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Concept and Feasibility Study for a "Climate Neutral" UEFA EURO 2024

Final Report

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

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1 Introduction

The German Football Association (DFB) has been making efforts to improve the sustainability of its own activities for many years. For example, with the Green Goal environmental action plans for the 2006 and 2011 FIFA World Cups, the DFB developed a de facto standard for the environmentally friendly staging of major sporting events, which has been replicated many times and continues to be a milestone for environmentally friendly sporting events in soccer and beyond to this day.

In 2012, more than 400 clubs took part in the DFB Environment Cup, an environmental competition that followed on from Green Goal, and implemented 1,400 measures to protect the environment and climate. Since then, the DFB has addressed the issue of the environment in a wide range of activities. In 2020, the DFB once again set a clear course toward more climate action and thus toward assuming social and societal responsibility by signing the Sport for Climate Action Framework. As a declared goal, the DFB's greenhouse gas (GHG) emissions are to be reduced. To this end, the DFB had a carbon footprint drawn up for it for the first time in 2020.

UEFA EURO 2024

In the wake of Germany's successful qualification to host the 2024 UEFA European Football Championship (UEFA EURO 2024[1]), the focus on more climate action is addressed by the EURO 2024 sustainability action plan titled "United by Football. In the heart of Europe" (DFB 2018). The joint ESR (event social responsibility) strategy of UEFA and DFB for UEFA EURO 2024 also addresses the issue of climate neutrality and analysis of the event's carbon footprint (UEFA/DFB 2021).

As the overarching goal of this study, practical climate action measures are developed for the implementation of a EURO 2024 that has as small a carbon footprint as possible. Key priorities include the options for "climate-neutral" staging of the tournament and finding an alternative to the "classic" model of greenhouse gas offsetting. In addition to the stadiums and the actual tournament, the activities of the ten host cities[2] where the matches will be held are also taken into account.

The findings of this project are intended to assist the organisers of EURO 2024 and the ten venues in further developing and implementing their sustainability efforts in the field of climate action. At the same time, the project’s findings are also to be usable for other major national and international sporting events.

In accordance with the maxim of environmental life-cycle assessment and of carbon footprinting – "What gets measured, gets managed" – the first step towards a smaller carbon footprint is its inventory analysis (Section 2: Concept and methodology for recording GHG emissions and Section 3: Ex-ante carbon footprint of EURO 2024). On the basis of the analysis of direct and indirect emissions within the defined system boundaries, concrete practical measures and recommendations for action are then developed, in accordance with the principles of "prevent, reduce, offset". Those measures and recommendations apply not only specifically to EURO 2024, but can also be applied to other major sporting events (Section 4: Prevention options). Since emissions will remain even after options to prevent and reduce GHG emissions have been exhausted, Chapter 5 is about developing and evaluating offsetting schemes or a possible alternative to them, in order to achieve the goal of a

[1] In this study, "EURO 2024" is used as a short form.
[2] Berlin, Munich, Frankfurt, Hamburg, Stuttgart, Cologne, Düsseldorf, Leipzig, Dortmund, Gelsenkirchen; referred to as host cities.

EURO 2024 that has as small a carbon footprint as possible. The associated costs and an outlook on financing options follow in Sections 6 and 7.

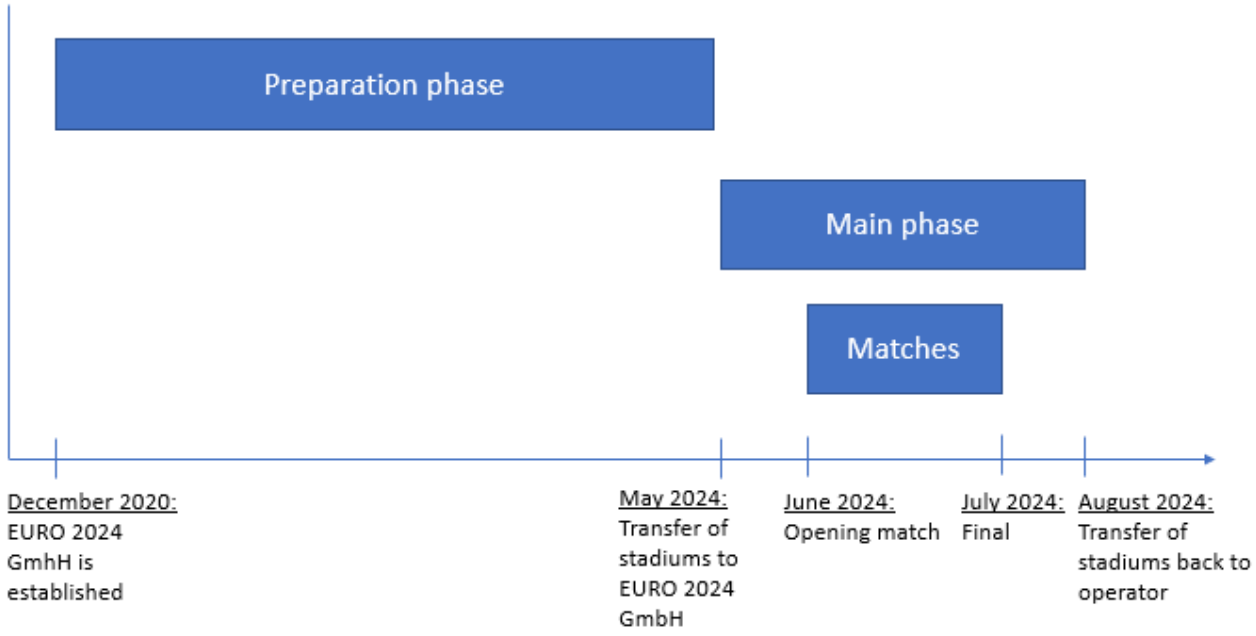
2 Concept and methodology for accounting of greenhouse gas emissions

2.1 Methodological basics

Ex-ante carbon footprint

The analysis for EURO 2024 presented here is an ex-ante carbon footprint that was prepared between autumn 2021 and spring 2022. Ex-ante assessments are based on planning parameters and allow an assessment before the realisation of projects/measures, etc., whereas ex-post assessments are carried out after realisation on the basis of actual data such as measured values. As Figure 2-1 illustrates, EURO 2024 was still in the preparatory phase when the ex-ante carbon footprint was compiled. Accordingly, numerous input parameters, such as the modal split (choice of transport mode) of fan traffic, cannot yet be recorded and the results contain corresponding uncertainties. Nevertheless, a well-founded assessment is possible, as numerous input parameters can be determined with sufficient accuracy, for example the number of tickets based on the capacities for international matches in the stadiums of the 10 host cities.

Figure 2-1: EURO 2024 timeline



Source: Oeko-Institut e.V.

GHG Protocol

The following documents provide the methodological framework for the ex-ante carbon footprint: Greenhouse Gas Protocol Corporate Standard or Corporate Value Chain (Scope 3) Standard; ISO standards 14040, 14044, 14064 Part 1, and 14067; and the IOC's Carbon Footprint Methodology for the Olympic Games (IOC 2018).

