

Climate Action for Sustainable Major Sports Events

Selected recommendations for action to minimise carbon footprints at major sports events

Annex to the final report:

Concept and Feasibility Study for a "Climate-Neutral" Staging of the 2024 UEFA European Football Championship (UEFA EURO 2024)

FKZ: UM21160060

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The R&D project on which this report is based was carried out on behalf of the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection. Responsibility for the content of this publication lies with the authors.



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Introduction

The present document "Climate Action for Sustainable Major Sports Events" represents the annex volume to the "Concept and Feasibility Study for a 'Climate Neutral' Staging of the 2024 UEFA European Football Championship (UEFA EURO 2024)" final report.¹

This annex volume contains selected recommendations for climate action at major sporting events and is aimed at the stakeholders involved in planning and carrying out such events. The main contents are the carbon footprint of large sporting events and concrete measures to reduce that footprint. In addition, the concept of "climate responsibility" is presented.

The concrete climate action measures are structured and discussed in the form of tables and checklists in six fields of action: transport, energy efficiency, energy supply, catering, use of materials and overnight stays.

¹ *Konzept- und Machbarkeitsstudie für eine "klimaneutrale" Ausrichtung der Fußball-Europameisterschaft der Herren 2024 (UEFA EURO 2024), Schlussbericht, FKZ: UM21160060, July 2022.*

Carbon footprint – the basics

What are the advantages of a carbon footprint?

"What gets measured, gets managed"

This often-cited statement draws attention to the fact that it is difficult for decision-makers to take appropriate measures without a solid quantitative data basis. With the help of a carbon footprint, which records and quantifies the greenhouse (GHG) gas emissions caused by the upcoming major sporting event, it is possible to identify which areas are particularly relevant and which stakeholder groups are responsible.

The **advantages of a carbon footprint** at a glance:

- Hot spots are identified, i.e. the most important individual items that contribute to the overall balance.
- "Low-hanging fruit" is identified, i.e. individual items where a significant reduction in greenhouse gases can be achieved with comparatively simple measures.
- The total amount of greenhouse gas emissions caused by the major sporting event is known, so that the extent of any compensation payments or own climate action projects can be estimated.
- Potential measures can be simulated with regard to their greenhouse gas effect with little effort and the possible savings potential can be quantified accordingly.
- Data collection triggers an intensive exchange within the organisation: Employees network and all those involved are made aware of the climate impact of the large sporting event.
- External inquiries on the subject of climate can be answered in a well-founded manner.

What is the process of a carbon footprint?

To ensure that important decisions can be made on the basis of a robust carbon footprint, that footprint should be carried out over an appropriately long period of time before the start of the major sporting event. At this point, of course, not all the relevant data that will ultimately determine the outcome of the carbon footprint are available. Much of the data can only be collected during the event itself. Nevertheless, a well-founded carbon footprint can already be drawn up several years in advance – this is termed an **ex-ante carbon footprint** (or advance carbon footprint).

Carrying out the carbon footprint is usually an external service offered by institutes, NGOs, engineering consultancies, etc. These experts ideally have access to data from previous major sporting events, such as the amount of beverages and food sold per person. In addition, a lot of data can be determined with good accuracy several years before the event, for example the sites at which sports events will be held.

Often, the organisation carrying out the event already has experience with past events or commands over planning data for the upcoming major sporting event. The carbon footprint experts will try to retrieve this knowledge and filter it for the purpose of the ex-ante carbon footprint. As a rule, there is an intensive exchange – both between experts and the implementing organisation as well as within the organisation.

With the help of data on greenhouse gas emissions per unit of product, per unit of a certain activity, etc., which the expert usually takes from corresponding databases, the ex-ante carbon footprint is created within a few months, which can then be used as an important basis for decision-making. The

implementing organisation learns how many tons of greenhouse gas emissions are to be expected for the entire event, which aspects contribute particularly strongly to the result, which actors are responsible for the corresponding emissions, etc.

Often, the actual activities, consumption, etc. are measured during the major sporting event and a climate balance is carried out after the event on the basis of this data – an **ex-post carbon footprint**. This is subject to significantly fewer uncertainties and is suitable for budgeting any compensation payments or own climate action projects.

What rules apply when preparing the carbon footprint?

The **Greenhouse Gas Protocol** has been the internationally recognised methodological standard for climate accounting for many years. It was initiated in the late 1990s by the World Resources Institute and the World Business Council for Sustainable Development and published for the first time in 2001. The most common application is climate balances for companies. The contents can also be applied widely to events.

The Greenhouse Gas Protocol provides particular support in **defining the scope of the carbon footprint**, i.e. in deciding which activities and aspects are recorded in terms of their greenhouse gas emissions and accounted for in the overall balance sheet. In addition, according to the Greenhouse Gas Protocol, all emissions must be classified into one of three categories, also known as Scope 1, Scope 2 or Scope 3. In particular, this should make it possible to determine at a glance how emissions can be influenced.

- Scope 1 emissions are direct emissions from sources owned or controlled by the organisation.
- Scope 2 emissions are those that occur due to the electricity demand of the major sporting event at the site of electricity production.
- Scope 3 emissions are all other indirect emissions.

According to the Greenhouse Gas Protocol, all **greenhouse gases** are to be recorded, i.e. particularly methane (CH₄), nitrous oxide (N₂O) and refrigerants in addition to CO₂. Different greenhouse gases contribute to global warming to different extents and are therefore converted into CO₂ equivalents using conversion factors.

Carbon footprint – defining the scope

The definition of the scope² determines which activities and aspects are recorded in terms of their greenhouse gas emissions and added to the overall balance. The scope is usually defined in close consultation between the clients of the carbon footprint, i.e. the decision-makers of the major sporting event, and the organisation responsible for preparing the footprint ("implementing organisation"). This is an important step that significantly determines the overall result of the carbon footprint.

What can I use to guide my selection?

If the scope is set too narrowly, there is a risk that not all emissions caused by the major sporting event are covered and public criticism of the carbon footprint may be voiced. If the scope is set too broadly, there is a risk that no actor will want to take responsibility for certain emissions and the statements will be watered down.

Therefore, keep the following **criteria in mind** when defining the scope:

