The path to greenhouse gas-neutral administration

Stages and guidelines

German Environment Agency

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"The What consider, more the How and Why"
(Johann Wolfgang von Goethe, Faust II)

Foreword

Dear readers,

Administrations construct and enforce the regulatory framework of our society and create the conditions under which a stable, liveable community can develop from a variety of cultural, social and economic activities. However, the public sector is not just a regulating and enforcing governmental power. As part of society, it is itself deeply rooted in and closely intertwined with the principles, values and developments which shape and affect citizens' lives. Above all, this also applies to the greatest challenge faced by the global community today, which administrations must tackle at all levels (i. e. internationally, nationally, regionally and locally): preventing a climate catastrophe, significantly reducing the man-made greenhouse effect, and striving to limit the global temperature increase to 1.5 °C above pre-industrial levels.

This enormous challenge is not just a complex and difficult task for administrations and their employees in respect of implementation. By using buildings, vehicles, equipment and devices, taking business trips, purchasing products, awarding contracts, holding events, allowing employees, visitors and suppliers to come to their premises and much more, administrations themselves contribute to climate change. The opportunities, difficulties and barriers involved in preventing or at least reducing the associated greenhouse gas emissions are just as varied and complex for administrations as they are for citizens and companies. Even more than them, the public sector has to fulfil a role model function – a function which is now even provided for in climate protection legislation: The measures to be taken by citizens to protect the climate which the state recommends or imposes on and sometimes even burdens citizens with must also be exemplified by the state in its administrations and institutions. If it achieves this, it not only gains credibility and authority, but also knowledge and experience of how climate protection can successfully be implemented in practice. This is truly a contribution to citizen-centered administration!

This publication aims to support administrations, in all their diversity and with all their differences, with fulfilling their function as role models for climate protection and increasing their credibility. To this effect, it provides practical descriptions of how administrations can systematically record, prevent, reduce and report their greenhouse gas emissions. It is primarily aimed at the employees of administrations who want to play a role in helping the relevant authorities achieving greenhouse gas neutrality. Besides the heads of authorities and their organisational units, this also includes those who implement practical climate protection measures at working level, whether as climate protection officers, in property management, in business trip management, in vehicle fleets, in procurement and contracting, in data centres or in event management. We hope to familiarise the relevant persons with the organisational, methodical and practical climate protection aspects within administrations and support them on the path to greenhouse gas neutrality.

The requirements, recommendations and guidelines compiled here may also help companies and other organisations outside the public sector to coordinate their climate protection efforts in a transparent and credible way. Additionally, they may also convey an understanding of the practical dimension of climate protection in a professional environment to all those who are preparing for future roles in administrations or in companies or who are interested in the issue for other reasons.

This publication was not written as a bureaucratic exercise; it is based on practical experience in authorities of the federal government, federal states and municipalities, not least in the German Environment Agency (*Umweltbundesamt*, UBA). It is also takes into consideration the experiences of companies, associations, societies and administrations from other countries and international organisations. We hope that it will support many administrations who on their path to greenhouse gas neutrality to carry out their functions as role models and to contribute to socioecological transformation in Germany and elsewhere.

Warmest regards,

Yours,

(President of the German Environment Agency)

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Greenhouse gas-neutral administrations –

a long road with many stages

The trend towards greenhouse gas neutrality

The EU and its Member States intend to achieve greenhouse gas neutrality by 2050. This means that no greater quantities of greenhouse gases are emitted than are captured in sinks, e. g. forests and soils, over the long term or are removed from the atmosphere by other means. Besides this fundamental commitment made by climate policy actors, there have been a number of announcements and **initiatives within industry and within administrations** concerning greenhouse gas neutrality.[1] The number of companies advertising greenhouse gas-neutral products or intending to become greenhouse gas-neutral in just a few years is growing rapidly. For example, this concerns the dispatch and transport of goods and materials, the operation of data centres, printers and canteens, the hosting of events, and the provision of numerous other services.

Politicians and administrations at all federal levels – from the EU, the federal government and the federal states to the towns, cities and municipalities – have set targets to achieve greenhouse gas-neutrality within administrations. In this way, they want to ensure that the actions of political actors and their administration are in line with climate policy decisions.

At EU level, the **EU Commission** has announced its intention to organise its administration in a climate-neutral way by 2030 and has carried out a feasibility study for this purpose[2], with an action plan to follow later in 2020. The **European Parliament** indicates that its administration has been greenhouse gas-neutral since 2015, but it is currently carrying out a study to explore possible steps to further reduce its carbon footprint.[3]

At national level, the **German federal government** has laid the target of achieving "climate-neutral federal administration by 2030" down in Section 15 of the Federal Climate Change Act (*Bundes-Klimaschutzgesetz*, KSG), thereby making it legally binding. Similarly, most federal states have also adopted initiatives to promote **greenhouse gas-neutral federal state administrations**. Finally, numerous **towns, cities and municipalities** have declared their intentions to become greenhouse gas-neutral and they have adopted corresponding targets for their administrations. In total, the goal of achieving greenhouse gas-neutral administration in Germany applies to **several thousand authorities with more than four million employees**. This gives rise to many questions and challenges for the administrations concerned, particularly where climate protection has previously only played a minor role or has not been considered at all and where, consequently, there is only little relevant expertise and experience.

Why administrations should become greenhouse gas-neutral

It goes without saying that all endeavours to achieve greenhouse gas-neutral administration are, first and foremost, aimed at protecting the climate. However, it is not simply a matter of reducing administrations' direct greenhouse gas emissions. Besides administrations' credibility and function as role models, it is also about the buying power of the public sector and practical experience with climate protection.

Increase credibility among citizens and industry

The achievement of climate policy targets requires citizens and companies to be prepared to adapt their consumption patterns and production structures and to accept the resulting changes. In future, we must live and work differently, get around differently, and eat and consume differently. The transition to a sustainable, climate-friendly way of life poses a great challenge. It will thus only be supported and accepted by the majority of people if they trust the institutions which create the necessary legal framework. It is therefore a question of credibility that the public administration makes whatever it demands of citizens and businesses the yardstick for its own actions.

Strengthening the role model function of public administrations in climate protection

The public sector should act as a role model for others by leading the way and setting an example in relation to climate protection. This role model function is not just a recommendation but a legal obligation to which an entire section of the KSG is devoted. In accordance

1 See Huckestein, B.: *Klimaneutrale Unternehmen und Verwaltungen – Wirksamer Klimaschutz oder Grünfärberei* (Climate-neutral companies and administration – Effective climate protection or greenwashing); GAIA 29/1 (2020), p. 21 et seq.
2 Le Den, X. (et al.): Feasibility and Scoping Study for the Commission to become climate neutral by 2030 – final report, 2 September 2020 (see https://ec.europa.eu/clima/sites/clima/files/eu-climate-action/docs/climate_neutral_commission_study_en.pdf).
3 Amanatidis, G., Randic, S.: The European Parliament's carbon footprint – Towards climate neutrality, September 2020.

with Section 13(1) KSG, when planning and making decisions, bodies discharging public duties shall give due consideration to climate protection and to the targets set for this purpose. Specifically, the KSG requires the federal government to consider how it can contribute to the achievement of climate protection targets when planning, choosing and making investments and during procurement. Section 15 KSG specifies that the federal administration should be climate-neutral by 2030.

Whether for construction works or the operation of buildings, for business trips and commuting, for vehicle fleets, for procurements, or when planning and hosting events, the experience of administrations can motivate and inspire practical climate protection solutions in companies and elsewhere. Their findings help to raise awareness and to strengthen understanding of the fact that climate protection is a task for everyone, not just for the primarily responsible competent authorities.

Increasing demand for climate-friendly products

Greenhouse gas-neutral administrations lay down strict climate protection requirements in respect of their buildings, their vehicles, their procurement and their behaviour. With their demand, the public authorities have a direct and indirect effect on the development of climate-friendly goods and services. This sends a clear signal to (potential) suppliers and creates certainty among those who can meet this growing demand for climate-friendly products.

Gaining practical experience of climate protection

By pursuing climate protection themselves, administrations develop a more practical and concrete understanding of which approaches and measures work when it comes to reducing greenhouse gas emissions, but also of which challenges and barriers are associated with them. They benefit from their findings concerning both aspects when designing and implementing climate policy with their tools and measures, when carrying out various public duties in a climate-friendly way, and when dealing with the actors involved. Solutions for and approaches to reducing greenhouse gas emissions can be applied and tried out internally, aligned with other tasks and, if necessary, adapted. This creates an understanding not only of the challenges, barriers and problems associated with the transition to a greenhouse gas-neutral society, but also of the opportunities and leads to a revelation which might be surprising to some: It does work!

INFOBOX

Climate neutrality and greenhouse gas neutrality

Climate neutrality is a condition in which human activities ultimately have no net effects on the climate system. These activities include emissions which affect the climate, measures aimed at removing greenhouse gases from the atmospheric cycle and human activities which have regional or local bio-geophysical effects (e. g. changes in surface albedo). By contrast, **greenhouse gas neutrality** means that there are "only" net zero greenhouse gas emissions. Accordingly, the goal of climate neutrality requires a different and more ambitious policy than the mere goal of greenhouse gas neutrality, because it is not just greenhouse gas emissions which must be taken into consideration but also all other effects of human activity on the climate, e. g. soil sealing by roads and human settlement.

Outside scientific discourse, e. g. in political debates, "climate-neutral" and "greenhouse gas-neutral" are often used interchangeably. This publication uses the term "greenhouse gas-neutral", unless the name of a specific initiative or campaign is being used or legal wording is being quoted.

Greenhouse gas neutrality – greenwashing or effective climate protection?

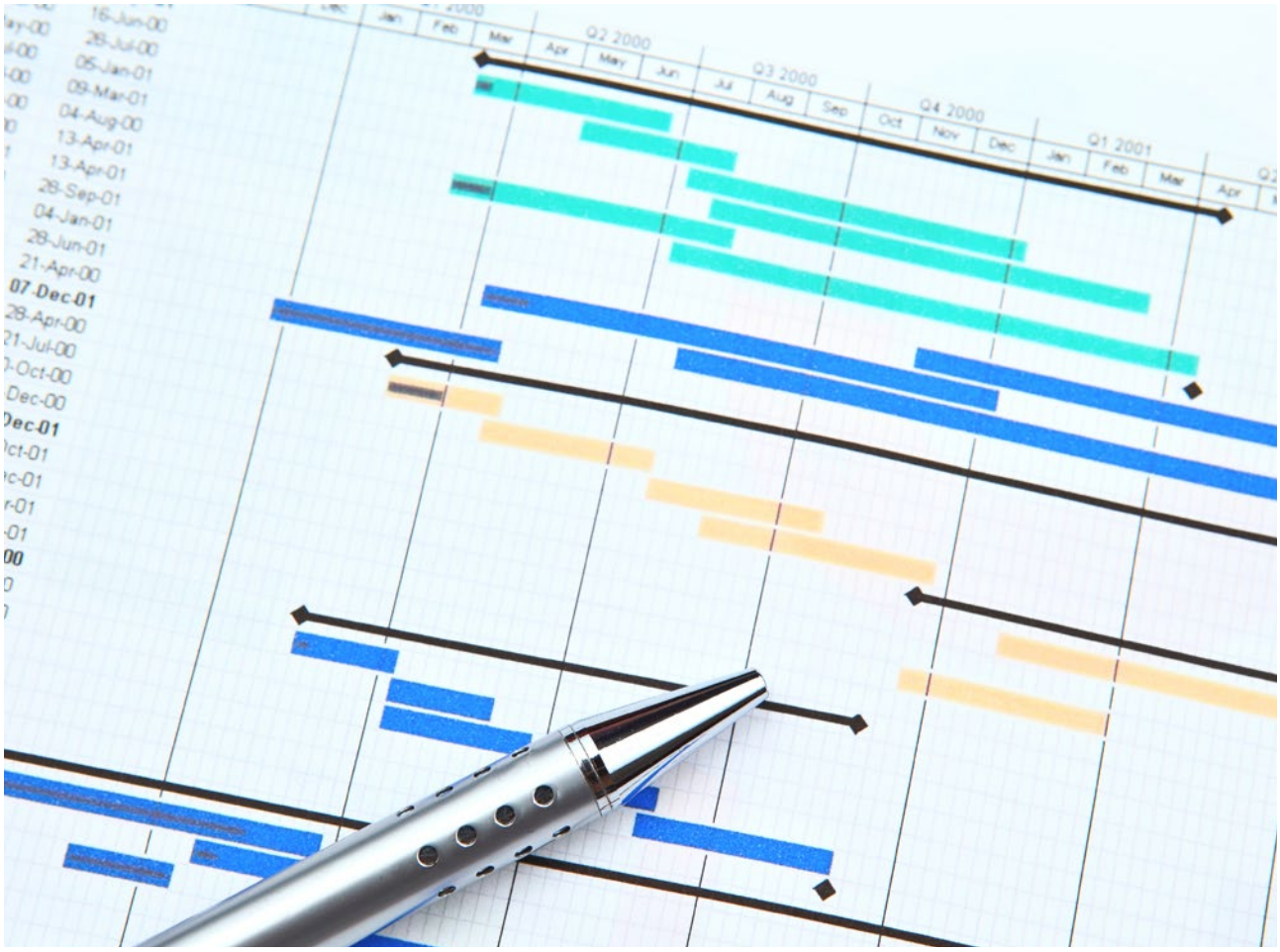
Greenwashing is an attempt by organisations to pretend eco-friendliness without genuinely adapting their strategic approach, targets and activities. Administrations which label themselves as greenhouse gas-neutral or wish to become so easily risk being suspected of greenwashing. Firstly, this is because even greenhouse gas-neutral administrations still emit greenhouse gases, which are usually offset through compensation measures. Many people consider such offsetting a form of "indulgence trade", regardless of the commitment and credibility of the administration concerned. Secondly, there are some stakeholders driving initiatives – particularly in climate-damaging sectors – which have brought the greenhouse gas neutrality approach into disrepute through a lack of commitment to climate protection and through dubious compensation measures. Rotten apples like these discredit greenhouse gas neutrality in general, which also affects committed and ambitious initiatives.

Essentially, whether or not greenhouse gas neutrality initiatives actually make an effective contribution to climate protection or only help to maintain and greenwash current unsustainable patterns of production, consumption and behaviour depends on their specific design. There are significant differences between the individual initiatives in terms of the areas and fields of action they include, the methods they apply for greenhouse gas emissions calculation and accounting, whether and what targets they include for reducing their greenhouse gas emissions and for climate protection, and what requirements they place on climate protection projects for voluntary compensation.

The allegation that greenhouse gas neutrality initiatives are a form of greenwashing is most effectively refuted when administrations – but, of course, companies and other organisations too – meet some fundamental requirements. This includes binding and concrete targets for reducing greenhouse gas emissions, effective climate protection management, and the inclusion of both upstream and downstream emissions. Appendix I contains a checklist which can be used to check the credibility of organisations which label themselves as greenhouse gas-neutral or wish to become so.

About this publication: Guidebook and stage planner

This publication offers administrations and similar organisations guidance for the path to greenhouse gas neutrality. Based on practical experience gained in many authorities and the latest technical knowledge, it describes the various stages of becoming a greenhouse gas-neutral administration and illustrates them using practical examples. This includes



extensive information on how administrations determine responsibility, competences and fields of action in respect of climate protection, define their organisational and operational boundaries for the calculation of their greenhouse gas emissions, adopt sensible targets and measures, formulate requirements for the offsetting of unavoidable emissions, organise internal and external communication, and review the efficacy of their climate protection activities. This publication describes practical requirements, methods and options for each stage. Reference is made to the UBA's other applicable publications with regard to compensating for emissions which are unavoidable. Users can also find extensive references to other publicly accessible information and materials, as well as an appendix with checklists and key emission factors. Based on the information provided here, every administration can, in principle, determine the approach which is appropriate for it and review and adapt its efficacy.

The prerequisites and features of effective climate protection vary between individual administrations and depend on the individual technical, legal, political and organisational backdrop. Consequently, it is impossible here to address all the obstacles and challenges to be expected in the real world – let alone the unexpected ones – and to offer suitable solutions. Those involved in the process of achieving greenhouse gas neutrality must therefore gain their own experience and learn from it. In this publication, they will find a wealth of information and suggestions they can use to improve their problem-solving skills and to advance their work towards achieving greenhouse gas neutrality.

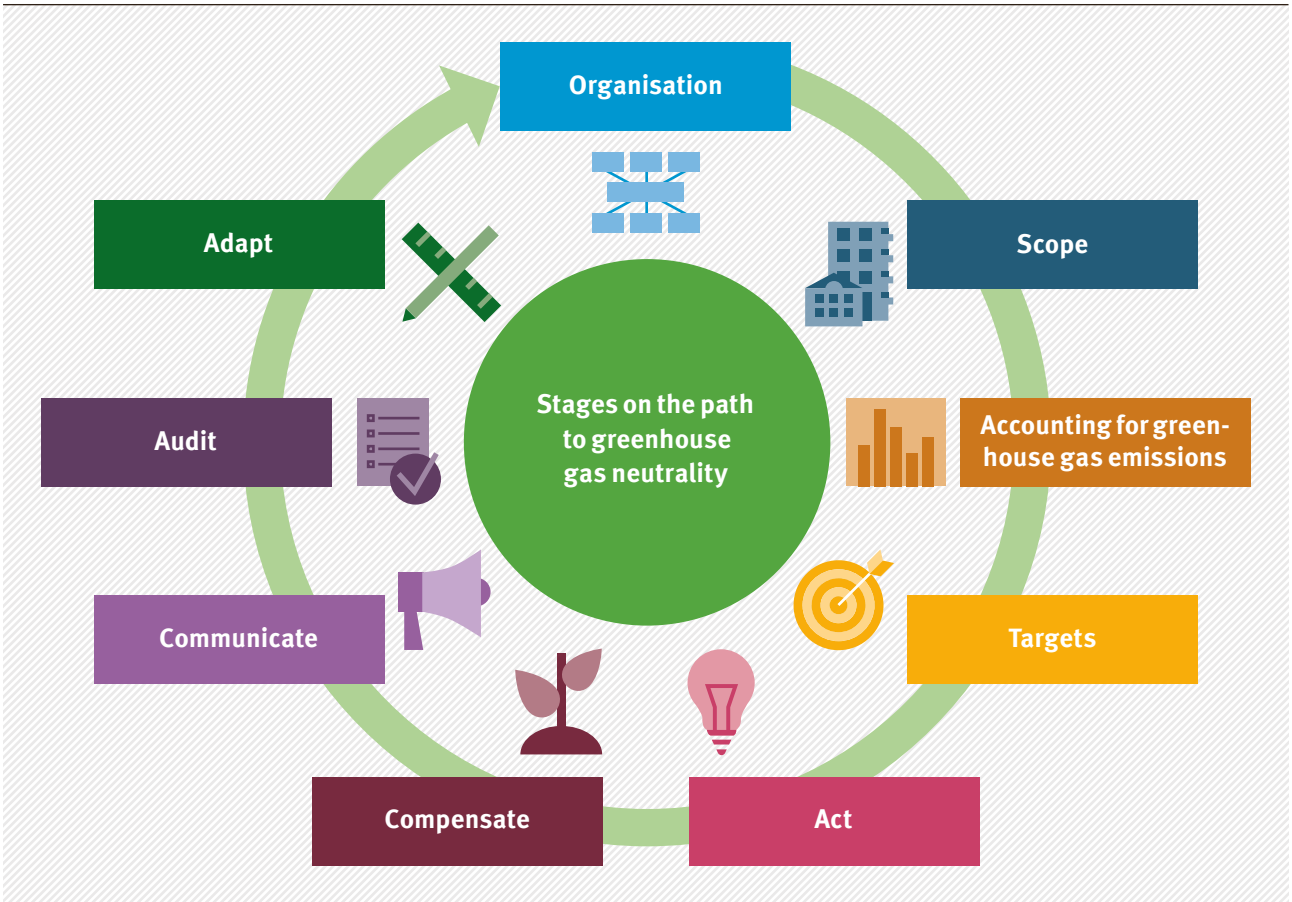
Nine stages towards greenhouse gas neutrality

The path to greenhouse gas-neutral administration may seem long and sometimes difficult to many of those involved. There are indeed many barriers and challenges on the road to success. Those who do not want to deal with this may try to take a seemingly easy shortcut: having their greenhouse gas emissions calculated by an offset provider using certain key figures and compensating for their emissions by purchasing emission reduction credits on the market for voluntary offsets. Whether that actually contributes to climate protection is doubtful. Definitely indisputable is that this shortcut does not contribute to the public sector's function as a forerunner and role model, nor does it increase credibility among citizens or enable any practical experience of climate protection.

The path to greenhouse gas-neutral administration is like a marathon. Like all marathons, it becomes somewhat less imposing if it is divided up into many shorter stages. The order of the stages, the pace and the tactics with which administrations take the path to greenhouse gas neutrality depends on their physique, level of training and motivation. Each administration must figure out for itself at which speed and with how many stops it can work through the stages. Experienced marathon runners among the administrations may have the confidence to take the path quickly and without breaks. By contrast, untrained administrations and those with limited mobility may begin by braving individual stages, and they may obtain support from personal trainers and fitness coaches for the difficult parts of the route. The goal, however, is the same for all: In the end, they will have pushed climate protection in their administrations forward, and they will have strengthened their functions as role models and increased their credibility.

Figure 1

Stages towards greenhouse gas neutrality



Overall, the path to greenhouse gas-neutral administration is divided into the following nine stages (see Figure 1), which also form the chapters of this publication:

Stage 1
Organisation

This stage involves embedding responsibility at management level, delegating competences for the various aspects, and defining the procedures, contributions and decision-making rules.

Stage 3
Accounting

In this stage, emissions-related data is collected within the scope of application and the greenhouse gas emissions are calculated on this basis.

Stage 5
Act

In this stage, the measures through which administrations intend to achieve their climate protection targets are planned, adopted and carried out.

Stage 2
Scope

This stage consists of defining organisational and operational boundaries. Organisational boundaries specify which divisions, locations and buildings are part of a greenhouse gas-neutral administration. The operational boundary determines the climate protection aspects and activities for which greenhouse gas emissions should be calculated.

Stage 4
Targets

In this stage, administrations set their climate protection targets, particularly with regard to how significantly they intend to reduce their greenhouse gas emissions and mitigate their impact on the climate.

Stage 7
Communicate

This stage involves providing information to employees, contractual and collaborative partners, political decision-makers and the general public.

Stage 9
Adapt

In this stage, administrations have to readjust and adapt their climate protection activities based on changing conditions and growing experience and knowledge. In principle, this concerns all the previous stages, which means that the entire path to greenhouse gas-neutral administration must be trodden again, but this time at a higher speed and with significantly improved fitness.

Stage 6
Compensate

If greenhouse gas emissions cannot be avoided or reduced, they are offset in this stage by funding extra climate protection measures.

Stage 8
Audit

This stage consists of a systematic review of how effective the climate protection activities performed by administrations in the individual stages are and of how much they correspond to the targets adopted.

The order in which administrations carry out these stages does not necessarily have to correspond to the sequence chosen here. Therefore, administrations can even determine the scope of application first and produce an initial corporate GHG inventory before establishing the competences, procedures and decision-making rules. Some stages, such as adopting targets and measures, may overlap or coincide.

Administrations can also tackle compensation either immediately after accounting or after communication, without affecting the success and credibility of their climate protection activities. In order for the path to greenhouse gas-neutral administration to be a credible and exemplary process, it is crucial that it contains all the stages; none can be left out or indefinitely postponed.

Stage 1:

Establish organisational structures – Defining competences, procedures and decision-making rules

In order to design the internal processes of an administration towards greenhouse gas neutrality, responsibility must first be embedded at management level, competences and contributions must be defined, and procedures and decision-making rules in the event of conflicting objectives must be established. This approach ensures that the manifold tasks associated with climate protection can be spread among as many people and fields of competence as possible and that they are truly enshrined in administrations.

Embedding responsibility at management level

A crucial prerequisite for success is that decision-makers at **top-level management** acknowledge their importance as role models for administrations with regard to climate protection and actively support the objective to achieve greenhouse gas neutrality. It is only when the management appreciates the importance of controlling its own greenhouse gas emissions that the goal of effectively preventing and reducing them and, to a lesser extent, of compensating for inevitable emissions prevails over other goals and interests within administrations in the long term. Support at management level can be demonstrated on the one hand by the fact that managements communicate the goal of climate neutrality resolutely and credibly to employees, contractual partners and the general public. On the other hand, it can also be assessed by whether the organisational units entrusted with implementation are adequately equipped with personnel, materials and the necessary budget to facilitate for instance further training, consultancy projects and compensation measures. If the commitment to greenhouse gas neutrality is just an additional task "on top" of the already existing ones, the assertiveness of administrative bodies and thus ultimately their importance as role models will be affected.

Legal regulations and resolutions which take climate protection aspects into account – for example, climate protection laws, decrees issued by superior authorities or resolutions taken by municipal councils – are useful as they formally oblige administrations to take greater climate action. However, the **margin of discretion** that exists in practice is only then used to systematically reduce greenhouse gas emissions if managements are aware of their importance as role models for mainstreaming climate protection within administrations and if they **prioritise** it accordingly. Easily achievable climate protection measures such as the procurement of green electricity, the use of recycled paper, low carbon company cars and climate-friendly ranges in canteens should then come naturally.

Last but not least, how seriously the management takes the goal of greenhouse gas neutrality is evidenced by the **human and financial resources** allocated to the new tasks involved. And even if no additional human resources and budgetary funds are provided, managements can still re-prioritise tasks and relieve the staff members involved of other duties.

Creating organisational structures

Defining duties and functions

The practical implementation of climate protection within authorities involves a **wide variety of tasks and organisational units**. They range from the

Good practice example: "Climate-neutral BMZ 2020" ("*Klimaneutrales BMZ 2020*")

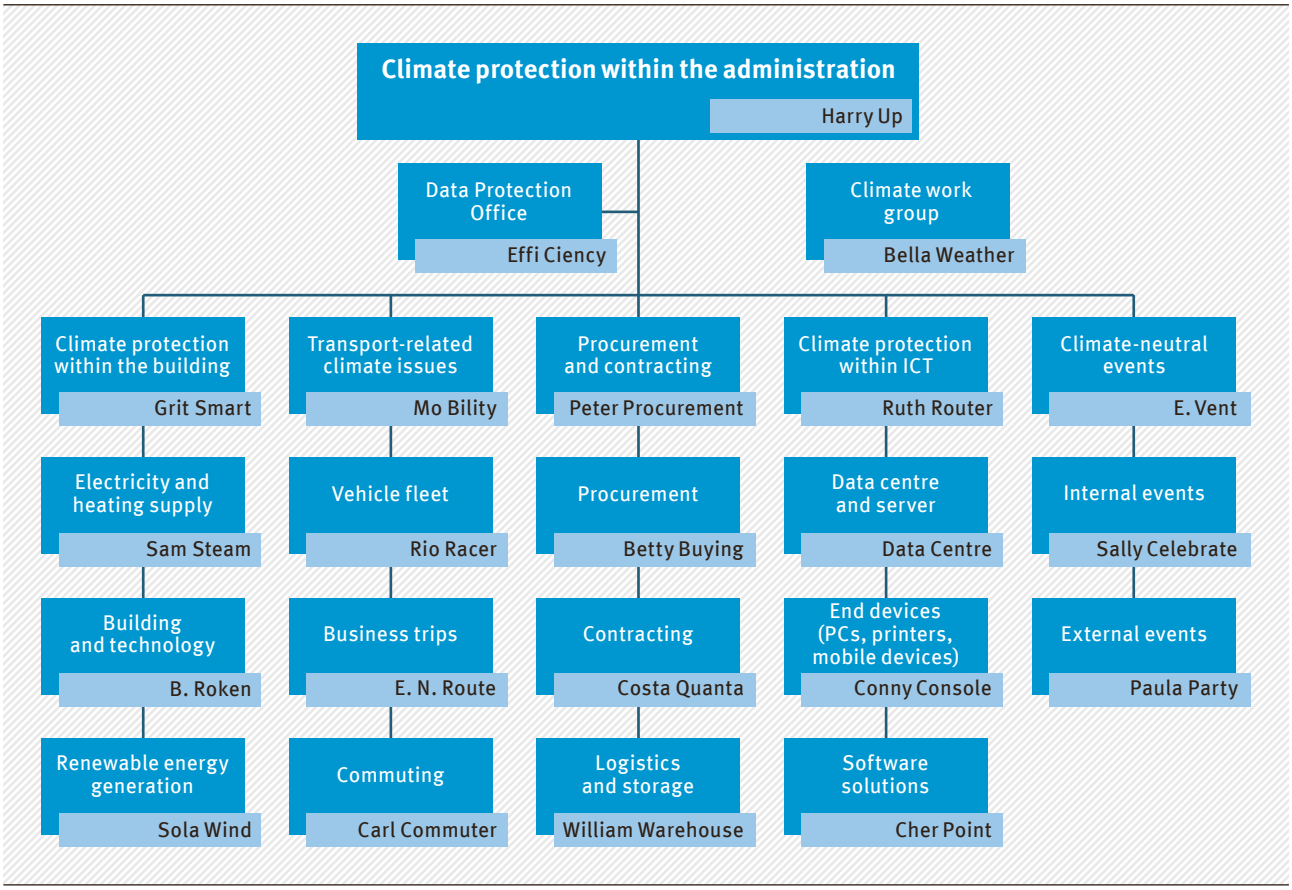
The Federal Ministry for Economic Cooperation and Development (*Bundesministerium für wirtschaftliche Zusammenarbeit*, BMZ) demonstrates what active support by managements can look like. On 5 November 2017, Federal Development Minister (*Bundesentwicklungsminister*) Gerd Müller told the press:

"We want to become a climate-neutral ministry, a climate-neutral administration, by 2020. This should also send a signal to public administrations, to ministries, to all administrations in Germany: Public services and administrations can and must take extensive action – they must lead the way."

To achieve this goal, the Minister set up the project group "Climate-neutral BMZ 2020 and Environmental Management" ("*Klimaneutrales BMZ 2020 und Umweltmanagement*") in 2018 equipped with a total of four staff members and its own budget. He and his state secretaries also defined further targets and measures for preventing and reducing direct and indirect greenhouse gas emissions. At the end of 2019, the BMZ offset its greenhouse gas emissions for 2017 and 2018.

Figure 2

Climate protection organigram (example)



provision, care and maintenance of buildings and their technical infrastructures (property management) and ensuring transport and mobility services, including travel services and business trip management, to procurement, contracting and event organisation. The organisations responsible for the **budget and finances** (budget units, accounting offices, etc.) are also relevant when it comes to climate protection, at least when costs come into play. Administrations must decide which organisational units, functions and individuals (e. g. commissioners) are responsible for which climate protection-relevant tasks and activities and are thus to be involved. **External parties**, e. g. the construction and property management offices responsible for buildings and properties, travel management, security, providers of IT services, key suppliers, and other contractual partners may also be involved.

To coordinate these various organisational units and individuals and to align them all in respect of the goal of greenhouse gas neutrality, administrations may designate one or more individuals as **climate protection officers or climate protection coordinators**. It can be helpful for larger administrations to appoint a **lead organisational unit** which coordinates the various activities, informs the management of the relevant aspects and developments, and prepares important climate protection decisions. Appointing such a lead unit does not mean that all climate-related responsibilities and duties are pooled within this unit and that everyone else is either not involved at all or only marginally. Instead, it opens up the possibility that the various climate-related activities within the administration can be coordinated there and that this unit can take on key tasks, such as compiling performance-related data and key figures on climate protection, preparing management decisions or producing a climate protection report.

Responsibilities and contributions

Responsibility often lies with the central department (e. g. with the units “Internal Services” or “Building and Technology”). Administrations which already undertake environmental, energy or sustainability management usually tie these new responsibilities in

to existing functions. The **decision on the lead unit** can in principle be based on where the necessary and desired qualifications and skills are actually available. As the decision is based more on coordination skills than on technical competence, a policy department or a senior management office within an authority can also be designated as the lead unit. The crucial factor is whether the potential lead unit has the **staff capacity** and the appropriate **skills** to handle the additional tasks. Otherwise, not just the employees but also the success and the credibility of climate protection within the administration will be affected.

One particular challenge arises for administrations if they are coordinating greenhouse gas neutrality for many, sometimes rather different organisations (e. g. ministries, agencies, hospitals, schools and nurseries, museums and theatres). This applies to, among others, local authorities or state governments which want to make their entire administrations greenhouse gas-neutral. For such an inter-agency goal, responsibilities and competences must first be defined. To this end, a lead department and within this an organisational unit, e. g. a committee or a new working group, must be appointed and entrusted with the task of coordination. One of the first tasks of this coordinating committee is to inform the management of all institutions involved what obligations are associated with its entrustment and which specific consequences this entails, e. g. in respect of energy supply, business trips, procurements and upcoming construction work. Each participating institution is also recommended to appoint a competent person who acts as the central contact point and is responsible for the processes, targets and activities within the relevant institution. This person may also be a member of an interdepartmental working group. The subsequent procedure within the participating institutions can then follow the stages recommended in this publication.

Creating a coordination committee

To properly utilise the various skills, experiences and perspectives within administrations, it has proven successful in some administrations to first establish a **coordination committee**, e. g. a project group or a work group. Besides the organisational units entrusted with climate protection-related duties, this may also involve external experts, e. g. from other administrations, academia or consulting firms. Such a coordination committee also leaves room for critical perspectives and can expose any potential conflicts. This applies in particular when, for environmental reasons, familiar – and functioning! – procedures and routines are to be questioned and adapted. The committee's findings and recommendations can be very valuable for both the management level and the working level. Administrations which undertake **environmental or sustainability management** can in principle make use of the committee established for this purpose too, e. g. the EMAS team or the environmental management steering committee. On the one hand, this facilitates its incorporation into existing environmental management structures, ensures the involvement of different organisational units, and prevents parallel structures. On the other hand, it can easily lead to an overloading of existing committees and an overburdening of their members. Such temporary committees can be helpful in preparing for

Good practice example: Establishment of the KKB

In Section 15, the KSG of November 2019 states: "The Federation shall set itself the goal of climate-neutral organisation of the federal administration by 2030." To monitor and oversee this transformation process, the State Secretaries' Committee for Sustainable Federal Government (*Staatssekretärsausschuss Nachhaltigkeit der Bundesregierung*) adopted a resolution in December 2019 on the establishment of a Liaison Office for Climate-neutral Federal Administration (*Koordinierungsstelle Klimaneutrale Bundesverwaltung*, KKB).