Greenhouse gases and CO_2 equivalents

Accordingly, all greenhouse gases were recorded, including in particular CO_2, CH_4, N_2O and refrigerants, and converted to CO_2 equivalents (CO_2 eq.) using the IPCC 2013 GWP factors.

Aim of the ex-ante carbon footprint analysis

The ex-ante analysis is intended to serve as a scientific basis for decision-making by the client, the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), and all other decision-makers involved, in particular the Federal Ministry of the Interior and Community (BMI), the Federal Ministry for Economic Affairs and Climate Action (BMWK), EURO 2024 GmbH[3], the Union of European Football Associations (UEFA), the German Football Association (DFB) and the host cities. Specifically, its purpose is to:

- Determine the projected GHG emissions attributable to EURO 2024 and identify hot spots that are particularly high contributors to EURO 2024 GHG emissions;
- Develop scenarios showing how the carbon footprint changes when key parameters are varied;
- Quantify the effects of selected measures;
- Use this information to prepare steps towards offsetting or climate responsibility; and
- Gain insights useful for ex-post carbon footprinting, such as key data requirements to be met by appropriate surveys or measurements.

2.2 Scope

To define the scope[4], Oeko-Institut first developed a draft based on experience with carbon footprints in the field of sports and events, including the 2006 Men's World Cup and 2011 Women's World Cup, German Bundesliga soccer clubs, and the 2017 Bonn Climate Change Conference (UNFCCC COP 23). This draft was compared to the scopes underlying the carbon footprints of past major sports events, see Table 2-1. In addition, the scope was discussed and agreed with the client and presented and discussed in a workshop with all stakeholders, including EURO 2024 GmbH. As a result, the ex-ante carbon footprint for EURO 2024 is based on the scope presented in Figure 2-2.

[3] EURO 2024 GmbH is a joint venture between the DFB and UEFA.
[4] “System boundary” is a further common term.

Table 2-1: Literature review of the scope of carbon footprints of past major sporting events

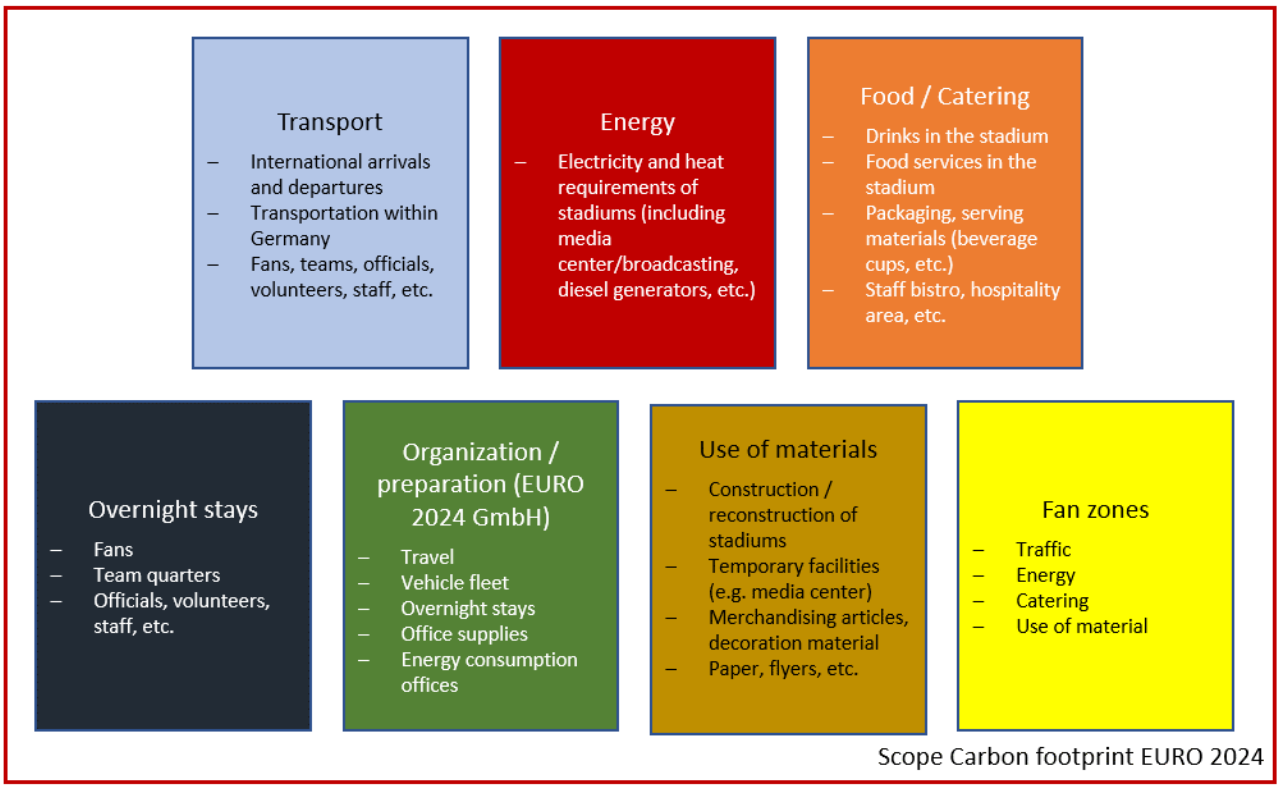
Aspects covered by the scope	EURO 2020, Europe	EURO 2016, France	EURO 2008, Austria	EURO 2008, Switzerland	FIFA 2018, Russia	FIFA 2014, Brazil	FIFA 2011, Germany	FIFA 2010, South Africa	FIFA 2006, Germany	Olympia 2016, Rio de Janeiro	Olympia 2012, London	Olympia 2010, Vancouver	Olympia 2008, Beijing
1. Transport													
1.1 International arrivals and departures	X	X	x	X	X	X	X	X	-	?	X	X	X
1.2 Traffic within Germany	x	x	x	x	x	x	x	x	x	?	x	x	x
1.3 Fans, teams, officials, media, volunteers	x	x	x	x	x	x	x	x	x	?	x	x	x
2. Energy													
2.1 Electric demand of the stadiums	X	(x)	(x)	(x)	(x)	(x)	X	(x)	X	(x)	X	X	(x)
2.2 Heat demand of the stadiums	?	(x)	(x)	(x)	(x)	(x)	X	(x)	X	(x)	X	X	(x)
2.3 Diesel generators	?	(x)	(x)	(x)	(x)	(x)	X	(x)	X	(x)	X	X	(x)
2.4 Media Center, Broadcasting, Other	?	(x)	?	(x)	(x)	X	?	(x)	X	X	X	X	(x)
3. Food / Catering													
3.1 Drinks in the stadium	X	X	?	?	X	X	X	?	?	(x)	X	X	(x)
3.2 Food services in the stadium	x	x	?	?	x	x	x	?	?	(x)	x	x	(x)
4. Overnight stays													
4.1 Team quarters	(x)	x	?	?	x	x	(x)	(x)	?	?	x	x	(x)
4.2 Overnight stays of the official etc.	(x)	x	?	?	x	x	(x)	(x)	?	x	x	x	(x)
4.3 Stadium visitors	(x)	x	x	x	x	x	(x)	(x)	x	?	x	?	(x)
5. Organization/preparation of EURO (UEFA/DFB)													
5.1 Travel incl. Fleet	?	X	?	(x)	?	?	(x)	?	x	?	X	X	(x)
5.2 Overnight stays	?	?	?	(x)	?	?	(x)	?	?	x	x	x	(x)
5.3 Office supplies (paper)	?	?	?	(x)	x	?	(x)	?	?	x	x	x	(x)
5.4 Energy consumption offices	?	x	?	(x)	?	x	(x)	?	?	?	x	x	(x)
6. Material use													
6.1 Construction / reconstruction stadiums	-	X	?	X	?	-	X	X	X	?	X	X	X
6.2 Temporary facilities (including media center)	x	?	?	?	x	x	?	?	?	?	x	?	?
6.3 Merchandising articles & decoration material	?	x	?	?	x	x	?	?	?	?	x	?	?
6.6 Paper & flyers	?	?	?	?	x	?	?	?	?	?	x	x	?
7. Fan zones													
7.1 Energy	?	?	X	X	?	-	(x)	X	?	?	?	?	?
7.2 Traffic	?	?	x	x	?	-	(x)	x	?	?	-	?	?
7.3 Catering	?	?	?	?	?	-	(x)	?	?	?	x	?	?