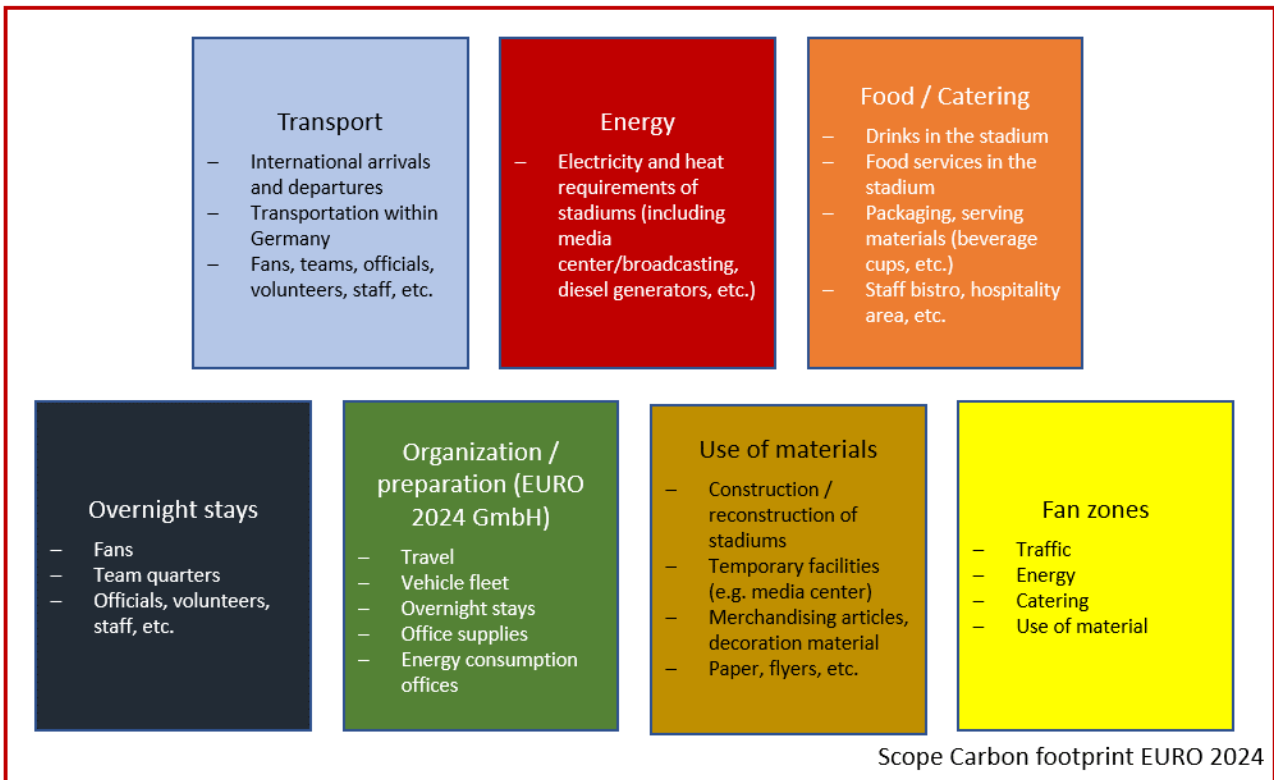
- **Causality:** Are the emissions of the aspect in question caused by the major sporting event? Or would the emissions (in part) also have occurred without the major sporting event?
- **Materiality / Relevance:** Is this an aspect that causes relevant amounts of greenhouse gas emissions? In many cases, initial rough calculations are needed to appraise this point. There is no generally accepted definition of the level at which an emission is considered significant or relevant. It is recommended to include aspects in the scope that represent at least 1% of the total emissions.
- **Influenceability:** Can the emissions (in part) be influenced by decision-makers involved or are they outside their sphere of influence?

Make a decision

The definition of the scope is always a case-by-case decision. An aspect that is already clearly relevant for one event in the preliminary assessment, for example fan zones, may sometimes be irrelevant for another event. Against this background, the definition of the scope must always be accompanied by intensive weighing and discussion.

² Other common terms are system boundary or balance frame.

An overview of potential scope elements to be considered is shown in the following figure.



Temporal and spatial definition of the scope

In addition, it must be defined which points in time mark the start and end of the coverage. In particular, it must be decided whether organisational preparations, sporting qualifications, official events, etc. that lie up to several years before the actual major sporting event should also be included in the scope.

With regard to the spatial system boundary, emissions should not only be recorded in the host country. International travel to and from the event, especially by athletes, organisations and spectators, should also be accounted for, as should emissions from the value chain of products such as steel or food.

Sports facilities are part of the scope

There are certain elements that are a mandatory part of the scope of the carbon footprint of a major sporting event. These include, in particular, the transport and overnight stays of fans. Sports facilities (e.g. stadiums) must also be included in the scope. Please note: Inclusion in the scope does not mean that the emissions associated with the initial construction of the sports facilities are to be allocated 100% to the major sporting event for which the carbon footprint analysis is performed. Depending on the subsequent use of the sports facilities, a proportion of construction-related emissions may be allocated based on the facilities' useful life.

Carbon footprint – the data collection

What are the types of data?

A large number of different data are included in a carbon footprint. A rough differentiation can be made between

- A) Data for mapping the right processes and averages, e.g.
 - which groups of people are to be considered?
 - what is the modal split?
- B) Data to record the quantitative scope of an activity, e.g.
 - how far did a fan travel?
 - how many nights were booked?
- C) Data used to determine greenhouse gas emissions per unit of product or activity (specific emission factor), e.g.
 - per passenger-kilometre coach,
 - per litre of beer.

What must be considered during data collection?

While type C) data can usually be extracted from established databases that can be accessed by the carbon footprint experts performing the compilation, the implementing organisation must be proactive for type A) and B) data. In many cases, the information already exists. This is especially true for qualitative data, which sometimes seem obvious but play a crucial role for the carbon footprint, for example whether or which temporary structures are planned for the event. Numerous other data are also already recorded by the organisation as standard, for example energy consumption of sports facilities. The main task here is to process the existing data material.

With regard to data collection during the event, the organisation staging it will automatically and independently collect a lot of relevant data that can be used for the ex-post carbon footprint, such as the actual number of tickets sold.

Nevertheless, preparations must be made for data collection during the event so that the ex-post carbon footprint can access all the necessary data. The focus should be on transport and overnight stays, i.e. on the areas that usually have the greatest relevance for the CO₂ footprint.

Data acquisition via app

In many cases, an app is developed for the major sporting event, which spectators and, as appropriate, other participants can use to buy tickets and organise the event. It should be examined to what extent it is possible to collect data via the app, e.g. in order to record information on where the ticket holders live or which transport routes will be associated with travel to and from the event. For example, the zip code and permission to use this information for scientific purposes could be requested when tickets are purchased.

Data collection via questionnaires

For a complete and correct mapping of the greenhouse gas emissions associated with transport and overnight stays, further information is still needed that does not automatically result from ticket purchases (via app). Explicit surveys are essential for this. These can be carried out both on site – i.e. at the sports venues or event locations (e.g. fan zones, public viewing, etc.) – and digitally via app or similar.

Sample questions for spectators

- Did you arrive or depart mainly to visit the sports/event venue?
- How many events have you attended (number of tickets)?
- How often were you at the sports/event venue (if entered multiple times in one day, count accordingly)?
- What modes of transport did your journey to the hotel and to the sports or event venue consist of?
 - Passenger car:
 - Number of km incl. return trip _____
 - How many people were in the car? _____
 - Coach:
 - Journey: Starting point _____ Destination _____ incl. return journey? __yes/no?
 - Train:
 - Journey: Starting point _____ Destination _____ incl. return journey? __yes/no?
 - Airplane:
 - Flight: Starting point _____ Destination _____ incl. return flight? __yes/no?
- How many nights in total did you book in commercial accommodation (hotel, motel, vacation rental, Airbnb, etc.)? How many stars did the accommodation have?

What does your statement refer to? Sports event, fan zone, etc.? _____

Sample questions for other groups of people

- To which group of people do you belong: officials (e.g. FIFA, IOC, UEFA, organising committee, representatives of federal government / state government / host cities, police, etc.), partner / sponsor, media, volunteer, staff (security, medical, catering, cleaning, hosts/hostesses, driver, waste management, guide)? _____
- What were your *total* travel distances, i.e. including any international travel to and from the event as well as travel within Germany, as a result of your involvement in the event?
 - Passenger car:
 - Number of km incl. return trip _____
 - How many people were in the car for the majority of the trips? _____
 - Coach:
 - Journey 1: Starting point _____ Destination _____ incl. return journey? _____yes/no?
 - Journey 2: Starting point _____ Destination _____ incl. return journey? _____yes/no?
 - ...
 - Train:
 - Journey 1: Starting point _____ Destination _____ incl. return journey? _____yes/no?
 - Journey 2: Starting point _____ Destination _____ incl. return journey? _____yes/no?
 - ...
 - Airplane:
 - Flight 1: Starting point _____ Destination _____ incl. return flight? _____yes/no?
 - Flight 2: Starting point _____ Destination _____ incl. return flight? _____yes/no?
 - ...
- How many nights in total did you book in commercial accommodations (hotel, motel, vacation rental, Airbnb, etc.)? How many stars did the accommodation have?