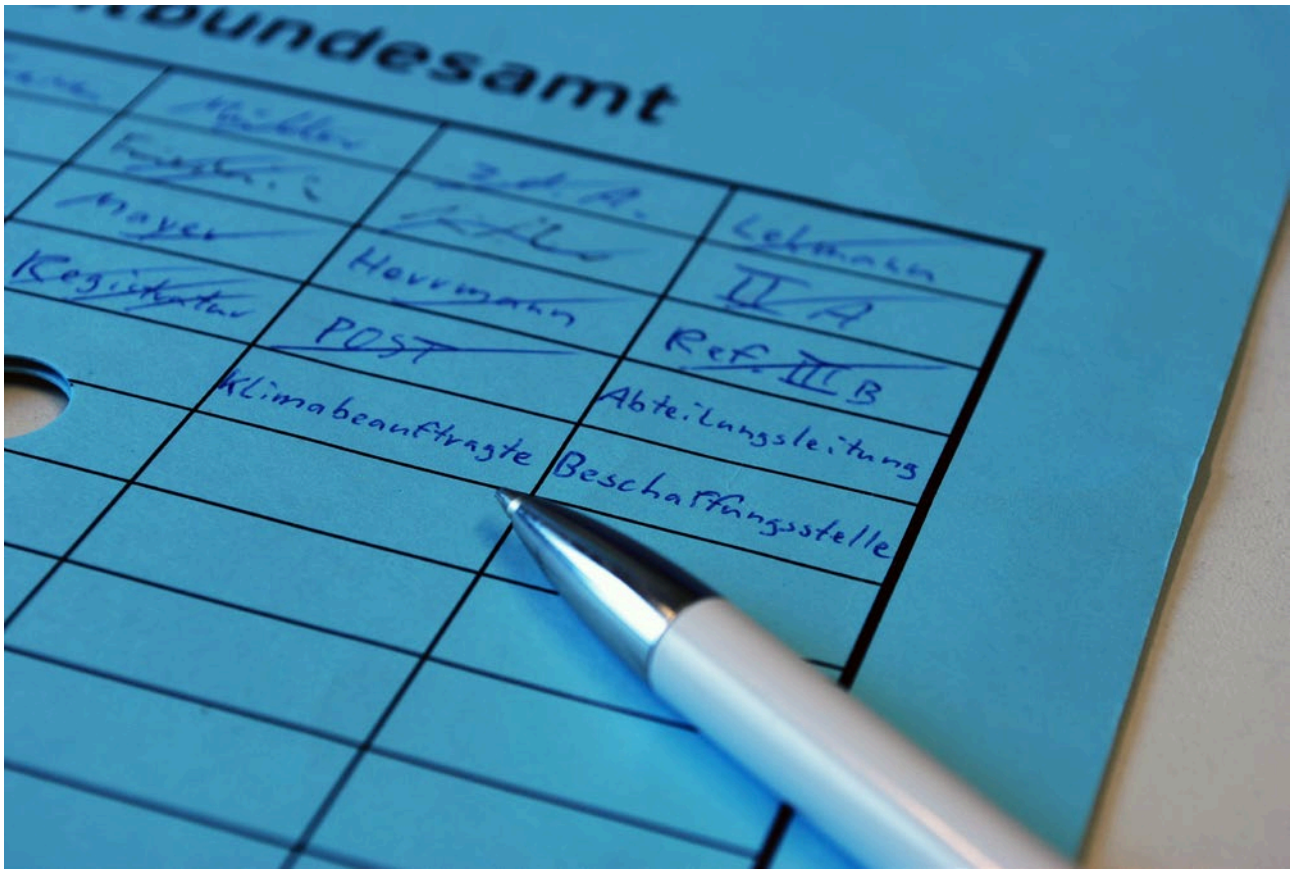
The KKB sees itself as an instigator and supporter of communication processes. Its duties include coordinating the relevant activities of the federal administration, supporting departments by providing information, best practice examples and tools, drawing up recommendations for measures and implementation plans, supervising the introduction of environmental management systems at departmental level, fulfilling the obligations arising from the Climate Action Programme 2030 (*Klimaschutzprogramm 2030*), and documenting and reviewing the KSG. The KKB commenced its work within the Central Department (*Zentralabteilung*) of the BMU at the end of February 2020.

and assisting with the establishment of permanent responsibilities for climate protection within administrations. Sooner or later, however, it will make sense to firmly embed responsibilities for climate protection in the **schedule of responsibilities and in the organisational chart** of administrations.

Regulating procedures and decision-making processes

Clearly regulating responsibilities and decision-making powers helps administrations to make the necessary decisions for climate protection transparently and stringently. At the same time, the participation of all relevant actors can prevent processes from becoming too complex and those responsible from becoming overburdened. For this purpose, it is helpful to lay down clear and transparent **rules for decisions and contributions** at all levels, from the management and the fields of action to the working level. The latter in particular is important to enable fast and binding decisions on climate protection to be made within administrations while, at the same time, enabling contributions and **the consideration of further tasks**, goals and requirements to the greatest extent possible.

The procedures and decision-making rules laid down in authorities apply in principle for all tasks and targets. The goal of greenhouse gas neutrality is a good reason to review whether established responsibilities, contributions and procedures are relevant to the climate and to amend them if necessary. For climate-related procedures, administrations can define environmentally friendly standards as a matter of principle and only allow exceptions if additional requirements regarding justification, participation and recording are met. This applies, for example, to application and approval procedures for business trips, procurements and publications. If, for instance, domestic flights require particular justification and the associated greenhouse gas emissions must be disclosed, this acts as a stimulus and encourages awareness of more environmentally friendly business trips. For procurements, the requirements of the "Blue Angel" ("*Blauer Engel*") – a label for environmentally sound products – could be adopted as a baseline, if applicable. The duty to involve the climate protection officer or the lead department for greenhouse gas neutrality (see above) can also be helpful in climate-relevant procedures.



Stage 2:

Define the scope of application –
Establishing organisational and operational boundaries

The scope of application covered by greenhouse gas neutrality initiatives should be defined and delineated as precisely as possible. Firstly, this involves determining the organisational boundary and, secondly, the operational boundary. With the organisational boundary, administrations decide which locations, divisions and organisational units they will include in their greenhouse gas neutrality initiatives. The operational boundary determines for which climate protection aspects and activities administrations will calculate and account for their greenhouse gas emissions.

Defining the organisational boundary

The organisational boundary can in principle be defined in three different ways:

In the **operational control approach**, administrations include all locations, organisational units and divisions which are subject to their decision-making authority and which are bound by their instructions. This approach is particularly useful in classic administrations with a clear and linear hierarchical structure. It can also be used in inter-agency administration structures like those found at federal level or within a department, e. g. the administration of a local authority, a federal state or the federal government, or all authorities belonging to a department (top-level, high-level, mid-level and low-level). The organisational boundary then includes all institutions for which the decisions and directives of the competent bodies are binding.

The **financial control approach** is a suitable way of including organisational units, locations and divisions which are publicly funded. Besides "classic" administrations, these are public institutions with non-linear organisational and decision-making structures, e. g. universities with departments and institutes of equal rank or with a high level of decision-making autonomy, e. g. in the culture, education or health sectors (museums, theatres, schools and nurseries, hospitals). This approach is also a suitable way of including publicly funded companies which provide public utilities and services, e. g. municipal energy companies, waste management companies and public transport.

According to the **ownership/stake approach**, administrations can also include publicly owned companies, foundations and other institutions in order to demonstrate their responsibility for these organisations. They can directly influence the climate-relevant activities of administrative and regulatory bodies, provided they hold a majority in them. Even if they have a stake of less than 50 %, their influence is not insignificant.

In practice, most administrations define their organisational boundary using the operational control approach and add further divisions to this in accordance with the financial control approach or the ownership/stake approach. Administrations can decide on a case-by-case basis whether and to what extent this includes locations which are only partially or temporarily used or which are not used on a regular basis. Ultimately, a list of all locations, divisions and organisational units included is required, which must be as complete and transparent as possible and which clearly documents development over time, e. g. additions and removals or classification changes.

The organisational boundary can in principle be confined to an administration in a broader sense. Divisions and sectors other than administrations, e. g. private households, trade, commerce and industry, and private and commercial transport, do not fall within the organisational boundary in principle, even if accounting for them is highly important from a climate policy perspective.

Defining the operational boundary

Accounting requirements of the Greenhouse Gas Protocol

As a guide to greenhouse gas emissions accounting for private and public organisations, the Greenhouse Gas Protocol is internationally prevalent and contains generally accepted categories for greenhouse gas emissions which can also be usefully employed in administrations. In the Greenhouse Gas Protocol, emissions are divided into three "scopes":

Scope 1 contains **direct greenhouse gas emissions** from combustion processes in administrations' stationary and mobile facilities, such as heating systems, motor vehicles, equipment for maintaining outdoor areas and for winter service, and uninterruptible power supplies. It also includes emissions from physical or chemical processes, e. g. the leakage and diffusion of refrigerant from refrigeration

systems. Physical or chemical processes may be relevant for certain divisions or locations with special functions (e. g. laboratories, workshops).

Scope 2 includes **indirect greenhouse gas emissions from the procurement of grid-bound energy**. For administrations, these are mainly emissions associated with the generation and transport of electricity and district heating. For certain locations, district cooling (e. g. to cool data centres or laboratories) may also be relevant.

Scope 3 contains all other **indirect greenhouse gas emissions from upstream and downstream activities** which are caused by administrations, either directly or indirectly. In many administrations, emissions as defined in Scope 3 make up the highest share of all emissions. These primarily include the climate impact of business trips, emissions from staff commuting, and the emissions caused by purchased goods and services. The emissions from extraction, processing, transport and distribution of raw materials and commodities under Scope 1 and Scope 2 also fall under Scope 3. Depending on the activities and particular features of the locations included, administrations may include further indirect emissions, e. g. from transport and logistics services, printing and copying, or waste generation.

The requirements of the Greenhouse Gas Protocol and the resulting international standard ISO 14064-1 make it mandatory for organisations to account for Scope 1 and Scope 2 emissions, while including Scope 3 is voluntary. However, the exemplary and pioneering role of public administration requires at least the **material emissions under Scope 3** to be included. To assess their "materiality", it is recommended to systematically record and evaluate all direct and indirect activities and conditions which affect greenhouse gas emissions. On the one hand, such records should be as comprehensive and complete as possible; on the other hand, however, they should not be too detailed and fragmented. Checklist 2, which is based on the scopes specified in the Greenhouse Gas Protocol, can be used for reference and contains a suggestion on how the "materiality" of the different scopes may be assessed (see next chapter). The climate protection aspects do not necessarily have to correspond to the categories for the individual scopes specified in the Greenhouse Gas Protocol; they can in fact be formulated and delineated for the relevant administration in an appropriate and flexible manner. For example, it may be helpful to combine the emissions from the upstream electricity consumption chain – which usually are accounted for under Scope 3 – into one aspect with the procurement of electricity under Scope 2. It may also be useful for administrations to aggregate both upstream and downstream transport contracts in the climate protection aspect "Transport and logistics services".

Municipal accounting method

In 2014, the *Institut für Energie- und Umweltforschung Heidelberg GmbH* (Ifeu) developed an accounting methodology for municipal greenhouse gas emissions in the energy and transport sectors on behalf of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (*Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit*, BMU).[4] The UBA published an analysis of the need for further development of the methodology in 2020.[5] With this method, which is known as **BISKO** or *Bilanzierungs-Systematik Kommunal* (municipal accounting method), towns, cities and municipalities can calculate the greenhouse gas emissions generated in their area and thus create a transparent, comparable data basis for municipal climate policy. Its aim is to account for all emissions associated with energy consumption within the municipality under Scope 1 and Scope 2 and it thus covers far more than just administrations. The BISKO standard distinguishes between five energy consumption sectors: 1) private households, 2) industry, 3) municipal facilities, 4) trade, commerce, services and other, and 5) transport.

Even if accounting in accordance with the BISKO standard is generally carried out for other purposes and targets than those of the Greenhouse Gas Protocol, accounting for emissions in administrations should in principle be performed according to the same methods (see stage 3). The aforementioned study by the UBA compares the BISKO standard and

4 Ifeu – Institut für Energie- und Umweltforschung Heidelberg: *Empfehlungen zur Methodik der kommunalen Treibhausgasbilanzierung für den Energie- und Verkehrssektor in Deutschland* (Recommendations on a methodology for municipal greenhouse gas accounting for the energy and transport sectors), Heidelberg, April 2014.

5 Ifeu – Institut für Energie- und Umweltforschung Heidelberg: *Weiterentwicklung des kommunalen Bilanzierungsstandards für THG-Emissionen, Bilanzierungssystematik kommunal – BISKO; Abschlussbericht im Auftrag des UBA* (Further development of the municipal accounting standard for GHG emissions, municipal accounting method – BISKO; Final report on behalf of the UBA), Climate Change 19/2020, Dessau-Roßlau, 2020 (https://www.umweltbundesamt.de/publikationen/weiterentwicklung-des-kommunalen).

the Greenhouse Gas Protocol in greater detail. The UBA recommends extensive use of this method at municipal level.

Assessing the "materiality" of climate protection aspects

Administrations should include all *material* climate protection aspects in their corporate GHG inventories.

Criteria for assessing materiality

To **assess the materiality**, significance in terms of volume and controllability are the most common criteria for administrations. Relevance for key groups of actors and target groups (referred to as stakeholders) and data availability also play a role. Administrations should therefore report an aspect if it is significant in terms of volume, if administrations can control it, if it is relevant for the stakeholders, and if enough data can be obtained for accounting purposes.

Significance in terms of volume

To assess the **significance in terms of volume** of a climate protection aspect, it is advisable to consider the greenhouse gas emissions generated by it and also to take into account the energy consumption. Broad categories ranging from high to medium or low are sufficient. Besides energy consumption for heating and electricity, it will probably be mainly business trips and staff commuting, as well as information and communication technology, which are considered to fall into the "high" category in most administrations. The procurement of goods and services, as well as the vehicle fleet, may also be of major significance for many administrations. Most other environmental aspects are usually only of medium or low significance in terms of volume.

Controllability

Controllability can be classified into categories such as "direct", "indirect" and "not at all". Generally speaking, direct controllability can be assumed if a climate protection aspect is subject to an administration's authority to make decisions and give instructions. For example, this applies for electricity and heat consumption, business trips and the vehicle fleet, consumption of paper and office materials, and procurement and contracting, insofar as requirements concerning greenhouse gas emissions and energy consumption can be specified for the relevant procurements and contracts. Administrations can only directly influence building-related climate protection aspects, e. g. building technology or the generation of renewable energy, if they have their own properties; otherwise, they can have an indirect influence only. Influence is deemed indirect if administrations can only give prompts or made suggestions but decisions on their implementation are ultimately made by other actors. This is the case, for example, with the emissions of external service providers, if administrations cannot regulate them directly through contracts. Influence over staff commutes is indirect for most administrations as well.

Stakeholder relevance

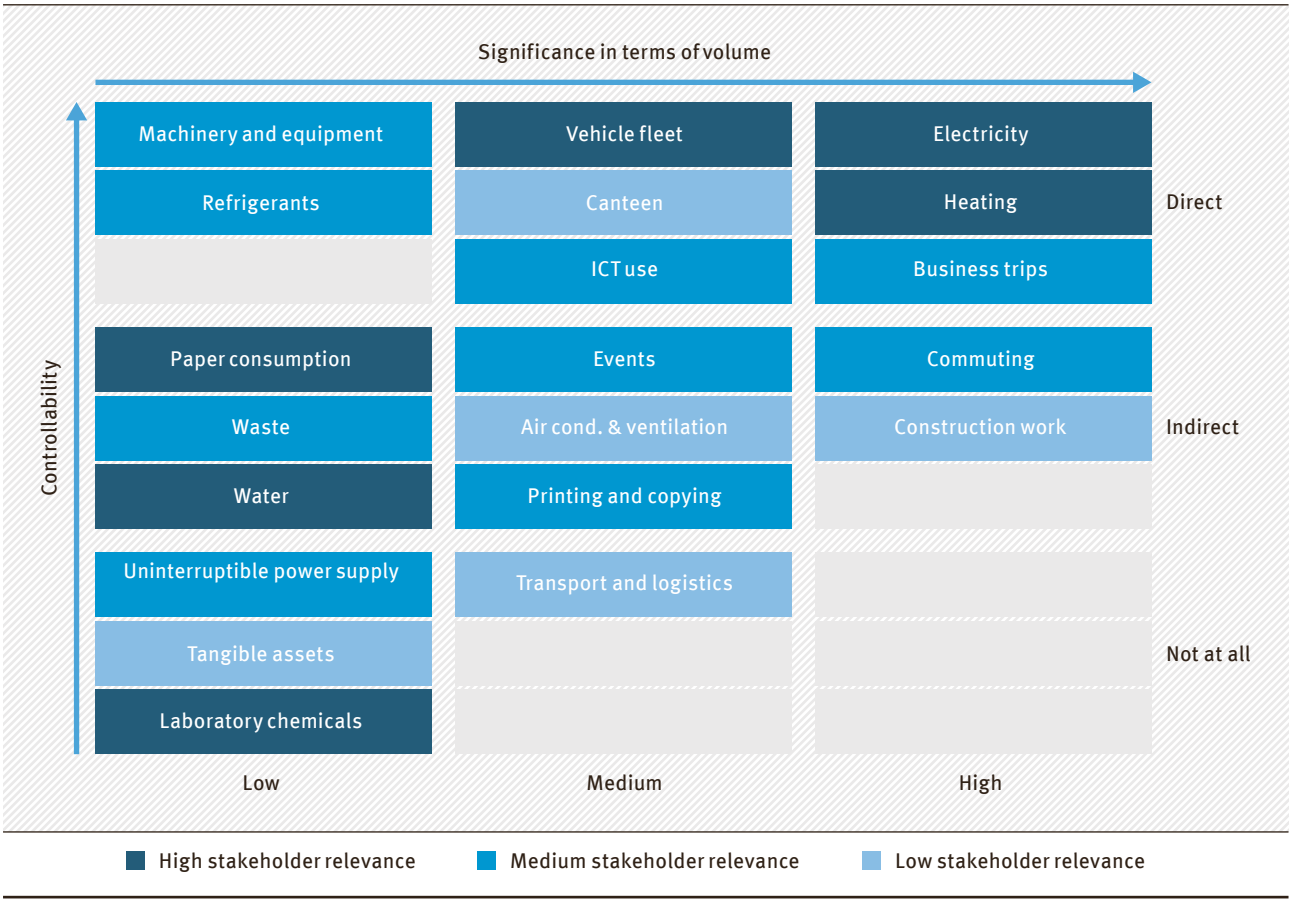
Another criterium which is primarily used by large companies – but also by some administrations – is the so-called "**stakeholder relevance**". This term refers to the significance of the actors and groups who are particularly affected by administrations' activities and who have specific requirements and expectations of administrations. Besides employees as the most important internal stakeholders, this also includes higher-level, framework-setting institutions such as parliaments and supervisory authorities, key contractual and collaborative partners, and the natural and legal persons who profit from administrations' services. Stakeholder relevance depends crucially on which actors and groups are important to administrations and what significance individual climate protection aspects have for these. It may be high, medium or low.

Data availability

Data availability is a necessary prerequisite which enables the greenhouse gas emissions associated with a climate protection aspect to be accounted for. It may be good, moderate or poor. Data availability is rated as good if figures on consumption are already available or if such figures can be calculated with relatively little effort. For example, this is the case with electricity, heating and fuel consumption. If data is available but the calculation of greenhouse gas emissions on this basis is complex or inaccurate, data availability is rated as moderate. For example, this may be the case with employees' business trips and commutes, the operation of data centres, and waste generation. Data availability is deemed poor when there are no or only very inaccurate figures and the effort involved in obtaining reliable data is very high. In most administrations, this is the case for most products purchased, canteen food or the utilisation

Figure 3

Materiality analysis of administrations (example)



of space, for example. If a climate protection aspect is quantitatively significant and controllable but its "materiality" is assessed as being low due to a lack of data, this can impair the credibility of an administration. Poor data availability therefore constitutes a mandate for improvement.

Regularly reassessing materiality

The identification of material climate aspects is only ever a **momentary snapshot**. Significance in terms of volume, controllability, stakeholder relevance and data availability change over time, not least because of growing experience of accounting, the efficacy of the climate protection measures taken, and political and social developments. For certain climate protection aspects, materiality may be temporarily high during periods of construction work, investment projects, relocations and organisational reforms, but low before and after this. For this reason, it is important to re-analyse the materiality from time to time and to clearly document the result.

Material climate protection aspects of administrations

For administrations, the material climate protection aspects are generally those associated with **energy and fuel consumption**. This primarily includes **heating and electricity consumption, the vehicle fleet, and business trips**. The materiality of **commuting** depends, among other things, on how accessible locations are on foot, by bicycle and on public transport, and which facilities are provided at these locations (availability of parking for bicycles and/or cars). **Procurement and the hosting of events, as well as information and communication technology,** are also material climate protection aspects in most administrations. Which other aspects might be material mainly depends on administrations' tasks and particular features. The result of the materiality analysis for a federal or state ministry may therefore be different to that for municipal administration offices, enforcement agencies or the administration of a school.

Defining fields of action

In organisations which already undertake environmental or climate protection management, it has proven successful to divide climate protection into different fields of action to reduce complexity and increase controllability. Fields of action can be defined and delineated in such a way that they easily fit into the administrations' organisational structures, responsibilities and competences and are tied in to existing tasks, processes and activities. The targets and measures within a field of action can then be combined and can complement each other in a useful way. Which fields of action are identified and how these are defined and delineated, i. e. which climate protection aspects are aggregated in them, depends on their materiality for the relevant administration (see above), their duties and competences, their organisational and property structure and, last but not least, external parameters.

Field of action: Buildings

For most administrations, it is useful to combine all aspects associated with **buildings and properties** in one field of action. This usually includes the entire portfolio of buildings, together with their technical equipment and devices. Whether or not **construction work** or major **investments in technology and equipment** are also included in the field of action, or whether this is limited to the **operation of the building**, depends on factors such as the specific legal status (ownership or rental), organisational responsibilities within and outside administrations, and structural conditions. This field of action also usually includes the supply and use of electricity, heating and cooling, including the **acquisition and use of renewable energies**. One key element of this field of action is energy controlling, i. e. the differentiated recording, assessment and control of the consumption of electricity, heating and cooling in various applications. If administrations have large undeveloped areas (e. g. forestry and green spaces commissions), an independent field of action for environmentally friendly **land use** can be useful.

Field of action: Transport

Transport can also be an independent field of action. Some administrations already undertake independent **mobility management** to control their **vehicle fleet** or their employees' **business trips** and **commuting behaviour**.[6] In this case, the field of action can be integrated into the climate protection strategy based on the responsibilities and procedures of mobility management. Administrations with a high number of visitors can add this aspect into the field of action too. If there is a large **vehicle fleet**, administrations can also establish an independent field of action for this. If the field of action and the actors involved in it are closely aligned with responsibilities, procedures and activities in the building sector, it will be easier, for

6 See UBA: *Mobilitätsmanagement in der Bundesverwaltung – Handlungsempfehlungen für die Praxis* (Mobility management in the federal administration – Recommendations for action in practice), Dessau-Roßlau, 2019 (https://www.umweltbundesamt.de/publikationen/mobilitaetsmanagement-in-der-bundesverwaltung); BMVI (Ed.): *Handlungsleitfaden: Mobilitätsmanagement in Bundesbehörden – Vorgehensweise und Ergebnisse des Pilotprojektes im BMVI* (Action guidelines: Mobility management in federal authorities – Approach and findings from the pilot project in the BMVI), Berlin, February 2020 (https://www.bmvi.de/SharedDocs/DE/Publikationen/Z/handlungsleitfaden-mobilitaetsmanagement-in-bundesbehoerden.html).

example, to align the volume of business trips with technical video conferencing equipment, the choice of means of transport for commuting with the use of available car parking spaces, or the use of bicycles with the quality of bicycle parking facilities and other services related to bicycles (e. g. bicycle repair service, company bicycles).

Field of action: Procurement

Procurement may also be a relevant field of action for many administrations. Besides the procurement of goods (e. g. office equipment in the broader sense), this also includes awarding **service contracts**. No useful generalisations can be made as to whether the greenhouse gas emissions associated with the **delivery** of goods should be attributed to the field of action "transport" or the field of action "procurement". Here, every administration is free to choose the classification that suits it best. The same applies for the **dispatch** of goods, which can also be attributed to different fields of action (service contracts or transport).

Field of action: Information and communication technology

Administration without information and communication technology (ICT) are now inconceivable. Every desk has an **end device**, i. e. internet-enabled computer hardware connected to a network with desktop computers, laptops or notebooks, smartphones, tablets or thin clients. Many administrations have their own **data centres**; if not, they rely on external service providers. **Standard or special software** is used for all administrations' duties. Effective climate protection measures are possible and necessary in all areas of ICT. This includes the greenhouse gas emissions associated with the manufacture of the hardware and applies in particular for end devices, the manufacture of which causes by far the largest share of climate-related emissions during their life cycle.

Field of action: Events

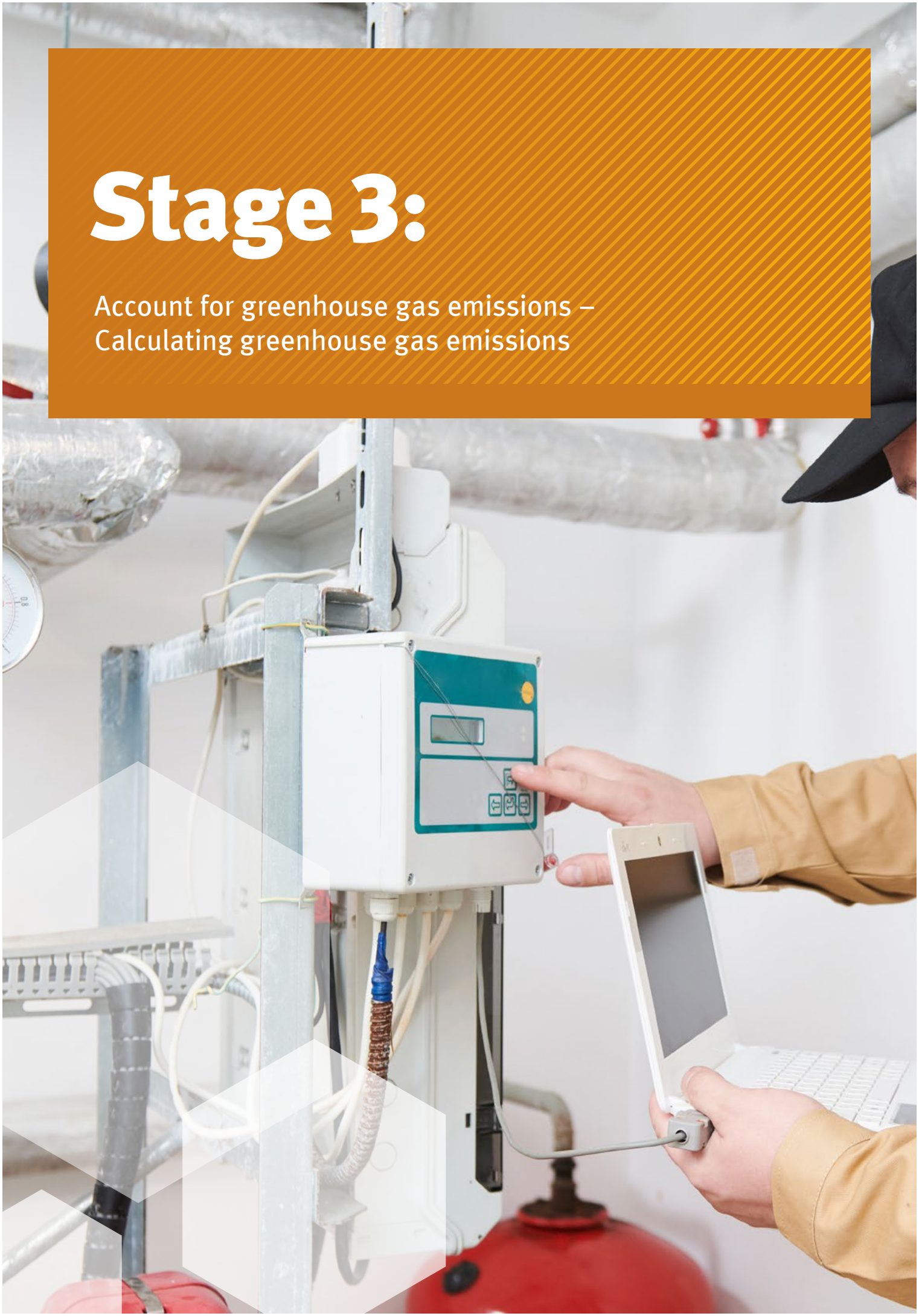
If administrations host many **events** and have possibly established a system of central event management for this purpose, it is useful to create an independent field of action for this. Because the concept of "events" includes a wide array of formats, every administration may decide for itself which types of events to include in this field of action. This applies, for example, to the decision on whether to include work parties, work sports teams, or third-party events on administrations' premises. A pragmatic and practical way of defining this can also be to initially assign to this field of action only those events which are recorded by the central event management. Other events, e. g. those organised by decentralised organisational units or external events agencies, would then be assigned to other fields of action, e. g. procurement and contracting. If **visitor traffic** is already included in the field of action "transport", attendees' return journeys may also be included in it, for example.

Other fields of action

Which other fields of action are included in the climate protection strategy depends on the organisational structure and task structure, qualifications and competences and, last but not least, the commitment and priorities of the management and employees. Other fields of action may arise from individual administrations' particular tasks and responsibilities, such as those carried out by public office holders in the sectors of education, health, transport, culture, and internal and external security. This applies in particular for administrations with tasks and responsibilities related to climate policy, e. g. financial, economic, building or traffic authorities which are often confronted with political and legal requirements such as green finance, environmentally friendly business development, energy efficiency in existing buildings or climate-friendly transport. On the one hand, such fields of action stemming from climate policy motivations exceed the actual administrative functions and the defined organisational boundaries. On the other hand, administrations can therefore exert their potential influence on the upstream and downstream greenhouse gas emissions in accordance with Scope 3. In this way, politicians can avoid any suspicion that the activities to achieve greenhouse gas-neutral administrations are merely an attempt to conceal their insufficient commitment to climate policy.

Stage 3:

Account for greenhouse gas emissions –
Calculating greenhouse gas emissions



Administrations must account for their greenhouse gas emissions within the operational boundaries. The internationally established requirements for this must be observed. A well-founded data pool and a good accounting methodology are required in order to fulfil these requirements.

Ensuring compliance with greenhouse gas accounting requirements

International qualitative standards broadly based on widely accepted accounting principles have been established for greenhouse gas emissions accounting. The key requirements concern the transparency, relevance, completeness, consistency and accuracy of the corporate GHG inventory.[7]

Transparency

The fundamental principles and method of greenhouse gas accounting must be clearly documented. This is important not just in order to enable accounting to be reviewed at a later stage (see Stage 8); it is also important to enable the accounting method to be developed and to enable amendments, recounts and comparisons based on improved data, if necessary. When doing so, it is important to substantiate the underlying data and all assumptions made, including the applied emission and conversion factors, and to indicate any subsequent changes to the data or calculations.

Relevance

The accounting process should provide a realistic representation of all administrations' greenhouse gas emissions, based on which the management can make well-founded decisions – e. g. in respect of targets and measures (see stages 4 and 5) – and other stakeholder groups can adequately assess the emissions. This implies that all relevant emissions are taken into account and nothing is omitted.

Completeness

To produce a complete account of administrations' impacts on the climate, all emissions, including indirect emissions from upstream and downstream stages, should be considered if possible. When that does not happen, it is usually because certain emissions can either not be calculated or estimated at all, or only with a disproportionate amount of effort. Missing data should either be replaced by plausible estimations or clearly substantiated.

Consistency

The accounting process should be geographically, factually and temporally consistent. Geographical consistency involves the consistent delineation of locations and buildings within the inventory. Factual consistency ensures that uniform definitions, demarcations and methods of calculation are used throughout the accounting process. Consistency over time ensures that different years can be compared with each other in the emission inventory and are not distorted by different organisational boundaries and locations.

Accuracy

Even though the calculation of greenhouse gas emissions is always associated with a certain degree of uncertainty, the accounting process should be as accurate as possible. This places high demands on data availability and the accounting methodology in terms of accuracy. Systematic overestimations and underestimations should be avoided if possible. This does not mean that methodically conservative approaches should not be used for accounting in case of doubt.

Coherence

Besides the requirements laid down in the Greenhouse Gas Protocol, greenhouse gas emissions accounting must be uniform, i. e. coherent, and follow a consistent approach and logic. This enables the different fields of action to be aligned and compared with each other. To ensure this, emissions are calculated by employing consistent or at least similar calculation methods.

7 See Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, Washington D. C. 2004; see also ISO 14064-1:2018-12: Greenhouse gases – Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.

INFOBOX

Administrations' (corporate) GHG inventories vs. national GHG inventories

Accounting for the (corporate) greenhouse gas emissions of an organisation is fundamentally different from producing national GHG inventories in accordance with the United Nations Framework Convention on Climate Change (UNFCCC). The requirements applicable for the latter are intended to ensure that greenhouse gas emissions are calculated in a complete and comparable manner and can be clearly attributed to a country. For this purpose, the standards of the IPCC Guidelines for National Greenhouse Gas Inventories from 2006 should be applied and data from national official statistics should primarily be used. Calculation is also carried out in line with the recognised accounting principles of transparency, completeness, accuracy, comparability and consistency. In terms of their fundamental premises and methods, the preparation of national GHG inventories differs from greenhouse gas emissions accounting by organisations in the following ways:

- **Source principle:** In principle, national GHG inventories attribute emissions to the source from which they originated, e. g. the emissions from electricity generation are assigned to power stations and not to electricity consumption.
- **Territoriality principle:** National GHG inventories contain the emissions which arise within the territory of a nation state. This excludes the calculation and reporting of emissions in the upstream chain if they originate outside state boundaries. These are included in other states' inventories. This ensures that all emissions are taken into account and there is no double-counting.

Both principles are extremely important to enable sound, comparable and practically relevant information on a country's greenhouse gas emissions to be provided promptly under the international climate regime. The accounting of greenhouse gas emissions by organisations, as provided for in the Greenhouse Gas Protocol, provides neither the source principle nor the territoriality principle. Instead, the polluter pays principle is applied, which attributes emissions to the actors, products or activities which emitted them. Such inventories based on the polluter pays principle can definitely raise organisations' awareness of the consequences of their actions. However, they are not suitable for national emissions reporting.

Collecting data on material climate protection aspects

Greenhouse gas emissions cannot be recorded directly. They must be calculated based on data concerning individual fields of action and climate protection aspects. In this respect, the following principle applies: The better the data pool, the more accurate the accounting. The data must be clearly linked to greenhouse gas emissions and facilitate calculations for a specific financial year. Besides this, a good data pool also provides more options for organising, controlling and auditing climate protection activities in individual fields of action, e. g. using data-based targets and measures (see Chapter 2.4).

Data on buildings

In the field of action "buildings", **data on final energy consumption** used for heating, cooling and operating technical equipment and devices is required first and foremost. This data can be calculated with relatively little effort using **meter readings, bills and delivery notes**. Collecting and documenting this data is usually routine in all administrations. To enable specific key figures to be prepared using this data, it must be linked to data on the development of the employee base or of the usable area. While data on the employee base can be procured from HR departments, information on the usable area, number and size of office workstations, and the structural and technical infrastructure can be provided by the organisational units responsible for running the buildings.

Key figures regarding building operation should be transmitted to the bodies responsible for greenhouse gas accounting, e. g. the climate protection officers or coordinators (see stage 1), on a regular basis, i. e. at least yearly. If administrations already undertake environmental management, this is usually guaranteed, otherwise corresponding regulations must be drawn up and implemented.

If the actual energy consumption is not recorded or documented for certain locations, parts of buildings or rooms, e. g. because energy costs are charged at a flat rate or the locations concerned are only used occasionally, **consumption levels must be estimated**. This can be carried out based on usable area or the number of employees, for example. If the area concerned is just a small proportion of an administration's total space, flat-rate estimates are sufficient, e. g. breakdowns of energy consumption by proportion of space used. Otherwise, more differentiated data may be estimated. In any case, estimates and the assumptions on which they are based must be documented transparently.

The number of **air conditioning and cooling facilities** and the type and quantity of **refrigerant** they contain are considered key data when it comes to calculating greenhouse gas emissions from the leakage and diffusion of refrigerant. This can usually be provided by the building management, e. g. the Building and Technology unit, based on inventories of equipment and devices. The type of refrigerants and the quantity of refrigerant losses can be found in maintenance records or calculated based on the type of equipment.

Data on traffic

Data on traffic relates to the vehicle fleet, business trips and staff commuting. Data concerning visitor traffic, delivery traffic and transport services may be relevant as well.