Legend: The aspect is
"X": included in the scope
"x": partially included in the scope
(x): mentioned as an overarching theme of the carbon footprint
"-": explicitly excluded
"?": not mentioned

A clear assignment was not always possible due to the different methodological approaches.

Source: Oeko-Institut e.V. based on BMLFUW et al. 2008, Econ Pöyry (2009), FIFA (2014), FIFA (2019), LOCOG (2007), OC 2006 FIFA World Cup et al. (2006), OC Summer Olympic Games (2018), Organising Committee FIFA Women's World Cup (2011), UEFA (2016), UNEP (2009), Quantis (2021), VANOC (2009).

Figure 2-2: Scope of the ex-ante carbon footprint



Source: Oeko-Institut e.V.

To define the scope, the following criteria were applied in accordance with the above methodological frameworks:

- Causality
- Materiality / Relevance
- Influenceability
- (data availability)[5]

Rationale for the selection of scope elements

The aspects listed in the first column of Table 2-1 correspond to the scope of the ex-ante carbon footprint for EURO 2024. Aspects that were considered for most of the carbon footprints (rows predominantly filled with "X", "x" or "(x)") were not discussed in depth, because their consideration is obviously reasonable and established. The following aspects are included in the scope of the ex-ante carbon footprint for EURO 2024 and, to a substantial degree, excluded or not mentioned in the literature (in at least 5 of the 13 sources examined):

[5] Data availability is a weakened criterion on the basis of which a decision is only made in exceptional cases. An aspect must not be excluded from the scope of the carbon footprint solely on the basis of insufficient data. If other criteria already suggest exclusion of an aspect, poor data availability can be used as a further criterion against inclusion in the scope.

- Catering: The argument against inclusion in the scope is that consumption in the stadium or fan zone does not necessarily represent additional consumption in total, as people would otherwise eat and drink at home or elsewhere. The aspect is nevertheless included in the scope, since in many cases consumption is additional, for example consumption of alcoholic beverages, and higher environmental burdens are associated with such consumption (relevance). For example, the catering sector is responsible for significant parts of the electricity demand in the stadiums. In addition, spectators come into direct contact with catering (awareness) and have opportunities to act, for example, in the selection of food (influenceability).

- Temporary facilities such as the media centre, merchandising and decorative materials, paper and flyers: Causality and influenceability are clearly given. It is possible that the aspect was placed less prominently in other studies, disregarded or not presented transparently, since many materials such as tents are rented and have many cycles of use before disposal. The aspect is nevertheless taken into account, as an initial assessment showed that the GHG emissions of the potentially non-reused materials are of a relevant amount.

- Organisation/preparation: Here, too, causality and influenceability are clearly given. It is possible that the aspect was placed less prominently in other studies, was disregarded, or was not presented transparently, as relevance was considered to be low and no data was available. The aspect is nevertheless taken into account, since the information (number of trips, modal split, number of vehicles in the fleet, etc.) was available and the balance is more complete through its inclusion.

- Fan zones: Fan zones are the aspect most often explicitly excluded (2 sources with "-" entry). It can be argued against their inclusion that fan zones are in part outside the sphere of influence of the tournament organiser and mainly in the responsibility of the host cities. In addition, the criterion of causality or additionality can be questioned, for example because less electricity is required for private TV consumption as a result of public viewing, or because the transport of fans in the fan zone sometimes takes place not because of the fan zone visit, but for other reasons. For the ex-ante carbon footprint of EURO 2024, fan zones are part of the scope, as host cities are among the addressees of the study and can influence the framework conditions of fan zones. Furthermore, the number of visitors, beverages consumed, etc. associated with the fan zones reach or exceed the respective values from the stadiums, so that quantification of their associated GHG emissions is of major interest.[6]

Occasionally, the literature review also reveals aspects that are considered in other sources and are not part of the scope of the ex-ante carbon footprint for EURO 2024. These include the following:

- EURO 2024 qualifiers, which will be played from March 2023 to March 2024: The focus of this ex-ante carbon footprint is on the main tournament. In addition, there is little or no influence in many areas, as the relevant national associations and stadiums are not part of the target group of this study. Furthermore, the results are highly dependent on the group draw, which will not be made until October 2022. An additional consideration of the qualifying matches is conceivable in principle, especially in the context of an ex-post carbon footprint. However, an excessively broad scope[7] in the ex-ante analysis may lead to a softening of core findings.

[6] Only the official fan zones in the 10 host cities are considered. The fan zones in other cities and countries are not part of the scope of this ex-ante carbon footprint.

[7] The number of qualifying matches far exceeds the number of EURO 2024 matches.

- UEFA events such as the logo or ticket launch, the group draw for the main round, etc.: The focus of the ex-ante carbon footprint is on the main tournament. Moreover, comparatively low relevance is anticipated.

- Overnight stays by fans visiting the fan zone: Causality is not given for the majority of fan zone visitors, because for this majority, hotel overnight stays are booked because of a stadium visit, other touristic intents or business reasons. No data are available for the assumed small proportion of visitors who book hotel accommodation because they visit the fan zone.

Further methodological specifications

In general, all GHG emissions associated with the above scope elements are accounted for, regardless of whether they are scope 1, 2 or 3 emissions[8] . Scope 1 emissions are defined from the perspective of EURO 2024 GmbH or the host cities, and include:

- the vehicle fleet of EURO 2024 GmbH

- local emissions from the combustion of diesel in generators in stadiums and fan zones, and from the combustion of natural gas in the stadiums

- Refrigerant losses in the catering sector

In addition, the following determinations are made:

- In Scope 1 and 2, the Oeko-Institut does not expect any multi-output processes that have to be causally attributed to both EURO 2024 and another actor. Therefore, no allocation rules or the like are needed to apportion the associated GHG emissions. For Scope 3 emissions, those rules to solve multi-output process are applied that were used in the preparation of the life cycle inventory dataset and are documented in the corresponding LCA database.