Data collection in the areas of energy, catering, organisation, material usage

In the areas of energy, catering, organisation and use of materials, the following aspects in particular should be recorded:

- Type and volume of material required for (temporary) structures or facilities, for example m³ of concrete, m³ of reinforced concrete, t of steel, t of wood, t of plaster, t of plastics, carpets, fabrics, etc.
- Energy consumption at sports facilities, especially heat (natural gas, etc.), electricity and diesel in diesel generators, as well as own generation and consumption of renewable energy
- Energy consumption at other facilities, for example the International Broadcasting Centre and temporary facilities
- Quantities of food and beverages sold at all associated event venues
- Travel and accommodation associated with tournament organisation
- Merchandising products, textiles, etc. produced

Building blocks of a climate action plan for events

The **development of climate targets** can be an important component of a climate strategy for a large sporting event. They can serve as a basis for the development of specific actions to be taken, and underpin commitment to implementing an action plan. On the following pages, suggestions and examples for possible targets are presented for the individual fields of action. These need to be adapted and modified for a given event. Targets facilitate the monitoring and evaluation of what has been achieved for climate action at a specific event. The goals and measures in the fields of action promote the overarching goal of making a large sporting event as climate-friendly or "climate-neutral" as possible.

A core area of any climate action plan is the **development of suitable and practicable climate action measures**. With the help of such measures, possible goals are to be achieved and the greenhouse gas (GHG) emissions of a (large) sporting event are to be minimised as far as possible. In the following, climate action measures are presented structured according to different climate-relevant fields of action of sporting events. They provide an overview of the possibilities for working actively towards a climate-friendly (large) sporting event.

Since the focus of these recommendations for action is on climate protection and the reduction of GHG emissions, measures in other areas such as water and wastewater, nature and landscape, or noise are not addressed. The organisation of events and communication, which are also important building blocks for the success of a climate action plan, are not addressed here either. On the other hand, attention is paid to the transport sector, which causes by far the largest share of GHG emissions of a large sporting event. The sports facilities and their efficient operation are addressed under the heading of energy efficiency. The actual construction of the sports facilities is left out, as this cannot be addressed suitably within the scope of the present recommendations for action.

The possible climate action measures are presented below in tables and checklists. In addition to brief explanations of the measures, the key partners for implementing them are also named.

For further information and the basic approach to planning and carrying out an environmentally friendly major sports event, please refer to the Green Champions guide³ and the Green Champions 2.0 Internet portal (<https://www.green-champions.de>). Comprehensive lists of measures for all relevant fields of action can also be found there.

³ Green Champions for Sport and the Environment, Guidelines for Environmentally Friendly Major Sporting Events, Oeko-Institut e. V., German Sport University Cologne, Science Journalist C. Friedl, published by DOSB, BMU, 2007.

Climate action measures in the transport sector

Large sporting events are attended by a large number of spectators. In addition, there are many volunteers, officials, the organising team, media representatives and other stakeholders involved in such events. Not surprisingly, the greenhouse emissions resulting from the journeys of these people represent **by far the largest share of all greenhouse emissions** attributable to an event. Typically, transportation often accounts for more than three-quarters of all greenhouse gas emissions from large sporting events. Effective **measures for environmentally sound transportation behaviour are the linchpin of climate action** and represent the greatest challenge of large sporting events. Transport measures come into play at all levels, international, national and local, necessitating close interlinking between measures.

Examples of qualitative and/or quantitative targets

No flights are operated within the host country. Exceptions for train journeys of more than (e.g.) 8 hours time duration are to be considered.

Only battery electric vehicles are used for the vehicle fleet.

The share of bicycles in the modal split to sports facilities is at least 10%.