Data on the vehicle fleet concern in particular mileage and fuel consumption, as well as the number and composition of company vehicles. This data is usually collected by fleet management (travel services). Annual mileage and fuel consumption are also recorded there based on logbooks and fuel receipts. The proportion of electric vehicles is also relevant, as is **data on the charging infrastructure**, such as number and type, power consumption and use of charging points. If the power consumption of electric vehicles and plug-in hybrids is not recorded separately, it must be estimated based on the mileage of the individual vehicles and the average real consumption. It must also be taken into account when calculating electricity consumption for building operation to prevent emissions being recorded in both the field of action "buildings" and in the field of action "transport" and thus being counted twice. Naturally, the vehicle fleet also includes **company bicycles**, including cargo bikes, both with and without electric powertrains. Data on the number, type and use of company bicycles may also be recorded and documented as climate-relevant. In some administrations, responsibility for company bicycles lies with another organisational unit. This may be relevant for the provision of data. An alternative to the use of company vehicles are the **use of car-sharing, rental cars, taxis or private cars for business purposes**. For this reason, it is useful to collect data on this aspect as well. This data can then be compared and, if necessary, coordinated with the development of fleet data. The relevant data can usually only be provided by performing a detailed analysis of business trips.

Because **business trips** are a material aspect of climate protection in almost all administrations, relevant data is essential. Usually, this data is collected as a part of **travel or business trip management.** As a basis for the preparation of greenhouse gas inventories, aggregated data on the number, duration

and distance of business trips differentiated by means of transport is required. Business trip management, which is typically oriented towards the efficient use of travel costs rather than the climate-friendly handling of business trips, can usually only provide this data with additional effort. For this purpose, a corresponding **agreement** with the office responsible for business trip management is advisable, which stipulates the requirements for the provision of data. For example, data on the federal government's business trips is recorded by federal travel management at the Federal Office of Administration (*Bundesverwaltungsamt*, BVA). In particular when there is a large number of flights, it is recommended to summarise travel data based on destination and distance or to calculate all greenhouse gas emissions from business trips in line with transparent requirements. For the federal government, the UBA calculates the emissions associated with business trips based on data from travel management. If reliable data concerning climate protection is collected when applying and accounting for business trips, aspects of **data protection** must also be observed. Therefore, involving the data protection officer and the staff council at an early stage is recommended.

In order to determine the greenhouse gas emissions from staff commuting, the **length of the commutes** and the **chosen mode of transport** (modal split) are decisive. There are various ways of estimating the length of commutes. Some administrations use their employee data to compile commuting statistics, in which the number of employees is categorised by distance and accessibility by public transport. Another way of calculating the distance covered from home to work is an anonymous analysis of the location of employees' homes. The data can usually be found in the HR department. To prevent potential breaches of data protection, categorisation by postcode may also be sufficient, particularly in congested

Good practice example: Mobility surveys by the UBA and the BMVI

One good way of collecting data on the aspects mentioned is carrying out regular employee mobility surveys. Since 2009, the UBA has carried out several surveys regarding its employees' commutes and business trips, and it has obtained extensive data for its mobility and environmental management from the results in order to derive specific targets and measures, e. g. the encouragement of mobile working as well as pedestrian and road traffic. This does not just include the number of commutes – including the routes avoided by working from home – and the associated greenhouse gas emissions, but also individual modes of transport as a proportion of commutes and domestic and international trips. Publishing the methodical procedure and the key results also helps other administrations to carry out such surveys.[1]

The Federal Ministry of Transport and Digital Infrastructure (*Bundesministerium für Verkehr und digitale Infrastruktur*, BMVI) also asked its employees about their mobility patterns on the way to work as part of a pilot project in Bonn and Berlin and published the results in a separate guide.[2] Further guidance on and practical examples of such surveys can be found in the federal administration's recommendations for action on mobility management.[3] Surveys yield a wealth of useful data with benefits far exceeding the reporting of greenhouse gas emissions from commutes. Depending on the size and number of an authority's locations, the costs of designing, planning, carrying out, analysing and documenting a methodically sound, extensive survey range from EUR 20,000 to EUR 50,000.

Further information: See footnotes

1 UBA: Mobilitätsumfrage des Umweltbundesamtes 2017 (Mobility Survey of the German Environment Agency 2017 – Summary Report), texts 68/2018 (https://www.umweltbundesamt.de/publikationen/mobility-survey-of-the-german-environment-agency).

2 BMVI (Ed.): Handlungsleitfaden: Mobilitätsmanagement in Bundesbehörden – Vorgehensweise und Ergebnisse des Pilotprojektes im BMVI (Action guidelines: Mobility management in federal authorities – Approach and findings from the pilot project in the BMVI), Berlin, February 2020; (https://www.bmvi.de/SharedDocs/DE/Publikationen/Z/handlungsleitfaden-mobilitaetsmanagement-in-bundesbehoerden.html).

3 UBA: *Leitlinien für umweltverträgliche Dienstreisen im Umweltbundesamt* (Guidance on environmentally friendly business trips in the German Environment Agency), Dessau-Roßlau, June 2016 (https://www.umweltbundesamt.de/sites/default/files/medien/376/dokumente/leitlinien_fuer_umweltvertraegliche_dienstreisen_im_umweltbundesamt_0.pdf).

urban areas. Recording the utilisation of the spaces available (parking spaces, underground parking) and the origins of cars based on vehicle registration numbers, or recording the number of job tickets issued for public transport, usually has not proved successful due to the insufficient quality of the data base. If a high proportion of employees regularly work from home (**home office**), collecting data on this is also recommended in order to estimate the influence of commuting on the volume of traffic.

Data on procurement and contracting

Collecting climate-related data on **procurement** and contracting is difficult for many administrations. This is due to the variety of products purchased (including services) and the high number of contracts and orders. In most administrations, there is barely any aggregate, sound data besides the field of energy (Scope 1 and Scope 2) which could serve as a basis for determining the greenhouse gas emissions associated with procurement. Due to poor data availability, administrations often consider the "materiality" of the climate protection aspects associated with procurement to be low or they limit themselves to **selected goods and services** for which they can collect key figures. Most of these are homogeneous, standardised products purchased in large quantities whose material, properties and quality can be described with sufficient accuracy. Accordingly, **office paper and printing orders** are among the products which are included in the accounting process most often. If the greenhouse gas emissions from other procurements are also to be accounted for, product-specific details such as material, origin and weight are required. These details are usually only available for a small number of product groups, e. g. for ICT products (see below). For most products, they can only be gathered with great effort, e. g. by analysing orders and deliveries of the corresponding product groups which have been placed and made in the past or by asking the key suppliers. Data collection is made simpler if climate-relevant requirements are already contained and specified in product specifications. From this, the proportion of products with or without corresponding requirements can then be determined.

To enable them to estimate the transport costs associated with **delivery**, administrations require data on the quantity, weight and origin of parcels and other deliveries received each year. Information, or at least approximate information, on this can be requested from mailrooms and receiving departments and projected for a period of one calendar year. Records covering limited periods of time, e. g. from tally charts, are also an option if necessary.

Data on information and communication technology

Data on information and communication technology (ICT) is important to record the contribution of ICT to direct greenhouse gas emissions, to formulate climate protection targets for this field of action and to review the effectiveness of measures in this area. This includes recording electricity consumption by ICT (e. g. in data centres and server rooms). In most administrations, the electricity consumed by information and communication technology is only recorded partially or not at all. In this case, it can be estimated based on technical equipment and plausible assumptions regarding lifetime and capacity.

How many and which end devices (notebooks, thin clients, desktop PCs, etc.) – including monitors, keyboards, mice and, if applicable, docking stations – are on desks, as well as which infrastructure and equipment is used in data centres, is well recorded and documented in most administrations. This also applies for smartphones and tablets, which are gaining increasing importance in public authorities as well.

One particular challenge in collecting ICT data lies in the growing importance of working from home and of mobile working. These modern forms of working mean that an ever-increasing proportion of electricity consumption by ICT equipment is no longer captured by administrations' electricity meters but is incurred in the private households of employees instead. In order to calculate the level of this partial relocation of energy consumption and greenhouse gas emissions at least approximately, administrations require data on the extent of working from home and consumption by the end devices used there.

A significant proportion of greenhouse gas emissions from ICT products is emitted during their manufacture. In the case of end devices, upstream chain emissions actually make up the biggest share by far. Reliable data on the upstream chain is not only important to fully capture greenhouse gas emissions from ICT, but also to take into account the consequences that decisions on ICT equipment have on the environment. If, for example, functioning end devices are replaced by more efficient equipment, this will reduce electricity consumption within administrations but in the vast majority of cases will nevertheless lead to higher greenhouse gas emissions. To include the manufacturing costs for ICT products, the UBA offers tools which can help with calculation.[8]

Climate-relevant information is also important for IT services that are outsourced. Otherwise, there is the risk that administrations will "greenwash" themselves by outsourcing greenhouse gas-relevant tasks. In order to account for greenhouse gas emissions from external IT services, administrations can already request corresponding information in the service specification and consider it when awarding contracts, e. g. by calculating the greenhouse gas emissions associated with these tasks based on established methodical standards.

Another growing source of greenhouse gas emissions is data transfer over the internet. It is still very difficult to account for these emissions. The UBA is currently developing a calculation tool for the accounting of video conferences, including data transfer.[9]

Data on events

Recording greenhouse gas emissions from events is usually complex. On the one hand, the term "event" covers a wide range of types and formats, from meetings and conferences to cultural events, public festivals and work parties. On the other hand, events have very different effects on the climate. The largest proportion is usually attributable to attendees' journeys to and from the events. Depending on the type of event, catering and – to a lesser extent – energy and material consumption also make up a relevant proportion of greenhouse gas emissions.

8 See https://www.umweltbundesamt.de/dokument/oeko-vergleichsrechner-fuer-arbeitsplatzcomputer. See also Publications on information and communication technology.

9 UBA: Rechentool für die Treibhausgasemissionen durch Videokonferenzen, Veröffentlichung in Vorbereitung (Calculation tool for greenhouse gas emissions from video conferences), publication in progress.

Besides the number of events which an administration hosts in a calendar year, the total number of attendees can also be broken down and recorded or, if necessary, estimated by type, duration and attendee catchment area (e. g. regional, national, international or global). If events are organised centrally, these details can be provided by the organisational unit concerned. If there is no central events management committee or if this is only responsible for some events, this information must be calculated or estimated in another way, e. g. by analysing event calendars and bookings for the relevant rooms or by making inquiries within administrations.

Producing the corporate GHG inventory

The greenhouse gas emissions for all material climate protection aspects for a given year are compiled in a **corporate GHG inventory**. The earliest year for which the emissions can be calculated is usually the **initial corporate inventory**. However, they may relate to another year, e. g. in order to meet legal requirements, to ensure consistency with other administrations, or to prevent the initial corporate inventory being affected by extraordinary influences. It is important that the methodical basis for the initial corporate inventory, e. g. the system and operational boundaries together with the climate protection aspects which are included and the assumptions and conversion factors used, is clear and well-documented. This is important in order to allow subsequent emission inventories to be compared with the initial corporate inventory as well as to enable the influence of additionally included climate protection aspects or of improved accounting methods to be identified and to be distinguished from that of already implemented climate protection measures. Otherwise, the initial corporate inventory can only be used to a limited extent as a basis for total emission reduction targets.

The greenhouse gas emissions of all material climate protection aspects must be calculated using conversion factors and, if necessary, other plausible assumptions based on the data available (see above). In principle, the corporate GHG inventory can also be prepared with by an external service provider, e. g. an environmental consultant. In this case, the following explanations serve to describe the associated services as precisely as possible.

Emissions from the operation of buildings

For the most part, emissions from the operation of buildings can be calculated based on the consumption of electricity, heating and cooling by multiplying the consumption data available by the **emission factors for CO_2 equivalents (CO_2eq).** These emissions are in general slightly higher than that for CO_2 only because they also include emissions of other greenhouse gases, e. g. methane, nitrous oxide and hydrofluorocarbons. In principle, in addition to the direct emissions from combustion, the **emissions from the upstream chain**, which occur during the extraction, treatment, transport and distribution of energy sources, should also be taken into account. The key emission factors for the CO_2 equivalents of heating consumption, including the upstream chain, can be found in Appendix III.[10]

Accounting for electricity consumption

The greenhouse gas emissions from electricity consumption (Scope 2) can be determined based on the electricity supplier's **electricity disclosure**, which is attached to the electricity bill (see Infobox: Electricity disclosure). However, this value does not contain emissions from the upstream chain, which can be calculated as indirect emissions (Scope 3) based on the emission factors in Table III 1 in Appendix III. Alternatively, the **emission factor for the "general electricity mix"** can be used (see Table III 1 in the Appendix). This is calculated by the UBA every year based on the emissions from the German power plants reported in the German national GHG inventory and, among other things, forms the basis for electricity accounting for electric vehicles.[11] Unlike suppliers' electricity disclosures, it takes into account both line losses and other losses in the electricity system, as well as the specific upstream chains of the primary energy sources used in the power plants.

An argument in favour of using the information provided in the electricity disclosure is that the choice of electricity supply, i. e. the switch to green electricity, is rooted in the desire to reduce greenhouse gas emissions and that it also has an impact on the administration's corporate GHG inventories. The

10 See also UBA: *Emissionsbilanz erneuerbarer Energieträger; Bestimmung der vermiedenen Emissionen im Jahr 2018* (Emission inventories for renewable energy sources; Identification of avoidable emissions in 2018); Climate Change 37/2019.

11 See in this regard: https://www.umweltbundesamt.de/themen/verkehr-laerm/kraft-betriebsstoffe/vollzug-38-bimschv-anrechnung-von-strom-fuer.

disadvantage of this approach is that the saving of electricity subsequently has barely any effect on the greenhouse gas emissions reported. If the emission factor is taken as a basis for the general electricity mix, however, this results in electricity consumption being a significantly higher proportion of administrations' total emissions, which corresponds to electricity generation as a proportion of total national greenhouse gas emissions. Energy-saving measures and the use of self-generated renewable electricity are therefore directly reflected in the corporate GHG inventory.

In-house consumption of self-generated electricity (e. g. photovoltaic electricity at administrations' own properties) affects the corporate GHG inventory by substituting electricity procured according to an electricity supply contract and reducing the consumption of the bought-in electricity. In addition, this reduces greenhouse gas emissions from electricity consumption, including the upstream chain, i. e. emissions from the manufacture of equipment for energy conversion or the extraction and treatment of primary and secondary energy sources. To account for the emissions incurred from in-house consumption of self-generated electricity from renewable energies, the associated emission factors, including upstream chains, are therefore also provided in Table III 1 in the Appendix.

Disclosure of renewable energy generation for information purposes

Administrations often have great potential to generate electricity using renewable energy, particularly on roofs, which are well-suited to photovoltaic systems (PV systems). For climate protection and the expansion of renewable energies, it is useful if this potential is exploited in the best possible way, regardless of

INFOBOX

Electricity disclosure

The European Directive concerning common rules for the internal market in electricity requires all states to regulate electricity disclosure (2019/944, Appendix I: Minimum Requirements for Billing and Billing Information). In Germany, electricity suppliers are required by Article 42 of the Energy Industry Act (*Energiewirtschaftsgesetz*, EnWG) to disclose the composition of the electricity mix they supply to end customers. When doing so, the volume is broken down into individual energy sources and the environmental impacts of electricity production (CO_2 emissions and radioactive waste) are reported in the electricity product purchased.

Since January 2013, electricity suppliers have only been able to label electricity as being from renewable energies and report it in the electricity disclosure if they have also cancelled guarantees of origins (*Herkunftsnachweise*, HKNs) in the register of guarantees of origin (*Herkunftsnachweisregister*, HKNR) for the quantity of renewable electricity supplied. This makes electricity disclosure reliable and prevents double-selling, because each electricity producer can only have one certificate per megawatt hour issued confirming that the electricity is from renewable sources.

If electricity suppliers do not know the origin of the electricity supplied, they must report the emissions based on the emission factor for what is known as the "residual mix". This denotes the mix of energy sources for electricity generation which remains after the renewable energy evidenced by guarantees of origin is removed.[1] This approach ensures consistent and correct electricity disclosure in Europe. Electricity disclosure is also necessary to ensure that the HKNR is able to verify and approve HKNs from other countries.

In Germany, the adjusted ENTSO-E energy source mix (adjusted by removing the renewable energies which are funded by the Renewable Energy Act (*Erneuerbare-Energien-Gesetz*, EEG) levy and accompanied by guarantees of origin) is taken as a basis for the residual mix in this case in accordance with legal requirements and serves as the baseline for accounting for CO_2 emissions.

1 Calculation is performed centrally throughout Europe (see also https://www.aib-net.org/facts/european-residual-mix).

INFOBOX

Green electricity

Green electricity is an electricity product with an electricity disclosure featuring only renewable energy sources, for which corresponding volume-based HKNs are required. If necessary, a proportion designated "Tenant electricity, funded by the EEG levy" ("*Mieterstrom, finanziert aus der EEG-Umlage*") is added. A green electricity product therefore consists of at least two components: the actual electricity supply and the corresponding volume-based HKNs. Besides the origin of the electricity, a differentiation can also be made between green electricity products with optional features. These features (e. g. investments in extra facilities for generating renewable energy, the supplier's energy-saving range or even investments in environmental protection projects) are intended to create added value because the purchase of green electricity is still not reflected in the electricity mix on the present European market. The additional benefit, however, can make the green electricity product a product which is advantageous for energy transition or for other social concerns[1]. Green electricity is electricity from renewable energies which, in Germany, are not reimbursed according to the EEG.

1 UBA: Marktanalyse Ökostrom II. (Market Analysis Green Electricity II.), Climate Change 30/2019, Dessau-Roßlau 2019, p. 33.

whether administrations consume the electricity generated themselves or feed it into the general network.

Administrations which generate renewable energy on their own properties are usually interested in offsetting this in their corporate GHG inventories. Direct offsetting is not compliant with the requirements of the Greenhouse Gas Protocol, in accordance with which the generation of renewable energy only reduces an organisation's corporate GHG inventory if it uses the energy generated itself and therefore decreases the generation of fossil fuel emissions within the organisation (Scope 1) or the purchase of grid-bound energy (Scope 2). Systemic emission reductions external to the organisation, which result from the substitution of energy from fossil fuels outside the organisation, are not taken into consideration in the accounting regulations of the Greenhouse Gas Protocol. This means that neither energy fed into the public electricity grid nor energy supplied directly to end users is reflected in administrations' corporate GHG inventories.

To make this positive contribution to climate protection and the energy transition apparent, however, the UBA recommends reporting systemic emission reductions through renewable electricity generation at administrations' properties for information purposes. Indirect emission reductions through electricity generation using renewable energies can be considered based on the avoidance factors from the emission inventories for renewable energy sources, as stated in Table III 1 in Appendix 3. An energy source-specific avoidance factor indicates how many greenhouse gases (CO_2 equivalents) per kilowatt hour (kWh) of renewable electricity generation are avoided in total. Besides substitution relationships between renewable and conventional energy sources on the European electricity market, this also takes into account the energy source-specific emissions of the relevant upstream chains (net inventory).

Emissions from heat pumps, cooling systems and air conditioning systems

In addition to direct and indirect emissions from energy consumption, direct emissions from **refrigerants from heat pumps, cooling systems and air conditioning systems** must also be accounted for. These occur as a result of filling and/or installing new equipment, leakages from existing equipment, and the incorrect disposal of decommissioned existing equipment. The amount of greenhouse gas emissions from refrigerants can be calculated based on the type of equipment and the global warming potential of the refrigerant used in accordance with Table 3 in Appendix III.

Emissions from transport

Greenhouse gas emissions from the vehicle fleet

Greenhouse gas emissions from the **vehicle fleet** can be calculated from the consumption of the relevant fuels and the corresponding emission factor for CO_2eq. The emission factors for the most important fuels are published by the UBA.[12] The emission factor for diesel, for example, is 2.6 kg CO_2eq per litre and for fuel 2.3 kg CO_2eq per litre. However, the emissions from the upstream chain, i. e. greenhouse gas emissions which arise from the production, treatment, transport and distribution of the fuels, are not yet included. The emission factors for the upstream chain and for other fossil fuels, especially liquefied petroleum gas, result from the UBA's Transport Emission Model (TREMOD) and are publicly accessible in the corresponding TREMOD background reports.[13],[14]

To calculate the greenhouse gas emissions from electricity consumption by plug-in hybrid and electric vehicles, administrations require information on how much electricity is used to charge the vehicle fleet. This information can be recorded in a logbook/fuel record, if the charging station has an electricity meter. Otherwise, it can be estimated using the mileages of the electric vehicles by assuming average electricity consumption of 20 kWh for plug-in hybrids and of 23.6 kWh per 100 km for electric vehicles.[15] For electricity consumption calculated in this way, greenhouse gas emissions can then be calculated as described above (see Accounting for electricity consumption"). To avoid double-counting, the electricity used to charge the vehicles may be included in the corporate GHG inventory only to the extent that it is not already accounted for as part of the energy consumption of buildings (see above). Accounting for the electricity consumption of electric vehicles can then be limited to the electricity used to "refuel" outside the organisation. This proportion of the total electricity demand of electric vehicles should be realistically estimated for this purpose.

12 UBA: *CO_2-Emissionsfaktoren für fossile Brennstoffe* (CO_2 emission factors for fossil fuels), Climate Change 27/2016, Dessau Roßlau, 2016 (https://www.umweltbundesamt.de/publikationen/co2-emission-factors-for-fossil-fuels).

13 UBA: *Aktualisierung der Modelle TREMOD/TREMOD-MM für die Emissionsberichterstattung 2020, Berichtsteil "TREMOD", UBA-Texte 116/2020* (Update of the TREMOD/TREMOD-MM model for emissions reporting 2020, "TREMOD" section, UBA texts 116/2020) (https://www.umweltbundesamt.de/publikationen/aktualisierung-tremod-mm-2019).

14 The emission factors for fuels may fluctuate slightly depending on their composition and the production conditions in refineries. However, these fluctuations can be disregarded if the factors are stated with verified accuracy to one decimal point.

15 Handbuch der Emissionsfaktoren (HBEFA) 4.1 (Handbook on Emission Factors for Road Transport 4.1) (2019); These values are still based on a small amount of data, particularly with regard to the actual proportion of electric performance in the case of a plug-in hybrid. This data is currently being updated. Attention should therefore be paid to subsequent versions of the Handbook on Emission Factors for Road Transport (*Handbuch für Emissionsfaktoren des Straßenverkehrs*, HBEFA).

Greenhouse gas emissions from business trips

Greenhouse gas emissions from **business trips** are estimated using data from business trip management on numbers, distances and modes of transport of business trips. The UBA has developed a corresponding recommendation on this and already given it a trial run for the business trips of the federal administration.[16] These emissions are largely caused by air travel. The greenhouse gas emissions from air travel depend on numerous factors such as aircraft type, number of stopovers, passenger load factor, booking class, flight height, etc., which usually are not recorded by business trip management. There are various services on the internet that can be used to determine the **greenhouse gas emissions from flights** based on model calculations. When choosing a flight emissions calculator, it should be ensured that the underlying assumptions are transparently disclosed and that the **non-CO_2 climate effects**, which are mainly caused by nitrogen oxide emissions and condensation trails, are adequately taken into account. The climate impact of non-CO_2 effects is highly dependent on individual flights and their calculation is very complex. If a flight emissions calculator does not perform these complex calculations in detail, the CO_2 emissions should be multiplied by a factor of at least 2.7 to determine the overall climate impact. The UBA carbon calculator[17] also applies this factor of 2.7. Meanwhile, however, compensation for the business trips by the federal government is based on the slightly more conservative factor of 3.[18]

Using the data on the total kilometres covered using individual modes of transport, greenhouse gas emissions can be calculated based on emission factors.[19] To enable the different modes of transport to be compared, the vehicle's emissions are based on the average capacity of this vehicle group, so that the emissions can be stated in grams per passenger kilometre. For specific routes, e. g. between towns/cities which are visited frequently, the environmental mobility check provided by Deutsche Bahn can also be used.[20]

As part of the **federal government's business travel compensation scheme**, the UBA determines the transport-related emissions from business trips and official journeys for the direct federal administration. Accounting is performed based on aggregate data from the BVA on air travel, provided that the flights are booked via the federal travel management at the BVA. For company vehicles, actual fuel consumption is recorded and emissions are calculated using the aforementioned emission factors.[21] In the absence of available consistent data sources,[22] the distances covered by private vehicles, local public transport, taxis and rental cars and the resulting emissions are not currently recorded. The federal administrations involved can include the data calculated by the UBA for company vehicles in their corporate GHG inventories. Other administrations can calculate these emissions using their business trip data based on the same methods which apply to calculate the emissions from their vehicle fleet and from commuting.

In addition to transport-related emissions, business trips cause greenhouse gas emissions due to **overnight stays** as well. In order to ensure that the level of effort is reasonably proportional to the accuracy of the emissions estimations, these can be estimated based on the total number of overnight stays with a fixed emission factor per overnight stay.[23]

Greenhouse gas emissions from commuting

In the same way as for business trips and travel, administrations can also record greenhouse gas emissions from staff **commuting**. A prerequisite for this is that data on the distance of commutes and the chosen mode of transport (modal split) is available or can be plausibly estimated (see Data on traffic). The

16 See also UBA: *Klimaneutrale Dienstreisen der Bundesregierung* (Climate-neutral business trips by the federal government), Berlin, February 2020 (https://www.dehst.de/DE/Klimaschutzprojekte-Seeverkehr/Dienstreisen-der-Bundesregierung/dienstreisen-der-bundesregierung-node.html).

17 UBA carbon calculator (https://uba.co2-rechner.de/en_GB/).

18 See UBA: Integration of Non-CO_2 Effects of Aviation in the EU ETS and under CORSIA, Climate Change 20/2020, Dessau-Roßlau, 2020 (https://www.umweltbundesamt.de/en/publikationen/integration-of-non-co2-effects-of-aviation-in-the). It follows that approximately two thirds of the climate effects of air transport are non-CO_2-related. See also UBA: *Umweltschonender Luftverkehr – lokal – national – international* (More environmentally friendly air transport – local – national – international), texts 130/2019, Dessau-Roßlau, 2019 (https://www.umweltbundesamt.de/en/publikationen/integration-of-non-co2-effects-of-aviation-in-the).

19 According to TREMOD, greenhouse gas emissions per person in 2018, including the upstream chain, amounted to 147 g/pkm for cars, 58 g/pkm for local public rail transport, 80 g/pkm for local public road transport, 57 g/pkm for regional trains and 32 g/pkm for long-distance trains. Domestic flights 230 g/pkm (https://www.umweltbundesamt.de/themen/verkehr-laerm/emissionsdaten#treibhausgas-emissionen-im-personenverkehr-grafik).

20 www.bahn.de/umweltmobilcheck

21 UBA: *Klimaneutrale Dienstreisen der Bundesregierung* (Climate-neutral business trips by the federal government), Berlin, February 2020 (https://www.dehst.de/Dienstreisen-der-Bundesregierung).

22 As booking and billing services are performed by different service providers using different IT systems, the data required for the calculation is not currently available in a consistent, analysable format. However, consolidation is being sought.

23 The emission factor per overnight stay varies depending on the building standard and the size and furnishing of the room, and is usually between 5 kg and 30 kg per night. Further details can be found at www.bookdifferent.com/en, for example.

distance of commutes and the modes of transport used for them is directly related to the chosen place of residence and therefore subject to the employees' personal discretion ("factory gate principle"). Nonetheless, administrations can estimate the associated greenhouse gas emissions by combining the available data on the average distance of commutes and the chosen mode of transport (see above, Data on traffic) with the corresponding emission factors.

A particular methodological challenge which arises when calculating greenhouse gas emissions from commutes lies in the trend towards flexible forms of working, particularly to mobile working from home. On the one hand, these reduce the frequency of work journeys between home and work. On the other hand, potential rebound effects must be taken into account. These can be due to the fact that flexible forms of work are accompanied by the choice of residences which are further away from the place of work and thus result in longer journeys – both to work and for other purposes. Besides this, flexible working can mean that employees require bigger homes and extra equipment with end devices, which results in higher electricity and heat consumption by the employees. These rebound effects may partly or even fully neutralise the positive savings arising from reduced commuting.[24]

With targeted measures, administrations can support their employees with choosing environmentally friendly means of transport and reducing the greenhouse gas emissions associated with commuting. This also includes avoiding commuting through mobile working and providing an efficient and reliable technical infrastructure, including data transfer services for telephone and video conferencing. The collection of data on work travel then does not serve to determine corporate GHG inventories, but rather to create relevant key figures with regard to influential measures.

Greenhouse gas emissions from visitor and supplier traffic

Visitor and supplier traffic also causes emissions which should be taken into account in the corporate GHG inventory, provided they are assessed as material climate protection aspects. If there is enough data on the number of visitors, the distances of their journeys and their modes of transport, the associated emissions can be calculated like those from business trips and commuting. However, it must also be noted here that opportunities for administrations to exert direct control are limited and that the effort of collecting data and the associated environmental benefits should be weighed up first. As is the case with commuting, the "factory gate principle" could be applied here as well. By contrast, emissions from delivery traffic are attributed to procurement (see next chapter).

Emissions from procurement

Greenhouse gas emissions from procurement can be determined approximately for individual product groups based on the total weight of materials and a corresponding emission factor. Apart from a few exceptions, this information cannot be collected from common order and delivery documents, or it can only be collected with great effort. For classic administrations, the exceptions primarily include office paper and toilet paper; in certain cases, e. g. for civil engineering and building departments, they may also include building materials and supplies such as gravel, concrete and asphalt. Emission factors from which the associated greenhouse gas emissions can be calculated using the quantities (in tons) of paper, plastic and other materials if necessary, can be looked up, for example, in the UBA ProBas

24 See Hook, A. et al.: A system review of the energy and climate impacts of teleworking Sussex (UK), 2020 (http://sro.sussex.ac.uk/id/eprint/90965/); Cerqueira, E. et al.: Does working from home reduce CO_2 emissions? An analysis of travel patterns as dictated by workplaces, Transportation Research Part D: Transport and Environment, Volume 83, June 2020.

database.[25] According to this database, the emission factor is 800 kg CO_2eq per ton for recycled paper (including the upstream chain) and 1,905 kg for PVC.

The emissions associated with the delivery of goods and consignments can in principle be estimated based on number, weight and origin (distance) of the deliveries with fixed emission factors per mode of freight transport.[26] Meanwhile, emissions calculators for freight are also available on the internet free of charge[27], with pools of data based, among other things, on HBEFA data. As deliveries are usually made using vans or lorries, an approximate fixed emission factor can be taken as a basis.

Emissions from information and communication technology

Emissions from the internal operation of information and communication technology is already accounted for as part of administrations' electricity consumption and does therefore not need to be calculated separately. However, it is useful to record these emissions as a key indicator with regard to influential measures so that administrations can plan reduction measures and check their effectiveness. The conditions for awarding the Blue Angel eco-label for "Energy-Efficient Data Centre Operation", (*Energieeffizienter Rechenzentrumsbetrieb*) for example, contain a concept for the measurement and assessment of electrical performance and the energy requirements of data centres' key components.

The manufacture, transport and disposal/recycling of ICT products causes the largest proportion of greenhouse gas emissions, particularly end devices such as desktop PCs, notebooks, etc. The UBA provides tools for calculating this on its website.[28] Emissions from energy consumption by IT service providers, e. g. when servers are operated in an external data centre or administrations use cloud services, are most easily determined by embedding them in the corresponding service specifications and contracts as a reporting obligation on the contractor's part.

Emissions from electricity consumption by employees who are working from home can be roughly estimated based on the proportion of average working hours of employees in home office and from data on the consumption of company end devices. Accounting for emissions from data transfer over the internet is still difficult. For the accounting of video conferences – including data transmission – the UBA is currently creating a calculation tool that is expected to be available from late 2020.

Emissions from events

Greenhouse gas emissions from events which administrations host throughout a year can be recorded with reasonable effort using the data collected or estimated in respect of the type of events and the number of attendees based on **assumed flat-rate values**. As attendees' journeys to and from the events usually make up more than 90 % of total emissions, the accuracy of the estimations primarily depends on realistic assumptions on journey distances and modal split. TREMOD is most suitable for this purpose (see above). The emissions associated with catering can in principle be estimated based on average values.[29] **Overnight stays** by attendees who have travelled there can be calculated in the same way as for business trips (see above), if appropriate data is available. For most events typical of administrations, emissions from **energy consumption** (heating, electricity, cooling) only play a minor role. If events are held at administrations' own premises, they are

25 UBA: *Prozessorientierte Basisdaten für Umweltmanagementsysteme* (Process-orientated basic data for environmental management systems) (ProBas) (https://www.probas.umweltbundesamt.de/php/index.php).
26 For greenhouse gas emission factors in 2018, including the upstream chain, TREMOD 6.03 contains the following data: 112 g/tkm for lorries, 18 g/tkm for freight trains and 31 g/tkm for inland waterway vessels (https://www.umweltbundesamt.de/themen/verkehr-laerm/emissionsdaten#treibhausgas-emissionen-im-personenverkehr-grafik).
27 https://www.ecotransit.org/calculation.de.html

28 See "Publications on information and communication technology".
29 With regard to catering, see, for example, the databases maintained by Klimateller (www.klimateller.de/klimateller-app/) or eaternity (www.app.eaternity.org). With regard to overnight stays, see www.bookdifferent.com/en/.

already included in the emissions from the operation of buildings (see above). If event venues are hired, they can usually be estimated using data from the venue owner as well as simplified assumptions, e. g. on average size and lifetime. As an alternative, they can be estimated based on average values. Emissions from **material consumption**, e. g. from distributing documents to the attendees, can also be estimated (see Emissions from procurement). Meanwhile, there are also quite useful **emissions calculators** for events, which are based on sound scientific and empirical assumptions about relevant circumstances and make the methodically complex and not always simple accounting for emissions from events significantly easier.[30]

Taking changes in accounting principles into account

Organisational boundaries or accounting principles in administrations may change over time, e. g. when responsibilities are reassigned, organisational structures are amended or climate protection aspects are reassessed. In the event of a subsequent **change in the organisational boundaries or the accounting methodology** compared with the initial corporate inventory, a reliable **comparison between the current emission inventory and the initial corporate inventory** is no longer immediately possible. It may not be clear, whether developments of the current emission inventory are due to actual emissions or to an altered accounting methodology.

To be able to delineate and differentiate between these two influences, it is important to establish the initial corporate inventory and the current inventory on a **common calculation basis**. The best way to do this is to subsequently recalculate the initial corporate inventory using the modified methodology, to "adjust it methodically". If this is not possible, e. g. due to missing data, the current emission inventory must be adjusted according to the organisational boundaries and the methodology of the initial corporate inventory. If – for example, due to growing methodical experience and findings – additional climate protection aspects which were not included in the initial corporate inventory are included in the accounting process or other locations are subsequently integrated into administrations, these

30 Besides the UBA carbon calculator, which is available at https://uba.co2-rechner.de, the emissions calculator provided by Energieagentur Nordrhein-Westfalen at www.energieagentur.nrw/klimaschutz/eventrechner can also be used.

additionally accounted emissions may not be taken into consideration in the comparison with the initial corporate inventory.

Such methodical backgrounds are very important for understanding and evaluating current emission developments, particularly for reviewing the current emission inventories with regard to the established reduction targets. Nonetheless, this is often complex and poses a challenge which should not be underestimated in respect of communication with key actors such as management, employees, superior authorities or the general public (see the remarks on the stage 7).