- In line with the task, an attributional rather than a consequential accounting approach is followed.[9]

- The reference for the carbon footprint is the successfully held EURO 2024 tournament.[10]

[8] The differentiation between Scope 1, 2, and 3 emissions, respectively, was largely established by the GHG Protocol (WBCSD et al. 2015). In simple terms, Scope 1 emissions arise from sources owned or controlled by the organisation, Scope 2 emissions represent emissions associated with electricity production, and Scope 3 emissions represent all other emissions.

[9] There are two basic approaches to environmental and climate accounting: attributional and consequential. For questions such as "What impact would a potential future change X have in the future?", a consequential approach tends to be chosen. For questions such as "What are the impacts associated with established product X or process Y?" an attributional approach tends to be used. A consequential approach is used to consider interactions with other systems. Accordingly, multi-output processes are usually resolved by a system expansion approach. With an attributional approach, multi-output processes are usually resolved by allocation. An attributional approach is mostly based on LCA datasets that represent current market averages, while a consequential approach is mostly based on LCA datasets that represent marginal mixes.

[10] Part of any life cycle assessment or carbon footprint is the definition of the functional unit or reference of the results, in particular to allow comparisons of product variants, etc. In the case presented here, all results are related to EURO 2024 as a whole with the scope elements defined in Section 2.2.

2.3 Data

A large number of data, parameters and assumptions are included in the ex-ante carbon footprint. A rough differentiation can be made between data

a) for capturing the correct processes and averages, e.g.
   - which groups of people are to be considered?
   - what is the modal split?

b) for accounting of the quantities of an activity, e.g.
   - how far did a fan travel?
   - how many nights were booked?

c) to determine the GHG emissions per unit of product or activity (specific emission factor), e.g.
   - per passenger-kilometre coach travel,
   - per litre of beer,

Major data sources for types a) and b), respectively, were:

- EURO 2024 GmbH or UEFA, and the documentation available to these two organisations on past EUROs,
- the host cities,
- literature sources, including in particular the reports on the climate or sustainability analyses of the past European and World soccer championships.

Sources for type c) data were in particular the ecoinvent database v.371 and TREMOD. The emission factors per passenger-kilometre or ton-kilometre and per kilowatt hour of electricity were determined using future scenarios and represent the year 2024.

Table 2-2 documents an excerpt of key basic data.

Table 2-2: Excerpt of key basic data for the ex-ante carbon footprint

Parameter	Value
Number of stadium tickets	2,800,000
Number of tickets for hospitality and partners/sponsors	130,000
Proportion of tickets sold to fans residing in Germany	68%
Average number of tickets per person[11]	2.1
One-way travel to the stadium of fans residing in Germany	160 km
Total passenger-kilometres (pkm) of fans for international arrivals and departures	1,400,000,000 pkm
Total person-kilometres of teams	5,200,000 pkm
Number of officials (UEFA and EURO 2024 GmbH)	4,500
Number of media representatives	14,000
Number of volunteers	16,000
Number of other staff	110,000
Number of overnight stays by fans residing in Germany	950,000
Number of overnight stays by fans residing outside Germany	1,800,000
Number of overnight stays by other groups of persons	380,000
Electricity demand in all stadiums	11,000,000 kWh
Diesel demand in all stadiums	270,000 L
Number of meals consumed at stands in the stadium	1,300,000
Number of beverages consumed at stands in the stadium	4,300,000
EURO 2024 GmbH vehicle fleet	785 vehicles
Number of merchandising, decorative and gift items	6,600,000
Number of 20-foot containers in all stadiums	1,100
Number of different people in fan zones	3,800,000
Number of stands in all fan zones	550

Source: Oeko-Institut e.V., mainly based on EURO 2024 GmbH, OC 2006 FIFA World Cup et al. (2006) and UEFA (2016).

2.4 Outlook: ex-post carbon footprint

With the help of an ex-post carbon footprint, which would be prepared following EURO 2024 approximately in late summer/autumn 2024, the following goals can be achieved:

- Determination of actual GHG emissions with significantly lower uncertainties regarding the data to be used compared to the ex-ante carbon footprint,
- Determination of exact financial resources for offsetting or climate responsibility based on actual GHG emissions,

[11] Relating to persons residing outside Germany.

- Determination of greenhouse gas savings achieved by specific measures compared to ex-ante carbon footprint.

From a methodological perspective, it is recommended that the boundary conditions on which this ex-ante carbon footprint is based, in particular the scope, be retained or selected as the starting point, and only deviated from in justified cases. It could also be considered appropriate to expand the scope and include in it the preparation and qualification phase of EURO 2024. Furthermore, for the ex-post carbon footprint, a great amount of precise data will be available, such as the match schedule, the number of matches per nation, the actual number of tickets sold, etc.

Data needs: Lessons learned

In the course of the ex-ante carbon footprint, it was possible to access a sound and sufficient data framework in the areas of energy, catering, organisation and material use, which was collected in the course of the EUROs 2016 and 2020/2021. Assuming that the collection of corresponding data has become a standard part of the implementation of EUROs, and against the background that a large part of the total emissions is caused by transport, a comparatively low need for additional data to be collected is seen in the areas of energy, catering, organisation and material use. In the area of transport (both for stadiums and fan zones), however, and to a lesser extent in the area of overnight stays, relevance for overall emissions is high while data availability needs improvement in certain respects.

Focus of data collection: Traffic-related emissions

To ensure that the actual GHG emissions are recorded as completely and practically as possible as part of the ex-post carbon footprint analysis, transport volumes in particular need to be recorded. A correspondingly central aspect is the survey of fans (stadiums and fan zones) and other groups of people by means of questionnaires or apps. Volunteers could be involved in the survey if necessary. In addition, the number of people entering the fan zones and the number of people in other groups (officials, media representatives, staff, etc.) should be recorded.

Specifically, the zip code and permission to use it for scientific purposes should be obtained when tickets are purchased. With regard to the surveys among fans and other groups of people, it is recommended, based on the experience gained in the course of the carbon footprint analysis of the 2006 World Cup, the evaluation of the fan survey in the context of EURO 2016 (UEFA 2016) and the ex-ante carbon footprint for EURO 2024, that at least the following aspects be integrated:

Transport and overnight stays: Fan survey

Addressing fans in the stadium or fan zone. Answering digitally (e.g. in browser or via app) following the tournament. Questions:

- Did you travel from abroad or Germany? _____
  - If Germany: which postal code? _____
- Was the predominant reason for arriving to visit the stadium or the fan zone? _____
- How many matches did you attend (number of tickets)? _____
- How often did you enter the fan zone (if you entered multiple times in one day, count accordingly)? _____

- What modes of transport did your journey to the hotel/stadium consist of?
  - Passenger car:
    - Number of km incl. return trip ____
    - How many people were in the car? ____
  - 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 accommodation (hotel, motel, vacation rental, Airbnb, etc.)? How many stars did the accommodation have? _____

