 2045

Dr habil. Fritz Reusswig, lead researcher at the Potsdam Institute for Climate Impact Research

Susanne Walz, CEO of urban development enterprise L.I.S.T. GmbH, which focuses on solutions at district level

INTERVIEW

"The sensitisation of society is crucial"

With the BEK 2030, the Federal State of Berlin is actively paving the way towards climate neutrality in the year 2050. Implementation is underway, demonstrated by such projects as "Flotte Kommunal" (municipal fleet) or consultation offers on the use of rainwater. There is ongoing development in technologies, legislation and Berlin's awareness with regard to climate-friendly action. Thus the Federal State of Berlin is continuing to exchange ideas with civil society, politics, the corporate sector and – not least – with representatives from the fields of science and climate protection. In this interview, Dr habil. Fritz Reusswig and Susanne Waltz discuss challenges and opportunities for climate protection and climate change mitigation. Both were involved in the development of the BEK 2030.

Which innovation has the greatest potential for climate protection in Berlin?

FRITZ REUSSWIG The development of photovoltaics over the last 20 years has simply been incredible. The cost of power generation has declined steeply and yields are high. There has to be an expansion of decentralised, renewable sources of energy. This is necessary to cover the current as well as the future demand for electricity used in electrical applicances, especially in the area of e-mobility.

If we take up the buzzword mobility, what are the challenges in this sector?

FRITZ REUSSWIG It will require political legislation, maybe even a tax on CO_2 emissions, to encourage the industry to develop alternative engine technology as fast as possible. I refuse to believe that the German industry is incapable of building climate neutral drives.

When it comes to climate change mitigation, what are the crucial factors?

SUSANNE WALZ The sensitisation of society is crucial. And it is also important to remember existing measures that are often easy to implement, such as the greening of facades or the creation of shady seating areas which provide alternatives and relief to the city's inhabitants. With regard to this, we can learn a lot from southern European countries, for instance in the design of buildings.

Will Berlin present quite a different picture in 2050?

SUSANNE WALZ I hope we will be living in a green city by then, with less traffic and free drinking water available everywhere. There will be cool relaxation zones in the green and undeveloped areas as well as in spaces accessible to the public. This will enhance the quality of life.

What are examples of concrete technologies that will become relevant in the future?

FRITZ REUSSWIG "Smart metering", meaning the intelligent measurement of consumption, will very probably become the standard in terms of electricity supply to households. The integration of CO_2 computers is another possibility. They show the consumer how much CO_2 is being emitted. Practical tools and apps such as these will increasingly be used.

How significant will digitalisation be for climate protection and climate change mitigation?

SUSANNE WALZ Digitisation can support the process, but it mostly plays a secondary role. There may be digital solutions for the monitoring and managing of room temperatures or communication technologies for heat warnings.

FRITZ REUSSWIG Digitisation has its risks as well. It is important that technological development pays heed to the requirements of politics and users. It makes no sense to use artificial intelligence where there is a lack of social intelligence.

Photos: PIK/Karkow; L.I.S.T. GmbH

IMPRINT

Published by
Senate Department for the Environment,
Transport and Climate Protection
Public Relations
Am Köllnischen Park 3
10179 Berlin
www.uvk.berlin.de

Content and editing
Senate Department for the Environment, Transport and Climate Protection
Division for Climate Protection and Adaptation

dpa Deutsche Presse-Agentur GmbH
dpa-Custom Content
Mittelweg 38
20148 Hamburg
www.dpa.com

Layout and proofreading
dpa-Custom Content

Picture credits title
Nadine Kunath

Printed by
ARNOLD – www.arnoldgroup.de

Berlin, April 2019

Senate Department
for the Environment, Transport
and Climate Protection