Accounting guidelines and support

Support from external experts

Some **consultants and service providers** now have many years of experience and expertise in respect of accounting for organisations' greenhouse gas emissions. Administrations can request support from these providers when drawing up corporate GHG inventories. It is important that the experts involved are well enough acquainted with the relevant administrations, have access to the available data, and can categorise and interpret this data properly. It has proven less effective to impose a methodological concept "out of the box" on the administration, which does not adequately take the unique features of each administration into account (e. g. its specific tasks, locations and conditions).

The more precisely the administration describes its material climate protection aspects, its organisational and operational boundaries, the pool of data available and the organisational, methodical and practical requirements of greenhouse gas neutrality in the **service specification**, the better founded and more accurately providers and potential contractors can calculate greenhouse gas emissions and address the administration's unique features and challenges. When formulating requirements of providers, it may also be helpful to take the experiences of other administrations with external experts into account (for instance during the aforementioned exchange of experiences or by making specific enquiries with responsible employees).

Accounting software (CO_2 calculator)

A number of already existing **programs and IT tools**, which can be used for establishing company GHG inventories, can in principle also be applied in administrations. These programs and tools are often components or parts of more comprehensive environmental management systems used to record, evaluate and document key environmental figures. In principle, they can also be employed to prepare corporate GHG inventories (also referred to as Corporate Climate Footprint). Due to the wealth of data entered and the many underlying assumptions, the use of these **accounting tools** can always only support and facilitate the calculation of the greenhouse gas emissions of an administration, but never replace a comprehensive determination. It is important that the tools take the specific features of the relevant administration into account, particularly with regard to the available data, the underlying assumptions, and the specific information and communication needs. Here, too, it is advisable to **make enquiries with other administrations or organisations** as to what experiences they have with which tools, what to bear in mind in corresponding tenders and what requirements are important for the tools and those who program them. On its website, the UBA offers tools which can be used to calculate emissions throughout the entire lifecycle of ICT products and to account for emissions associated with video conferences.[31]

31 See also Publications on information and communication technology.

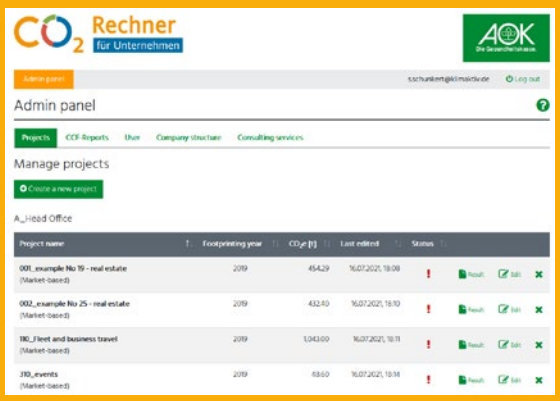
Training

If accounting is carried out by internal staff members, they must be **qualified and trained** to do so. For this purpose, too, there are a number of providers who offer instruction on the basics of greenhouse gas accounting, the handling of climate-relevant data, the selection of the right emission factors and the methodological challenges. When choosing suitable **education and training providers**, it is also helpful to make enquiries with other administrations and consider their experiences. It can also be helpful to approach specific training organisations, e. g. the German Federal Academy of Public Administration (*Bundesakademie der öffentlichen Verwaltung*, BAköV) or the postgraduate colleges for senior civil servants, together with other authorities, and specifically demand appropriate further training there. Greenhouse gas accounting can then be incorporated into broader training events such as **seminars or workshops on climate protection management** or on greenhouse gas neutrality too.

Other administrations' experiences

Numerous administrations already have experience with accounting for greenhouse gas emissions. If these experiences have been documented and published – e. g. as part of climate reporting (see stage 7) – other administrations can draw on them with a minimal amount of research. These experiences can still be used even if they have not been documented, whether in the context of a knowledge exchange between administrations (see Stage 9) or by directly contacting individuals who have appropriate experience with accounting for greenhouse gas emissions.

Practical Example: AOK Baden-Württemberg



The AOK Baden-Württemberg, Germany's fifth largest public health insurance company with 4.5 million insured persons, is pursuing the path to climate neutrality.

The carbon footprint of the central administration, the 14 regional offices, the training centre with over 10,000 employees and of the numerous events is calculated and documented using the Corporate Carbon Footprint Calculator of KlimAktiv gGmbH (non-profit LLC).

Stage 4

Set targets – Establishing ambitious and measurable climate protection targets

One crucial element of a successful and credible greenhouse gas neutrality strategy is that administrations set themselves **ambitious and measurable climate protection targets**. The KSG obliges the public sector to generally **set an example in climate protection**.[32] This gives administrations not just the right but actually the **duty to set comprehensive climate protection targets**, particularly with regard to reducing greenhouse gas emissions. Besides a long-term **overall reduction target** for greenhouse gas emissions, administrations can also set other **climate protection targets** to make the overall reduction target more specific to stakeholders and to make it more compatible with their relevant tasks. The more specific, detailed and minute a target is, the more it takes on the character of a measure (see next stage). Unlike measures, targets can be reviewed based on specific figures, while measures can only be evaluated afterwards based on their impact.

With targets, there is always a **conflict between what it necessary in the long term and what is possible in the short term**. The credibility of administrations may suffer if overly ambitious targets are not met. If they are too unambitious and focus too much on foreseeable developments, administrations' credibility and function as role models will also suffer because the administrations are not exploiting their full potential for climate protection. There may be concerns that very far-reaching targets are compromising administrations' duties and their actual core business or that their economic efficiency might be affected. In principle, however, ambitious targets do not stand in the way of administrations' original targets and the requirement of economic efficiency. On the contrary, the economic efficiency criterium actually requires the economic costs of climate protection, e. g. the external costs arising from greenhouse gas emissions, to be taken into account when defining climate protection targets.[33]

Targets for reducing greenhouse gas emissions

Long-term and medium-term reduction targets

The most important factor for the credibility and the role model function of administrations are measurable and ambitious targets for the reduction of greenhouse gas emissions. By setting such targets, administrations send a clear signal regarding the specific contribution they intend to make to the achievement of global and national climate targets. With an **overall reduction target** for their greenhouse gas emissions, administrations specify by how much and by when they will reduce their overall recorded emissions based on their initial corporate inventory. The target can be expressed as either an absolute quantity of emissions (in tons of CO_2 equivalents) or as a percentage reduction between the target year and the base year.

While the base year is usually a defined constant, it is helpful for administrations to define various target years and thus long-, medium- and short-term overall reduction targets. The recommended **long-term target year** is **2050**; this year has been set in the federal government's Climate Action Plan and in the EU climate policy targets and no longer leaves any room for compensation measures (see stage 6). One possible **medium-term target** is the year **2030**, which is mentioned as a target year for climate-neutral federal administration inter alia in Section 15 KSG, as well as in individual state climate protection initiatives. In addition, s**horter-term targets** for periods **significantly before 2030** can be set, which can be aligned with current or foreseeable developments within administrations (e. g. building or investment projects).

Bottom-up and top-down approach

Administrations usually base short-term targets on feasibility, i. e. they derive them from an analysis of the reduction potential within their relevant climate protection aspects and fields of action (**bottom-up approach**). To this end, they examine the climate protection aspects with the highest emissions in detail and assess the technical, organisational and other (e. g. those associated with employee behaviour) options for reducing emissions. External support, e. g. by an energy or climate protection consulting company, can be useful. Long-term reduction targets cannot be deduced from analyses of reduction

32 In accordance with Section 13(1) KSG, public office holders must take the targets laid down in Part 2 of the KSG (Sections 3 et seq.) into account in their planning and decision-making.

33 The UBA estimated the external costs of the emission of one ton of CO_2eq at EUR 180 for 2016. See UBA: Methodenkonvention 3.0 zur Ermittlung von Umweltkosten – Kostensätze (Methodical convention 3.0 for the calculation of environmental costs – Cost rates), Dessau-Roßlau, 2019.

potentials; instead, they have to be based on long-term needs as stipulated in the Paris Agreement and the greenhouse gas reduction targets for 2050 which the EU and Germany derived from these needs (**top-down approach**). This approach is pursued by the so-called "Science-Based Target Initiative" of various international climate protection actors, which has now been joined by approximately one thousand companies and other organisations worldwide.[34]

Emission reduction targets for individual fields of action

In addition to the overall reduction target, administrations can also define reduction targets for individual fields of action. These can also be defined as **absolute or percentage emission reductions** (in tons per year) for a target year relative to a base year. Like the overall reduction target, reduction targets for individual fields of action must also relate to the greenhouse gas emissions accounted for in the initial corporate inventory and take into consideration changes regarding the delineation and the accounting methodology.

Administrations whose development is particularly dynamic or difficult to forecast can also define **relative targets** by relating the intended emission reductions to employees or usable space. There are also other reference values for administrations with special duties, e. g. for universities the number of students, for cultural institutions the number of visitors, or for public companies certain performance indicators such as passenger numbers, waste volumes or patient numbers. The advantage of such relative targets is that they can better take into account the specific situation and developments within administrations. The disadvantage is that such relative targets only provide a vague representation of the absolute development of greenhouse gas emissions and the actual contribution to climate protection.

Other climate protection targets

Greenhouse gas emissions are not yet sufficiently familiar target parameters for many actors within administrations, not least because many administrations do not yet routinely record their greenhouse gas emissions. Unlike energy consumption, the calculation and optimisation of greenhouse gas emissions in many administrations is still not part of the daily routine for staff in charge of building services. To make climate protection a natural part of everyday procedures and activities and to enable as many employees and partners as possible to get involved, administrations can specify and supplement their declared greenhouse gas emission reduction targets with actor- and field of action-specific targets for other parameters.

Legislators and governments at the federal, state and municipal levels also lay down specific climate protection targets which the relevant administrations have to comply with. For example, the GEG[35] contains specific minimum targets for the proportion of renewable energies used to supply heating and cooling to public buildings. For the federal administration, the State Secretaries' Committee for Sustainable Federal Government (*Staatssekretärsausschuss Nachhaltige Entwicklung*) has laid down binding targets for construction work, procurement and energy supply. Other targets for administrations can be found in federal and state climate action programmes too. If administrations want to fulfil their function as role models and increase their credibility, they need targets which exceed these requirements.

34 See www.sciencebasedtargets.org. For guidance on how to define and use such targets as the basis for a climate protection strategy in companies and administrations, see Erhard, J.; Götz, M.; Krebs, J.; von Gagern, S. (2019): *Science Based Targets – Wissenschaftsbasierte Klimaziele als Grundlage für die unternehmerische Klimastrategie* (Science-based climate targets as a basis for corporate climate strategy) (www.globalcompact.de/wAssets/docs/Umweltschutz/Publikationen/DGCN_Diskussionspapier_SBT_191008.pdf).

35 The Buildings Energy Act (*Gebäudeenergiegesetz*, GEG) of 1 August 2020 combines the Energy Conservation Act (*Energieeinspargesetz*), the Energy Savings Regulation (*Energieeinsparverordnung*) and the Renewable Energy Heating Act (*Erneuerbare-Energie-Wärmegesetz*). It entered into force on 1 November 2020 (Federal Law Gazette (*Bundesgesetzblatt*) Part I (2020), No. 37 of 13 August 2020).

Administrations can break emission reduction targets down into clear, concrete and measurable figures. This does not just facilitate implementation at working level and employee involvement; it also enables assessment, feedback and, if necessary, adaptation by those responsible, those in charge and other actors within administrations based on familiar key figures. In principle, measurable climate protection targets can thus be defined using all the available climate protection-related data. Each administration must decide for itself which ones are appropriate and target-oriented, in the literal sense. Important is only that the supplementary targets are compatible with the established greenhouse gas emission reductions and consistent with each other. What matters is not the number of targets but rather how the overarching goal of becoming greenhouse gas-neutral can be most effectively and appropriately made conceivable and fleshed out for the actors involved. The following sections describe options for setting specific targets in different fields of action.

Climate protection targets for buildings

Buildings are a particularly good way of emphasising administrations' functions as role models through ambitious climate protection targets. The legislator has also acknowledged this by specifying a number of environmental targets for the buildings used by the public sector. Legal climate protection requirements in buildings do not just concern building and investment projects, energy consumption and energy efficiency, but also energy supply and the acquisition of renewable energy.

Building and investment targets

Administrations are particularly in a position to realise climate protection goals in the building sector when buildings are newly constructed, renovated, converted or repaired. This has also been recognised by the federal government, state governments and municipalities, which have adopted corresponding requirements for building projects undertaken by the public sector. For example, the federal government's Action Programme "Sustainability"[36] includes the target of adhering to the "silver level" defined in the Assessment system for sustainable building (*Bewertungssystem Nachhaltiges Bauen*, BNB) as a minimum standard for civil federal buildings and to try out the "gold standard" for selected redevelopment projects. The GEG lays down minimum proportions for the use of renewable energies to cover the heating and cooling energy demands for public buildings, which are between 15 % and 50 % depending on the type of energy and the type of building. This requires the public sector to use renewable energies to meet a significant proportion of its heating and cooling requirements when buildings are fundamentally renovated. If buildings are used which are not owned by the federal government, the priority is to rent or lease buildings which already fulfil this condition or, secondarily, buildings, whose owners undertake to fulfil it when carrying out the fundamental renovation.

The replacement and renewal of technical systems, devices and equipment – such as the renovation of the air conditioning system or of the event technology in conference and meeting rooms – are good opportunities to establish ambitious and measurable climate protection targets within administrations. For **public building projects**, corresponding targets already apply based on mandatory political and legal requirements.[37] These concern the energy consumption and the energy efficiency of buildings, the generation of renewable energies, the environmental sustainability of building materials and the achievement of particular standards and quality requirements, e. g. as part of the **BNB**.[38] Ambitious targets in this area bolster the public sector's function as a role model and send important signals for architects, building contractors and suppliers of environmentally friendly building technology. They can push the state of the art forward, e. g. through better integrity and air tightness of the building envelope, the installation of more energy-efficient equipment and the use of suitable energy systems.

36 State Secretaries' Committee for Sustainable Development (*Staatssekretärsausschuss für nachhaltige Entwicklung*): *Nachhaltigkeit konkret im Verwaltungshandeln umsetzen – Maßnahmenprogramm Nachhaltigkeit* (Implementing sustainability directly into administrative action – Action Programme "Sustainability"); decision of 30 March 2015, last amended 24 April 2017.

37 For federal construction work, the decree on the "Model function of federal buildings for energy-efficient construction" ("*Energetische Vorbildfunktion von Bundesbauten*") contains specific provisions for exceeding the requirements of the 2013 Energy Savings Regulation (*Energieeinsparverordnung* 2013, EnEV 2013). See BBSR (2019). The federal states have enacted similar regulations for construction works by their administrations.

38 See https://www.bnb-nachhaltigesbauen.de/bewertungssystem.html.

Other targets relating to construction work may concern demolition and the recycling of building materials or a particular environmentally friendly construction method. This includes, for example, setting targets for the transport of building materials, raising awareness and training of staff, or using "**green electricity**" on the construction site, i. e. supplying the construction site with power from renewable energies.

Energy consumption and energy efficiency targets

Energy consumption targets are particularly beneficial for organisational units and partners working in property management and building management. Based on emission factors for the energy sources used, emission reduction targets can be converted into specific heating, electricity and cooling consumption volumes for individual locations, parts of buildings and consumption groups. The conditions under which the resulting energy-saving targets can be achieved depends on the structural, technical and organisational conditions on site, as well as on the changes which can be made to the procedures and the conduct of the employees working there. Therefore, these targets must also be discussed with the responsible property managers, building services staff and employees on site. In this way, highly specific targets, e. g. for reducing electricity requirements for interior and exterior lighting, ICT, air conditioning and ventilation, can also be agreed with those concerned. Targets can also be set for areas of buildings with specific functions, such as the canteen, conference and meeting rooms, storage facilities and workshops or communal areas (kitchenettes, recreation rooms, toilets, etc.).

Instead of absolute energy consumption targets, administrations can also define **energy efficiency targets,** e. g. concerning energy consumption per usable area or workstation. Targets for increasing energy efficiency can also be set for individual locations, buildings and even for specific pieces of equipment and devices (e. g. for the ICT infrastructure or the ventilation system). When doing so, efficiency needs not be restricted to technical aspects. For example, targets for a more efficient utilisation of buildings, which are set as a reduction in energy demand per usable area or as average energy consumption per office workstation, pose a major challenge that in organisational terms is at least as great as in technical terms.

A fundamental requirement for energy efficiency targets is that electricity, heating and cooling consumptions are recorded and evaluated separately for different buildings, pieces of equipment and purposes. Such a **differentiated pool of consumption data** is often not available, however, and can often only be produced with great effort, particularly in buildings with an older technical infrastructure. In this case, the structure of such a data pool may be an appropriate operational target, e. g. the setup of **energy controlling** or – as a temporary solution or a simpler alternative – an **energy consumption register** (see above section Data).

Increasing the utilisation of building capacity is a special type of energy efficiency target. For example, it may be expressed as a reduction of average office space per employee. This target can be made even more specific and practically conceivable by formulating it as a reduction of PC workstations per 100 employees for existing buildings and offices. In 2018, for example, the UBA had set itself the goal of accommodating up to 100 employees with 89 office workstations in its head office. The organisational and technical opportunities presented by flexible working methods such as working from home and mobile working do not just enable administrations to prevent staff commuting; they also enable them to accommodate more employees in existing building spaces avoiding the need of additional space and the associated use of energy- and resources. A positive "side effect" of the higher utilisation of office capacity is significant cost savings in respect of the provision, maintenance and management of usable areas, which exceed the costs of heating and ventilation by far. However, this is offset by the fact that extra space (e. g. home offices), office equipment, and electricity and heating are required in employees' own homes, thus resulting to some extent in a mere relocation ("externalisation") of greenhouse gas emissions.[39]

39 In this regard, see Hook, Andrew et al. (2020): A systematic review of the energy and climate impacts of teleworking; Environmental Research Letters, ISSN 1748-9326;

Energy supply and provision targets

Administrations can also adopt **targets concerning the environmentally friendly supply and provision of energy**. Appropriate targets may relate to the proportion of renewable energy in the energy supply and may, if applicable, make a distinction between electricity, heating and fuel supply. Administrations may also decide to procure electricity from renewable sources for their properties or a part thereof. Additionally, targets may also be set for individual sites based on the technical possibilities and the availability on site. Administrations with many locations and different energy requirements and supplies in particular can therefore organise the transition to a fully greenhouse gas-neutral energy supply step by step.

Other targets relating to buildings

In principle, other or additional climate protection targets can also be set to facilitate the process towards greenhouse gas neutrality process in relation to buildings. Which targets they are exactly depends on the specific data available and the actors involved. For locations with numerous air conditioning systems and units, targets can be defined, for example, concerning the **quantity of specific refrigerants used** or the replacement with more environmentally friendly alternatives.

Targets for **qualifications and training** are particularly beneficial if the staff responsible for building management does not have much experience with climate protection matters. A concrete, measurable target may relate to the number of training sessions or qualifications for specific employee groups, e. g. managers or technical staff. In 2015, for example, the administration of the state of Hesse set a target for further training and qualifications for energy officers and maintenance personnel; in 2019, the participation of managerial staff and coordinators for energy-related matters at information events regarding climate protection was added as a target.

Climate protection targets relating to transport

For the field of action “transport”, climate protection targets can also be set for the vehicle fleet, business trips, staff commuting or visitor and delivering traffic.

Targets for the vehicle fleet

Concrete targets for the vehicle fleet primarily concern the size and composition of the vehicle fleet, absolute and specific fuel consumption, and total mileage. Generally speaking, a vehicle fleet should be as small as possible and only as big as necessary. For example, the **number or proportion of vehicles with emission-free powertrains** (usually electric vehicles) can be set as a target. There are already legal and political guidelines in this regard for many administrations. For example, the federal government’s Action Programme “Sustainability” sets an average emission target for the business vehicle fleet

of 95 g CO_2/km from 2020 and and requires that 20 % of newly purchased or rented vehicles have an emission value of less than 50 g CO_2/km (not including special vehicles).[40] To further increase the proportion of alternative and more environmentally friendly powertrains, this proportion should be greater than 40 % by 2025 and 100 % by 2030, with the proportion of plug-in hybrids in the federal government's vehicle fleet being no greater than 50 %.[41] Federal state and municipal climate action programmes contain similar targets. Administrations can manage their vehicle fleet's greenhouse gas emissions even more effectively by adding additional **targets concerning real consumption** – expressed as the ratio of fuel consumption (and electricity consumption) to the total mileage of the vehicle fleet – or direct **targets concerning mileage** and **fuel and electricity consumption**. To make sure that lower CO_2 emissions do not lead to higher emissions of pollutants, **targets for pollutants** (e. g. nitrogen oxide emissions) can also be adopted. There are, however, generally no "real emission" factors for specific pollutants; these factors must therefore be based on average values, e. g. broken down by exhaust emission standards and powertrains. Besides this, administrations can also adopt measurable **targets for training driving personnel**, for better **route planning** or concerning **vehicle capacity utilisation**.

Targets should not create incentives to simply transfer greenhouse gas emissions to external actors. This is the case e. g. if the vehicle fleet is downsized and, as a result, more business trips are made using hire cars, taxis or employees' private vehicles, without recording their emissions. For this reason, **accompanying rules on the use of hire cars, taxis and private vehicles** are beneficial.

Targets for business trips

In principle, administrations can set targets concerning the number of business trips, the proportion of individual modes of transport (modal split) or the number of video conferences. The **number of business trips** depends on professional duties and is often difficult to control. However, through travel

restrictions to curb Covid-19 infections, administrations have been able to gain extensive experience of how business trips can be substituted by other forms of collaboration with actors in other places. As a result, business trips were reduced considerably, as they were increasingly replaced by telephone and video conferences.

At the start of 2020, the Federal Ministry of the Interior (*Bundesinnenministerium*, BMI) significantly increased possibilities for the federal administration to favour train journeys over flights. Accordingly, business trips can be taken by train even if flights might be cheaper. The BMI explicitly recommends that federal authorities create incentives for the often more time-intensive use of rail by pointing out to employees in a circular the legal options to work during business trips.[42] This does not just increase **incentives for train use**; it also enables federal authorities to set corresponding targets for a higher proportion of train journeys or the reduction of flights. Even before this BMI circular, the BMZ had already committed to a 33 % reduction in the number of its domestic business trips by 2021.

40 Federal government Action Programme "Sustainability" (*Maßnahmenprogramm Nachhaltigkeit der Bundesregierung*), p. 10.
41 Federal Government Climate Action Programme 2030 (*Klimaschutzprogramm 2030 der Bundesregierung*), Measure 3.5.1.2.
42 BMI: Circular dated 21/01/2020 on the implementation of the Climate Action Programme 2030 in the Federal Travel Costs Act (*Bundesreisekostengesetz*) (https://www.bva.bund.de/SharedDocs/Downloads/DE/Bundesbedienstete/Mobilitaet-Reisen/RV_RK_TG_UK/Rechtsgrundlagen/Dienstreisen/bmi_rdschr_21_01_20_vorgriffsregelung_bahnnutzung.pdf).

In addition to the **budgetary and travel expenses rules**, the **collective agreement provisions for the public sector** on the crediting of travel time as working hours must be observed when setting targets. These provisions allow the setting of targets for preferential train use, for example. Certain authorities have already issued **guidance on environmentally friendly business trips**, which can serve as a reference for measurable climate protection targets for business trips.[43] This may also include choosing particularly environmentally friendly overnight stays. Nonetheless, it is important for the acceptance of such targets that the potential effects for employees, e. g. with regard to family-friendly business travel times, are taken into account and adequately communicated.

Targets for staff commuting

For commuting, targets can be set for the number of daily commutes and the proportion of public modes of transport (buses and trains), walking and cycling. The number of regular commutes primarily depends on the proportion of employees who make use of flexible forms of working (e. g. remote working (working from home), mobile working or reductions in working hours with full-day attendance). Such targets can therefore also promote a better balance between work and family life.

If regular mobility surveys are carried out among the employees, targets for all key figures collected in these surveys can also be set in principle. In some administrations, there are already targets for the proportion of environmentally friendly modes of transport in commuting. Other possible benchmarks for targets include the number of employees with season tickets for public transport and – if there is a high proportion of long-distance commuters – with a rail card. Additionally, allocation keys for parking facilities – indicating the ratio of bicycle storage spaces or car parking spaces to the number of employees – can make good starting points for targets within the applicable legal framework (e. g. municipal parking by-laws). At the UBA's head office e. g., for 100 employees 40 parking spaces are provided for bicycles, but only 25 for cars.

Targets for visitor and delivery traffic

Administrations with a high and regular volume of visitors can set targets concerning environmentally friendly journeys. For example, these may include the proportion of environmentally friendly modes of transport or the reduction of vehicle traffic. Administrations usually have only limited influence on the transport choices of their visitors. In addition, accessibility on foot and by bicycle, public transport links, and the spatial and structural conditions on site vary considerably. For this reason, such targets primarily involve the provision of car parking spaces – especially those with charging facilities for electric vehicles – as well as bicycle storage spaces and their utilisation. Logically, the provision of additional charging facilities for electric vehicles and the creation of bicycle storage spaces on car parking spaces are the most common targets in this regard.

Due to a lack of data, measurable targets concerning delivery traffic are still rare. Qualitative targets may concern environmentally friendly delivery or the pooling of deliveries. Administrations may integrate such requirements into supply and service agreements. A possible target could relate to the number of agreements with corresponding requirements for the environmentally friendly delivery of goods.

Procurement targets

Due to a wide variety of procurements and a lack of data, it is difficult to define meaningful, measurable targets for procurement based on key figures. It is therefore easier to devise climate protection targets concerning procurement based on qualitative procurement requirements and selected climate-relevant goods and services (see Data on procurement and contracting in stage 5). There are a number of legal requirements in this regard at European and national level which administrations can use as guidance when formulating procurement targets.[44] Besides this, various federal states have enacted procurement regulations for state and municipal administrations.[45]

43 See e. g. UBA: *Leitlinien für umweltverträgliche Dienstreisen* (Guidance on environmentally friendly business trips) (https://www.umweltbundesamt.de/sites/default/files/medien/376/dokumente/leitlinien_fuer_umweltvertraegliche_dienstreisen_im_umweltbundesamt_0.pdf).

44 See UBA: *Rechtsgutachten umweltfreundliche öffentliche Beschaffung* (Legal report on environmentally friendly public procurement), texts 30/2019, Dessau-Roßlau, 2019 (www.umweltbundesamt.de/publikationen/rechtsgutachten-umweltfreundliche-offentliche).

45 See UBA: *Regelungen der Bundesländer auf dem Gebiet der umweltfreundlichen Beschaffung* (Federal state regulations in the field of environmentally friendly procurement) (updated April 2020); texts 126/2020, Dessau-Roßlau, 2020 (www.umweltbundesamt.de/themen/stadtstaaten-sind-vorreiter-bei-umweltfreundlicher).

Good practice example: Climate-neutral procurement of postal services by the Free and Hanseatic City of Hamburg

The financial authorities of the Free and Hanseatic City of Hamburg regularly procure their postal services in EU-wide tendering procedures. The first tendering procedures were carried out in 2016 for the postage of letters and in 2017 for the postage of parcels. In accordance with the applicable procurement law (Section 3b(9) of the Hamburg Procurement Act (*Hamburgisches Vergabegesetz*, HmbVgG), both procedures were subject to strict environmental requirements, particularly in respect of the use of emission-free vehicles, compliance with the level of pollutants emissions according to the applicable Euro level for vehicles with conventional powertrains, and compensation for remaining greenhouse gas emissions through regional and global climate protection projects. As a result, the contract for letter postage and parcel postage was awarded subject to the requirement that approximately 100 street scooters must be used for delivering post and more than 690 t of CO_2 emissions must be offset through the Deutsche Post/DHL GoGreen climate action programme.

Further information: https://www.umweltbundesamt.de/postdienstleistungen

The climate protection initiatives of the federal states also contain, to a large extent, requirements and targets for their state administrations' procurement. This applies, for example, to the inclusion of life cycle and economic costs for climate protection in the profitability analysis. Many federal states also require the preferential procurement of products which meet the requirements of eco-labels or of the highest relevant energy efficiency class (e. g. A+++).

Finally, administrations can also set targets to increase awareness and qualifications among employees in respect of environmentally friendly procurement, e. g. participation in corresponding training sessions and workshops such as those offered by the Competence Centre for Sustainable Procurement (*Kompetenzstelle für nachhaltige Beschaffung*, KNB).

Information and communication technology targets

In the field of action "information and communication technology", administrations can adopt targets for data centres and end devices, i. e. desktop PCs, notebooks, etc.

In **data centres**, greenhouse gas emissions are primarily generated through electricity consumption by servers and the peripheral equipment (e. g. the cooling system), through the manufacture of hardware and through the refrigerants used. In order to set sensible targets, it is insufficient to only take individual key figures into account, because in a data centre – as in an orchestra – there are many parts to be brought together. Administrations should therefore take a holistic view of all sources of greenhouse gas emissions in the data centre and, above all, aim to increase the **utilisation of server capacities**. Then the electricity requirements for running the equipment (including cooling) and refrigerant requirements decrease, greenhouse gas emissions are avoided, and raw materials required to manufacture new servers are saved.

One important qualitative target for the data centre could be implementing the **monitoring of energy consumption** that is envisaged for the "Blue Angel" and specified in the awarding criteria for procurement contracts.[46] An even better option is to strive for the **Blue Angel label for the entire data centre.** A more advanced qualitative target would be to use the **KPI4DCE method** (KPI4DCE = Key Performance Indicators for Data Centre Efficiency)[47], which the UBA has developed for a holistic assessment and monitoring of the energy and resource efficiency of data centres. The KPI4DCE method uses a system of key figures to put the environmental effects of servers, data storage devices, networks and building technology in relation to performance indicators. This method can be applied to simulate or test the effect of improvements to see whether changes would produce or have already produced the desired effects. Besides greenhouse gas emissions, the KPI4DCE method also

46 Blue Angel for data centres: DE-UZ 161 Energy-Efficient Data Centre Operation: https://www.blauer-engel.de/de/produktwelt/elektrogeraete/rechenzentren

47 Schödwell, B.; Zarnekow, R.; Liu, R.; Gröger, J.; Wilkens, M.: Kennzahlen und Indikatoren für die Beurteilung der Ressourceneffizienz von Rechenzentren und Prüfung der praktischen Anwendbarkeit (Key figures and indicators for assessing the resource efficiency of data centres and assessing practical applicability), texts 19/2018, February 2018 (https://www.umweltbundesamt.de/publikationen/kennzahlen-indikatoren-fuer-die-beurteilung-der).

takes other impact indicators into account.[48] The UBA is currently developing an expert tool to assist data centres with their calculations. The tool will be available from the UBA on request.[49]

The key figure PUE (Power Usage Effectiveness), however, is not a suitable way of assessing or comparing the efficiency of data centres. It is merely an expression of the relationship between the data centre's total electricity consumption, including the necessary infrastructure (primarily air conditioning), and the electricity consumed solely by IT components. The efficiency of the actual core activity, namely running the server, the communications systems and the storage systems, is not included in the calculation. Refrigerants and the manufacture of hardware are not relevant for the PUE either.

For **end devices**, an effective target can be the longest possible **useful life**, because by far the largest part of greenhouse gas emissions are generated during manufacture. A key figure which can be used for this purpose is the useful life of equipment in administrations, which can be increased by choosing repairable equipment based on needs, cascade utilisation and concepts such as virtual desktop infrastructure. This reduces raw materials and costs as well as greenhouse gas emissions. When purchasing new hardware such as servers, end devices, monitors, network printers, etc., administrations should also try to keep **electricity requirements as low as possible** during use. One (qualitative) target related to this is to make it a priority to purchase equipment which meets the **"Blue Angel" criteria**[50] and to use it long term, e. g. because it can be upgraded or repaired.

Another possible target relates to the **reuse of equipment**. To do so, administrations can hand hardware which is no longer required over to refurbishers (companies which prepare equipment for reuse by other users), sell it via the internet platform *Zoll-Auktion*[51] or give it to schools instead of disposing of it. This increases its useful life even further.

Targets for events

In the field of action "events", targets for reducing specific greenhouse gas emissions per event participant are particularly appropriate. Targets for individual climate protection aspects of events can also be set. To reduce the climate effects of journeys to an event, one target could be ensuring that a higher proportion of participants use public transport or bicycles, for example. Targets concerning the provision of food and drinks make also sense, for example, targets for the proportion of vegetarian and vegan dishes or the proportion of drinks without packaging (tap water in carafes, hot drinks from thermal jugs). Targets can also be set in respect of the quantity and quality of documents and materials.

In addition, administrations can define strict environmental criteria and set a target to gradually increase the proportion of its events which fully meet these criteria, until finally, in a few years, all events satisfy these requirements. If external service providers are commissioned to plan and host events (e. g. event agencies), targets required by environmentally friendly procurement and contracting can be prescribed (see above). Compliance with criteria is not always easy to record and review. Administrations can also set targets related to this, e. g. "creation of conditions for recording effects of events on the climate". Therefore, targets concerning training the personnel responsible for events, recording and documenting climate-related key figures or reviewing the effects on the climate may also be appropriate (see stage 8).

48 See https://www.umweltbundesamt.de/publikationen/kennzahlen-indikatoren-fuer-die-beurteilung-der.
49 Further information is available at https://www.umweltbundesamt.de/kpi4dce-20.
50 For the "Blue Angel" list for ICT products with links to the criteria for awarding contracts, see "Publications on information and communication technology".
51 https://www.zoll-auktion.de

Stage 5:

Act – Planning and implementing climate protection measures

The Federal Climate Change Act (*Klimaschutzgesetz*, KSG) emphasises the importance of the public sector as a role model and contains an obligation for administrations to take climate protection targets into account when making plans and decisions.[52] Before mentioning the various **types of measures**, this chapter will first clarify the relationship between measures and targets and take a look at the **requirement of economic efficiency**. Guidance is then given on a action programme for climate protection (**"climate action programme"**), in which measures can be combined and managed.

Targets and measures are closely correlated. On the one hand, climate protection targets specify where administrations must take effective measures to reduce greenhouse gas emissions. On the other hand, administrations derive a substantial part of their climate protection targets from the projected effect of possible measures to reduce emissions. Whether administrations derive measures from targets (top-down approach) or targets from measures (bottom-up approach) can hardly be distinguished in practice. In any case, it should be assumed that specific ideas for effective measures facilitate the adoption of ambitious climate protection targets in administrations and that, in turn, ambitious targets enable the establishment of effective climate protection measures. Both stages – i. e. the adoption of targets and the planning and implementation of measures – should be as closely coordinated as possible.

Efficiency of climate protection measures

Administrations are always subject to the **principles of economy and efficiency** when making their decisions. Budgetary law even requires an adequate **economic feasibility analysis** for all measures.[53] Therefore, in principle, the measures which guarantee the intended purpose for the lowest cost should be chosen. Concrete and distinct climate protection targets (see stage 4) can help administrations to plan and adopt appropriate measures which satisfy the requirement of economic efficiency. Climate protection measures are efficient when they guarantee the climate protection targets for the lowest possible cost.