Transport and overnight stays: Survey of other groups of people

- To which group of people do you belong: UEFA, EURO 2024 GmbH, representatives of the German federal government / federal states / host cities, police, partners / sponsors, media, volunteers, staff (security, medical, catering, cleaning, hosts/hostesses, drivers, waste management, guides)?: _____
- What transport routes did you take in *total*, i.e. including any international travel to and from the event as well as transport routes within Germany, as a result of your involvement in EURO 2024?
  - 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 accommodation (hotel, motel, vacation rental, Airbnb, etc.)? How many stars did the accommodation have? _____

Data collection: Energy, catering, organisation, material use

In the areas of energy, catering, organisation and use of materials, the practice already established at past EUROs of collecting data on the following aspects should be continued:

- Energy consumption incl. diesel consumption in stadiums
- Energy consumption of International Broadcasting Centre (IBC)
- Quantities of food and beverages sold
- Travel and accommodation during the preparation for the tournament
- Produced merchandising products, textiles, etc.
- Types and amounts of material requirements for temporary structures or facilities

There is potential for optimisation in the following aspects:

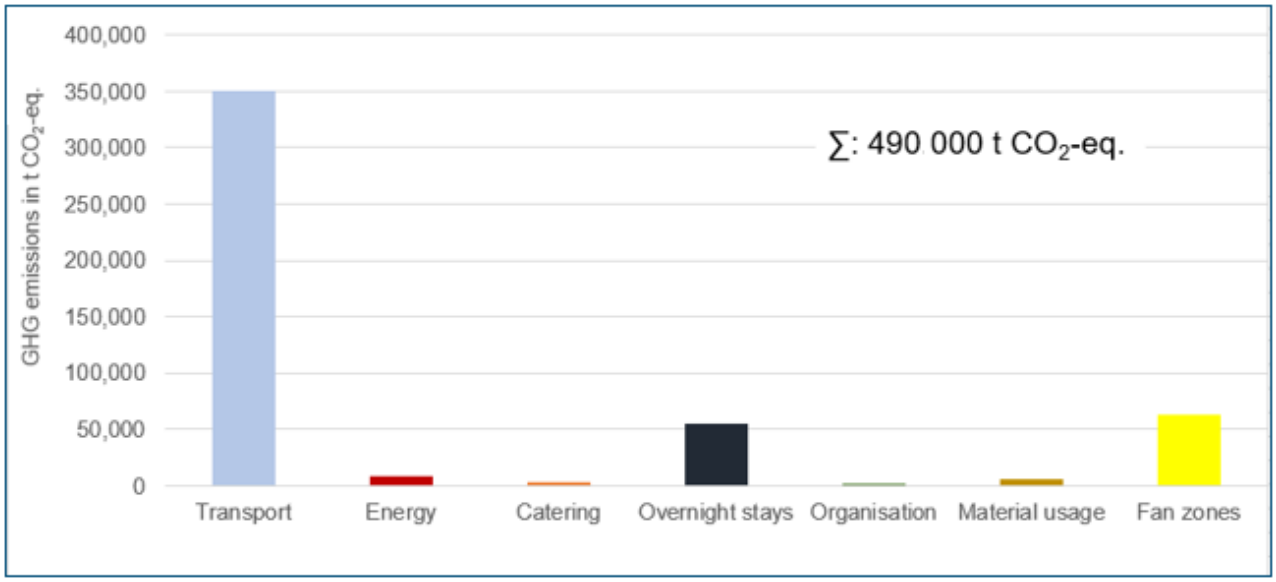
- Recording of food and beverages sold including waste and food and beverages to officials / staff in staff bistro, etc.
- Energy consumption in the fan zone for event technology and stands
- Quantities of food and beverages sold in the fan zone
- Material requirements in the fan zone

3 Ex-ante carbon footprint of EURO 2024

3.1 Overall result

Figure 3-1 presents the overall result of the ex-ante carbon footprint analysis of EURO 2024 differentiated by the different areas of the scope.

Figure 3-1: Overall result of the ex-ante carbon footprint



Source: Oeko-Institut e.V.

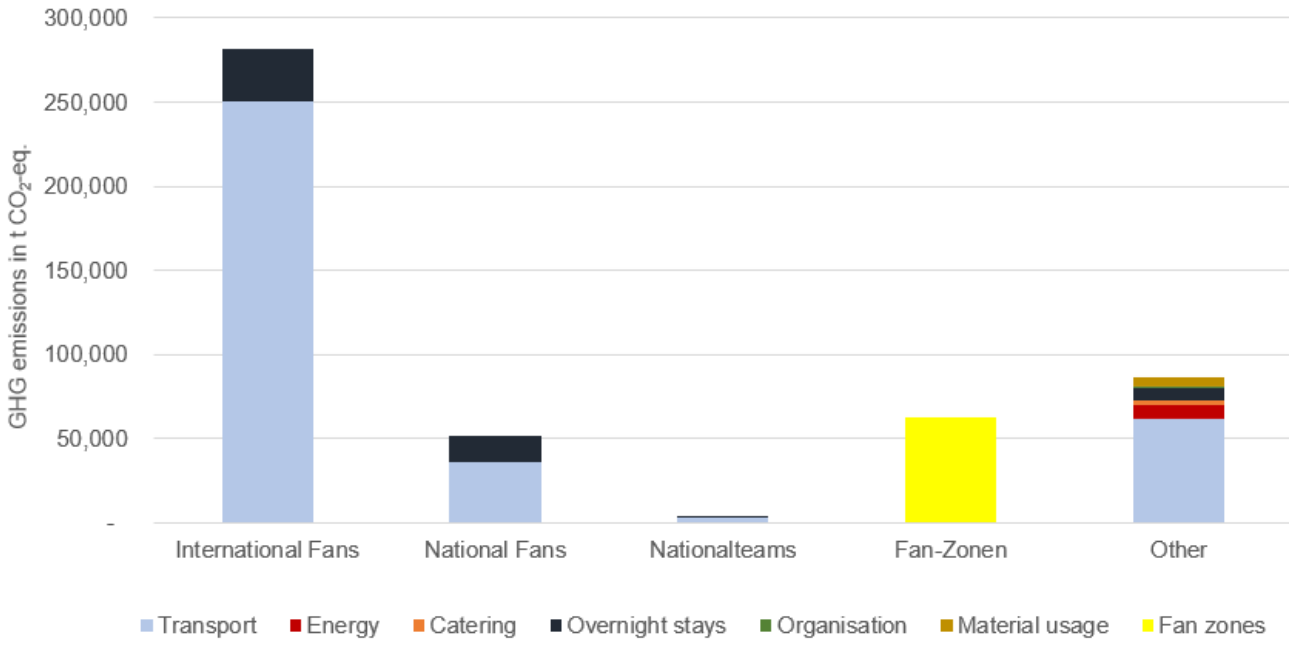
The key results are as follows:

- At approx. 490,000 t CO_2-eq, the overall result is in line with the results for similar major sports events. For EURO 2016 in France, which took place without corona-related restrictions and was held in geographical proximity to Germany, the result was approx. 600,000 t CO_2-eq[12]. For EURO 2020/21, approx. 220,000 t CO_2-eq. were determined, whereby for corona-related reasons significantly fewer fans were admitted to the stadiums and correspondingly smaller transport volumes were caused.
- The transport sector clearly dominates the overall result.
- Fan zones and overnight stays are of noteworthy relevance to the overall result, with fan zone emissions also largely transport-related.
- All other areas contribute less than 2% to the overall result.