Measure	Explanation	Responsible	Already available / done	New / to be addressed
National combined ticket	The ticket for the sports event also entitles the holder to use public transport in the venue on the day of the match and the following day at no additional cost (established combined ticket). In addition, the ticket allows free use of long-distance trains to the venue on the day before the event, on the day of the event and on the day after the event.	Organisers, transport associations, rail companies	<input type="checkbox"/>	<input type="checkbox"/>
Use of alternative fuels for aircraft; PtL demonstration project.	Use of alternative, low-GHG fuels, PtL (Power to Liquid), for non-avoidable flights as a lighthouse/demonstration project. It is assumed that only selected flights can be realised with alternative fuel (mix: conventional kerosene with a small proportion of PtL fuel) in	Organisers, PtL plant operator, airline	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
	the next few years. Cooperation project between an operator of a PtL (pilot) plant and an airline.			
Travel of national teams by train to the host country	Role model function: Teams and athletes use the train for arrival/departure instead of airplane for international travel to the host country. There are many destinations (especially neighbouring countries) that can be reached by train in a reasonable amount of time. Special trains or special compartments can be arranged for national teams.	Sports associations/national federations, athletes, organisers, rail companies	<input type="checkbox"/>	<input type="checkbox"/>
Travel of foreign visitors by train to the host country	Use of train instead of airplane/car for travel of foreign visitors to the host country. Reduction of GHG emissions: as many flights (and car journeys) of the visitors as possible are replaced by train journeys. There are many destinations that can be covered by train in a reasonable amount of time or in a time similar to car trips. Europe-wide night trains are also an option. Special trains can also be useful for fans/visitors; e.g. arrival/departure on the day before or after a single event. Attractive, cross-border special tickets for international travel must be offered, and extensive communication is necessary.	Visitors, organisers, rail companies	<input type="checkbox"/>	<input type="checkbox"/>
All athletes and teams refrain from flying within the host country	Role model function: All (national) teams and athletes exclusively use train/bus within the host country. Voluntary commitment of all teams/athletes to a "no-fly policy". (Exceptions for journeys of e.g. more than 6 or 8 hours to be considered.) Depending on the route and the accommodation of the teams/athletes, a combination of train/bus (preferably electric bus) may be necessary and useful. Some teams/athletes can participate in the event completely "flight-free" (incl. international travel). Offers of special compartments for athletes/teams; to be considered:	Sports federations / national associations, athletes, organisers	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
	are special trains (e.g. direct trains without stopover) necessary and possible for certain destinations?			
Optimisation of event plan	Optimise event/match schedule in such a way that travel distances are reduced as much as possible. Design the match plan in such a way that long (time duration) destinations are avoided.	Organiser	<input type="checkbox"/>	<input type="checkbox"/>
Use of e-buses for the team buses	Provision of e-buses (or hydrogen buses) to all teams, for use.	Organisers, Sponsors	<input type="checkbox"/>	<input type="checkbox"/>
Free use of public transport, both long-distance and local, for all officials	Time-limited (duration of event plus short period for pre/post-event preparation) free use of public transport for all officials (organising team, etc.), helpers, journalists, etc. Limited to all journeys between, from/to venues and cities	Organisers, transport associations, rail companies	<input type="checkbox"/>	<input type="checkbox"/>
Officials refrain from air travel	Obligation of all officials etc. to refrain from flights, cars; flight/car only possible in exceptional cases.	Organiser	<input type="checkbox"/>	<input type="checkbox"/>
Formulation of travel policy	Development of a travel guideline for the organisation team and other stakeholder groups: Preference for environmentally friendly public transport; air travel only from e.g. 700km upwards, car only when transporting luggage/material etc.	Organiser	<input type="checkbox"/>	<input type="checkbox"/>
Reduction in number of business trips	Reduce number of work/office trips and number of participants as much as possible and hold digital meetings wherever possible (organising team, event organisers).	Organiser	<input type="checkbox"/>	<input type="checkbox"/>
Expansion of train service	Additional train services in the late evening/night hours to enable the journey home after the end of the event (also to more distant destinations). In addition, special trains for e.g. foreign fan groups.	Organisers, transport associations, rail companies	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
Reduction of national private transport through on-demand bus service	<p>On-demand bus service, especially for (rural) areas with poor rail/(public transport) connections: flexible (tour) buses / minibuses, on demand via app.</p> <p>Vehicles pick up passengers at specific hubs and drive directly to the sports venue or to the next larger train station; after the event ends, same route back.</p>	Organisers, transport associations, rail companies	<input type="checkbox"/>	<input type="checkbox"/>
Expansion of local public transport services	<p>Expansion of capacities on event days (buses, rapid rail transit, subway/underground, trams).</p> <p>Establishment of shuttle buses to sports / event venues / media centres. Shuttle buses (with alternative drives).</p> <p>Improved public transport links between the surrounding area/region and the sports / event venues (e.g. special trains / buses, consider improved frequency).</p>	Organisers, transport associations, rail companies	<input type="checkbox"/>	<input type="checkbox"/>
Alternative drives	<p>If possible, use buses with alternative drives (e-buses, hydrogen) for routes to sports / event venues / media centres; e.g. for shuttle traffic.</p>	Organisers, transport associations, sponsors	<input type="checkbox"/>	<input type="checkbox"/>
Develop mobility app	<p>All information on environmentally friendly arrival/departure and travel within the host cities. See, for example, citymapper.com. Extend information to also cover tourism offers (e.g. the 10 highlights of each host city).</p>	Organisers, host cities	<input type="checkbox"/>	<input type="checkbox"/>
Reduction in the number of parking spaces	<p>No parking at sports facilities and their wide surroundings for private cars; no park-and-ride parking. Parking spaces only for buses and people with disabilities.</p> <p>Consistent parking bans in the wide vicinity of sports venues; designation of no-parking zones throughout the host city; inspection and awareness-raising activities.</p>	Organisers, host cities	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
Rededication of parking spaces	Permanent rededication of portions of sports facility parking areas for e.g. bicycle parking (incl. multi-storey), photovoltaic (PV) systems.	Sports facility operator / owner	<input type="checkbox"/>	<input type="checkbox"/>
Parking fees	Increase in parking fees on match days in the host city (e.g. in multi-storey car parks).	Host cities	<input type="checkbox"/>	<input type="checkbox"/>
Bicycle parking	Creation of a sufficient number of secure bicycle parking spaces (e.g. multi-storey) at all sports facilities	Sports facility operator / owner	<input type="checkbox"/>	<input type="checkbox"/>
Transport bikes	Use transport bikes for logistics transport in the host city wherever possible; by organising team during planning, preparation and execution of the event. After the event, the transport bikes can be transferred to a city project; see for instance the "Heinerbike" scheme of the city of Darmstadt in Germany (free cargo bike rental for all).	Organisers, host cities	<input type="checkbox"/>	<input type="checkbox"/>
Charging stations for e-bikes	Charging stations for e-bikes at sports facilities in sufficient quantity, possibly with monitoring at bicycle parking area	Sports facility operator / owner	<input type="checkbox"/>	<input type="checkbox"/>
Expansion of cycle paths	Creation of new / improvement of existing safe bike lanes to all sports venues. Short-term (pop-up) and permanent bike lanes; coordination with the bike lane concept of the respective host city. Regional bike path concept to host city and its sports venues. Connection of the surrounding communities; coordination with the city and region's cycle path concept (e.g. cycle fast lanes).	Host cities, sports facility operators/owners, event organisers	<input type="checkbox"/>	<input type="checkbox"/>
Signage of bike paths	Comprehensive (permanent) signage of cycling routes (to sports venues) in the host city and region.	Host cities	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
Rental bikes	Increase number of sharing/loan/rental bicycles in host cities (during the event period). Offer bike rickshaws, especially as a tourist option.	Host cities, organisers	<input type="checkbox"/>	<input type="checkbox"/>
Reward for cyclists	Incentives when using the bike; e.g. a coupon at gated bike parking for a discounted drink.	Organiser, caterer	<input type="checkbox"/>	<input type="checkbox"/>
Bike repair shops	Establish (temporary) bicycle repair/service stations at sports venues.	Host cities, sports facility operators / owners, organisers	<input type="checkbox"/>	<input type="checkbox"/>
Fan routes to sports venues and public viewing	Establishment of "fan routes" to sports venues. Designation of the route with e.g. "red carpet"; such as a main route from the city centre / train station to sports facilities and public viewing. Choice of location for public viewing: good accessibility by foot, bicycle and local public transport. Signposting of and communication about the fan routes (sports facilities and public viewing). Attractive design of fan routes; food/drink, entertainment, culture, information. If possible, take into account when routing: places of interest, attractive route in "green areas" (parks), safe routes (no or clear demarcation of streets), attractive neighbourhoods (culture, entertainment), climate adaptation (shading) Citizen participation; e.g. development and implementation of concepts by neighbourhoods.	Host cities, organisers	<input type="checkbox"/>	<input type="checkbox"/>
Environmentally friendly vehicle fleet	Use only e-vehicles (passenger cars, minibuses, etc.; only battery electric vehicles (BEV)); use efficient vehicles (battery electric cars	Organiser	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
	with low consumption e.g. up to 18 kWh/ 100 km). Keep number of vehicles to a minimum.			
Charging options	Create charging options for all e-vehicles (also e-bicycles, e-load bikes) at all sports facilities	Sports facility operators / owners, organisers	<input type="checkbox"/>	<input type="checkbox"/>
Environmentally friendly logistics transport	Acquire/use cargo bikes and e-transport vehicles for logistics transportation in event cities.	Organiser	<input type="checkbox"/>	<input type="checkbox"/>
Driver training	Offer electricity-saving driving training to all drivers.	Organiser	<input type="checkbox"/>	<input type="checkbox"/>
VIP group transport	VIP transport in event cities (trips from e.g. train station to stadium): Carry out group transports with e-minibuses; avoid individual transports and limousines.	Organiser	<input type="checkbox"/>	<input type="checkbox"/>

Climate action measures in the area of energy efficiency

Electricity represents the decisive cost factor in energy consumption and is crucial for the carbon footprint of the energy sector of large sporting events. Both technical efficiency measures and organisational measures contribute to the reduction of energy consumption.

Examples of qualitative and/or quantitative targets

Reduction of the annual energy consumption of the sports facilities (electricity and heat) by X% compared to the reference year.

A comprehensive energy check is carried out at all sports facilities and specific energy-saving measures are derived and implemented.