For the federal administration, this **cost minimisation requirement** is defined in greater detail in the KSG. The cost minimisation requirement obliges the federal administration to consider how the target of climate protection can be achieved, particularly when planning, choosing and making investments and during procurement. If there are several possible measures, those through which the minimisation of greenhouse gas emissions can be achieved over their entire lifetime for the lowest cost should be expressly preferred.[54] The most efficient option here does not necessarily have to be the most favourable. In fact, both a **lifecycle cost analysis** and the **economic costs of climate protection** should be appropriately taken into account.[55] To take lifecycle costs into account, administrations can, for example, demand that equipment has a specific minimum lifespan, that a specific level of electricity consumption is not exceeded or that buildings meet certain standards in respect of heat insulation, heating or air conditioning. Besides purchase costs, lifecycle costs also include the **costs of use** (particularly from the consumption of energy and auxiliary materials) as well as the **costs of maintenance and disposal**. In addition, they include **external costs**, i. e. the environmental impacts associated with the commissioned service during its lifecycle, provided that its monetary value can be determined and verified.[56]

Meanwhile, there are also similar regulations in some federal states and municipalities. They do not just enable administrations but in some cases even oblige them to take a **comprehensive cost approach** as a basis for the efficiency of climate protection measures. Although, until recently, budget commissioners and treasurers still presented an obstacle for expensive climate protection measures for federal and state authorities and municipalities respectively, today they are important allies for greenhouse gas-neutral administrations. The role of courts of audit

52 See Part 5 (Sections 3 et seq.) KSG. Section 13(1) KSG reads: "Bodies discharging public duties shall give due consideration to the purpose of this Act and to the targets set for its implementation."

53 This obligation arises from Article 7(2) of the Federal Budget Code (*Bundeshaushaltsordnung*, BHO) and Article 6(2) of the Budget Principles Act (*Haushaltsgrundsätzegesetz*, HGrSG) in conjunction with the first clause of Article 114(2) of the Basic Law (*Grundgesetz*, GG).

54 Section 13(2) KSG reads: "Where there are two or more planning, selection and implementation options for investments and procurements, preference shall be given, after balancing against other relevant criteria …, to the option or options with which the aim of reducing greenhouse gas emissions over the whole lifetime of the capital good or procured item can be achieved at the lowest cost."

55 Section 13(3) KSG: "… Due consideration shall be given to the expected costs of climate action to the national economy."

56 UBA: *Einführung in die Berechnung von Lebenszykluskosten und deren Nutzung im Beschaffungsprozess; umweltfreundliche Beschaffung* (Introduction to the calculation of lifecycle costs and their use in the procurement process; Environmentally friendly procurement); training script 2, 2nd edition, August 2019, p. 8. With regard to the determination and calculation of external costs, see also UBA: *Methodenkonvention 3.0 zur Ermittlung von Umweltkosten – Kostensätze* (Methodical convention 3.0 for the calculation of environmental costs – Cost rates), Dessau-Roßlau, 2019.

(*Rechnungshöfe*) has also changed accordingly.[57] Investments, procurements and other measures with effects on expenditure which do not adequately take climate protection into account are therefore not efficient in the modern sense.

Which measures are appropriate in the truest sense of the word for a particular administration, does not just depend on its climate protection targets but also on its duties and its starting point, its organisational structure and its employees' commitment and competence. Climate protection targets can be distinguished and structured based on quite different criteria. Besides differentiation by field of action and target, they can also be distinguished by their effective time scale (long-term, medium-term or short-term) or by their budgetary impact, i. e. the level of the costs associated with them. **Building and investment projects** usually have the greatest potential for reducing greenhouse gas emissions. Effective improvements in climate protection can often also be made with **procurement and the awarding of contracts**. For other measures, e. g. in the areas of information and communication, training and qualifications, or measures to improve organisation and control, impact on climate protection targets usually cannot be estimated or only imprecisely; nonetheless, they are also important, e. g. in order to accompany and improve the efficiency of other measures.

Construction work and investment measures

To strengthen the public sector's function as a role model, administrations must run their buildings in the most environmentally friendly, energy-efficient and sustainable way possible, thereby demonstrating that ambitious climate protection targets related to building are in line with cost efficiency and functionality. This imposes high standards on administrations' **construction work** in particular. Besides new buildings, this also concerns the extension, conversion, renovation, maintenance and repair of existing buildings or parts thereof. Construction work is usually time-consuming and complex and – in addition to the administration concerned – a number of other institutions and actors are involved in its planning and execution. In return, such work offers the greatest potential for the reduction of greenhouse gas emissions, for long-term energy savings and for the expansion of renewable energy generation. Often, administrations' roles are reduced to that of **building users** which state their needs and incorporate them into the planning process. Even if other parties have a greater influence over the planning and the result of public construction work, it is important that administrations introduce their climate protection targets into the **planning process** at an early stage and convert them into **specific requirements** for the relevant building project. The more specific and precise these requirements are, e. g. in respect of energy quality, the consumption of heating and cooling for running the building and generating renewable energy, the better they can be included into the planning of construction works.

It would be beyond the scope of this publication to list the technical and organisational planning possibilities for construction work and to make corresponding recommendations. Similarly, it would be inappropriate to discuss measures that can be used to calculate or reduce greenhouse gas emissions from the building process, individual building services or even from building products and materials. However, references to certain special guidance, materials and further information on environmentally friendly construction work are provided. Key suggestions and recommendations are provided in the "Sustainable Building" guidance (*Leitfaden "Nachhaltiges Bauen"*) from the Federal Office for Building and Regional Planning (*Bundesamt für Bauwesen und Raumordnung*, BBR),[58] the publication by the Federal Institute for Research on Building, Urban Affairs and Spatial Affairs at the BBR (*Bundesinstitut für Bau-, Stadt- und Raumforschung im BBR*, BBSR) on the federal government's importance as a role model in the building sector[59] and the framework provided by the German Sustainable Building Council (*Deutsche Gesellschaft für nachhaltiges Bauen*, DGNB) on climate-neutral

57 In a comment on an energy-related renovation roadmap, for example, the Federal Court of Auditors (*Bundesrechnungshof*) urged the federal government to focus more strongly on climate protection targets when renovating federal buildings. See Bundesrechnungshof (2018): *Bericht nach § 88 Abs. 2 BHO über das Aufstellen eines Energetischen Sanierungsfahrplans für Bundesgebäude* (Report pursuant to Article 88(2) BHO concerning the establishment of an energy-related renovation roadmap for federal buildings), Potsdam, 2 July 2018, p. 4.

58 Federal Ministry of the Interior, Building and Community (*Bundesministerium des Inneren, für Bau und Heimat*): *Leitfaden Nachhaltiges Bauen* (Sustainable Building Guidelines); Berlin 2017.

59 BBSR: *Vorbildwirkung Bundesbau – Klimaschutz und die Vorbildfunktion des Bundes im Gebäudebereich* (Exemplary federal building – Climate protection and the importance of the federal government as a role model in the building sector), Bonn, December 2018.

buildings[60]. The BNB also contains specific requirements for construction work that enable administrations to achieve their climate protection targets.

To promote environmentally friendly construction work by the public sector, the federal government, federal states and municipalities have adopted so-called **energy-efficient renovation roadmaps (**energetische Sanierungsfahrpläne**)** with comprehensive targets for energy consumption in public buildings. For federal construction work, the federal government has declared that by 2022, new buildings should exceed the applicable requirements for new buildings by at least 60 %. Large-scale renovation and modernisation work on existing federal buildings should exceed the requirements by 45 %. At the same time, the renovation rate should increase by 4 % per year.[61] The federal states have set similar ambitious energy-related standards for new buildings and renovations, which are furthered by corresponding **building renovation schemes**. Comparable climate protection requirements for construction work have also been laid down by governments of the federal states and numerous municipalities. To meet these standards, administrations must plan construction work accordingly at an early stage, e. g. by providing for plus-energy buildings and for additional renewable energy generation capacities using heat pumps, PV systems and geothermal energy.

60 DGNB: *Rahmenwerk für "Klimaneutrale Gebäude und Standorte"* (Framework for "climate-neutral buildings and locations"), Stuttgart, May 2018.

61 See *Klimaschutzprogramm 2030 der Bundesregierung zur Umsetzung des Klimaschutzplans 2050* (Federal Government Climate Action Programme 2030 on the implementation of the Climate Action Plan 2050); of 8 October 2019, Measure 3.4.2.6. The standards EH 40 and EH 55 mean that the building's energy requirements are 40 % or 55 % of those of a reference building.

Besides construction work, **industrial engineering** also offers great potential for permanently reducing administrations' greenhouse gas emissions and achieving climate protection targets. This primarily applies for the replacement and optimisation of technical equipment and devices, e. g. heating, ventilation, building management systems and equipment for video conferences. In this way, the technical infrastructure can be harnessed effectively for the benefit of climate protection. Yet the improvement of a technology often leads to its increased deployment and to greater demand for it. These "rebound effects"[62] diminish the positive climate effects associated with the relevant investments.

Procurement and contracting

Investments in infrastructure and technical equipment are closely linked with procurement and often cannot be separated from it. The procurement of equipment, devices and products opens up a wealth of opportunities for administrations to protect the climate. It includes the procurement of electricity, the acquisition of motor vehicles, the purchase of office equipment including lighting, printers and copiers, and the awarding of contracts for climate-relevant services, from transport contracts, events organisation, IT services and software to the running of canteens and cafeterias.

There is a federal administrative regulation governing this for the procurement of electronic devices.[63] According to this regulation, federal authorities must in principle purchase goods and products with the highest available efficiency rating. Additionally, the administrative regulation advises authorities to require product certification with the eco-label "Blue Angel" or, if this is not awarded for the relevant service, with the European Ecolabel. There are also similar regulations and instructions in some federal states and in many municipalities. In addition, Section 13 KSG states that federal authorities should preferably purchase products "with which the aim of reducing greenhouse gas emissions over the whole lifetime of the capital good or procured item can be achieved at the lowest cost". The federal government's Action Programme "Sustainability" also obliges the entire federal administration to base its procurement on the guiding principle of sustainable development, and it lays this down in concrete terms based on requirements for different product groups.[64]

These regulations oblige administrations to specify strict requirements in respect of climate protection and energy consumption when purchasing particularly climate-relevant goods and services. For example, this concerns external data centre services and other IT services, the running of canteens, printing and copying, transport and logistics services, or consultation and expert evaluation services. The climate-relevant requirements must be laid down in the service specifications sufficiently concrete, comprehensively and with binding effect. When there are climate protection targets with a clear link to the product purchased or the service to be contracted, the service specifications should translate this into specific product features, e. g. into maximum annual energy consumption under realistic conditions of use.

Above the EU thresholds, contracts are awarded to the tender offering best value for money in accordance with Article 58 of the Regulation on the Award of Public Contracts (*Verordnung über die Vergabe öffentlicher Aufträge/Vergabeverordnung*, VgV). "The most economical bid is determined based on the best price-performance ratio. Besides the price or the costs, qualitative, environmental or social award criteria can also be taken into account, particularly quality, including technical value, aesthetic, fitness for purpose, service accessibility (particularly for individuals with disabilities), compliance of the service with the requirements of 'Design for All', social, environmental and innovative features, and distribution and trading conditions (...):"

Below the thresholds, Article 43 of the Regulation on sub-threshold procurement (*Unterschwellenvergabeordnung*, UvgO) applies. The lowest bid price alone is not decisive. On its procurement website (www.beschaffung-info.de), the UBA publishes a range of tools (legal reports, lifecycle cost calculation tools, training scripts, good practice examples and much

62 See UBA: *Rebound-Effekte – Wie können sie effektiv begrenzt werden?* (Rebound effects – How can they be limited effectively?) Dessau-Roßlau, June 2016.

63 *Allgemeine Verwaltungsvorschrift zur Beschaffung energieeffizienter Leistungen* (General administrative regulation on the procurement of energy-efficient services) (AVV EnEff) of 18 May 2020.

64 State Secretaries' Committee for Sustainable Development: Nachhaltigkeit konkret im Verwaltungshandeln umsetzen (*Staatssekretärsausschuss für nachhaltige Entwicklung*) – Maßnahmenprogramm Nachhaltigkeit (Implementing sustainability directly into administrative action – Action Programme "Sustainability"). Decision of 30 March 2015 (last amended 24/04/2017). Under no. 6(f) therein, concrete requirements for procurement by authorities and institutions of the federal administration are laid down.

more), as well as specific recommendations for the tendering of numerous products, which always contain climate protection aspects too.

Information and communication technology measures

In many cases, ICT measures can be aligned meaningfully with and integrated into administrations' digitalisation strategies. This enables synergies and increases controllability in respect of climate protection targets and environmental management. Carefully selected criteria for purchasing hardware and strategic decisions on IT architecture increase the efficiency of data centres and ensure the longest possible use of end devices. In many cases, this requires management decisions.

For data centres, a sensible first step is to take the measures provided for by the "Blue Angel". They increase the efficiency of data centres and decrease greenhouse gas emissions during operation as well as the need for resources for manufacturing hardware. The first and most important measure is monitoring different key figures, as described in the award criteria. Certification of the data centre with the "Blue Angel" would then be the next step. This does not always require construction works or other major investments. Further measures in the data centre can be derived from the determination of the KPI4DCE (Key Performance Indicators for Data Centre Efficiency)[65].

For end devices, the most effective climate protection measure is ensuring a long lifespan, as the largest part of the greenhouse gas emissions caused by them is attributed to their manufacture. The practice of replacing end devices on a regular basis (e. g. notebooks every three years and desktop PCs every five years), which is still common in many administrations, makes no sense. Far longer useful lifespans are now possible. This does not just cut greenhouse gas emissions but also the demand for raw materials and, last but not least, costs. Devices which no longer meet usage requirements can often continue to be used in other departments with lower requirements (cascade utilisation). Furthermore, most end devices can be upgraded, e. g. additional random access memory (RAM).

Concepts such as virtual desktop infrastructure (VDI) increase the lifespan of end devices further. In a VDI architecture, thin clients or even old desktop PCs or notebooks which no longer meet requirements can be used as end devices. VDIs also work well when combined with working from home and mobile working because they even enable secure access to the internal network from old, private and potentially insecure hardware. The lifespan of end devices can be extended further if administrations hand hardware which they no longer require themselves over to refurbishers, sell it via the internet platform "Zoll-Auktion"[66] or give it to schools or similar instead of disposing of it and recycling it.

Good practice example: UBA calls for tenders for greenhouse gas-neutral projects

At the end of 2019, the UBA tendered and awarded contracts for several projects that are to be implemented in a greenhouse gas neutral manner. To this end, the service specifications included the following requirements for carrying out the project:

"The performance of the project shall be greenhouse gas-neutral. For this purpose, the greenhouse gas emissions associated with the performance of the project shall be calculated in accordance with the requirements of the Greenhouse Gas Protocol and the international standard ISO 14064-1 and compensated for by purchasing emissions certificates on the market for voluntary offsets in consideration of the recommendations made by the UBA in this regard."

In order to avoid overburdening bidders and to prevent negative effects on the number and quality of bids, the requirement for greenhouse gas-neutral project implementation was initially tested for projects with a technical link to climate protection and greenhouse gas neutrality.

65 See above "Information and communication technology targets"; further information is available at https://www.umweltbundesamt.de/kpi4dce-20.

66 https://www.zoll-auktion.de

Efficiency potential can also be leveraged when using end devices through power management and screen settings. This does not just involve activating automatic brightness settings, but also automatically switching off screens after a few minutes of inactivity. After a further period of 15 minutes, for example, the computer should go into hibernation mode, causing the power consumption to drop to almost zero. The "wake-up time" is only slightly longer than for standby. In addition, shutting their PCs down at the end of the day should be part of the daily routine for all employees.

When purchasing new hardware such as servers, end devices, monitors, network printers, etc., administrations should also try to keep electricity requirements as low as possible during use. Equipment which satisfies the "Blue Angel"[67] criteria is economical, long-lasting, low-emission and quiet. In many cases, authorities are even obliged to take the Blue Angel requirements into account during procurement; see also the above section on procurement and contracting.

Software also has a significant influence on systems' energy requirements. The Blue Angel has been available for software products[68] since the start of 2020. There are guidelines providing advice on the procurement of software.[69]

When equipping office buildings with printers and multifunctional devices, printer policies governing the quantity, size, quality and terms of use of network and workstation printers can be helpful. In many cases, workstation printers can be replaced by functions such as "confidential printing" on network printers. The printer policy should also include a check as to whether colour printers or printers/scanners for DIN A3 format are necessary, because often small, economical devices which can handle up to DIN A4 format are sufficient.

Measures to control employee behaviour

Climate protection in administrations does not end as soon as buildings have been built, facilities have been installed and office equipment has been purchased, because administrations have numerous opportunities to control their employees' behaviour in all their fields of action. This concerns the use of heating and cooling in the office, the mode of transport chosen for business trips and commuting, the preferential procurement of environmentally friendly products, the use of information and communication technology, and the planning and hosting of events. For commuting, for example, they can reduce the number of car parking spaces which are available free of charge, offer company travel passes and annual passes for public transport, make walking and cycling more attractive, or make mobile working and working from home easier.

67 ICT products with a "Blue Angel" can be found below in the section "Publications on information and communication technology" with links to award criteria.
68 *Blauer Engel für Ressourcen- und energieeffiziente Softwareprodukte* (Blue Angel for resource-efficient and energy-efficient software products) (DE-UZ 215) (https://www.blauer-engel.de/de/fuer-unternehmen/vergabekriterien).
69 https://www.umweltbundesamt.de/publikationen/guide-on-green-public-procurement-of-software.

Good practice example: "mission E" by the BImA

The Institute for Federal Real Estate (*Bundesanstalt für Immobilienaufgaben*, BImA) launched its motivation campaign "mission E" in 2012 to raise awareness among federal employees for energy-conscious and efficient behaviour and to reduce energy costs, dependence on imports and environmental damage, particularly from greenhouse gas emissions. The BImA assesses the savings potential that can be achieved in this way to be similar to that achieved through building and technical measures. The campaign ensures that federal administration employees have the latest information, provides practical advice on saving energy – at work and at home – and offers tools which can help with changing habits.

More than 230 civil properties owned by the federal government have already taken part in the campaign, from the main customs office (*Hauptzollamt*) in Stralsund and the federal police headquarters (*Bundespolizeidirektion*) in Pirna to the Max-Rubner-Institut in Karlsruhe. This means that more than 43,000 employees have been reached directly, on site. Since 2014, "mission E" has also been included in the curriculum for candidates for the federal police service, with numerous specially created learning events being held at education and training centres every year. The campaigns are continuously expanded and advanced. This means that many further campaigns with new ideas may also be held in civil federal office buildings in the coming years in order to continuously reduce CO_2 emissions by the federal government.

Further information is available at https://missione.bundesimmobilien.de,

Contact: missionE@bundesimmobilien.de.

It would be beyond the scope of this publication to list the possible measures in individual fields of action. Comments made in this regard are thus confined to measures concerning information, motivation and enablement, advice and coaching, and training and qualifications.

Information, motivation and enablement measures
Administrations have numerous possibilities for giving their employees information on environmentally friendly and energy-saving behaviour, raising their awareness of this and motivating them to behave accordingly. Which formats and topics they choose to initiate social discourse on climate protection within their own administration and to start a discussion regarding climate protection depends on each individual administration's targets, starting points and specific circumstances. In addition to the established methods of communication found in all administrations, such as email, intranet and meetings, administrations can use **brochures and handouts** as well as **events, talks** and **special initiatives** such as workshops to promote environmentally friendly behaviour, particularly among managerial staff. Besides this, **campaign days, apprentice or trainee projects** or **ideas competitions** may also be appropriate, as well as **specialist presentations, panel discussions** or **cultural events**, e. g. exhibitions and film screenings. **Posters** and **brochures**, **information emails** or **pages for specific topics on the intranet** or on shared portals used by administrations can increase willingness among employees to actively contribute to climate protection within their administrations. Measures and campaigns in this area are particularly promising when they have a specific link to the relevant administration's tasks.

Special awareness can be raised at management level in particular through **joint campaigns and collaborations with local and regional actors** from the fields of politics, culture and science. For example, joint events or campaigns about climate protection may be held with municipal administrations, regional politicians, culture professionals, companies or environmental associations. In addition, **collaborations with universities** are also an option, e. g. when administrations offer internships related to their climate protection initiatives, supervise student work on individual aspects of greenhouse gas neutrality or become involved in research projects as pilot users of innovative approaches to influencing behaviour. The advantage of such collaborations is not just that administrations benefit from the findings and results of the joint projects but also that administrations

thereby increasingly become drivers of the social and environmental transition to sustainability and climate protection.

Consultancy and coaching measures

Consultancy and coaching also play a special role when embedding climate protection into administrations. Measures in this field can help administrations at all stages and on all levels, from the development and optimisation of the organisational structure and the identification of structural, technical and behavioural energy-saving potential to accounting and compensating for greenhouse gas emissions. The creation of a communication and motivation campaign or the introduction of an environmental and energy management system can also be supported and accelerated by appropriate consultancy and coaching.

The range of such consultancy and coaching services available to administrations is large and complex; it is not possible to depict and evaluate it even approximately here. Besides the **numerous private providers**, such as **engineering and consultancy firms** or **energy and coaching agencies**, the federal government – like most federal states and many municipalities – has set up **schemes for advising public organisations**, from which specialist climate protection advisory services can also be funded. The federal government funds these services, e. g. through the Federal Fund for Energy Consulting for Non-Residential Buildings for Municipalities and Charitable Organisations (*Bundesförderung für Energieberatung für Nichtwohngebäude von Kommunen und gemeinnützige Organisationen*)[70] or the BMU municipal funding scheme (*Kommunalrichtlinie*), which is aimed specifically at municipal institutions. The municipal funding scheme provides support through a wide range of climate protection consultancy services for municipal institutions, including those concerning energy and environmental management, climate protection concepts, networks or the identification of existing potential.[71] Within the framework of its expanded real estate-related environmental management and auditing system LUMAS^{Plus}, the **BImA** supports the federal administration with the **launch of an environmental and energy management system**. It offers federal authorities free consulting for all steps in establishing the system up to the EMAS validation. This also includes the continuous supply of data on property-related material flows which, in the field of energy efficiency and emissions, are one of the foundations of a greenhouse gas-neutral federal administration.[72]

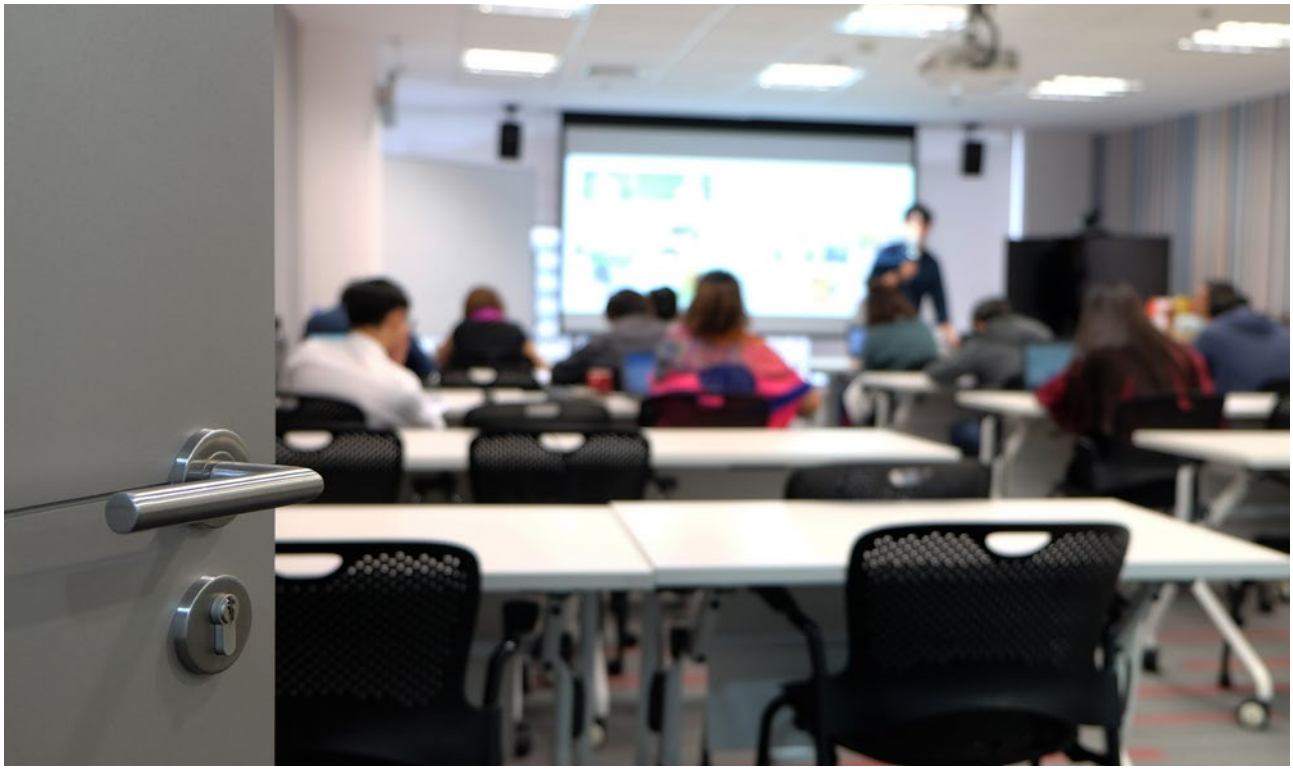
Training and qualification measures

In order for employees to support the initiative launched to achieve greenhouse gas-neutral administrations, **education**, **training and qualifications** measures for employees are important, too. Most employees in administrations have been trained for their roles, without paying any attention to climate protection aspects. Accordingly, for many of them, the initiative to achieve greenhouse gas neutrality in administrations poses a professional and practical challenge for which they must be appropriately qualified and prepared.

Through suitable education and training, administrations can enable their employees to bring their roles in line with the special requirements of climate protection and provide optimum support with their climate protection targets. Such measures are not just relevant for those who are directly entrusted with climate protection duties within administrations (stage 1) or who carry out internal climate audits (stage 8). They concern all employees whose duties and activities can affect administrations' greenhouse gas emissions, e. g. in respect of property management, the vehicle fleet, business trip management, IT services, purchasing or events management.

In order to plan suitable training measures, administrations must first identify and specify their particular training requirements and then find a suitable offering to meet these requirements. Managers and employees can then access a wide range of seminars and events which convey knowledge on environmental and climate protection management or on individual fields of action relating to corporate climate protection. However, most offerings are not tailored to the special circumstances of the public sector and its specific regulations, e. g. in respect of budgetary and procurement law. One exception is the training provided by the BAköV. At the start of 2020,

70 See www.bafa.de/DE/Energie/Energieberatung/Energieberatung_Nichtwohngebaeude_Kommunen/sanierungskonzept_neubauberatung_node.html.
71 See www.klimaschutz.de/kommunalrichtlinie.
72 https://www.bundesimmobilien.de/7397209/umweltmanagement



the BAköV created the **Sustainability Education Agency (*Geschäftsstelle Nachhaltigkeitsbildung*)**, which is gradually developing specific trainings on sustainability, taking aspects of greenhouse gas-neutral administration into account.[73] The **Competence Centre for Sustainable Procurement** (*Kompetenzstelle nachhaltige Beschaffung*) also offers training and seminars on public procurement not just for federal, state and municipal authorities but also for grant recipients, churches and other institutions which make purchases in accordance with public procurement law.[74]

When administrations make use of **existing training offerings,** multiple administrations can pool their efforts and sign up together. The more people from the public sector take part, the sooner providers can adapt to providing such training for administration clientele and, if necessary, offer separate dates for staff from administrations. Lecturers can also prepare more specifically and address the particularities of administrations. As demand grows, it pays for the providers to create **special training offerings for administrations** that take into account their specific informational needs and issues. In any case, it is thus helpful for administrations to indicate their specific training requirements – be it individually or together with other administrations.

In many cases, it may be helpful to tender and carry out bespoke **training courses** for administrations. These training measures must be planned, funded and laid down in service specifications at an early stage. **In-house training** is a good option for this. This does not just eliminate unnecessary travel for participants, but also allows for **practical relevance** with specific use scenarios and application examples on site. Depending on the contents and target groups of the trainings, it may also be interesting for administrations to join forces with other administrations and organise several events at different venues and on different dates. This does not just enable more employees to take part; it also facilitates knowledge-sharing and collaboration between participants from different authorities.

73 See https://www.bakoev.bund.de/DE/01_Bundesakademie/Organisation/Nachhaltigkeit_GS/Nachhaltigkeit_Klimaneutralitaet.html.
74 See http://www.nachhaltige-beschaffung.info/DE/Schulungen/schulungen_node.html.

Creating a climate action programme

As a rule, climate protection targets cannot be achieved by administrations adopting as many measures as possible in order to prove their good intentions and their commitment to climate protection. Well-meaning activism with impressive lists of measures can quickly overwhelm participants and those involved in planning, coordination and implementation and affect their ability to actively work towards climate protection targets. Target-based, well-planned action by administrations is made considerably easier by pooling all measures in one **climate action programme.** The action programme provides an **overview of the climate protection measures planned, adopted and taken** by administrations in respect of their climate protection targets.

Function and components of the climate action programme

With a climate action programme, administrations are able to create the conditions for achieving their climate protection targets (see stage 4) and to plan and control the measures required. It enables administrations to utilise their capacities based on their targets and divide them between climate protection targets and other targets and duties. By coordinating the measures contained between those responsible for them and those involved in them in advance, the climate action programme prevents conflicts and allows for far-reaching synergies. It also makes it easier for administrations to distribute the measures and the associated efforts appropriately among the various **organisational units and employees**.

To meet these requirements and to fulfil these roles, climate action programmes must give administrations an overview of measures in terms of field of action, target, responsibility and competence. It can also be helpful to organise the measures by deadlines, financial requirements, contributions to reduction of greenhouse gas emissions or involvement of external partners. For this purpose, it is useful for a climate action programme to contain the **content**, **result,** responsible **organisational unit or person**, necessary **resources** and **deadline** for each measure.[75]

Content and result of the measures

The climate action programme must state the content and intended result of each measure clearly enough for all those involved to get a sufficiently concrete idea of their individual duties and which condition they are aiming for. However, defining the measures **in too much detail and too minutely** makes no sense, because this affects the clarity and controllability of the climate action programme.

Which level of specificity and detail is appropriate, depends on the respective administration, in particular on its organisational, managerial and communication structure and the individuals involved. In many cases, it can be helpful to combine measures relating to the same target to form one **overarching measure**, provided that they fall under the responsibility of a single organisational unit. For example, different measures for more efficient lighting – such as installing motion sensors, replacing light bulbs with LEDs or reducing facade lighting at night – can be combined to one overarching measure for the climate action programme. By contrast, **dividing an overarching task up into multiple measures** can be useful if it involves different organisational units. This can be the case, for example, when purchasing more energy-efficient equipment which can be allocated to separate procurement measures for building services, ICT or laboratory equipment, each falling under the responsibility of a different organisational unit.

Sometimes, the right level of detail in terms of content and result is achieved when the climate action programme makes **reference to overarching concepts and programmes** which were not primarily initiated for environmental reasons. For example, this concerns concepts involving information and communication technology, mobile working, the vehi-

75 Administrations which already have an environmental management system are likely to be already be familiar with these requirements from planning their measures to achieve their environmental targets. The requirements for planning measurements within the context of environmental management are defined in No 6.2.2 of the environmental standard ISO 14001:2015. It reads: "When planning how to achieve its environmental objectives, the organization shall determine: a) what will be done; b) what resources will be required; c) who will be responsible; d) when it will be completed; e) how the results will be evaluated, including indicators for monitoring progress toward achievement of its measurable environmental objectives (...). The organization shall consider how actions to achieve its environmental objectives can be integrated into the organization's business processes."

cle fleet or training. The climate action programme can make reference to the measures which these concepts contain and merely describe supplementary requirements. This way, administrations can ensure that their data centres meet the requirements of the Blue Angel or that total CO_2 emissions from the vehicle fleet are significantly reduced. By the same token, a climate action programme can include measures aimed at the environmentally friendly development of these concepts, e. g. by adding climate protection aspects to the existing training concept. This also facilitates the integration of climate protection into existing responsibilities and procedures (see stage 1).

Responsible person and competence

In climate action programmes, administrations define who is responsible for carrying out each measure. In principle, a distinction must be made between the **responsible person** and **competence**. The responsible person bears responsibility for the measure. It should in principle be able to ensure the successful implementation of the measure on time, resolve potential conflicts between targets and capacities and, if necessary, eliminate any existing barriers. This includes responsibility for personnel and for the budget, as well as the possibility of appointing employees to carry out the measure and granting the necessary budgetary funds. Competence governs who within an administration works on the measure and takes the steps associated with it.

The level at which responsibility is defined within the administrative structure has an impact on the smooth implementation and the success of a measure. If the level of responsibility is set too low, e. g. if responsibility is transferred to a department management, there is the risk that the measure, conflicting with other tasks and competing for scarce resources, will be eroded and ultimately fail. By contrast, if the level of responsibility for a measure is set too high, the measure may fail because the necessary decisions and stipulations for those implementing it are too abstract and irrelevant in practice. The person responsible for a measure must have a realistic idea of the amount of time and personnel required for the measure, of the available options and alternatives

and of the consequences of the measure or its failure. This requires an understanding of the specific steps, circumstances and challenges.

Necessary resources and deadline

For each measure, a climate action programme must state the **resources** associated with it and the **deadline** by which the measure must be completed. This is necessary in order to be able to plan and provide the **necessary personnel** and the **budgetary funds required**. The personnel requirement mainly refers to the **additional human resources** needed for the measure. This predominantly concerns **additional full-time equivalents**, unless the measure can be carried out with the existing level of personnel. It may also be possible to estimate the time spent by existing employees. After all, continuously adapting priorities and achieving a balance between existing and new tasks is part of the usual challenges and the normal demands on all managers within administrations. Otherwise, every measure, however small, would result in a requirement for more personnel and more funds, and would thus be destined to fail from the very start. For this reason, it is only useful to state the necessary personnel for a measure in a climate action programme if the measure lies beyond the scope of the responsible organisational unit's other duties and priorities and takes up a significant part of the working hours of the employees concerned.

The necessary budgetary funds associated with the measure primarily concern **investment funds and material resources,** as well as funding for **business trips and training**. Of particular relevance for a climate action programme are measures which cannot be funded using the usual budgetary funds, particularly investments and large procurements (see above). On the one hand, this is usually where the greatest potential for energy savings and reductions in greenhouse gas emissions lies. On the other hand, it is a question of self-conception and credibility to cover the costs associated with climate protection measures for material resources, business trips and further training to a limited extent from the current budget. With the exception of investment measures, it should be sufficient in many cases that the required resources must be plausibly estimated, but not precisely calculated, and that their economic viability must be proven in each individual case (which makes planning, coordinating and implementing measures considerably easier).

Example of the structure of a climate action programme

The following table provides a notional example of how administrations' climate action programmes could be structured:

Reference no.[1]	Measure	Intended result	Responsibility and contribution	Necessary resources	Deadline	Comments
	...	...	...	...	...	...
	Renovation of an office building	Positive-energy building in accordance with BNB gold standard	Building and Technology unit in cooperation with BBR, BImA and BMF	In accordance with funding plan of 20/03/2019	01/01/26	See location and usage concept and building decision-making document
	Energy consumption record	Record of electricity and heating consumption broken down by building and department	Building and Technology unit; BfH and BImA involved	€ 34,000 for additional electricity meters and heating volume meters	31/12/21	See medium-term energy concept of 12/05/17
	Replacement of vehicles with electric vehicles	Adjustment of fleet concept based on climate protection targets	Fleet management; head of office and Building and Technology unit involved (due to charging capacities)	€ 20,000 extra required to buy vehicles	30/11/21	See fleet concept of 05/09/18
	Energy-efficient lighting	Installation of lighting and motion sensors	Building and Technology unit; FASi involved	€ 30,000	30/04/22	See medium-term energy concept of 12/05/17
	Information and motivation campaign about energy saving in the workplace	Realisation of various communications measures		€ 16,000 for climate protection communications concept	30/06/21	Call for tenders for communications concept published on 31/03/20
	...	...	...	...	...	...
	Climate protection coordinator training	Qualification relating to climate protection management	Management of the central unit; HR department and staff council involved	€ 2,400 for further training	31/12/20	3-day training course for 2 people (including deputy)
	Increase the efficiency of the data centre	Certification of administration's own data centre with the eco-label "Blue Angel" (DE-UZ 161)	Management of central unit, management of the data centre, Building and Technology unit		30/09/22	
	...	...	...	...	...	...