[12] The very high emissions due to new stadium construction are not fully reflected in this figure.

Figure 3-2 shows how the GHG emissions of EURO 2024 are distributed among different responsible groups.

Figure 3-2: Overall result of the ex-ante carbon footprint, broken down by responsible groups



Source: Oeko-Institut e.V.

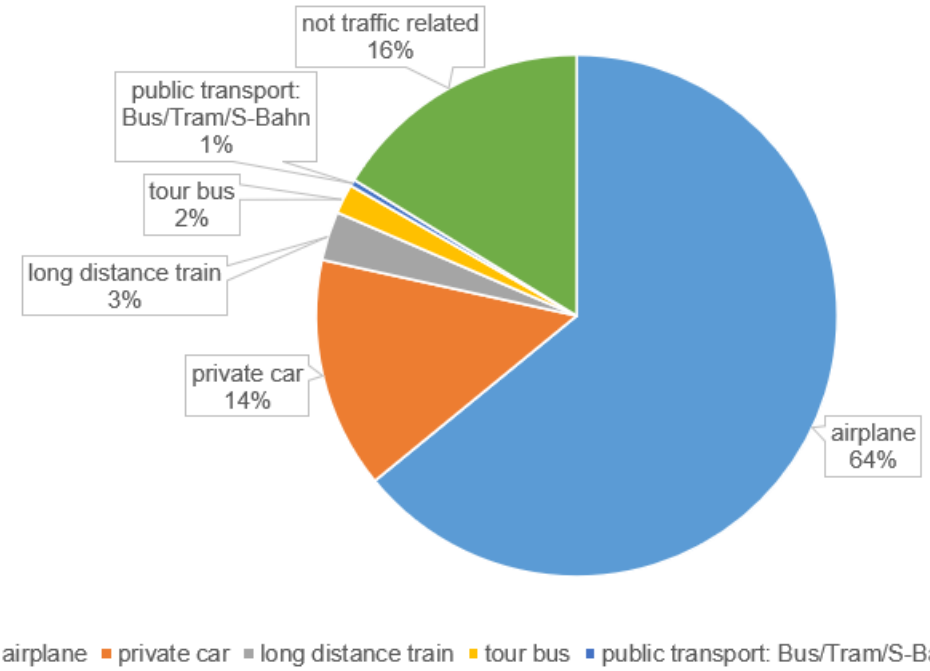
Results:

- International fans cause more emissions than all other groups combined.
- Although it was estimated that 68% of stadium tickets are sold to people residing in Germany, fans residing outside Germany cause more than five times the emissions of national fans.
- Travel to and from the stadium, as well as overnight stays by fans with stadium tickets, account for just under 70% of total emissions.
- The emissions of the national teams play a minor role in the overall result.

3.2 Transport

Figure 3-3 shows how the total GHG emissions of EURO 2024 are distributed among different modes of transport.

Figure 3-3: Overall result of the ex-ante carbon footprint, broken down by mode of transport



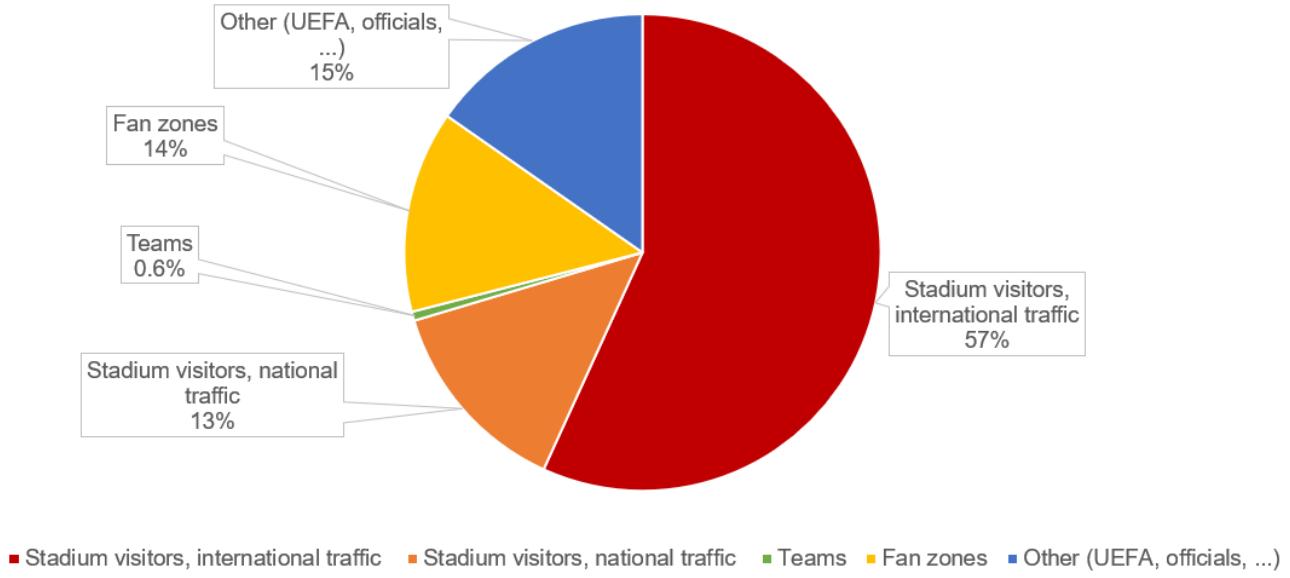
Source: Oeko-Institut e.V.

Results:

- Just under two-thirds of total emissions are caused by flights.
- Almost 85% of total emissions are caused by traffic.
- 14% of total emissions are caused by car trips.

Figure 3-4 shows how transport-related GHG emissions are distributed among different transport groups.

Figure 3-4: Distribution of transport-related emissions among transport groups



Source: Oeko-Institut e.V.