Measure	Explanation	Responsible	Already available / done	New / to be addressed
Comprehensive energy check and development of reduction measures	<p>Stadiums, arenas and other large sports facilities are complex buildings. A consideration of individual measures is often not sufficient to tap high savings potentials. Rather, an overall system approach is necessary. Carrying out a comprehensive energy analysis by a qualified engineering firm, taking into account usage in line with requirements. Development of energy efficiency measures and optimisation of energy supply. The goal is a significant reduction in energy demand. Examples of possible measures: Energy management/controlling, LED lighting, optimisation/modernisation of the heating system, optimisation of the lawn heating system, measures for ventilation/heating/cooling, night setback and adjustment of the heating curve, individual room control and temperature adjustment of the ancillary rooms.</p> <p>Comprehensive energy check of all sports facilities of a league in convoy; implementation as a joint action in the run-up to the major sports event.</p>	Sports facility operator/owner	<input type="checkbox"/>	<input type="checkbox"/>
Reduce opening hours	Reduced opening hours of e.g. media centres, accreditation centres, canteens, etc.	Organiser, sports facility operator	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
Temperature control of temporary facilities	Temperature control system to improve air conditioning in the temporary facilities; heating and cooling based on demand and depending on the outside temperature.	Organiser, sports facility operator	<input type="checkbox"/>	<input type="checkbox"/>
Use of equipment with the highest energy efficiency	Use of equipment with highest energy efficiency for video wall, sound system, lighting, catering, ventilation/heating/cooling for all temporary facilities; already consider in tenders.	Organiser, sports facility operator	<input type="checkbox"/>	<input type="checkbox"/>
LED lighting	Conversion of all lighting to LED in sports facilities. Use of LED lighting in all temporary facilities; include in tenders.	Organiser, sports facility operator/owner	<input type="checkbox"/>	<input type="checkbox"/>
Lighting control	Installation of timers in passage and staircase areas; light switching via motion/presence detectors or partial switching off of unnecessary lights; brightness sensors for daylight-dependent control of lighting	Sports facility operator/owner	<input type="checkbox"/>	<input type="checkbox"/>
Use of energy-efficient devices	Use of IT equipment, printers, multifunction devices, etc. that meet the criteria of the "Blue Angel" eco-label. Use of freezers, refrigerators, dishwashers with the highest energy efficiency class.	Sports facility operator/owner	<input type="checkbox"/>	<input type="checkbox"/>
Optimise device settings	Device settings of computers/laptops and training of employees regarding user behaviour (standby, energy-saving mode of the IT infrastructure; (night) shutdown of computers, monitors, copiers, etc.)	Organiser, sports facility operator/owner	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
Reduction of electricity demand in sports facilities	Division of interior lighting into individually switchable groups, verification of night setback in all areas	Sports facility operator/owner	<input type="checkbox"/>	<input type="checkbox"/>
LED strip systems	Installation or retrofitting of energy-efficient LED strip systems in stadiums and other sports facilities.	Sports facility operator/owner	<input type="checkbox"/>	<input type="checkbox"/>
Reduction of cooling demand in sports facilities	Insulated facade reduces need for cooling, passive solar control measures: Sun protection and shading of windows and glass surfaces, natural aeration and ventilation	Sports facility operator/owner	<input type="checkbox"/>	<input type="checkbox"/>
Reduction of energy demand for air conditioning	Air conditioning: not more than 6 degrees below outside temperature	Sports facility operator	<input type="checkbox"/>	<input type="checkbox"/>
Refrigeration plant	Optimised control of the refrigeration system according to weather conditions	Sports facility operator	<input type="checkbox"/>	<input type="checkbox"/>
Proper ventilation	Training of employees on correct, i.e. energy-efficient ventilation	Sports facility operator	<input type="checkbox"/>	<input type="checkbox"/>
Energy management / controlling in sports facilities	Central control of individual heat and electricity consumers; switching on only when required; seasonal / usage-related adjustment of heating and cooling supply; improvement of consumption transparency through installation of meters; building management system	Sports facility operator/owner	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
Air conditioning of the server room	Optimisation (increased) server room temperatures; optimisation of server room air conditioning	Sports facility operator/owner	<input type="checkbox"/>	<input type="checkbox"/>
Reduction of heat demand in sports facilities	Waste water heat recovery, heat recovery from kitchen exhaust air system, no hot water connections for hand wash basins, temperature reduction at night, room temperature not above 20 degrees, inspection of heated surfaces by means of thermal imaging camera	Sports facility operator/owner	<input type="checkbox"/>	<input type="checkbox"/>
Stadium turf heating	Optimised regulation of turf heating according to weather conditions	Sports facility operator	<input type="checkbox"/>	<input type="checkbox"/>

Climate action measures in the area of energy supply

Sporting events are major consumers of energy. How much electricity and heat is required depends largely on the types of sports facilities, the types of sports, and the duration of the event. The type of energy supply has a major impact on the resulting greenhouse gas emissions. The following measures to reduce greenhouse gas emissions focus on existing sports facilities and do not consider construction and a fundamentally new energy supply.

Examples of qualitative and/or quantitative targets

Use of 100% renewable energy for power supply through own generation or certified renewable electricity. X% of electricity consumption is covered by own generation with renewable energy.

At least X kW_p of photovoltaics will be newly added by year Y.

The use of diesel generators for power generation is completely dispensed with.

Measure	Explanation	Responsible	Already available / done	New / to be addressed
PV array construction	Construction of new photovoltaic (PV) systems or expansion of existing systems at the sports facility (roof of the sports facility, other roofs of adjacent buildings, roofing of footpaths, etc.). Construction of new PV systems on adjacent buildings in the immediate vicinity of the sports facility. Own consumption of PV electricity in combination with battery storage (also for existing installations).	Sports facility operators / owners, cities	<input type="checkbox"/>	<input type="checkbox"/>
PV systems on parking lots	Rededication of parking areas of the sports facility for the construction of new PV systems (an elevation of the PV panels above the parking areas should also be considered).	Sports facility operators / parking area owners	<input type="checkbox"/>	<input type="checkbox"/>
Renewable hot water production	Construction of solar thermal systems for hot water supply of sports facilities on building roofs of the sports facilities area.	Sports facility operators	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
No diesel generators	Power supply as far as possible via the electricity grid – wherever connection possibilities exist – instead of diesel generators; at sports venues, fan zones and media centres	Sports facility operators, organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>
Diesel generator replacement	Large batteries (preferably second-life batteries from electric vehicles) replace diesel generators (sports venues, fan zones, media centres). Possible applications are for back-up/uninterruptible power supply, provision of required capacity and own consumption of self-generated renewable electricity (PV systems). The batteries can replace temporary diesel generators during the event and existing permanent diesel generators at the sports venues (e.g. also for peak load management). The batteries can be charged before the day of the event/ overnight with grid electricity and/or renewable energy from PV systems and release the stored electricity on the day of the event.	Organisers, sports facility operators, cities	<input type="checkbox"/>	<input type="checkbox"/>
Certified renewable electricity	Certified "renewable" electricity (from renewable sources) is used in all areas (sports facilities, media centres, etc.) when grid electricity is purchased.	Sports facility operators, organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>

Climate action measures in the catering sector

Large quantities of food and beverages are consumed during a major sporting event. Throughout the entire production chain, i.e. including agricultural production, processing, packaging, long-distance transport, distribution, cold storage and preparation, significant greenhouse gas emissions are associated with this. Globally, food consumption causes about 25% of all greenhouse gases. Even though the field of action is of high importance for environmental and sustainability considerations, catering is of less relevance for the overall CO₂ footprint of large sporting events. However, the platform should be used for showcase projects, especially with regard to a diet low in meat and animal products.

Examples of qualitative and/or quantitative targets

At least one vegetarian or vegan alternative is offered for every meat-based offering.

Only vegetarian and vegan meals are offered in the canteens.

Measure	Explanation	Responsible	Already available / done	New / to be addressed
Vegetarian and vegan alternatives	The food offer is expanded to include vegetarian and vegan alternatives. Food stands must offer at least one vegetarian/vegan alternative to each meat-containing offer (e.g. 1 meat-containing meatball & 1 vegetarian meatball). In restaurant areas, buffets, etc., at least one separate vegetarian and one vegan alternative must be offered for each meat-containing offering.	Caterers, organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>
Predominantly vegetarian and vegan meals in canteens	Canteens for e.g. volunteers offer mainly vegetarian and vegan meals. Meat dishes are not offered or only 1-2 times per week.	Caterers, organisers	<input type="checkbox"/>	<input type="checkbox"/>
Reduction of the amount of meat per serving	For buffets, canteens, etc., the amount of meat per serving is reduced.	Caterers	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
Reduction of beef products	There will be at most one beef meal ⁴ at each food outlet (food stalls, canteens, buffets, etc.).	Caterers, organisers	<input type="checkbox"/>	<input type="checkbox"/>
Price surcharge for meals containing meat	A flat-rate surcharge for meals containing meat is applied, e.g. €1 in the restaurant area and €0.50 for food stands. The price surcharge is communicated, for example by means of a separate statement on the bill (restaurant area) or appropriate signage (food stands). The additional funds raised are used for climate action projects, for example in sports clubs.	Caterers, organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>
Pricing according to CO ₂ footprint of meals	The prices (of a food type) are set proportionally to the respective CO ₂ footprint of the food, for example, a vegan bratwurst must cost about 40% and a vegetarian bratwurst about 60% of the price set for a meat-based bratwurst (pork). ⁵	Caterers, organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>
High quality vegetarian and vegan dishes	High-quality vegetarian and vegan dishes are selected, with the help of test runs to ensure that the products taste good. The staff is trained in the preparation and cooking of vegetarian and especially vegan dishes.	Caterers	<input type="checkbox"/>	<input type="checkbox"/>
Preference for seasonal foods	In the restaurant sector, seasonal foods are increasingly used.	Caterers, organisers	<input type="checkbox"/>	<input type="checkbox"/>
Offer organic food	Organic foods are increasingly used. Due to a lower yield per unit area, the CO ₂ footprint of organic food is not in all cases lower than that of the conventional variant. The increased use of organic food is nevertheless	Caterers, organisers	<input type="checkbox"/>	<input type="checkbox"/>

⁴ Products from ruminants, especially cattle, are associated with high GHG emissions because methane is produced during digestion. In addition, the ratio of meat yield to feed fed is more detrimental for large animals. For example, the carbon footprint per kilogram of beef is approximately 3 times that of pork.