1 Reference numbers are particularly useful for large administrative units with many measures. They increase clarity and make controlling easier by assigning individual numbers or codes to criteria such as location, field of action, climate protection aspect or responsibility, for example.

Stage 6:

Compensate – Offsetting unavoidable greenhouse gas emissions

Voluntary compensation for greenhouse gas emissions

Fundamental principle of voluntary compensation
As long as administrations generate direct and indirect greenhouse gas emissions, the final step in achieving greenhouse gas neutrality is compensating for emissions which are unavoidable and cannot be reduced any further through funding additional climate protection projects (compensation). Emission reduction credits ("certificates") are then issued for climate protection projects which are used as compensation. The quantity of credits generated corresponds to the level of additional emission reductions in a climate protection project. One credit is equivalent to one ton of CO_2eq. Depending on the standard and the methodologies it contains, independent experts verify the emission reductions calculated before they are issued as credits. Unlike participation in EU emissions trading e. g. by operators of power stations and energy-intensive industrial facilities, the purchase of credits is voluntary.

Before administrations can compensate for their emissions, they need a budgetary authorisation. For example, this is granted when the funds needed to purchase emission reduction credits are included in the budget or when a suitable budget line can be used. For municipal administrations, this is usually subject to a decision by the municipal or town council; for state and federal administrations, a corresponding decision by the state parliament (*Landtag*) or federal parliament (*Bundestag*) is required. For subordinate administrations, the approval of the superior authority may be sufficient.

Compensation is always the last resort for administrations with regard to climate action. It is not relevant if greenhouse gas emissions are completely avoided or reduced. Such avoidance or reduction should be the goal. The debate about compensation can contribute to raising awareness of climate protection issues in administrations and among their employees, to the implementation of measures for avoiding emissions and to increasing awareness of the financial consequences of administrative action.

INFOBOX

Greenwashing

Greenwashing is the attempt by organisations to adorn themselves with an environmentally friendly image without actually adjusting their goals, orientations and activities accordingly. Characteristics include

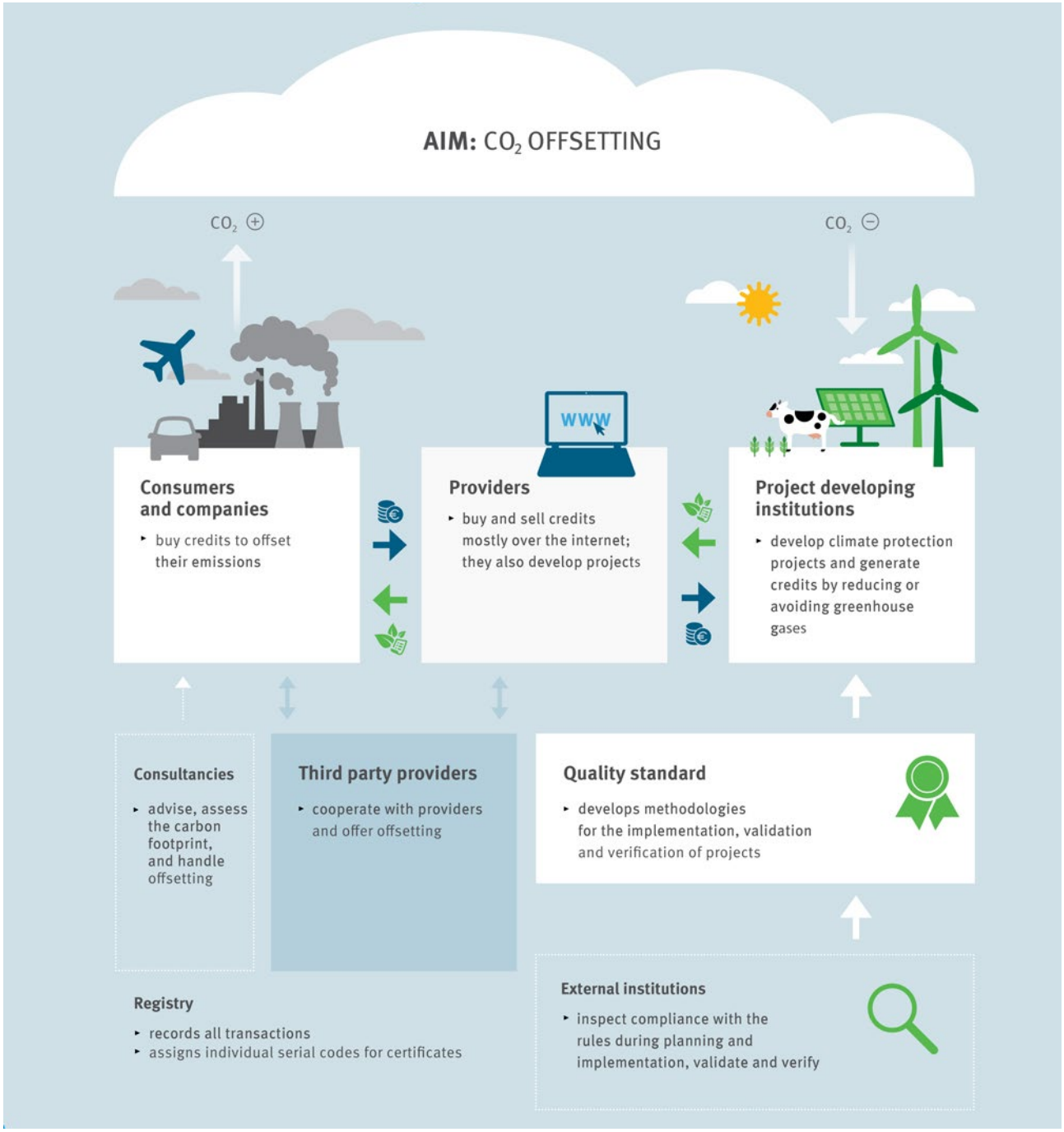
- unwillingness to act in a truly environmentally friendly way,
- covering up or downplaying their own environmental impacts,
- comparing their own environmental impacts with alternatives which are even more harmful to the environment,
- presenting mandatory environmental improvements as a commitment to the environment,
- vague statements and targets concerning environmental improvements which cannot be verified,
- passing environmental improvements by suppliers and partners off as their own work, and
- a lack of evidence, e. g. through independent verification or serious studies.

To a critical public, voluntary compensation is often subject to the allegation of **greenwashing** or even compared to the **practice of selling indulgences**. To avoid such an allegation, some organisations deliberately do not consider compensation as an option in their climate protection strategies and focus solely and completely on preventing and avoiding greenhouse gas emissions instead. In actual fact, the best way for administrations to avoid giving the impression of greenwashing is by integrating climate protection into their responsibilities, procedures and activities and by setting themselves ambitious climate protection targets which they endeavour to achieve by taking decisive action. By contrast, if they simply opt out of compensation, a certain amount of emissions are not compensated for and no contribution is made to funding for meaningful climate protection projects. In this case, administrations do not make the most of their climate protection opportunities.

Appendix I contains a checklist for recognising greenwashing.

Figure 4

How does voluntary emission offsetting work?



Source: adelphi

The market for compensation services

The market for the voluntary compensation of greenhouse gas emissions in Germany has developed and diversified dynamically in recent years. In order to inform the general public and users of compensation methods, the UBA has published a guide containing information and guidelines on how emissions can be voluntarily offset through climate protection projects.[76] It describes in particular the different quality standards and the criteria on which they are based. These quality standards are primarily intended to ensure that greenhouse gas emissions are actually offset to the intended extent. This guide provides extensive information on the various aspects of compensation in view of the additionality of reductions, transparency requirements or the avoidance of double-counting.

Negative emissions

The term "negative emissions" denotes the removal of CO_2 from the atmosphere. If spaces are permanently reforested or rewilded, CO_2 is removed from the atmosphere naturally and more or less CO_2 is stored as biomass, depending on the type of reforestation or rewilding. The crucial factor is that the CO_2 storage is permanent and will not lead to higher emissions at a later date. Besides this, there are also a few natural ways of reducing the amount of CO_2 in the atmosphere. Negative emissions include, for example, **filtering CO_2 out** of the air using technical equipment, **fertilising the oceans** to enable absorption of CO_2 through increased algae growth, or reforestation for the purpose of using biomass to generate energy and, at the same time, to separate and store the CO_2 released **(Bioenergy Carbon Capture and Storage**, BECCS). Another technical way of reducing the greenhouse gas effect is by making spaces lighter, thus increasing the reflection of sunlight off the earth's surface ("albedo effect").

Before these methods and others can be used to compensate for greenhouse gas emissions, they must be researched and tested extensively. Otherwise, they may pose **significant risks** for people and the environment. For example, ocean fertilisation affects the marine ecosystem and can contribute to eutrophication. Widespread use of BECCS increases competition for space for growing food and has repercussions for ecosystems, water supply, and soil and water quality. In addition, the underground storage of CO_2 can increase the risk of groundwater acidification or cause seismic activity.

Ecosystem-based approaches, which also involve long-term CO_2 absorption and can also contribute to global sustainability targets such as the conservation of biodiversity, are fraught with risks as well. These include sustainable land use measures, e. g. soil-friendly and humus-increasing land cultivation, the protection and rewilding of marshes, the retention of grasslands and reforestation. Before using such methods for compensation, questions must be asked concerning the permanence of storage measures, potential relocation effects, the consequences for accounting and social impacts. If proven to be sustainable and environmentally safe, sustainable land use can contribute to e. g. reducing greenhouse gas concentrations and to adapting to the consequences of climate change as well as to achieving global sustainability targets.[77]

INFOBOX

Article 6 of the Paris Agreement

As of 2021, the Kyoto Protocol is being replaced by the 2015 Paris Agreement. However, the specific wording of the Article 6 of the Paris Agreement which is to be considered in this context is only available as a draft at present. This draft provides for the avoidance of double-counting so that the same emission reduction is not used by both a buyer, to achieve a position of climate neutrality, and a state, for NDC compliance.

76 UBA: *Freiwillige CO_2-Kompensation durch Klimaschutzprojekte, Ratgeber* (Voluntary CO_2 offsetting through climate protection projects), Dessau-Roßlau, 2018; https://www.umweltbundesamt.de/publikationen/voluntary-co2-offsetting-through-climate-protection

77 UBA: *Kurzposition zur Kohlendioxid-Entnahme aus der Atmosphäre – Carbon Dioxide Removal (sogenannte "negative Emissionen"* (Abstract on carbon dioxide removal from the atmosphere (so-called "negative emissions"); dated 18 February 2019; https://www.umweltbundesamt.de/sites/default/files/medien/376/dokumente/uba-kurzposition_zur_kohlendioxid-entnahme_aus_der_atmosphaere_2019.pdf).

Good practice example: Compensating for business trips and business journeys by the federal government and the federal administration

Since 2014, the federal government has compensated for the climate impact of business trips which its employees make by aeroplane and car. Business journeys (e. g. journeys made due to enforcement activities by the federal police) have been included in this compensation since 2018, too. For this voluntary activity, the federal government purchases emission reduction credits from climate protection projects which are certified in accordance with UN regulations under the Clean Development Mechanism (CDM) of the Kyoto Protocol.

To be registered as a CDM project, climate protection projects must undergo stringent checks pursuant to the rules and institutions of the Kyoto Protocol and by the secretariat of the United Nations (UNFCCC), before their quality is examined by independent experts. Independent experts also check the level of emission savings achieved at regular intervals throughout the project.

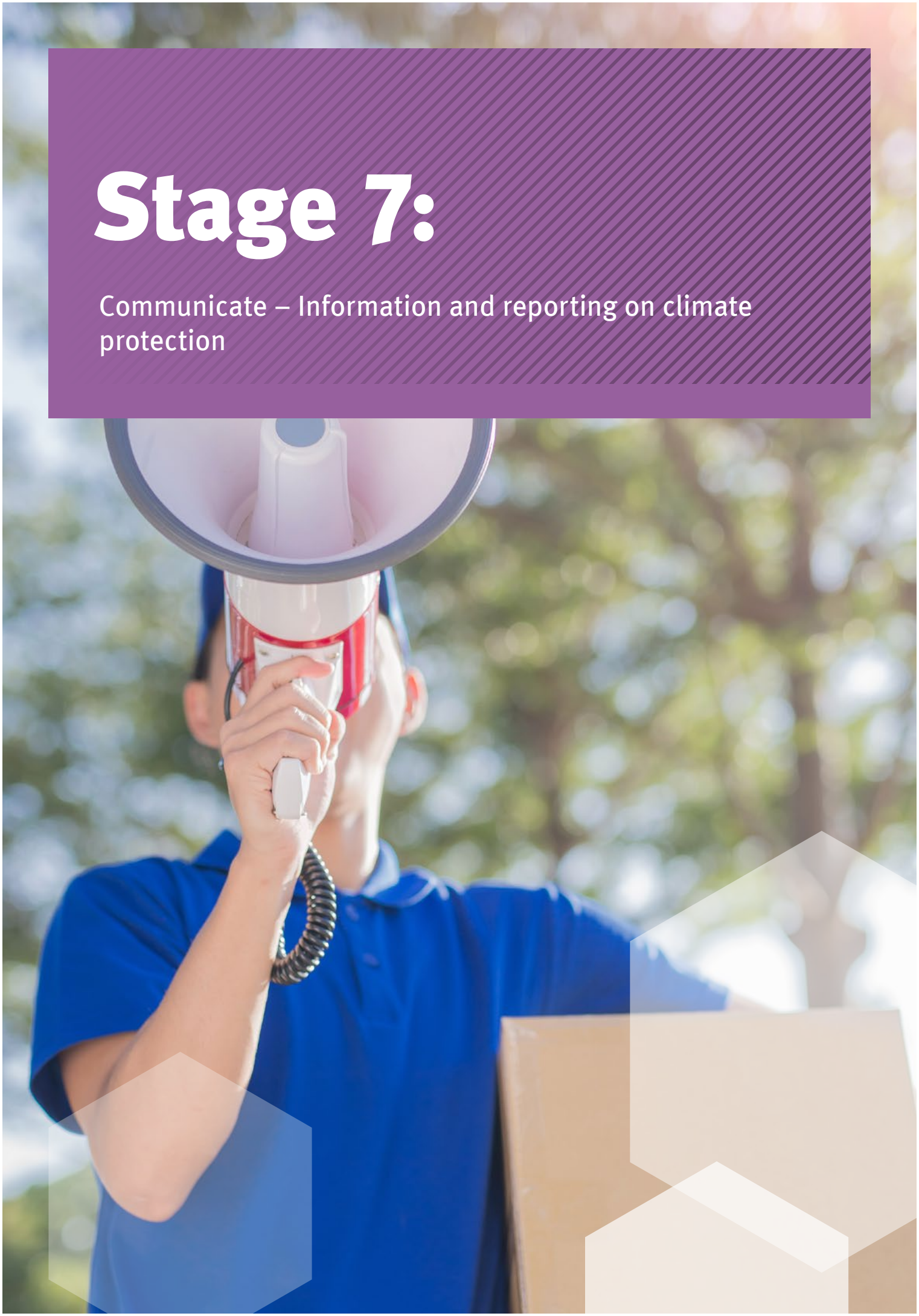
Besides the UN CDM regulations, compliance with various criteria is also considered to ensure that projects are of high quality. Thus, beyond a simple reduction of CO_2, climate protection projects also create sustainable added value for developing countries (co-benefits). For example, co-benefits include the protection of other environmental media such as air, soil or water, the conservation of resources, the expansion of rural electrification, increases in local jobs, further training for local employees, support for local distribution facilities and the protection of health. Further criteria concern extra certification in accordance with the international gold standard for greater inclusion of social and environmental factors, integration into the developing country's climate protection policies and support for small programmatic projects, especially those from the least developed countries if possible.

Certain CDM project types are excluded, e. g. lighting programmes with lamps containing mercury, biogas projects at palm oil mills or projects involving the extraction and processing of fossil fuels (except for private households). Primarily small projects and combined microprojects (Programme of Activities) are selected, as their cost structure usually puts them at an economic disadvantage compared to large projects. The generally significant costs of project development are regularly contrasted by lower revenues from the smaller quantity of credits in small and micro projects than in large projects. At the same, small projects have a number of co-benefits and thus make a direct contribution to local sustainable development.

You can find further information at https://www.dehst.de/Dienstreisen-der-Bundesregierung.

Stage 7:

Communicate – Information and reporting on climate protection



A successful and exemplary initiative to enhance the greenhouse gas-neutrality of an administration requires proper, adequate communication and reporting, both internally with management and employees and externally with collaborative and contractual partners and the general public.[78]

An important prerequisite of a successful initiative to improve the greenhouse gas neutrality of an administration is that employees are **continuously provided with information about the initiative** and involved in all stages and phases. This includes regularly providing information to management and communicating with employees.

Providing information to management

The management of an administration has overall responsibility for initiatives to achieve greenhouse gas neutrality in administrations and must coordinate these with and tie them in to other management-related issues, processes and targets. As part of this overall responsibility, they must regularly check whether and to what extent the administration is fulfilling its legal and political climate protection obligations and achieving the climate protection targets it has set itself (see stage 4). If certain obligations or targets are not being met, the administration must decide on further measures and, if necessary, on altering the climate protection targets.

In order to enable the management to assess the requirements of greenhouse gas neutrality and to make any decisions which may be required, it must be kept informed of climate-relevant developments and challenges, as well as of possible needs for adjustment and of alternative options for action. This can be done by appropriate **agenda items during management meetings**, for which **draft proposals**, presentations and verbal explanations are helpful. The flow of information at management level is considerably facilitated if a member of the management holds a senior position on the coordination committee (see the comments on Responsibilities and contributions in stage 1). To establish a reporting routine, it is beneficial for climate protection to be made a regular item on the agenda at meetings held

78 See also WWF/CDP: *Vom Emissionsbericht zur Klimastrategie* (From emissions reporting to a climate strategy), chapter 4: http://klimareporting.de/wp-content/uploads/2014/02/Klimareporting_Vom_Emissionsbericht_zur_Klimastrategie_2014_02_20.pdf.

by managements and the subordinated organisational levels. Besides management meetings, regular management **consultations** with the individuals responsible for climate protection – e. g. with the climate protection officer – are a suitable way of keeping management up-to-date.

As climate protection involves many issues which are relevant to management, it is important to make the potential consequences of management decisions on climate protection targets very clear to managements. To do so, it is helpful to involve the individuals responsible for climate protection as standard when preparing draft proposals. For example, this concerns draft documents concerning strategic orientation, organisational development, the provision of space, technology and financing for administrations, the digitalisation strategy, or internal procedures and processes.

Communication with managements should be open and honest. This also includes uncomfortable truths, conflicting goals and problems, and different views on certain aspects. This is an important prerequisite to achieve a sophisticated, balanced evaluation and a deeper understanding of the practical barriers and challenges associated with climate protection in administrations. Honest information about the challenges benefits the transparent consideration of different perspectives and enables managements to make balanced, practical decisions which all those involved can accept. By contrast, uncritical reporting which plays down problems and covers up conflicts makes it difficult for managements to take a robust position from which they can withstand resistance and handle criticism confidently.

Good practice example: Communications strategy of Berlin Land

At the start of 2019, Berlin Land adopted an action plan on "CO_2-neutral administration" containing a total of 33 measures. The coordinating senate responsible for climate protection considers communicating with employees to be a central element of the plan's success. It has thus commissioned the Berliner Energieagentur to develop an accompanying communication strategy for the implementation process. A separate page for CO_2-neutral administration on employee portal of Berlin Land, leaflets on climate-friendly and resource-saving behaviour in the workplace and prices for interactive events were introduced back in 2019. In 2020, among other things, ideas were developed for measures within the framework of a mobility campaign. Some elements of this campaign have already been implemented into administrations, e. g. calling on employees, as mobility ambassadors, to motivate colleagues within their own administration to switch to climate-friendly modes of transport.

At the same time, attention within individual administrations was drawn to the initiative to achieve CO_2-neutral administrations, e. g. at project days for employees on the intranet. In order to promote a regular exchange and the evaluation of the implementation of measures, the contact persons appointed for the coordination of the CO_2-neutral administration meet in regular steering committee meetings and discuss progress, challenges and further steps. For 2021, certain authorities are planning internal events for employees, e. g. "energy tours" through office buildings and other motivational campaigns concerning climate protection.

Further information is available at: https://www.berlin.de/sen/uvk/klimaschutz/klimaschutz-in-der-umsetzung/vorbildrolle-oeffentliche-hand/co2-neutrale-verwaltung/.

Communication with employees

Greenhouse gas-neutral administrations can only be established together with the employees. Administrations can achieve this by informing, motivating and enabling their employees, i. e. by encouraging them to get actively involved.

Informing employees

One fundamental aim of communication with employees is for administrations to **inform** them of all climate-relevant aspects and developments within administrations. All employees should know which contact persons in their administration are responsible for climate protection and for the individual fields of action. They should also be aware of the most important climate protection principles, targets and measures adopted by administrations. Administrations can use their tried-and-tested tools to inform their employees, with information leaflets and notices as well as the intranet, emails, internal memos and newsletters. The chance of this information being taken notice of and read, instead of being drowned in the daily flood of information, is greater if it comes directly from management and not "just" from working level, e. g. from the climate protection officer or the coordinating unit. This information also reaches recipients more effectively when written materials are supplemented by direct verbal information, e. g. during employee meetings or regular meetings at different organisational levels (e. g. department and division meetings).

Motivating employees

Providing information to the workforce is a necessary prerequisite for more climate protection in administrations, but it is not enough on its own. It is also important to **motivate** employees to scrutinise and adapt their own behaviour. This concerns heating and ventilation in rooms, the mode of transport chosen for travelling to work and on business trips, and taking climate protection aspects into account when tendering and awarding contracts, including purchasing the most energy-efficient devices instead of the usual familiar ones. The Bavarian Environment Agency (*Bayerisches Landesamt für Umwelt*) has published **guidelines on motivating employees** containing numerous recommendations and examples.[79] Some administrations have commissioned agencies to develop **communication and motivation campaigns** for employees.

Enabling employees

The more minds and hands there are working on the tasks and challenges associated with climate protection in administrations, the more successful it is. For this reason, it is necessary to **enable** as many employees as possible so that they actively participate and get involved in it. On the one hand, many participants are required to **carry out and assist with the necessary activities**, for example, by providing data, advancing measures in the climate action programme, becoming involved in working groups and committees, cooperating with internal audits or making contributions for climate reporting. On the other hand, climate protection is also brought to life within administrations in particular through the **voluntary commitment and initiative** of employees, e. g. by putting forward ideas and suggestions concerning climate protection, helping colleagues to behave in a more environmentally friendly way, having discussions with sceptical colleagues and generally contributing to a climate-friendly atmosphere within administrations. Therefore, employees are not just recipients but also actors in terms of successful communication with employees.

External communication

External communication involves providing information and reporting to contractual and collaborative partners, other authorities and the general public. Its main purpose is to give external parties information on responsibilities and activities concerning climate protection and to make administrations' climate impacts known. It thus enables administrations to achieve a high level of credibility and to really live up to their role model function.

A look at reports by administrations regarding their climate protection activities reveals great diversity and a high level of freedom in terms of format and content. This is particularly the case for voluntary reporting in organisation- or customer-specific

79 See Bavarian Environment Agency (ed.): *Mitarbeitermotivation für umweltgerechtes Verhalten – Ein Leitfaden für Unternehmen* (Employee motivation for environmentally friendly behaviour – A guide for companies), 4th revised edition, Augsburg, 2018. https://www.bestellen.bayern.de/shoplink/lfu_agd_00058.htm.

climate protection brochures and online reports. Here, press releases, newspaper articles or organisations' own websites are suitable communication tools.

A high level of credibility requires transparency and honesty which enables the recipient to understand the issues being discussed, evaluate their significance and consider them.

Climate reporting

There are no binding regulations regarding format and content of a climate report at present. However, are a number of voluntary requirements and reporting standards exist for climate reporting. The requirements of the Greenhouse Gas Protocol and the requirements of ISO 14064-1 expressly relate to reporting too. According to them, reporting should include direct and indirect emissions from energy consumption (Scopes 1 and 2) as a minimum and fulfil requirements with regard to transparency, relevance, completeness, consistency and accuracy.[80] Besides this, there are a number of other reporting standards which also concern climate protection. These include:

- the German Sustainability Code, particularly Criteria 1 to 9 and 13;[81]
- the Global Reporting Initiative (GRI), particularly No. 302 (Energy) and 305 (Emissions);[82]
- the Climate Change Program (CDP).[83]

The CDP, together with the WWF, has published a guide titled "From emissions reporting to a climate strategy", which also contains helpful information on climate reporting.[84] The most important climate reporting requirements include

- a description of the organisational structure responsible for climate protection and duties within administrations,
- a description of the fundamental climate protection aspects associated with administrative actions,
- the greenhouse gas emissions emitted by administrations and other climate impacts, which, in addition to direct and indirect emissions from energy consumption (Scopes 1 and 2), also includes indirect emissions from upstream and downstream processes (Scope 3),
- a schedule of the locations and aspects included and delineation of them,
- the specific measurable climate protection targets which administrations want to achieve,
- the key challenges and barriers to achievement of the climate protection targets,
- the central fields of action, measures and activities through which administrations intend to achieve their targets,
- the requirements of climate protection projects and other steps the administration intends to take or is already taking to offset their greenhouse gas emissions,
- references to further information and contacts for queries and more detailed aspects.

To attain credibility, it is important that the report also addresses and explains **less ideal aspects**, e. g. outdated buildings, a high number of flights for business travel, or a high proportion of employees who come to work by car. Otherwise, this can create the impression of bias or even window dressing. Credibility can also be increased by having the report, including all statements and data published in it, **validated by independent experts** (see stage 7: Audits by independent experts). If climate reporting is integrated into an environmental statement in accordance with EMAS, an audit of all the details provided therein, including the published key figures, by an independent environmental verifier is already part of the EMAS validation process. Reports in accordance with the other standards mentioned above can also be verified externally.

80 The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, Revised Edition, Washington D. C. (USA), 2004.
81 www.deutscher-nachhaltigkeitskodex.de/en-gb/Home/DNK/Criteria
82 https://www.globalreporting.org/standards/gri-standards-translations/gri-standards-german-translations-download-center/
83 https://guidance.cdp.net/en/guidance?cid=13&ctype=theme&idtype=ThemeID&incchild=1&microsite=0&otype=Questionnaire&tags=TAG-646%2CTAG-605%2CTAG-600
84 WWF, CDP: "From emissions reporting to a climate strategy", chapter 4: http://klimareporting.de/wp-content/uploads/2014/02/Klimareporting_Vom_Emissionsbericht_zur_Klimastrategie_2014_02_20.pdf.

Good practice example: BMZ climate report

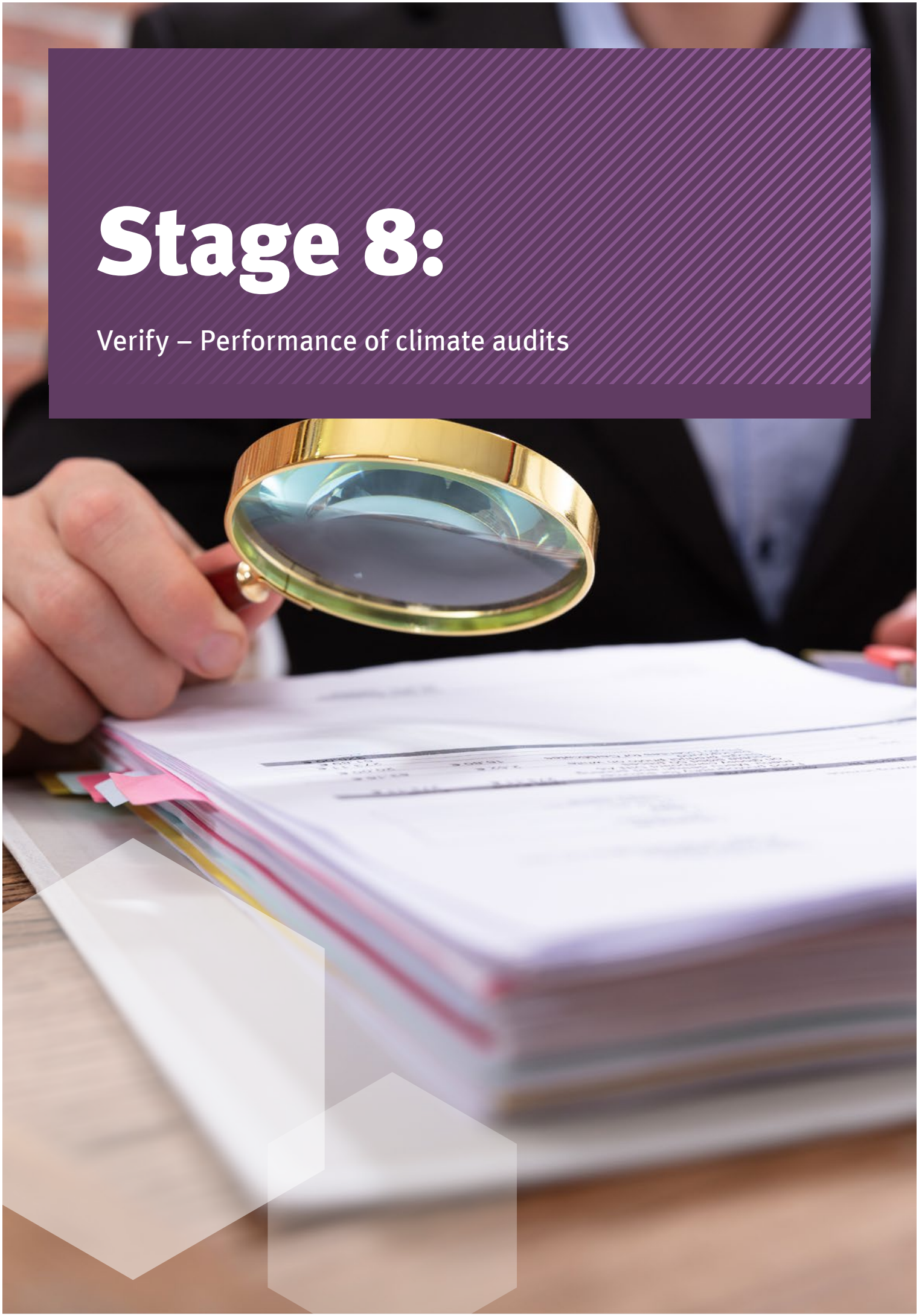
At the end of 2019, the BMZ published the report "Climate-neutral BMZ 2020" ("*Klimaneutrales BMZ 2020*"). The report outlines the relevant information on climate neutrality within the BMZ, including the climate policy framework, the fundamental strategic orientation and the responsibilities. The operational and organisational boundaries as well as the greenhouse gas emissions for 2017 and 2018 are presented transparently and distinctively based on the scopes. Besides the climate protection targets being pursued, which, based on a reduction pathway, are illustrated as being achieved by 2040, the report also describes the key measures and their expected impact. The challenges and barriers are not omitted either. All information is validated by an accredited environmental verifier in accordance with ISO 14063 – Part 3.[1]

See: http://www.bmz.de/de/mediathek/publikationen/reihen/infobroschueren_flyer/infobroschueren/sMaterialie470_bmz_klimaneutral_2019.pdf.

1 ISO 14064-3:2018: Specification with guidance for the validation and verification of greenhouse gas statements (ISO/FDIS 14064-3:2018).

Stage 8:

Verify – Performance of climate audits



As part of their credible, exemplary climate action measures, administrations must review, evaluate and develop the individual stages of greenhouse gas neutrality on a regular basis. Regular, systematic climate audits are a good way of doing so.

Aims of climate audits

In climate audits, administrations can review the functionality and adequacy of their greenhouse gas neutrality activities, evaluate their strengths and weaknesses, and identify potential for improvement. This generally includes all the stages described in this publication. Audits can thus verify whether administrations

- are familiar with, take into account and constantly comply with climate protection-related legal regulations, standards and obligations;
- adequately integrate climate protection aspects into their responsibilities, procedures and decision-making rules;
- appropriately define organisational and operational boundaries and the fundamental climate protection aspects of them;
- account for their greenhouse gas emissions transparently, fully, consistently and adequately;
- define appropriate fields of action and lay them down in sufficiently concrete terms;
- have adopted climate protection targets which are ambitious enough while also being realistic, and whether they regularly review achievement of them;
- plan, take and complete measures which are suitable for facilitating achievement of the climate protection targets;
- review the efficacy of the measures in respect of the applicable targets and adapt them if necessary;
- take suitable measures to compensate for or offset their greenhouse gas emissions;
- communicate with and report to management, employees, collaborative partners and the general public in a way which is appropriate and correct;
- regularly have their concepts, targets and activities concerning climate protection reviewed and, if necessary, certified through climate audits, and
- consider the results of climate audits to adapt and develop the stages towards greenhouse gas neutrality in the sense of a continuous improvement process.

Which of these targets have priority, must be established by the auditors before beginning the audit. This does not just determine which climate protection aspects are to be reviewed but also the methods and approaches to be taken during the audit.

A distinction can be made between first-party, second-party and third-party audits, depending on who performs the climate audit: **First-party audits** are carried out by administration themselves; they are therefore also referred to as **internal audits**. If audits are carried out by contractual or collaborative partners, they are **second-party audits**. Consequently, audits by independent experts are known as **third-party audits**.

Internal audits (first-party audits)

In **internal audits**, or first-party audits, the audit is carried out **by the employees of the respective administration**. The advantage is that the auditors usually know the organisation with its staff, procedures and parameters to be audited very well. As a result, the findings and conclusions of the audit can usually be categorised and evaluated well. However, the lack of distance from the persons and matters being audited can result in a more favourable audit and make dealing with conflict-related findings more difficult. The impartiality of the auditors can be increased if they do not carry out any audits in their own department.

Internal audits enable administrations to review and optimise their climate protection initiatives and activities. As drivers of continuous improvement, they also help to identify practical barriers and problems related to climate protection and ways of overcoming them within administrations. They also offer an opportunity to scrutinise the materiality

analysis of climate protection aspects (see Assessing the "materiality" of climate protection aspects") and, if necessary, to identify new potential, e. g. when construction work is being planned, new contracts are being put out to tender or new equipment is being purchased. The results are only used internally, but can also be used to prepare for certification as part of third-party audits.

Which people carry out internal audits and which stages, locations, fields of action and climate protection aspects are audited should be determined in an **audit plan**. The audit plan can easily be linked to different stages of greenhouse gas neutrality. Which stages are included in the audit depends on how far administrations have progressed on the path to greenhouse gas neutrality and what experience they have gained so far. If they have recently started out, the focus may be on the structure of climate protection organisation (stage 1), the scope of application (stage 2) and greenhouse gas emissions accounting. Administrations which have already mastered these stages may focus on the interaction between climate protection targets (stage 4) and measures (stage 5). If administrations already offset their greenhouse gas emissions, the audits may include compensation (stage 6) or focus on internal and external communication (stage 7).

In principle, internal auditors do not need **special qualifications or education**. Nonetheless, further qualification and training are useful to impart fundamental knowledge and skills for carrying out audits (see Training). Whether with or without training: In any case, auditors should be **well-briefed and well-instructed** so that they are familiar with the climate protection targets and definitions in their administrations, have a thorough understanding of the organisational, technical and practical context of climate protection in their administrations, and can focus their attention on the relevant aspects. In most cases, the climate protection officer is responsible for giving such instructions. However, they can also be given by other people, provided they have the appropriate knowledge and experience. **Practical aids**, particularly checklists, sample record sheets for inspections or pre-printed forms for recording results make recording, documenting and evaluating findings easier. A camera is useful as a way of documenting conditions or possible improvements because: "a picture is worth a thousand words".