⁵ Concept and Feasibility Study for a "Climate-Neutral" Staging of the 2024 UEFA European Football Championship (UEFA EURO 2024), Section 4.4.4 Catering, FKZ: UM21160060, July 2022.

Measure	Explanation	Responsible	Already available / done	New / to be addressed
	strongly recommended due to the clear advantages in the areas of pesticide use, nature conservation, biodiversity, animal welfare, etc.			
Avoidance of goods from heated greenhouses and goods transported by plane	Products from heated greenhouses and goods transported by plane are avoided.	Caterers, organisers	<input type="checkbox"/>	<input type="checkbox"/>
Rice avoidance	Rice is by far the most climate-damaging starch supplement and is therefore avoided as much as possible.	Caterers, organisers	<input type="checkbox"/>	<input type="checkbox"/>
Tap water	Water dispensers will be set up. Tap water is also served at food stands.	Caterers, organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>
Use of environmentally friendly paper products	Environmentally friendly paper products are used, e.g. products bearing the Blue Angel eco-label DE-UZ 65 "Unbleached cooking and hot filter papers" and napkins and kitchen rolls with the Blue Angel label DE-UZ 5 "Hygienic papers made from recovered paper"	Caterers, organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>
Labeling of the dishes at the buffet	The dishes at the buffet are clearly labeled to avoid people making unintended choices	Caterers	<input type="checkbox"/>	<input type="checkbox"/>
Awareness of serving staff	The serving staff is aware of the fact that the quantities dispensed become waste in the event of non-consumption and that appropriate measures should be taken accordingly, e.g. dispensing smaller quantities, selective replenishment of dishes	Caterers	<input type="checkbox"/>	<input type="checkbox"/>
Passing on food that has not been served	Food that is not served is donated to charitable organisations, such as food banks, in order to reduce waste. The applicable hygiene regulations are observed.	Caterers, organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
Waste separation	Collection of frying oil (deep fryers) for use as biodiesel.	Caterers, organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>

Climate action measures in the area of material use

Measure	Explanation	Responsible	Already available / done	New / to be addressed
Reusable catering items	Exclusive use of reusable items (beverage cups, cups, cutlery, plates, bottles, kegs, beverage crates, etc.) in all areas. In the fan areas, the use of paper plates/pads is dispensed with when serving food (e.g. bratwurst in a bun) and materials are reduced (e.g. French fries in a bag). Use deposit systems where necessary.	Organisers, caterers	<input type="checkbox"/>	<input type="checkbox"/>
Digital information	Use of an electronic media channel for media representatives; paper is dispensed with	Organisers	<input type="checkbox"/>	<input type="checkbox"/>
Use of recycled paper	As a matter of principle, use 100% recycled paper that meets the Blue Angel eco-label criteria. Blue Angel DE-UZ 14a " Recycled paper " https://www.blauer-engel.de/de/produktwelt/papier-druck/grafische-papiere-und-kartons-aus-100-altpapier-recyclingpapier-und-karton-neu Blue Angel DE-UZ 14b "Finished products made of recycled paper for office and school use" https://www.blauer-engel.de/de/produktwelt/papier-druck/fertigerzeugnisse-aus-recyclingpapier-neu Blue Angel DE-UZ 56 " Recycled cardboard " https://www.blauer-engel.de/de/produktwelt/papier-druck/recyclingkarton-ordner-mappen Blue Angel DE-UZ 195 "Printed products" https://www.blauer-engel.de/de/produktwelt/papier-druck/druckereien-und-druckerzeugn	Organisers, sports facility operators, cities	<input type="checkbox"/>	<input type="checkbox"/>
Reduction of paper consumption	Reduction of paper consumption: Check whether a printout is really necessary; use new media for communication; double-sided printing and copying; use eco-print setting on the printer; if legibility permits, reduce text size before printing or print several pages per sheet; sheets printed on	Organisers, sports facility operators, cities	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
	one side (e.g. misprints) can be used again for drafts, test printouts or as notepads; digital invitation and event management. Provision of brochures, etc. via QR codes (e.g. display only sample copies of brochures and provide them with QR codes).			
Abstaining from merchandising	Guest gifts, giveaways, etc. are dispensed with completely (sports facilities, fan zones and all other events). If, in exceptional cases, it is not possible to do without, only high-quality, sustainable products that can be expected to have a long service life will be selected.	Organisers, sports facility operators, cities	<input type="checkbox"/>	<input type="checkbox"/>
No flyers	Physical flyers for advertising, information, etc. are completely dispensed with. Where necessary, digital flyers and information are used.	Organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>
Sustainable material procurement	Provide for sustainability criteria when inviting tenders for products and services and when awarding contracts to event agencies as well as service companies and suppliers; when selecting bidders, consider competence in environmentally oriented management (EMAS certification). In principle, products with a label should be used as a simple criterion for sustainable procurement. Overview of seals and labels: http://label-online.de ; Seal clarity – evaluation of sustainability seals: https://www.siegelklarheit.de/home ; in principle, products with a seal should be used.	Organisers, sports facility operators, cities	<input type="checkbox"/>	<input type="checkbox"/>
Alternative locations	Wherever possible, existing buildings (parts of buildings) are used (in sports facilities and in the immediate vicinity); temporary facilities are only used if no other option is possible. In fan zones, make existing toilet locations usable instead of temporary toilets.	Organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
Environmentally friendly packaging	<p>As a general rule, the use of packaging should be reduced to a minimum. This not only avoids waste, but also the environmental impact of production and the consumption of resources.</p> <p>Products that do not need packaging either for protection (safety and hygiene) or for presentation (consumer acceptance) should be left unpackaged.</p> <p>The use of packaging materials should be limited to what is absolutely necessary for the protection of the packaged products and, if necessary, for their presentation.</p> <p>Transport packaging is to be designed as reusable packaging. If reusable packaging is not feasible, disposable transport packaging should be disposed of by the supplier.</p> <p>The use of composite packaging is to be avoided or reduced wherever possible. This lays an essential foundation for the recycling of used packaging. In cases of doubt, the use of composite materials can achieve the desired benefit in total with lower material consumption. In these cases, it must be weighed up which guideline is to be followed in order to optimise the overall balance.</p> <p>Secondary raw materials should be used as far as possible in the manufacture of packaging. The use of renewable raw materials should be given preference over fossil primary materials.</p>	Organisers, sports facility operators, cities	<input type="checkbox"/>	<input type="checkbox"/>
Reuse of materials	<p>Materials that cannot be reused are put to good use (upcycling). For example, flags and banners are processed into high-quality bags. Components, other products, materials, etc. are consigned to reuse via auction, exchange or portal.</p>	Organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>
Reusable components	<p>When constructing temporary structures, the use of materials should be kept as low as possible. Tents, exhibition stands, etc. are used repeatedly (standardised, modular systems). Material intensity per use is therefore</p>	Organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>

Measure	Explanation	Responsible	Already available / done	New / to be addressed
	low. Furniture, carpets, decoration materials, lighting, electrical fittings, other infrastructure, etc. are rented. For temporary structures, building materials made of recycled or renewable raw materials should be used if possible.			
Criteria catalogues for environmentally friendly construction and sustainable procurement	Include catalogues of criteria for environmentally friendly construction and sustainable procurement in invitations to tender (for temporary structures and general procurement in sports facilities, media centres, fan zones, organisational team).	Organisers, cities	<input type="checkbox"/>	<input type="checkbox"/>

Climate action measures in the area of overnight stays

Measure	Explanation	Responsible	Already available / done	New / to be addressed
Energy management in hotels	Initiative by host cities and Dehoga to improve energy efficiency in the city's hotels. Consultation and information campaign as part of the major sporting event with the aim of getting as many hotels as possible to carry out energy checks and energy-saving measures. Energy agencies, for example, can be involved in providing energy advice.	Cities, hotel industry association	<input type="checkbox"/>	<input type="checkbox"/>
Team accommodation selection	Selection of athletes' and team accommodation according to ecological criteria (EMAS, Viabono, energy management; environmental seals such as Green Globe, ISO 14001 or the DEHOGA environmental check). The choice of location takes into account the proximity and accessibility of the venues and sports facilities as well as the connection to the rail network.	Athletes / Teams	<input type="checkbox"/>	<input type="checkbox"/>
Sustainable hotels	Selection of hotels according to ecological criteria (EMAS, etc.). The choice of location takes into account the connection to (local) public transport. Generally select a "simpler" hotel category (with fewer stars); as a rule, hotels with lower stars have lower GHG emissions per overnight stay than hotels with more stars. Give preference to listing sustainable hotels in information/booking portals.	Cities, organisers	<input type="checkbox"/>	<input type="checkbox"/>
Accessibility of accommodation and sports facility	Choose sports facility and accommodation as close to each other as possible (principle of short distances); good accessibility by public transport of sports facility (hotel - sports facility) and accommodation (train station/city hotel).	Spectators, cities, organisers	<input type="checkbox"/>	<input type="checkbox"/>

Measures to raise awareness – the example of catering

Abatement measures can be divided into two different types. First, climate action measures with the clear goal of achieving the highest possible savings in GHG emissions. And then a second type of measure contributes – in addition to its climate impact – to raising awareness of climate and environmental issues. In addition to the direct contribution to reducing carbon footprints, raising awareness is another effect that measures of climate action plans and large sporting events as a whole can have on society.

Many measures take place behind the scenes, i.e. spectators or athletes do not come into contact with them. These include technical efficiency measures in sports facility construction and operation. Other measures affect spectators directly and have the potential to raise awareness of climate action. In the area of transport, for example, these include measures such as the Kombi-Ticket (a combined multimodal ticket), which supports the use of environmentally friendly means of transport, or the range of food on offer in the catering area, which directly addresses the physical well-being of spectators. As an example of this, the bratwurst (fried sausage) is presented below as a classic food item at events.

The production of meat products causes higher GHG emissions than a vegetarian or vegan alternative. Using the example of bratwurst as a food offering at an event, a climate action measure with elements of awareness-raising in combination with monetary incentives is explained.

The production of a conventional pork bratwurst, a vegetarian bratwurst and a vegan bratwurst results in different levels of GHG emissions. For an 80-gram bratwurst, the pork variant results in the highest GHG emissions at around 0.56 kg CO₂-eq. The vegan bratwurst performs best with around 0.24 kg CO₂-eq. At 0.34 kg CO₂-eq, the vegetarian bratwurst is associated with slightly higher emissions than the vegan variant.

As a monetary incentive and to raise awareness, the pricing of the sale of bratwursts should then be proportional to the CO₂ footprint of the respective bratwurst. The pork bratwurst then costs about 2.3 times as much as the vegan bratwurst. The price ratio of the bratwursts to each other therefore reflects their CO₂ footprint.

In addition to concrete savings in GHG emissions in the catering area, such a measure with meat-free alternatives contributes to raising awareness of climate-friendly dietary options. Successful implementation of awareness-raising measures requires appropriate communication at the event.

Lighthouse projects – the example of battery storage

Major sporting events can also serve as a showcase for a country or a venue to provide impetus for forward-looking development and innovation. Lighthouse projects with an innovative character are suitable for this purpose. The use and demonstration of future technologies as a lighthouse project at a major sporting event can contribute to the image of a venue as a technology location. As an example of such a future technology, the use of battery storage systems to replace conventional diesel generators for power generation is described below.

Diesel generators for power generation cause high GHG emissions and air pollutants such as particulate matter. Diesel gensets are not conducive to climate action and environmental concepts for large sporting events, all the more so when noise and exhaust gases are apparent. Wherever possible, diesel generators should be avoided or replaced.

This can be done by large battery storage systems, which can replace power generation using diesel gensets. There are two main applications, uninterruptible power supply and provision of additional power where there is no or insufficient power supply. The first priority should be to use grid power wherever possible. If this is not possible, large-scale battery storage can be used as a substitute for diesel gensets.

Mobile battery containers can be used for large events. In such large battery containers, batteries together with the complete control technology are mounted ready for use and securely fastened. The batteries can be charged before the event or overnight via the power grid or possibly also via an existing photovoltaic system. During the sporting event, any additional power required can then be provided by the battery. Thus, the electricity stored in the battery with lower GHG emissions replaces diesel electricity with high GHG emissions.

The following example calculation shows possible GHG emission savings potentials when replacing diesel gensets with battery storage. Diesel gensets, for example, consume 100,000 litres of diesel and thus cause approx. 320,000 kg CO₂-eq. At the same time, the diesel generators produce around 380,000 kWh of electricity. If, on the other hand, 380,000 kWh of electricity is drawn from the German power grid using a battery as intermediate storage, this only generates around 210,000 kg of CO₂-eq. The result is a saving of around 110,000 kg CO₂-eq.

The use of battery storage can be designed as a lighthouse project – even more so if second-life⁶ lithium-ion batteries from electric vehicles are used as storage. The innovative character of such a project is underlined by the avoidance of GHG emissions and air pollutants as well as the saving of resources by extending the lifetime of the batteries.

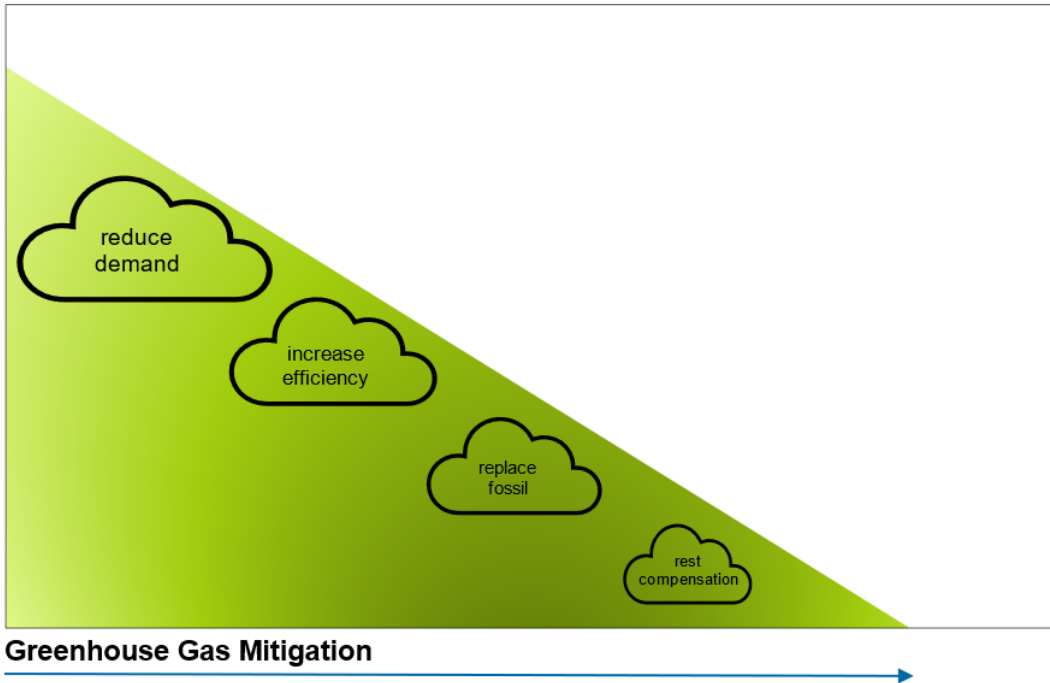
If battery storage is used permanently in sports venues such as soccer arenas, batteries can also perform other functions such as optimising own consumption of renewable electricity or providing peak load capping.