In principle, the auditor should be **independent** of the subject being audited, i. e. The auditor should not be part of the organisational unit being audited or bound by its instructions. Where this is not feasible, an independent person can also take part in the audit. Findings and recommendations, the documents and records inspected and, if necessary, the measures agreed should be recorded in a **results log**. This should include both positive and negative aspects. The results log is not just a means of proving that the audit has been performed (e. g. for the environmental verifier in a third-party audit) and of documenting findings; it is also a way of drawing conclusions (e. g. measures) together with all parties involved and identifying changes for future audits. It should be as brief, succinct and clear as possible. Tabular overviews usually fulfil this purpose better than lengthy "experience reports" and descriptions.

Audits by collaborative partners (second-party audits)

In **second-party audits** by collaborative and contractual partners, it is also assumed that the auditors are sufficiently familiar with the administrations and the matters and procedures to be audited. The **risk of conflicts of goals and interests** is high, so it should be ensured that such audits are preferably carried out by people who do not have to fear any negative consequences resulting from "uncomfortable" findings. The main aim of a second-party audit is to review and improve **aspects relevant to the collaboration**. For example, such audits may be carried out by the manufacturers of technical equipment to check whether administrations operate and maintain the equipment efficiently, fulfil their potential to save energy and manage the interaction with other equipment and technical processes appropriately. During an audit, a consultancy firm may also check whether the content of the consultation is implemented and applied correctly. In audits by contractual partners, it is often helpful to integrate such audits directly into the scope of services, e. g. when purchasing technical equipment or awarding consultancy contracts.

In some cases, the **mutual auditing of administrations** may be appropriate. For example, a climate action coordinator from one administration might carry out audits in another administration and vice versa. Such mutual audits do not just reinforce cooperation in climate protection; they also support mutual learning and the exchange of experiences.

Audits by independent experts (third-party audits)

Third-party audits by independent experts may be performed by environmental or climate protection advisers, for example. In principle, the results of these audits can also be used for external communication and reporting (see stage 7), particularly if the audit is carried out in the framework of a certification. Certification, verification or validation of processes or management systems – e. g. within the context of environmental management in accordance with ISO 14001 or EMAS – can only be carried out by accredited environmental verifiers. In Germany, such accreditation is granted by the German Accreditation Body (*Deutsche Akkreditierungsstelle*, DakkS) and the German Accreditation and Licensing Agency for Environmental Verifiers (*Deutsche Akkreditierungs- und Zulassungsstelle für Umweltgutachter*, DAU). As a rule, the audit should cover the entire process of climate protection initiatives in administrations, including all their stages. In principle, however, it is also possible to only have certain stages certified, such as greenhouse gas emissions accounting in accordance with ISO 14064-1 (stage 3) or external reporting, e. g. the climate protection report (stage 7). Validation in accordance with EMAS is subject to very high standards in respect of the independence of the experts to avoid even the slightest suspicion of being biased.

External verification

Having public administrations' methods and data audited by an external, independent auditor is a mark of quality which contributes to the credibility of administrations in respect of greenhouse gas neutrality. An appropriate, publicly accessible standard should be chosen and a competent, independent and expert verifier should carry out the audit in accordance with this. An organisation which has already been validated in accordance with the environmental management system EMAS (Eco-Management and Audit Scheme), for example, can also have its climate-related data audited and validated by an environmental verifier during its annual EMAS validation.

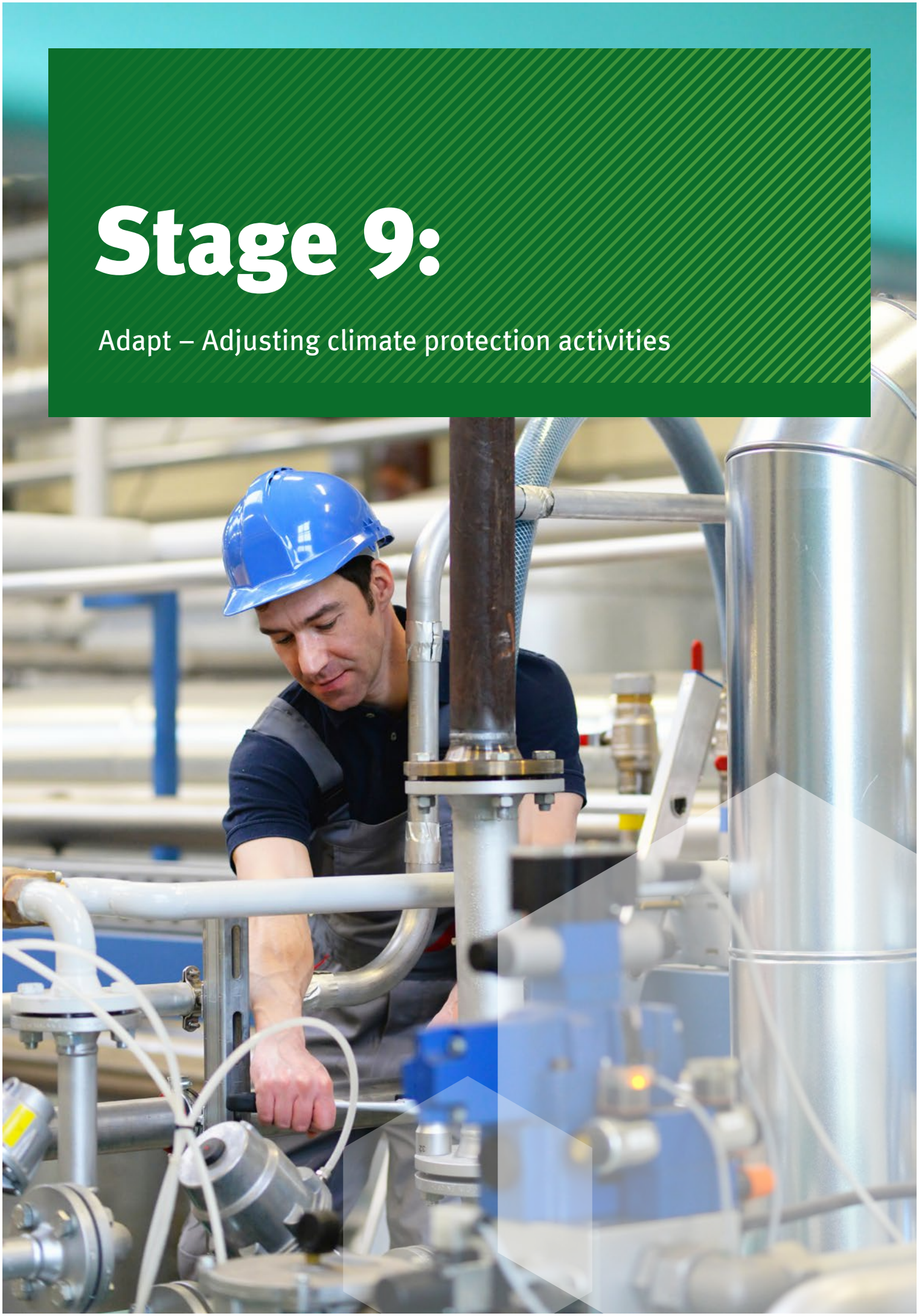
Good practice example: EMAS validation by accredited environmental verifiers

EMAS-registered administrations are audited annually by expert, independent environmental verifiers (EMAS audit). Before they can validate administrations in accordance with EMAS, the environmental verifiers undergo a test at DAU GmbH in which they must inter alia, prove their knowledge of the special features of public administrations. Besides public services law (including budget, procurement or travel expenses law), this also includes knowledge of organisation, procedures and decision-making processes and of the environmental aspects typical of administrations (building technology, information and communication technology, etc.). The accreditation process does not cover administrations that, in addition to the typical activities of administrations, perform additional duties which require special facilities and equipment (e. g. laboratories, equipment for energy generation or waste disposal). Environmental verifiers need further accreditation for this, e. g. for technical, physical and chemical testing. Accreditation as an EMAS environmental verifier covers all environmental aspects but also guarantees qualification for specific climate protection aspects in administrations.

Further information see http://www.emas.de.

Stage 9:

Adapt – Adjusting climate protection activities



As they say in football: "Keep your eye on the ball". After administrations have mastered all other stages on the path to greenhouse gas neutrality, they can gladly and confidently tackle the last stage: constantly adapting their climate protection activities. Strictly speaking, this is not a stage but rather a **continuous process** which covers all previous stages and by which administrations respond to changing conditions and developments utilizing the experience and knowledge they have gained so far. During this process, they look back at all stages critically and constructively to determine what went well and what went less well, which aspects they would like to retain and expand upon, and where they should readjust things or even do things completely differently. This adaptation process is an important prerequisite for ensuring that administrations can continuously fulfil their functions as role models and achieve their medium- and long-term climate protection targets.

The continuous improvement process

The aim of making adjustments is to initiate and establish a **continuous improvement process** in administrations. This is a prerequisite for ensuring that administrations can permanently decrease their greenhouse gas emissions and achieve their long-term climate protection targets so that they will eventually become greenhouse gas-neutral without offsetting their emissions. Such a continuous improvement process is not just aimed at greenhouse gas emissions and climate protection targets (see stage 4) but also at the measures taken in this regard (see stage 5). It concerns all stages and steps described in this publication, including organisation (stage 1), organisational and operational boundaries (stage 2), the calculation of greenhouse gas emissions (stage 3), compensation (stage 6), communication (stage 7) and climate audits (stage 8). The adaptation process itself (stage 9) can also be continuously improved, e. g. as part of "change management".

External and internal adaptation factors

Change is the only constant. Even administrations have to constantly adapt to changing conditions and developments to enable them to successfully fulfil their duties in the future. In this regard, a distinction can be made between **external and internal adjustment factors**. External factors, i. e. factors that cannot be influenced by administrations, concern e. g. the legal framework, social expectations or political decisions and requirements, such as new departmental responsibilities and organisational structures, extra or fewer duties, or new technical possibilities. **Internal factors** are induced by administrations themselves, e. g. when organisational structures are altered and priorities are changed, when employees leave or take on other duties, or when new employees start and bring their ideas with them. Both external and internal factors result in a permanent change of conditions and opportunities for climate protection in administrations, e. g. by windows of opportunity opening and then closing again.

Foundations of the continuous improvement process

Own experience

Administrations' **own experiences and knowledge** are an essential foundation for the successful adaptation of climate protection activities. All those involved are constantly learning, which puts them in a position to make the individual stages of the path to greenhouse gas-neutral administration (even more) effective, targeted and successful, and to deal with challenges and obstacles at all stages. As administrations' experiences and knowledge grow, routines can be established and fine-tuned and successful solutions can be transferred to other divisions. And it is not just positive experiences which are important. Less successful initiatives and processes are often more educational for the internal adaptation process. This means dealing with mistakes and failures honestly and constructively; instead of seeing failure as a weakness which should be concealed, should be considered the basis of a successful learning and development process. Such a **mistake culture** is particularly prevalent wherever quality management is performed. If administrations already have relevant experience, they can also use it for climate protection.

Exchanging experience with other organisations

Administrations are not alone on the path to greenhouse gas neutrality. The number of administrations that have experience with greenhouse gas neutrality is constantly growing. Sharing and exchanging experiences and insight with others benefits all those involved. Such exchanges can take place informally through personal contacts or through networks and regular meetings. **The exchange of experiences between authorities' climate protection officers**, which the UBA initiated and coordinated several years ago, has been responsible for putting the issue of greenhouse gas neutrality on the agenda at

annual meetings time and time again, and it enables participants to gather a lot of useful inspiration and additional contacts. The **exchange of experiences on climate-neutral administration between the federal and state governments (*Bund-Länder-Erfahrungsaustausch zur klimaneutralen Verwaltung*)** also facilitates the exchange of experiences and cooperation among parties. Most states with greenhouse gas-neutral administration targets have created opportunities for an exchange of experiences in similar ways. Because this does not involve political processes and the coordination of positions, the exchange can take place at working level without unnecessary administrative burden.

Exchanging experiences is not limited to events, workshops, seminars and training sessions in which only a few representatives of administrations are permitted to participate. A fundamental advantage also lies in the establishment of a **network** of contacts who can mutually share experiences and help each other with questions and problems. Often, it are informal contacts within this network which create opportunities to address highly specific topics and issues and to discuss actual solutions. Those who are not yet part of a greenhouse gas neutrality network can approach people in other administrations to exchange experiences with them and to learn from each other.

Results of internal and external audits

Another important foundation of successful adaptation are the results of climate audits as described in stage 8. The observations and recommendations made in these audits can often be used directly for specific developments and improvements in climate protection activities at all stages. This also requires a corresponding mistake culture, which does not assess the results of the audits as weaknesses, but rather regards them as constructive starting points for a continuous improvement process, even beyond the climate action programme.

Idea management and suggestions for improvement by employees

Most administrations already have a procedure for employees to make suggestions for improvement. This so-called **idea management**, also known as "employee suggestion scheme" (*betriebliches Vorschlagswesen*), can be used for the continuous improvement process. For this reason, it may be helpful – together with the responsible contact persons for idea management – to specifically ask employees for suggestions as to how to reduce greenhouse gas emissions, save energy or promote other climate protection targets. Besides this procedure, which is often made rather formal, administrations can also establish a simplified process in which employees can put forward suggestions and proposals for improving climate protection at all stages and in all fields of action.

Good practice example:
CO_2-neutral state administration learning network (*Lernnetzwerk CO_2-neutrale Landesverwaltung*) in Hesse

Under the leadership of the Hessian Ministry of Finance, the state government of Hesse established a learning network as a platform for constructive exchanges between state authorities, companies, municipalities, associations and societies back in 2010. Approximately 70 members from different fields, perspectives and backgrounds support the state of Hesse through their active involvement as partners of the CO_2-neutral state administration. By the end of 2019, 14 network meetings had already been held at different locations. Besides conveying the latest findings and practical experiences, the focus is on the participants' interests in specific project examples and the need to exchange practical experiences. The results of the network meetings, together with other news and information on CO_2-neutral state administration in Hesse, are published in a regular digital magazine, the "Climazine".

Further information: https://co2.hessen-nachhaltig.de/de/lernnetzwerk.html.

Contact: CO2-Projektbuero@hmdf.hessen.de.

Adaptation at individual stages

Adapting organisational regulations

The organisational structure established in stage 1 provides starting points for adaptation in respect of responsibility for climate protection at management level, responsibilities and contributions within administrations, as well as procedures and decision-making rules. A need for adaptation in this area usually arises when the persons responsible or involved or the staffing, budgetary and material resources change. However, administrations can also consider adaptations to the organisational structure when there have not been any changes. This is mainly due to the fact that consolidating and stabilising organisational arrangements is associated with different challenges from establishing new ones from scratch. Accordingly, other skills and characteristics may be useful at management level, e. g. in respect of dynamics and willingness to change. Therefore, it is not simply a matter of course that the individuals responsible in the beginning will also be suitable for the subsequent phases. Organisational adaptations may also be a helpful way of mitigating conflicts between climate protection and other fields of activity or of strengthening synergies with other tasks and subject areas.

Further need for adaptation may arise if certain rules and responsibilities have not proven as successful as first stated in the schedule of responsibilities. On the one hand, this concerns the chair, the composition and the distribution of duties of the coordination committee, which can be readjusted based on the skills, strengths and interests of the individuals involved. On the other hand, this concerns rules on decision-making and participation for climate-relevant procedures within administrations, e. g. the application and approval procedures for business trips, procurement, tendering procedures or events. If the existing procedures have proven successful at enabling greater consideration of climate protection aspects, adaptation is not required; otherwise, they should be amended or readjusted.

Defining the scope of application

Administrations can sometimes be more dynamic than they are reputed to be. Accordingly, they must adapt the scope of application which they defined in stage 2 in line with new developments. The **organisational boundary** must be adapted as soon as administrative structures, departmental responsibilities and fields of activity change and as soon as properties, locations and buildings are acquired or given up. Organisational boundaries also change when activities which have previously been carried out by administrations are suddenly carried out by external service providers instead, or vice versa. The scope of application can also change as a result of political decisions and priorities, e. g. when greenhouse gas-neutral administration targets are extended to subordinate authorities or to all publicly funded institutions and must therefore be integrated into the organisational boundary.

Administrations are also constantly developing **operational boundaries**. For a start, they can include additional climate protection aspects in the operational boundary, e. g. when they re-evaluate the materiality of their climate protection aspects as recommended in stage 2 (see Regularly reassessing materiality). Furthermore, due to growing experience and knowledge, administrations are in a position to include further climate protection aspects in their operational boundary in accordance with Scope 3

(see Appendix II). Finally, administrations can also expand their area of activity by defining additional **fields of action**. In this case, they can differentiate and expand their climate protection aspects further. If, for example, administrations later decide to establish information and communication technology as an independent field of action, they must delineate the aspects concerned which were previously integrated into different fields of action, such as building use and procurement, and revise them. Another example is canteen supplies, which several administrations, including the BMU and the BMZ, have defined as an independent field of action. This also enables the associated climate protection aspects to be redefined and evaluated.

Developing greenhouse gas emissions accounting

It is obvious that changes to the scope of application directly affect administrations' corporate GHG inventories, as additional locations, climate protection aspects and fields of action are included in the accounting process. But a constant scope of application also makes it necessary for administrations to constantly adapt and develop the methods they use to calculate their greenhouse gas emissions. Firstly, this results from the fact that with increasing experience and survey routine, administrations have access to a continuously **improving database.** In addition, the methodology used to determine greenhouse gas emissions from this database is also in constant development. This enables more precise estimations based on more current and sophisticated emission and conversion factors as well as more realistic assumptions. Finally, those who are able to use this data to calculate greenhouse gas emissions are also able to gain more and more methodical knowledge and experience. Anyone who has ever prepared an emission inventory for an organisation can confirm: **The first inventory is always the most difficult, but never the most precise.**

This gives rise to the phenomenon that in many organisations, **the initial corporate inventory reveals lower emissions than the inventories of following years**. Experts know, of course, that this is due to the growing experience and knowledge which administrations can rely on, when they calculate their emissions more comprehensively and precisely and thus include further properties, climate protection aspects and fields of action (see above Producing the corporate GHG inventory). Anyone who has ever had the privilege to convey to an authority's top-level management or even to a minister the fact that increasing greenhouse gas emissions reflect administrations' growing skills and experience and are thus a sign of the success of climate protection activities in administrations is fully aware of the challenge to communicate progress in greenhouse gas emissions accounting in a comprehensible way. It is usually easier to base subsequent emission inventories and the initial corporate inventory on a **common calculation basis** which enables a comparison of both, demonstrates the effects of including additional climate protection aspects and improved accounting methods, and distinguishes them from the effect of the climate protection measures taken (see above Taking changes in accounting principles into account).

Adapting and developing targets

Administrations can always only in hindsight check and evaluate how realistic the climate protection targets are that they decided on in stage 4. Raising targets at a later date is a different challenge to lowering them. Before administrations tone their targets down, they must rule out the possibility of achieving them through extra measures. An adaptation may be necessary if the initial conditions under which administrations have formulated and adopted their targets have completely changed or if **unforeseeable developments** have occurred. For example, this is the case when scheduled construction works cannot be carried out or when administrations have to carry out extensive additional tasks associated with additional greenhouse gas emissions. The challenges associated with measures to prevent Covid-19 infections can also result in the necessity to adapt targets concerning building use, business trips, commuting, information and communication technology or events. To do so, administrations have to re-evaluate their **starting position and possible actions**. Besides this, a **better, more up-to-date database** can be a reason to specify and, if necessary, further differentiate the targets adopted. Conversely, it is of course also conceivable that the database will prove to be inadequate and unreliable, which may make it necessary to adapt target definitions.

Initiating new measures and adapting ongoing measures

Continuously **updating and adapting the climate action programme** is part of the ongoing tasks of greenhouse gas-neutral administrations. This

includes constantly recording and updating the implementation status of ongoing measures, planning and adopting additional measures, and reviewing general regulations and procedures for monitoring climate protection activities.

Adopted and **ongoing measures** must be continuously reviewed with regard to their adequacy and fitness for purpose in light of current events and developments, and they must be adapted if necessary. Adaptation is always required if measures cannot be implemented or put into effect as planned, for example, due to unforeseeable barriers to implementation. For a wide variety of reasons, it can thus become necessary to transfer responsibility for certain measures to other people, to refine responsibilities and contributions, to provide additional resources or to adapt certain aspects when implementing measures.

For **completed measures,** administrations must evaluate their **efficacy** in respect of climate protection targets. The basis of this evaluation is the development of greenhouse gas emissions and other climate-relevant data (see above Collecting data on material climate protection aspects). When doing so, administrations must identify **inhibiting and supporting factors** in particular. If measures are effective, this suggests that they should be expanded or that similar measures should be taken more often. If measures do not have the desired effect, this can be seen as an opportunity to rely on other measures more in the future or to improve their effective conditions. If the measures taken so far are insufficient as a means of achieving climate protection targets, **additional measures** must be taken. Administrations must provide the resources required for this and, if necessary, balance them out with the resources tied up in ongoing measures. This may also make it necessary to re-prioritise administrations' various duties.

Adaptations may relate to the **procedure and the tools** which administrations employ to control and coordinate their climate protection measures and to continue the climate action programme (see above Creating a climate action programme). For example, it may be helpful to develop the composition and structure of the climate action programme, to adapt the number and level of detail of measures, or to improve the processes used to coordinate and participate in measures. Furthermore, the capacity for coordination and control can be improved by better adapting the implementation and performance of measures to the time available to the individuals responsible, so that the effort required by those involved is more constant and easier to plan. This may entail a different **distribution of short-, medium- and long-term measures**, for example. Besides this, there are now a number of programmes which can help organisations to manage their measures, e. g. special management software and applications.

Improving compensation for greenhouse gas emissions

The need to adapt stage 6 arises if the **market for the voluntary compensation** of greenhouse gas emissions and the international legal framework changes in this regard. In light of this, it is sensible for administrations to review the market from time to time. On this basis, administrations can reconsider and reformulate their general compensation requirements and their project-specific criteria in terms of project type, size, geographical location and the actors involved.

Finally, the **offer of compensation services** can also change in terms of project types, project regions, the actors or technical procedures involved, and the **evaluation thereof**. Growing experience with climate protection projects enables more in-depth insight into the advantages and disadvantages of certain project approaches and technical procedures, which administrations can take into consideration when offsetting emissions. This concerns, for example, specific project requirements, such as the preference for regional projects, for ecosystem-based approaches to sustainable land cultivation, or for the rewilding of marshes.

Developing communication and reporting further

In stage 7, adapting communication is always advisable if the target group for communication has changed or if the communication targets have not been achieved. In principle, **communication with management** should be evaluated on a regular basis and rearranged if necessary. Specific occasions might be that an authority appoints a new management or that the management requests further information to enable it to adequately evaluate the development of climate protection activities and make the necessary decisions.

Adapting **communication with employees** is always helpful if the level of information concerning climate protection and the motivation for and commitment to climate protection do not meet expectations. Whether and to what extent this is the case can be determined on a regular basis through internal audits (see stage 8, Internal audits) and from participation in the climate protection activities of an administration, or may be derived from the responses from employees and their general mood. It is completely natural for a positive, optimistic mood among the employees to wear off after a certain amount of time and to give way to a certain level of habituation. In this case, other forms of information, motivation and enablement may be appropriate.

How external communication with contractual and collaborative partners, other authorities and the general public should be adapted, is usually based on **responses** from previous informational activities. If these are largely positive, there is no need for change. In this case, adaptations may be limited to updating information, e. g. on the website and in the climate protection report. By contrast, unforeseeable and particularly critical responses are a reason to consider making changes to an administration's public image. This may include a form of expression which is easier for the target group to understand, a different ratio of text to images, or a better visualisation of contexts and processes using diagrams and charts. It can be helpful here to take a look at climate reporting by other organisations which is perceived (even) better and rated positively.

Besides external responses, **growing knowledge and experience** can lead to changes in reporting. Those who have been involved in climate reporting can use this experience to improve processes, overcome barriers more easily and deal with challenges better. For example, this includes involvement in press and public relations activities, the use of certain methods of communication, and the knowledge and application of certain reporting standards. In most cases, the results of internal and external audits and experts' recommendations serve as starting points for improving external communication.

Improving internal and external climate audits

Adaptations in the stage 8 relate to the planning, performance and evaluation of internal and external audits. Firstly, this concerns the number and qualifications of internal auditors. Even in the

initial phase, administrations frequently do not have suitable employees who are willing and able to carry out internal audits. To increase the number of internal audits, it can help to train **more internal auditors** and to entrust them with internal audits. If administrations already have experience of such training, this can be evaluated in terms of its content, organisation or format so that changes can be made if necessary. To improve internal audits, responses from participants and internal auditors are important as they are a way for these individuals to put forward ideas for planning, preparing for, performing and documenting audits. If **audits are already carried out by collaborative partners** (second-party audits), administrations can ask about their experience and agree on any changes if necessary. In addition, new partners with experience in climate audits can be involved in the audits.

The benefits and adequacy of audits are primarily demonstrated by how much they contribute to the improvement of administrations' climate protection and the expansion of the climate action programme. If the audits only yield a few suggestions for improvement and recommendations for climate protection for administrations, this can be a reason to adapt the **topics and methods or the approach** of the audits. This is also the case if audits yield too many fragmented results beyond the fundamental climate protection aspects which are difficult to integrate into the relevant fields of action and the climate action programme.

Finally, **experience with external auditors** is also important for the development of climate audits. Firstly, internal auditors can learn something from the "pros" and pick up things which they can use in their own audits. Secondly, over time the individuals from administrations who are taking part in external audits get a feel for whether an auditor is a good fit for the administration and are helping it along the path to greenhouse gas-neutrality. The aim is not to find as few "non-conformities" as possible in the external audits and to have the administrations' greenhouse gas neutrality and credibility confirmed without additional effort. Rather, it is important that the external auditor provides assistance with the continuous improvement process throughout all the stages and helps administrations to develop their strengths and work on their weaknesses.

Further information available in the public domain

General and cross-cutting publications

The UBA has published a document describing how organisations can build a climate management system which meets the strict requirements of the European eco-management and audit scheme (EMAS):

- UBA: *Klimamanagement in Unternehmen – Entwicklung eines Bausteins auf Grundlage des Umweltmanagementsystems EMAS* (Climate management in companies – Development of a component based on the eco-management system EMAS), texts 172/2020, Dessau-Roßlau, 2020 (see https://www.umweltbundesamt.de/publikationen/klimamanagement-in-unternehmen).

The Global Compact Network Germany (*Global Compact Netzwerk Deutschland*, GCND) has also published a number of guides, discussion papers and other documents regarding climate protection management which are relevant for administrations, particularly:

- *Einführung Klimamanagement – Schritt für Schritt zu einem effektiven Klimamanagement in Unternehmen* (An introduction to climate management – a step-by-step guide to effective climate management in companies), January 2017 (https://www.globalcompact.de/wAssets/docs/Umweltschutz/Publikationen/001-Einfuehrung-Klimamanagement-DGCN_web.pdf).

- *Unternehmerisches Klimamanagement entlang der Wertschöpfungskette – eine Sammlung guter Praxis* (Corporate climate management throughout the supply chain – A summary of best practice); November 2016 (https://www.globalcompact.de/wAssets/docs/Umweltschutz/Publikationen/gute-praxis-sammlung_klimamanagement.pdf).

A wide range of information and guidance on environmental management is available on the website www.emas.de. The website, which is continuously updated, also has many publications which are relevant for administrations. For example, http://www.emas.de/teilnahme/umwelterklaerungen/sammlung contains a collection of EMAS environmental statements in which companies and other organisations have documented their experiences of climate protection management and the steps towards greenhouse gas neutrality.

The EU Commission's Joint Research Centre has published an EMAS reference document for publication administrations which contains lots of useful guidance and information for climate protection in authorities.

- JRC Science for Policy Report: Best Environmental Management Practice for the Public Administration Sector, Seville (E) 2019 (https://susproc.jrc.ec.europa.eu/product-bureau/sites/default/files/inline-files/PublicAdminBEMP.pdf).

- EU Commission: Commission Decision (EU) 2019/61 of 19 December 2018 on the sectoral reference document on best environmental management practices, sector environmental performance indicators and benchmarks of excellence for the public administration sector under Regulation (EC) No 1221/2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS) (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019D0061&from=EN).

Fundamental insight into public institutions' progress along the path to becoming greenhouse gas-neutral administrations can also be taken from the corresponding background reports:

- European Parliament: The European Parliament's carbon footprint – Towards carbon neutrality, September 2020 (https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652735/IPOL_STU(2020)652735_EN.pdf).

- European Commission, DG Clima: Feasibility and Scoping Study for the Commission to become Climate Neutral by 2030, Final Report, September 2020 (https://ec.europa.eu/clima/sites/clima/files/eu-climate-action/docs/climate_neutral_commission_study_en.pdf).

- Federal Ministry for Economic Cooperation and Development (*Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung, BMZ): Klimaneutrales BMZ 2020 – Vermeiden. Reduzieren. Kompensieren* (Climate-neutral BMZ 2020 – Avoid. Reduce. Compensate), December 2019 (http://passthrough.fw-notify.net/download/240436/http://www.bmz.de/de/mediathek/publikationen/reihen/infobroschueren_flyer/infobroschueren/sMaterialie470_bmz_klimaneutral_2019.pdf).

- UBA: *Auf dem Weg zum treibhausgasneutralen UBA – Aktualisierte Umwelterklärung des Umweltbundesamtes 2018* (The UBA's path to greenhouse gas neutrality – Updated environmental statement by the UBA 2018), Dessau-Roßlau, 2019 (https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/190107_uba_fb_emas_bf.pdf).

- Ministry of the Environment, Climate Protection and the Energy Sector Baden-Württemberg (*Ministerium für Umwelt, Klima und Energiewirtschaft Baden-Württemberg): Auf dem Weg in die klimaneutrale Landesverwaltung – CO_2-Bilanz nach dem Klimaschutzgesetz Baden-Württemberg* (The path to a climate-neutral federal state administration – CO_2 inventory in accordance with the Baden-Württemberg Climate Protection Act), May 2017 (http://www.baden-wuerttemberg.de/klimaneutrale-landesverwaltung).

- *Auf dem Weg in die klimaneutrale Landesverwaltung – Zweiter Fortschrittsbericht zur CO_2-Bilanz 2010–2018 nach dem Klimaschutzgesetz Baden-Württemberg* (The path to becoming a climate-neutral federal state administration – Second progress report on the CO_2 inventory in accordance with the Baden-Württemberg Climate Protection Act), Stuttgart, 30 June 2020 (https://www.baden-wuerttemberg.de/fileadmin/redaktion/m-um/intern/Dateien/Dokumente/2_Presse_und_Service/Publikationen/Klima/Zweiter-Fortschrittsbericht-klimaneutrale-Landesverwaltung-300620_01.pdf).

The UBA has published further information on voluntary compensation:

- UBA: *Freiwillige CO_2-Kompensation durch Klimaschutzprojekte, Ratgeber* (Voluntary CO_2 offsetting through climate protection projects), Dessau-Roßlau, 2018 (https://www.umweltbundesamt.de/publikationen/voluntary-co2-offsetting-through-climate-protection).

- UBA: Future Role for voluntary carbon markets (https://www.dehst.de/DE/Klimaschutzprojekte-Seeverkehr/Freiwillige-Kompensation/freiwillige-kompensation_node.html).

- UBA: *Investieren in Waldklimaprojekte – Leitlinien für Unternehmen und private Investoren* (Investing in forest climate projects – Guidelines for

companies and private investors), 2011 (https://www.dehst.de/SharedDocs/downloads/DE/projektmechanismen/Waldprojekte_Leitfaden.pdf).

Publications on greenhouse gas emissions accounting

The Greenhouse Gas Protocol contains fundamental methodical requirements for the calculation of organisations' greenhouse gas emissions, as well as methodical guidelines. This can be viewed and downloaded in English free of charge at www.ghgprotocol.org. It contains a detailed description and delineation of climate protection aspects within the individual scopes, as well as requirements and methods for evaluating them. It also contains an extensive glossary of the key terms. The most important publications on greenhouse gas emissions accounting are:

- A Corporate Accounting and Reporting Standard, Revised Edition, Washington D.C. (USA), 2004 (https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf).
- Scope 2 Guidance. An Amendment to the GHG Protocol Standard, Washington D.C. (USA), 2015 (https://ghgprotocol.org/sites/default/files/standards/Scope%202%20Guidance_Final_Sept26.pdf).
- Corporate Value Chain (Scope 3) Accounting and Reporting Standard. Supplement to the GHG-Protocol Standard, Washington D.C. (USA), 2011 (https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf).
- Technical Guidance for Calculating Scope 3 Emissions (version 1.0); Supplement to the Corporate Value Chain (Scope 3) Accounting & Reporting Standard, Washington D.C. (USA), 2013 (https://ghgprotocol.org/sites/default/files/standards/Scope3_Calculation_Guidance_0.pdf).
- Global Protocol for Community-Scale Greenhouse Gas Emission Inventories; An Accounting and Reporting Standard for Cities, Washington D.C. (USA), 2014 (https://ghgprotocol.org/sites/default/files/standards/GHGP_GPC_0.pdf).
- The Greenhouse Gas Protocol for the U.S. Public Sector; Interpreting the Corporate Standard for U.S. Public Sector Organisations, Washington D.C. (USA) 2010 (https://ghgprotocol.org/sites/default/files/standards/us-public-sector-protocol_final_oct13.pdf).

The Greenhouse Gas Protocol also contains standards and guidelines for calculating the greenhouse gas emissions from products and projects.

- Product Live Cycle Accounting and Reporting Standard, Washington D.C. (USA) 2011 (https://ghgprotocol.org/sites/default/files/standards/Product-Life-Cycle-Accounting-Reporting-Standard_041613.pdf).
- The GHG Protocol for Project Accounting, Washington D.C. (USA) 2012

The GCND has also published some guidelines for determining greenhouse gas emissions from the supply chain, which is sometimes difficult:

- *Scope 3.1 – Praxisempfehlungen zur Datenerhebung und Berechnung von Treibhausgasemissionen in der Lieferkette* (Scope 3.1 – Practical recommendations for gathering data and calculating greenhouse gas emissions in the supply chain); 2nd edition, November 2019 (https://www.globalcompact.de/wAssets/docs/Umweltschutz/Publikationen/Diskussionspapier-Scope-3.1-DGCN_screen_k.pdf).
- *Scope 3.4/3.9 – Praxisempfehlungen zur Datenerhebung und Berechnung von Treibhausgasemissionen aus vor- und nachgelagertem Transport und Verteilung* (Scope 3.4/3.9 – Practical recommendations for gathering data and calculating greenhouse gas emissions from upstream and downstream transport and distribution), n.d. (https://www.globalcompact.de/wAssets/docs/Umweltschutz/Publikationen/DGCN_Diskussionspapier_Scope-3-Logistik-und-Verteilung.pdf).

CO_2 calculators can also be used to calculate greenhouse gas emissions from individual activities within administrations.

- UBA carbon calculator (https://uba.co2-rechner.de/en_GB/).
- Klimaktiv: CO_2 calculator for companies (https://demo.co2ckpit.de/de_DE/footprint).

Publications on climate protection targets and measures

On 30 March 2015, State Secretaries' Committee for Sustainable Federal Government (*Staatssekretärsausschuss Nachhaltigkeit der Bundesregierung*) adopted a comprehensive programme of sustainability measures, the implementation status of which is reviewed annually and published in a monitoring report.