⁶ Second-life in this context stands for further use of the batteries after the end of the initial service life of the traction battery in the electric vehicle.

Climate responsibility

From an environmental perspective, there is a clear sequence of priority for the various greenhouse gas mitigation strategies:

- 1) Reduce demand,
- 2) Increase efficiency,
- 3) Substitute fossil fuels,
- 4) Offset unavoidable emissions.



In this context, the specific costs of mitigation measures are a conceivable criterion for distinguishing within these priorities from which threshold onwards GHG emissions are to be classified as avoidable (by the institution itself) or unavoidable. The question arises, however, as to whether the price – or what price – is an appropriate criterion for determining which emissions are judged to be avoidable or unavoidable. The question of whether climate neutrality can be achieved or proclaimed at all in the short term, or whether it is rather a long-term goal that cannot be proclaimed at present, is addressed in more detail in the main volume of the underlying study⁷.

In climate action plans, "unavoidable" emissions remaining after mitigation measures have been exhausted are classically offset by "compensation measures". In the case of greenhouse gases, it is only the concentration in the atmosphere that matters – not where they are emitted. Therefore, they can also be reduced by mitigation elsewhere in the world and, within certain limits, at other times.

⁷ Concept and Feasibility Study for a "Climate-Neutral" Staging of the 2024 UEFA European Football Championship (UEFA EURO 2024), FKZ: UM21160060, July 2022.



This is usually evidenced by certificates (reduction credits or emission rights). In accordance with demand and supply, a price is formed for the certificates, which the demanders pay to the providers of abatement certificates. The suppliers use the revenues to refinance their abatement activities. What appears simple in theory faces various challenges in practice: Additionality, permanence, adequate baseline, no leakage, perverse incentives or double counting, etc. Ultimately, it is often not possible to determine with sufficient certainty whether the emissions that were not themselves avoided were reliably offset elsewhere.

It should be noted that compensation through offsetting can be considered as the last step for remaining, unavoidable emissions and that it is crucial for the credibility of a climate action plan that emission reduction credits from ambitious climate action projects are acquired and retired. There is an almost unmanageable number of providers for such certificates, each with a variety of different certificate qualities. The following platforms can be consulted for the selection of adequate certificates:

- **GHGMI & SEI:** Carbon Offset Guide;⁸
- **Oeko-Institut, EDF & WWF:** The Carbon Credit Quality Initiative.⁹

This raises the question of how a commitment to the goal of climate neutrality that goes beyond the legal obligations can look and be communicated. One conceivable option is not to use the claim "climate neutral" and instead to choose, for example, the term "climate responsible". That term is based on the fact that a contribution is made to achieving the goal of climate neutrality without claiming that climate neutrality has already been achieved today. To this end, the remaining emissions are multiplied by an applicable price and the climate responsibility budget determined in this way is used for greenhouse gas reduction measures. The applicable price can also be the criterion for differentiating between avoidable and unavoidable emissions in an institution's own area of responsibility. Measures that are more favourable per ton of CO₂ than the applicable price should be implemented.

Empirical data and plausibility considerations can be used to determine the applicable price. Ultimately, however, the determination of the applicable price is a normative question that cannot be scientifically justified in the final analysis, but must be decided "politically" by those responsible in each case. Conceivable prices range from climate costs (approx. 200 €/ton), over avoidance costs

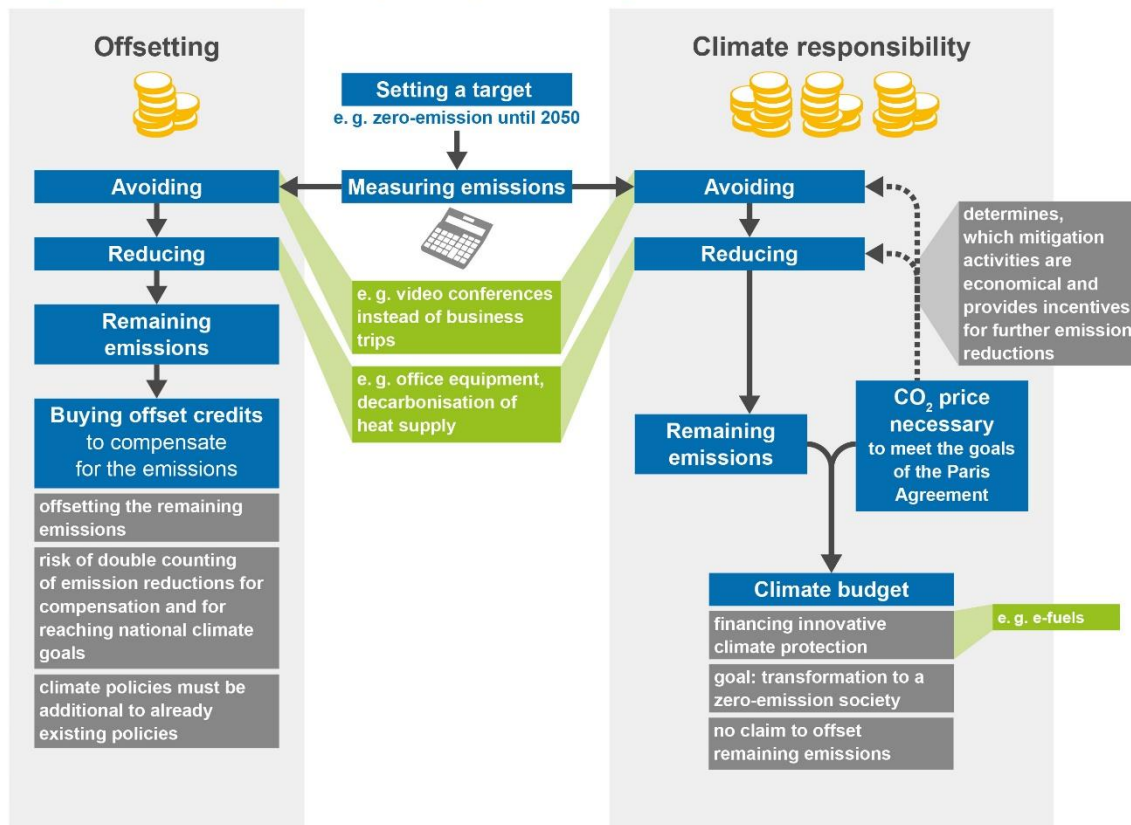
⁸ <https://www.offsetguide.org/>.

⁹ <https://carboncreditquality.org/>.

(35-90 €/ton) and empirically determined prices for compensation certificates (2-23 €/ton) to emission rights (approx. 50 €/ton). It is recommended to choose an applicable price not below 50 €/ton.

The climate responsibility budget can be used either for investments in transformative projects (e.g. technologies that will contribute to greenhouse gas mitigation in the future, such as synthetic fuels for aviation) or for investments in an institution's own area of responsibility where the specific costs exceed the applicable price. A combination of both approaches is also conceivable. For example, remaining emissions could be partially offset (e.g. for international travel, with offsetting by projects in developing countries) or fully offset by the purchase of high-quality mitigation certificates (see above) from the climate responsibility budget.

Offsetting versus climate responsibility in companies and organisations



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