- *Nachhaltigkeit konkret in Verwaltungshandeln umsetzen – Maßnahmenprogramm Nachhaltigkeit* (Implementing sustainability directly into administrative action – Action Programme "Sustainability"), decision of 30 March 2015, last amended 24 April 2017 (http://www.bundesregierung.de/Content/DE/_Anlagen/2015/03/2015-03-30-massnahmenprogramm-nachhaltigkeit.pdf).

- 2019 monitoring report of 13 July 2020: https://www.bundesregierung.de/resource/blob/998006/1768512/0cb7394ac8424fb18292216d81faa870/monitoringbericht-2019-massnahmenprogramm-data.pdf?download=1.

The aim of the "Science-Based Target Initiative" (www.sciencebasedtargets.org), which was established in 2015, is to provide help with deriving climate protection targets from scientific findings, and it has produced a number of studies, guidelines and other publications in this regard. The following may be helpful for administrations:

- Business Ambition for 1.5 °C – Guidelines and Frequently Asked Questions (https://sciencebasedtargets.org/wp-content/uploads/2020/03/Business-Ambition-FAQ.pdf).

- Foundations of Science-based Target Setting; Version 1.0, April 2019 (https://sciencebasedtargets.org/wp-content/uploads/2019/04/foundations-of-SBT-setting.pdf).

- Foundations for Science-Based Net-ZeroTarget Setting in the Corporate Sector, Version 1.0, September 2020 (https://sciencebasedtargets.org/wp-content/uploads/2020/09/foundations-for-net-zero-full-paper.pdf).

- Science-Based Target Setting Manual, Version 4.1, April 2020 (https://sciencebasedtargets.org/wp-content/uploads/2017/04/SBTi-manual.pdf).

The Global Compact Network Germany has also published a discussion paper regarding science-based targets:

- *Science Based Targets – Wissenschaftsbasierte Klimaziele als Grundlage für die unternehmerische Klimastrategie* (Science-Based Targets – Science-based climate targets as a basis for corporate climate strategy), October 2019 (https://www.globalcompact.de/wAssets/docs/Umweltschutz/Publikationen/DGCN_Diskussionspapier_SBT_191008.pdf).

Publications on construction work and use of buildings

The Sustainable Building Information Portal provided by the BBSR provides contains useful information for construction work by the federal government (www.nachhaltigesbauen.de).

- *Leitfaden Nachhaltiges Bauen – Zukunftsfähiges Planen, Bauen und Betreiben von Gebäuden* (Sustainable building guidelines – Planning, building and operation of buildings which are fit for the future), Berlin 2019 (https://www.nachhaltigesbauen.de/fileadmin/pdf/Leitfaden_2019/BBSR_LFNB_D_190125.pdf).

The BNB is a freely accessible, comprehensive quantitative evaluation system for office and administration buildings in terms of sustainability (https://www.bnb-nachhaltigesbauen.de/bewertungssystem.html).

The DGNB has published a framework containing accounting and reporting regulations and guidance on producing a climate protection roadmap:

- *Rahmenwerk für "klimaneutrale Gebäude und Standorte", Vorschau-Version* (Framework for "climate-neutral buildings and locations", preview version), May 2018 (https://static.dgnb.de/fileadmin/dgnb-ev/downloads/publikationen/DGNB_Report_Rahmenwerk_klimaneutrale_Gebaeude.pdf).

The DGNB has also put together a toolbox which gives the relevant actors in the building and property sector key information, recommendations for action and tools for arranging the process and planning, building and operation of climate-neutral buildings and accommodation: www.dgnb.de/de/themen/klimaschutz/toolbox/.

The non-profit organisation co2online GmbH has set up an information portal for buildings energy data: https://www.wohngebaeude.info.

Publications on transport

Basic guidance and guidelines for environmentally friendly transport:

- UBA (ed.): *Mobilitätsmanagement in der Bundesverwaltung, Handlungsempfehlungen für die Praxis* (Mobility management in the federal administration – Recommendations for action in practice), Dessau-Roßlau, 2019 (https://www.umweltbundesamt.de/publikationen/mobilitaets-management-in-der-bundesverwaltung).

- BMVI (Ed.): *Handlungsleitfaden: Mobilitätsmanagement in Bundesbehörden – Vorgehensweise und Ergebnisse des Pilotprojektes im BMVI* (Action guidelines: Mobility management in federal authorities – Approach and findings from the pilot project in the GMVI), Berlin, February 2020 (https://www.bmvi.de/SharedDocs/DE/Publikationen/Z/handlungsleitfaden-mobilitaets-management-in-bundesbehoerden.html).

- UBA: *Klimaneutrale Dienstreisen der Bundesregierung – Hintergrundpapier* (Climate-neutral business trips by the federal government – Background paper), Dessau-Roßlau, 2020 (https://www.dehst.de/SharedDocs/news/DE/Hintergrundpapier_Dienstreisen.html).

- UBA: *Klimaneutrale Dienstreisen der Bundesregierung, Factsheet* (Climate-neutral business trips by the federal government, fact sheet) Berlin, August 2019 (https://www.dehst.de/SharedDocs/downloads/DE/publikationen/Factsheet_Dienstreisen-BReg.pdf?__blob=publicationFile&v=16).

- UBA: *Mobilitätsumfrage des Umweltbundesamtes 2017* (Mobility Survey of the German Environment Agency 2017 – Summary Report), texts 68/2018, Dessau-Roßlau, 2018 (https://www.umweltbundesamt.de/publikationen/mobility-survey-of-the-german-environment-agency).

- UBA: *Fachliche Unterstützung der Umsetzung des "Aktionsprogramm Klimaschutz 2020" – Maßnahmen "Kraftstoffsparendes Fahren" und "Mobilität der Bundesverwaltung"* (Technical support with the implementation of the "Climate Protection Action Plan 2020" – "Fuel-saving driving" and "Federal government mobility" measures), texts 105/2020, Dessau-Roßlau, 2020 (https://www.umweltbundesamt.de/publikationen/fachliche-unterstuetzung-der-umsetzung-des).

- UBA: *Umweltschonender Luftverkehr – lokal – national – international* (Environmentally friendly air transport – local – national – international), texts 130/2019, Dessau-Roßlau, 2019 (https://www.umweltbundesamt.de/publikationen/umweltschonender-luftverkehr).

Further publications which can help administrations to improve their transport data or calculate transport-related greenhouse gas emissions:

- Deutsche Bahn: UmweltMobilCheck (https://www.umweltmobilcheck.de/).

- INFRAS: *Handbuch für Emissionsfaktoren im Mobilitätsbereich* (Handbook of emission factors in the mobility sector), 14 May 2020 (https://www.hbefa.net/d/).

- UBA: *CO_2-Emissionsfaktoren für fossile Brennstoffe* (CO_2 Emission Factors for Fossil Fuels); Climate Change 27/2016, Dessau Roßlau, 2016 (https://www.umweltbundesamt.de/publikationen/co2-emission-factors-for-fossil-fuels).

- UBA: *Aktualisierung der Modelle TREMOD/TREMOD-MM für die Emissionsberichterstattung 2020, Berichtsteil "TREMOD"* (Update of the TREMOD/TREMOD-MM model for emissions reporting 2020, "TREMOD" section), UBA texts 116/2020 (https://www.umweltbundesamt.de/publikationen/aktualisierung-tremod-mm-2019).

The following information may also be relevant for administrations:

- BMI: *Rundschreiben vom 21.01.2020 zur Umsetzung des Klimaschutzprogramms 2030 im Bundesreisekostengesetz* (Circular dated 21/01/2020 concerning implementation of the Climate Action Programme 2030 in the Federal Travel Costs Act) (https://www.bva.bund.de/SharedDocs/Downloads/DE/Bundesbedienstete/Mobilitaet-Reisen/RV_RK_TG_UK/Rechtsgrundlagen/Dienstreisen/bmi_rdschr_21_01_20_vorgriffsregelung_bahnnutzung.pdf).

- UBA: *Leitlinien für umweltverträgliche Dienstreisen im Umweltbundesamt* (Guidance on environmentally friendly business trips in the German Environment Agency), Dessau-Roßlau, June 2016

  (https://www.umweltbundesamt.de/sites/default/files/medien/376/dokumente/leitlinien_fuer_umweltvertraegliche_dienstreisen_im_umweltbundesamt_0.pdf).

Publications on procurement

The UBA provides a wide range of information and tools for environmentally friendly public procurement, particularly practice-based tendering recommendations and procurement guidance for various product groups and further guidelines such as legal reports, calculation tools for lifecycle costs, training scripts, good practice examples and much more (see www.beschaffung-info.de).

The KNB offers practical support with public sector buyers' day-to-day work by providing expert assistance via its telephone hotline or by email, as well as through custom-designed project consultancy and training on site. The KNB has also launched the web platform www.nachhaltige-beschaffung.info. It helps users to help themselves through relevant legal principles, guidance, action guidelines and practical examples which are available for download.

The German agency for international cooperation (*Gesellschaft für Internationale Zusammenarbeit*, GIZ) has published a report on sustainable, particularly socially responsible, procurement with experience, examples and tips from its own practice (see https://www.giz.de/de/downloads/giz2019-de-nachhaltige-beschaffung-low-res.pdf).

Kompass Nachhaltigkeit (www.kompass-nachhaltigkeit.de) is a collaborative project by the GIZ and Engagement Global with the Service Agency Communities in One World (*Servicestelle Kommunen in der Einen Welt*, SKEW) on behalf of BMZ to support sustainable procurement in accordance with social and environmental criteria. It provides information on implementing sustainability in all phases of procurement; guidance on quality seals and certification in key product groups; the inclusion of sustainability criteria in accordance with the requirements of procurement law and regulations; the identification of quality seals and texts which are in line with sustainability criteria, as well as suppliers who can provide proof of the criteria for the desired product; practical municipal examples for tendering, council decisions, guidance, official instructions and other documents – sorted by federal state and on an interactive nationwide map and with background information on sustainable procurement, the legal foundations and further links regarding sustainable procurement.

The federal government, the federal states and the municipalities have worked together in the Alliance for Sustainable Procurement (*Allianz für Nachhaltige Beschaffung*) since 2010, under the leadership of the federal government (represented by the Federal Ministry for Economic Affairs and Energy (*Bundesministerium für Wirtschaft und Energie*, BMWi)). For further information and reports, see http://www.bmwi.de/.

The Hessian Ministry of Finance offers practical support and advice from its own experience of procurement (https://finanzen.hessen.de/ueber-uns/nachhaltigkeitsshyprojekte/nachhaltige-beschaffung-hessen).

The Guidelines for Environmentally Friendly Procurement (*Leitfaden für umweltverträgliche Beschaffung*) published by the Free and Hanseatic City of Hamburg also contain helpful suggestions and recommendations for administrations: www.hamburg.de/umweltvertraegliche-beschaffung.

Finally, administrations can also find further information on the KNB website at http://www.nachhaltige-beschaffung.info/DE/Home/home_node.html.

Publications on information and communication technology

- ***"Computer am Arbeitsplatz"* ("Computers in the workplace") brochure**:
  Prakash, S., Köhler, A., Antony, F.: *Computer am Arbeitsplatz: Wirtschaftlichkeit und Umweltschutz – Ratgeber für Verwaltungen. Broschüre*. (Computers in the workplace. Efficiency and environmental protection – Advice for administrations. A brochure.) UBA, Dessau-Roßlau, June 2016. Accessible via https://www.umweltbundesamt.de/publikationen/computer-am-arbeitsplatz-wirtschaftlichkeit.

- **Position paper on the lifespan of devices**: Prakash, S., Köhn, M.: *Paradigmenwechsel in der Green-IT notwendig! Nutzungsdauer von Arbeitsplatzcomputern in der Bundesverwaltung – Wirtschaftlichkeit und Umweltschutz. Positionspapier.* (Paradigm shift required in green IT! Lifetime of workstations in the federal administration – Efficiency and environmental protection. A position paper.) UBA, Dessau-Roßlau, June 2016. Accessible via https://www.umweltbundesamt.de/publikationen/paradigmenwechsel-in-der-green-it-notwendig-0.

- **Calculation tool for provision of end devices**: *Öko-Vergleichsrechner für Arbeitsplatzcomputer: Ökologische und ökonomische Vergleichsrechnung von Computervarianten für die Verwaltung* (Eco-comparison calculator for workstations. Environmental and economic comparative calculation of computer options for administrations.) Created by the Öko-Institut on behalf of the UBA. Excel-Tool; accessible via https://www.umweltbundesamt.de/dokument/oeko-vergleichsrechner-fuer-arbeitsplatzcomputer.

- ***"Öko-APC"* ("Eco-WS") research report**
  Prakash, S., Antony, F., Köhler, A., Liu, R.: *Ökologische und ökonomische Aspekte beim Vergleich von Arbeitsplatzcomputern für den Einsatz in Behörden unter Einbeziehung des Nutzerverhaltens (Öko-APC)* (Environmental and economic aspects of comparing workstations for use in authorities, including user behaviour (Eco-WS)). Texts 66/2016. UBA, Dessau-Roßlau, January 2016. Accessible via https://www.umweltbundesamt.de/publikationen/oekologische-oekonomische-aspekte-beim-vergleich.

- **KPI4DCE research report**:
  Schödwell, Björn; Zarnekow, Rüdiger; Liu, Ran; Gröger, Jens; Wilkens, Marc: *Kennzahlen und Indikatoren für die Beurteilung der Ressourceneffizienz von Rechenzentren und Prüfung der praktischen Anwendbarkeit* (Key figures and indicators for evaluating the resource efficiency of data centres and assessing practical applicability). Texts 19/2018, February 2018. Available for download at https://www.umweltbundesamt.de/publikationen/kennzahlen-indikatoren-fuer-die-beurteilung-der.

- Calculation tool for greenhouse gas emissions from video conferences
  The UBA is currently working on a calculation tool which can be used to calculate greenhouse gas emissions from video conferences. It should be published at the end of 2020.

- Calculation tool for energy and resource efficiency of data centres
  The UBA is currently developing an expert tool for the calculation and monitoring of the energy and resource efficiency of data centres using the KPI4DCE method (KPI4DCE = Key Performance Indicator for Data Centre Efficiency). The tool will be available from the UBA on request.

- **Overview of all procurement guidelines, including those for the procurement of ICT products**:
  https://www.umweltbundesamt.de/themen/wirtschaft-konsum/umweltfreundliche-beschaffung/empfehlungen-fuer-ihre-ausschreibung.

- Guide on Green Public Procurement: Products and Services for Data Centres and Server Rooms
  Ratgeber (Guide), November 2016; available at https://www.umweltbundesamt.de/publikationen/guide-on-green-public-procurement-products-services.

- **Guide on Green Public Procurement of Software**:
  https://www.umweltbundesamt.de/publikationen/guide-on-green-public-procurement-of-software.

- Blue Angel/Survey of all Basic Award Criteria:
  https://www.blauer-engel.de/en/companies/basic-award-criteria.

- Blue Angel for data centres:
  DE-UZ 161 Energy-Efficient Data Centre Operation:
  https://www.blauer-engel.de/en/products/electric-devices/data-centers.
  DE UZ 214 Climate-Friendly Colocation Data Center: https://www.blauer-engel.de/en/products/electric-devices/climate-friendly-colocation-data-center.

- **Blue Angel for Computers and Keyboards** (DE-UZ 78)
  https://www.blauer-engel.de/en/products/electric-devices/computers-and-keyboards.

- **Environmentally Friendly Mobile Phones** (DE-UZ 106) https://www.blauer-engel.de/en/products/electric-devices/mobile-phones.

- **Blue Angel for Energy Saving and Low-Pollutant Printers and Multifunction Devices** (DE-UZ 205) https://www.blauer-engel.de/en/products/electric-devices/printers-and-multifunction-devices-until-12-2021.

- **Blue Angel for Resources and Energy-Efficient Software Products** (DE-UZ 215) https://www.blauer-engel.de/en/products/electric-devices/resources-and-energy-efficient-software-products.

Publications on events

There are now a number of guides and guidelines on planning and hosting climate-friendly events. A selection:

- In 2015, the BMU and UBA published a guide on the sustainable organisation of events, which includes numerous specific recommendations and practical tips as well as checklists. It was comprehensively updated and extended in 2020 (www.bmu.de/publikation/leitfaden-fuer-die-nachhaltige-organisation-von-veranstaltungen/).

- The guidelines published by Energieagentur NRW, "*Klimaneutrale Veranstaltungen – einfacher als gedacht*" ("Climate-neutral events – easier than they sound"), contain practical tips and recommended measures for all fields of action: https://broschueren.nordrheinwestfalendirekt.de/broschuerenservice/energieagentur/klimaneutrale-veranstaltungen-einfacher-als-gedacht/2962.

- The guidebook published by GIZ contains checklists for the various phases and fields of action involved in holding sustainable events: https://berichterstattung.giz.de/wp-content/uploads/sites/7/2019/01/GIZ-Wegweiser-Nachhaltiges-Veranstaltungsmanagement.pdf.

- The "*Einfach machen*" ("Make it simple") compass for environmentally sustainable production in the cultural sector provides practical recommendations for planning and hosting sustainable cultural events in particular: https://www.kulturstiftung-des-bundes.de/de/stiftung/umweltpolitik.html.

- Große Ophoff, Markus (ed.): s (Sustainable events management – Green meetings as a future project for the events industry). DBU Umweltkommunikation, Volume 7, Oekom-Verlag 2016.

- Oblasser, Christian; Riediger, Martina: *Nachhaltiges Veranstaltungsmanagement mit Strategie* (Sustainable events management with strategy); Verlag https://www.thalia.de/shop/home/mehr-von-suche/ANY/sv/suche.html?mehrVon=Wissenschaft%20&%20Praxis 2015.

- Bengts, Sonja: *Nachhaltigkeit in der Veranstaltungsbranche: Positionierung der Dienstleistung Catering bei der Ausrichtung nachhaltiger und klimaneutraler Veranstaltungen* (Sustainability in the events industry: Positioning the catering service in the orientation of sustainable and climate-neutral events), Akademikerverlag 2013.

Below are examples of calculators which can be used to calculate administrations' greenhouse gas emissions:

- UBA carbon calculator: https://uba-event.co2-pro.de/en_GB/page/footprint/,

- KlimAktiv CO_2 calculator: https://klimaktiv-event.co2-pro.de/en_GB/page/footprint,

- Energieagentur Nordrhein-Westfalen CO_2 calculator: https://www.energieagentur.nrw/klimaschutz/eventrechner.

Based on specific events, it is clear to see how accounting for greenhouse gas emissions from events can be carried out and how these can be avoided:

- BMU: *Aktualisierte Umwelterklärung der COP23 VN-Klimakonferenz vom 6. bis 17.11.2017 in Bonn* (Updated environmental statement for the COP23 UN Climate Change Conference from 6 to 17 November 2017 in Bonn) (https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Nachhaltige_Entwicklung/cop23_umwelterklaerung_bf.pdf).

- Climate-neutral Catholics' Day (*Katholikentag*): https://www.katholikentag.de/ueber_uns/katholikentag_klimaneutral/umweltmassnahmen.html.

List of Acronyms

BAköV	*Bundesakademie der öffentlichen Verwaltung* (Federal Academy of Public Administration)
BBR	*Bundesamt für Bauwesen und Raumordnung* (Federal Office for Building and Regional Planning)
BBSR	*Bundesinstitut für Bau-, Stadt- und Raumforschung im BBR* (Federal Institute for Research on Building, Urban Affairs and Spatial Affairs at the BBR)
BECCS	Bioenergy Carbon Capture and Storage
BImA	*Bundesanstalt für Immobilienaufgaben* (Institute for Federal Real Estate)
BMF	*Bundesministerium der Finanzen* (Federal Ministry of Finance)
BMU	*Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit* (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)
BMVI	*Bundesministerium für Verkehr und digitale Infrastruktur* (Federal Ministry of Transport and Digital Infrastructure)
BMWi	*Bundesministerium für Wirtschaft und Energie* (Federal Ministry for Economic Affairs and Energy)
BMZ	*Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung* (Federal Ministry for Economic Cooperation and Development)
BNB	*Bewertungssystem Nachhaltiges Bauen der Bundesregierung* (Assessment System for Sustainable Building, Federal Government)
BVA	*Bundesverwaltungsamt* (Federal Office of Administration)
CCF	Corporate Climate Footprint
CDM	Clean Development Mechanism (in accordance with the Kyoto Protocol)
CDP	Climate change programme
CO_2eq	Carbon dioxide equivalent (unit of measurement for comparing contributions to the greenhouse effect)
Covid-19	Coronavirus disease 2019
DAkkS	Deutsche Akkreditierungsstelle GmbH
DAU	Deutsche Akkreditierungs- und Zulassungsgesellschaft für Umweltgutachter GmbH
DE-UZ	Number of the “Blue Angel” (“*Blauer Engel”)* eco-label awarded in Germany
DGNB	*Deutsche Gesellschaft für nachhaltiges Bauen* (German Sustainable Building Council)
DIN	*Deutsches Institut für Normung* (German Institute for Standardisation)
DNK	*Deutscher Nachhaltigkeitskodex* (German Sustainability Code)
Ed.	Editor
EEG	*Erneuerbare-Energien-Gesetz* (Renewable Energy Act)
EF	Emission factor
EMAS	Eco-Management and Audit Scheme
ENTSO-E	European Network of Transmission System Operators for Electricity
EnWG	*Energiewirtschaftsgesetz* (Energy Industry Act)
GCND	*Global Compact Netzwerk Deutschland* (Global Compact Network Germany)
GEG	*Gebäudeenergiegesetz* (Buildings Energy Act)
GIZ	*Gesellschaft für Internationale Zusammenarbeit* (German agency for international cooperation)
GRI	Global Reporting Initiative
GWh	Gigawatt hour(s)
HBEFA	*Handbuch für Emissionsfaktoren des Straßenverkehrs* (Handbook on Emission Factors for Road Transport)

HKN	*Herkunftsnachweis* (Guarantee of origin)
HKNR	*Herkunftsnachweisregister* (Register of guarantees of origin)
HmbVgG	*Hamburgisches Vergabegesetz* (Hamburg Procurement Act)
ICT	Information and communication technology
Ifeu	Institut für Energie- und Umweltforschung Heidelberg GmbH
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organisation for Standardisation
KKB	*Koordinierungsstelle Klimaneutrale Bundesverwaltung* (Liaison Office for Climate-neutral Federal Administration)
Km	Kilometre(s)
KNB	Kompetenzstelle für nachhaltige Beschaffung (Competence Centre for Sustainable Procurement)
KPI4DCE	Key Performance Indicator for Data Centre Efficiency
KSG	*Bundes-Klimaschutzgesetz* (Federal Climate Change Act)
kWh	Kilowatt hour(s)
LDC	Least developed country
LED	Light-emitting diode
LUMAS^{plus}	Expanded real estate-related environmental management and auditing system, BImA
mission E	BImA motivation campaign to promote energy savings
MWh	Megawatt hour(s)
PC	Personal computer
PUE	Power usage effectiveness (unit of measurement for the energy efficiency of data centres)
PV	Photovoltaics
PVC	Polyvinyl chloride
RFI	Radiative forcing index (unit of measurement for the contributions to global warming)
SBT	Science-based targets
SKEW	*Servicestelle Kommunen in der Einen Welt* (Service Agency Communities in One World)
TREMOD	Transport emission model (model for calculating air pollutants emitted by vehicles)
UBA	*Umweltbundesamt* (German Environment Agency)
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UvgO	*Unterschwellenvergabeverordnung* (Regulation on sub-threshold procurement)
VDI	Virtual Desktop Infrastructure
VgV	*Verordnung über die Vergabe öffentlicher Aufträge* (Regulation on the Award of Public Contracts)
WS	Workstation (PC with screen, keyboard and mouse)

Appendix I: Checklist for recognising and avoiding greenwashing

Greenwashing is an attempt by organisations to pretend eco-friendliness without genuinely adapting their strategic approach, targets and activities. Whether greenhouse gas-neutral administration initiatives arise from a genuine commitment to more climate protection or whether they are merely a response to legal and political demands is hard to tell from the outside. Nonetheless, the credibility of a company or an authority which is on the path to greenhouse gas neutrality can be verified by asking some basic questions. The suspicion of greenwashing is all the less justifiable the more of the following questions can be answered with yes:

1. Environmentally friendly "business model"

- Does the organisation actively contribute to long-term environmentally friendly development, e. g. by promoting corresponding products or activities?
- Does the way in which the organisation combines personnel and resources ensure the lowest level of greenhouse gas emissions possible?
- Can the organisation get by without any activities which are damaging to the climate (e. g. use of fossil fuels or frequent journeys as a result of several locations being far apart), at least in theory?

2. Prioritising the avoidance and reduction of greenhouse gas emissions

- Are there binding greenhouse gas emission reduction targets?
- Are the targets based on what is needed in the long term (1.5 °C target)?
- Are there also short-term and medium-term targets in addition to long-term targets (e. g. for 2050)?
- Are the targets specific enough in terms of field of action, actors and those concerned?
- Can the targets be measured and reviewed (e. g. using key figures)?
- Are there also absolute targets in addition to specific targets (e. g. per employee or area)?

3. Climate protection management

- Is there already an environmental or sustainability management system in place to control climate protection targets and measures?
- Are the responsibilities, competences and skills surrounding climate protection defined precisely and transparently?
- Are direct and indirect climate protection aspects recorded and evaluated systematically?
- Are there clear regulations on taking climate protection aspects into account in internal processes and decisions?
- Are other environmental aspects besides climate protection adequately taken into account and are potential conflicts of goals avoided?
- Are publications regarding climate protection targets and measures regularly reviewed and amended, if necessary?

4. Inclusion of indirect greenhouse gas emissions

- Are emissions from business trips and staff commuting taken into account?
- Are upstream emissions from the procurement of climate-relevant products and services recorded and evaluated?

- Are downstream emissions from the distribution and use of the products and results of the organisation's own work recorded and evaluated?
- Are emissions from events within and outside the organisation's own locations included?
- Are other upstream and downstream emissions taken into account, e. g. from paper and water usage or waste generation?

5. Methodical requirements of greenhouse gas accounting

- Is the method of greenhouse gas emissions accounting transparent and consistent?
- Does the corporate GHG inventory convey a realistic image of the actual climate impact of the organisation in respect of completeness, relevance and accuracy?
- Are greenhouse gas emissions reported and communicated in a clear and comprehensible way?
- Are the requirements of the Greenhouse Gas Protocol referred to?

6. Disclosure of key information concerning greenhouse gas neutrality

- Is there a climate protection report with valid information about the fundamental aspects of greenhouse gas neutrality, or any similar publications?
- Does the organisation provide information about its previous, current and projected greenhouse gas emissions and about its climate protection targets and measures?
- Is this information easy to access, specific enough and understandable?

7. Requirements of voluntary compensation for greenhouse gas emissions

- If the organisation already compensates for its greenhouse gas emissions: What requirements does it make for compensation projects?
- Are the additionality and the permanence of the emission reduction guaranteed?
- How does the organisation avoid double-counting?
- Is there any transparent monitoring and independent verification of the projects (including proof of erasure of certificates)?
- Are the costs of compensation covered by the organisation's own budget?

8. Expert and independent auditing

- Is greenhouse gas neutrality audited by an independent body?
- Does this audit cover the organisation's greenhouse gas emissions accounting as well as its climate protection strategy?
- Does the auditing body have the technical, legal and organisational knowledge and experience of climate protection in administrations?
- Is it ensured that the auditing body has not previously been involved in the greenhouse gas neutrality strategy (e. g. through providing consultancy services or training to the organisation)?

Appendix II: Checklist of relevant climate protection aspects in administrations (in accordance with the GHG Protocol)

Climate protection aspects in accordance with Scope 1: Administrations' direct emissions					
	Significance in terms of volume	**Controllability**	**Stakeholder relevance**	**Data availability**	**Materiality**
1. Stationary facilities					
1.1. Heating systems (gas, oil, pellets, other)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
1.2. Uninterruptible power supply (e. g. diesel generators)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
1.3. Other combustion systems	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
1.4. Renewable energy generation (PV, solar thermal energy, geothermal energy)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
2. Mobile facilities					
2.1. Vehicle fleet	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
2.2. Machinery, tools and equipment with combustion engines (for maintaining green areas, clearing snow and similar during winter, repairs, etc.)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
2.3. Other mobile facilities	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
3. Chemical processes					
3.1. Production of greenhouse gases in laboratories, workshops, storage facilities, etc.	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
3.2. Treatment and incineration of waste	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
3.3. Other chemical processes	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
4. Direct greenhouse gas emissions					
4.1. Refrigerant losses (from leakages, evaporation, etc.)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
4.2. Other direct emissions	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low

Climate protection aspects in accordance with Scope 2: Indirect emissions from the procurement of grid-bound energy					
	Significance in terms of volume	**Controllability**	**Stakeholder relevance**	**Data availability**	**Materiality**
1. Electricity consumption					
1.1. Procurement of conventional electricity	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
1.2. Procurement of green electricity (with guarantee of origin)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
1.3. Internal consumption of electricity from renewable energies	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
1.4. Other electricity consumption (i. e. not recorded in 1.1 to 1.3)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
2. Procurement of steam					
2.1 Equipment operated with steam	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
3. Procurement of district heating					
3.1. District heating	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
3.2. Other district heating use	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
4. Cooling					
4.1 Procurement of refrigerants (through pipelines)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low

Climate protection aspects in accordance with Scope 3: Other indirect emissions from processes which are caused by administrations, either directly or indirectly					
	Significance in terms of volume	**Controllability**	**Stakeholder relevance**	**Data availability**	**Materiality**
1. Purchased goods and services					
1.1 Emissions from the mining and extraction of raw materials and materials for purchased products	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
1.2 Emissions from the production, transport, distribution and disposal of purchased products	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
1.3 Emissions from contracted services or services used	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
1.4 Emissions from other procurements and contracting	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low

	Significance in terms of volume	Controllability	Stakeholder relevance	Data availability	Materiality
2. Capital goods					
2.1 Upstream emissions from buildings (materials, building and maintenance)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
2.2 Upstream emissions from infrastructure and fittings (vehicles, furniture, equipment and devices, etc.)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
2.3 Emissions from construction work (unless included in Scope 1 or 2)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
3. Fuels and energy					
3.1 Upstream emissions from thermal energy consumption	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
3.2 Upstream emissions from fuel consumption	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
3.3 Upstream emissions from electricity consumption	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
3.4 Upstream emissions from renewable energy generation	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
4. Transport and distribution (upstream)					
4.1 Upstream emissions from the transport and distribution of purchased goods and services	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
4.2 Upstream emissions from the transport and distribution of capital goods	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
5. Waste (on site)					
5.1 Emissions from the transport, treatment, recycling and disposal of generated waste	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
6. Business trips					
6.1 Emissions from employees' business flights	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
6.2 Emissions from employees' business rail journeys	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
6.3 Emissions from the use of private cars for business	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
6.4 Emissions from overnight stays during business trips	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low

	Significance in terms of volume	Controllability	Stakeholder relevance	Data availability	Materiality
7. Staff commuting					
7.1 Emissions from regular commuting	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
7.2 Emissions from mobile working (additional energy consumption when working from home)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
8. Tangible fixed assets rented out or leased to the organisation					
8.1 Emissions from rented out or leased tangible fixed assets (unless included in Scope 1 or 2)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
9. Transport and distribution (downstream)					
9.1 Transport and distribution of manufactured goods and services (publications, etc.)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
10. Processing of sold products					
11. Use of sold products					
11.1. Emissions from continued use of decommissioned goods	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
12. Disposal of sold products					
13. Tangible fixed assets rented out or let by the organisation					
13.1 Emissions from rented out equipment and devices (e. g. kitchen, cafeteria, printing press)	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low
14. Franchises, concessions, patents					
15. Investments					
15.1 Emissions from sponsored investment projects	❑ high ❑ medium ❑ low	❑ direct ❑ indirect ❑ not at all	❑ high ❑ medium ❑ low	❑ good ❑ medium ❑ poor	❑ high ❑ medium ❑ low

Appendix III: Emission factors for the consumption of electricity and heating

Table III-1

Emission factors including upstream chains for the electricity obtained from the general grid (general electricity mix) and for self-generated electricity from renewable energy sources

Energy source	Emission factor in g CO_2eq/kWh[2]
General electricity mix	551
Biogenic proportion of waste	1
Landfill gas	124
Sewage gas	124
Biogas	341
Liquid biomass	252
Solid biomass	72
Deep geothermal energy	177
Photovoltaics	67
Offshore wind energy	6
Onshore wind energy	10
Hydroelectric power	4

1 Data in tables III-1 to III-3 based on UBA: *Emissionsbilanz erneuerbarer Energieträger – Bestimmung der vermiedenen Emissionen im Jahr 2018* (Emission inventories for renewable energy sources – Identification of avoidable emissions in 2018); Climate Change 37/2019. Corresponding to: 1 g/CO_2eq/kWh = 1 kg CO_2eq/MWh = 1 t CO_2eq/GWh.

Table III-2

Emission factors including upstream chains for fuel consumption and use of energy sources for heating and cooling

Energy source	Emission factor in g CO_2eq/kWh
Heating oil	318
Natural gas	246
Coal	428
Brown coal briquettes	443
District heating (including grid losses)	305
Electricity (including grid losses)	551
Wood chips	27
Wood pellets	22
Vegetable oil	146
Solar thermal energy	21
Biogas/biomethane	150
Deep geothermal energy	38

Table III-3

Avoidance factors for electricity generation from renewable energy sources (in g CO_2eq per kWh)

Energy source	Avoidance factor in g CO_2 eq/kWh
Biogenic proportion of waste	733
Landfill gas	612
Sewage gas	613
Biogas	394
Liquid biomass	536
Solid biomass	665
Deep geothermal energy	556
Photovoltaics	627
Offshore wind energy	701
Onshore wind energy	693
Hydroelectric power	736

Table III-4

Refrigerant losses from heat pumps, cooling systems and air conditioning systems (as % of emissions in CO_2eq)[1]

Equipment type	Refrigerant losses [%]		Average duration [a]
	Leak rate	Disposal loss	
Monosplit	5	38.5	10
Multisplit	4.6	21	13
VRF	5.3	21	13
Liquid coolers	3	19	15
Liquid coolers with turbo compressor	3	19	25
Heat pumps	2.5	28.5	15
Refrigeration units	1	39.6	10
Condensing unit	5.3	20.4	12
Cold store	4.9	17.9	30

Calculation of annual refrigerant losses in CO_2 equivalents:
Fill level [kg] x leak rate [%] x GWP value of refrigerant + fill level [kg] x disposal loss [%] x GWP value of refrigerant/lifespan of the equipment;
GWP values of fluorinated refrigerants which are frequently used: R404A=3.922, R410A= 2.088, R407C=1.774, R134a=1.430, R32=675, R1234ze(E)=7[2].

1 UBA: *Berichterstattung unter der Klimarahmenkonvention der Vereinten Nationen und dem Kyoto-Protokoll 2020 – Nationaler Inventarbericht zum Deutschen Treibhausgasinventar 1990–2018* (Submission under the United Nations Framework Convention on Climate Change and the Kyoto Protocol 2020 National Inventory Report for the German Greenhouse Gas Inventory 1990–2018), Climate Change 22/2020, July 2020, chapter 4.7.1, https://www.umweltbundesamt.de/publikationen/submission-under-the-united-nations-framework-5.

2 UBA: *Treibhauspotentiale (Global Warming Potential, GWP) ausgewählter Verbindungen und deren Gemische gemäß Viertem Sachstandsbericht des IPCC bezogen auf einen Zeitraum von 100 Jahren* (Global warming potential (GWP) of selected compounds and mixtures of them in accordance with the IPCC Fourth Assessment Report based on a period of 100 years), https://www.umweltbundesamt.de/sites/default/files/medien/2503/dokumente/treibhauspotentiale_ausgewaehlter_verbindungen_und_deren_gemische.pdf.

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