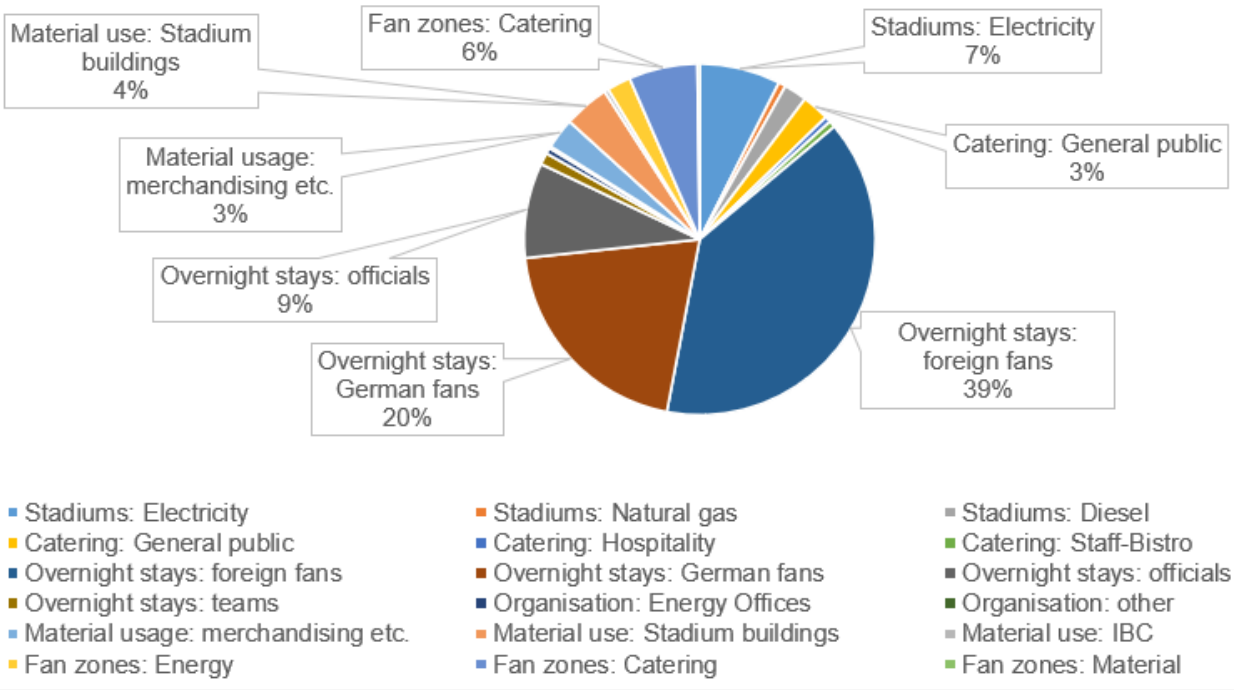
Results:

- Almost 60% of transport-related emissions are caused by international traffic of stadium visitors.
- Only 13% of traffic-related emissions are caused by the traffic of stadium visitors within Germany. This also includes the domestic traffic of international fans.
- As much as 15% of transport-related emissions are caused by other groups of people, in particular media representatives, partners/sponsors and UEFA.
- Transportation to visit fan zones in the 10 host cities accounts for approximately 14% of transportation-related GHG emissions.

3.3 Other areas without transport

Figure 3-5 shows how the EURO 2024 non-transport GHG emissions break down.

Figure 3-5: Breakdown of non-transport emissions



Source: Oeko-Institut e.V.

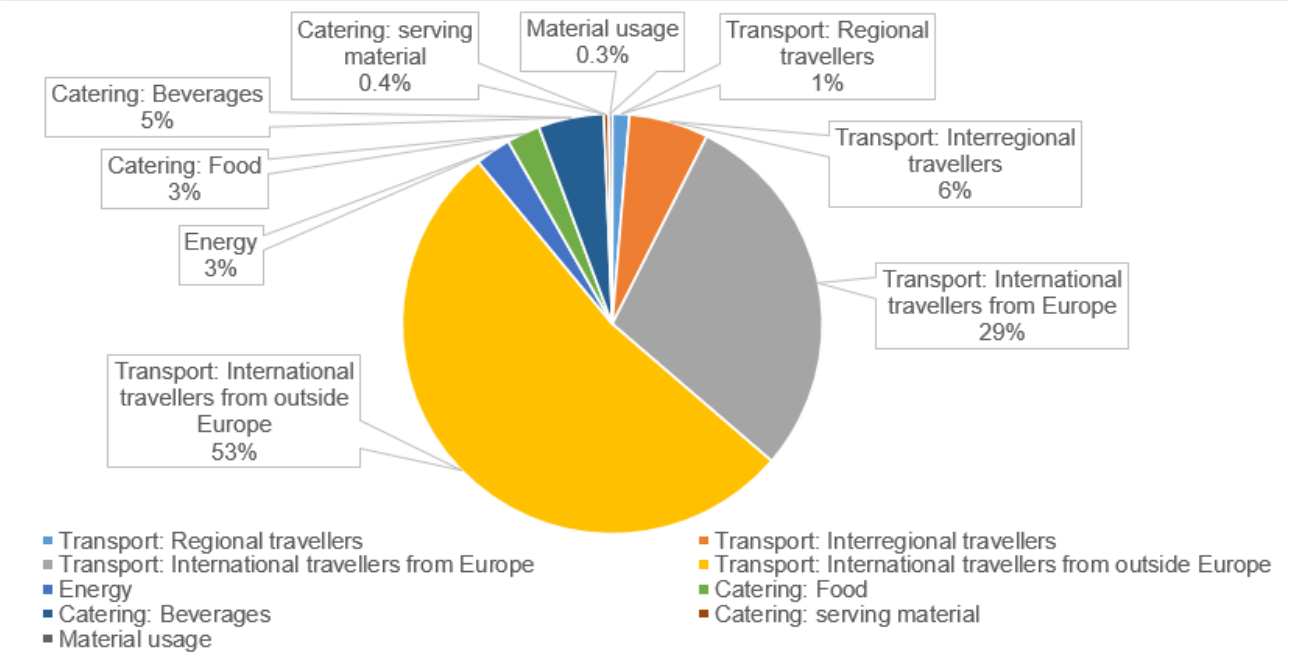
Results:

- Over two-thirds of non-transport GHG emissions result from overnight stays by different groups of people.
- Notable emissions also result from the stadiums' electricity requirements (7%), the materials used for stadium construction (4%), which are allocated over the total life time of the 10 stadiums, and catering (9% in total).

3.4 Fan zones

Figure 3-6 shows the breakdown of GHG emissions attributed to the fan zones of the 10 host cities.

Figure 3-6: Distribution of emissions from the fan zones



Source: Oeko-Institut e.V.

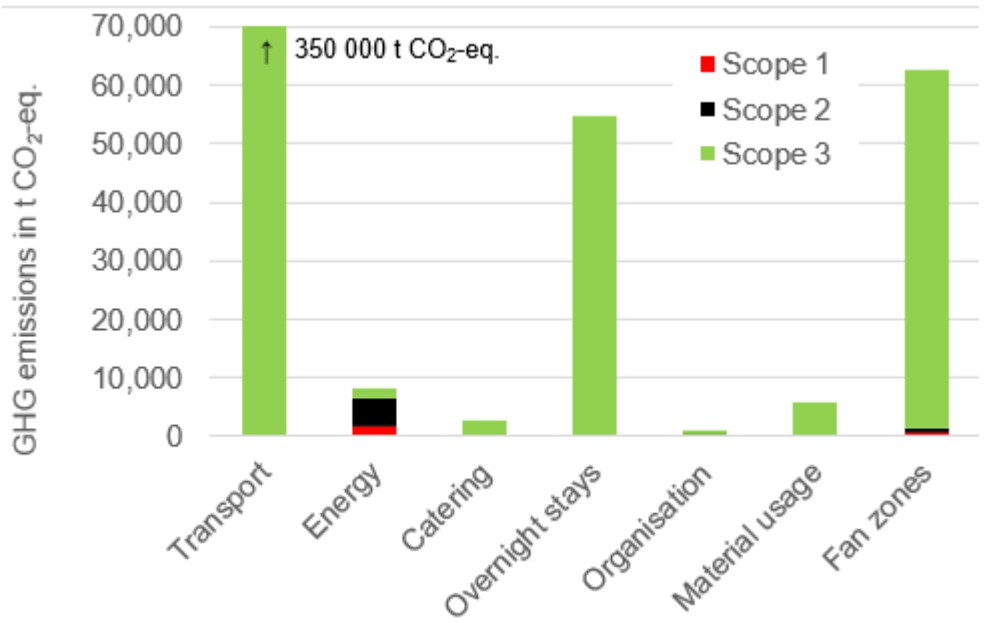
Results:

- Fans travelling from outside Europe account for over 50% of the GHG emissions from fan zones. The fact that there are people who travel to the EURO, who do not have a stadium ticket and who visit the fan zones was determined by means of a fan survey in the course of EURO 2016 in France (UEFA 2016). For the ex-ante carbon footprint presented here, it was assumed on the basis of the aforementioned survey that this group of people comprises around 9,000 people. This group of people thus represents only 0.9% of all people in the fan zones, but causes correspondingly high emissions due to long journeys to and from the event by air.
- Emissions due to on-site energy demand and due to the consumption of food and beverages in the fan zones contribute significantly to the total emissions (around 10%).
- Material use plays a minor role in fan zone emissions (less than 1%).

3.5 Overall result according to Scopes 1 to 3

Figure 3-7 shows how the overall EURO 2024 result is composed of Scope 1, Scope 2 and Scope 3 emissions.

Figure 3-7: Overall result of the ex-ante carbon footprint according to Scopes 1 to 3



Source: Oeko-Institut e.V.

Results:

- More than 98% of total emissions come from Scope 3 emissions. These include, in particular, all emissions from fans travelling to and from the event.
- Notable Scope 1 (diesel generators, natural gas heating) and Scope 2 (electricity) emissions are associated in particular with the provision of energy in the stadiums and fan zones.
- As shown in Table 3-1 low Scope 1 and Scope 2 emissions also occur in catering (refrigerant losses) and in organisation (vehicle fleet, energy supply to offices).

Table 3-1: Overall result of the ex-ante carbon footprint according to Scopes 1 to 3

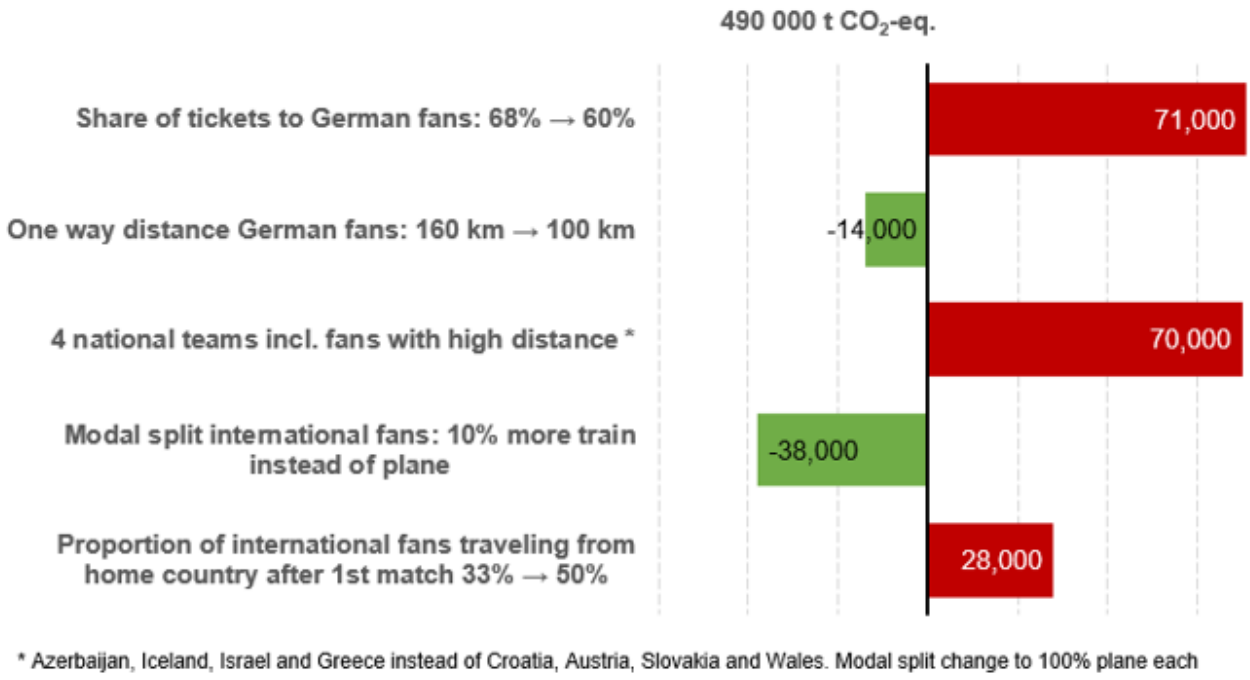
	Scope 1	Scope 2	Scope 3	Scope 1-3 total
	[t CO_2-eq.]	[t CO_2-eq.]	[t CO_2-eq.]	[t CO_2-eq.]
Transport	0	0	350,000	350,000
Energy	1,700	4,700	1,600	8,000
Catering	200	0	2,700	2,900
Overnight stays	0	0	55,000	55,000
Organisation	220	150	670	1,000
Material usage	0	0	5,900	5,900
Fan zones	790	600	61,000	63,000
Total	**2,900**	**5,500**	**480,000**	**490,000**

Source: Oeko-Institut e.V.; rounded values

3.6 Scenarios

Figure 3-8 shows the results of individual ceteris paribus analyses, in which selected parameters are varied while all other parameters remain unchanged.

Figure 3-8: Changes in the carbon footprint of EURO 2024 with variation of selected parameters



Source: Oeko-Institut e.V.

Results:

- The actual GHG emissions of EURO 2024 could be significantly higher or lower.

- The proportion of stadium tickets sold to fans residing in Germany is a very influential variable. Even an 8% reduction (reduction from 68% to 60%), i.e. a corresponding increase in the proportion of tickets sold to fans residing outside Germany, leads to additional emissions of around 71,000 t CO_2 eq. or just under 15%. The main reason for this increase is that fans living outside Germany travel longer distances and also fly more often on average.

- If the average one-way distance that fans residing in Germany travel to get to the stadium were to be 100 km instead of 160 km, assuming an unchanged modal split, a notable reduction of 14,000 t CO_2 eq. could be expected.

- Parameters that are completely beyond the control of the decision-makers can also strongly influence the overall result. These include, for example, which 23 teams qualify for the tournament: The ex-ante carbon footprint was based on the same 24 teams qualifying as for EURO 2020/21. If Azerbaijan, Iceland, Israel and Greece (4 national teams incl. fans travelling long distances) were to qualify instead of Croatia, Austria, Slovakia and Wales, fans (and teams) would travel significantly longer distances to and from the tournament on average and also fly more often, resulting in significant additional emissions of 70,000 t CO_2-eq.

- Significant savings could be achieved in particular by reducing the share of flights in the modal split. The overall result would be reduced by approx. 38,000 t CO_2 eq. if the proportion of international fans travelling by train instead of flying were to increase by 10%.

- The length of stay of international fans is also an important parameter. If the proportion of international fans travelling to the matches from their home country increases from 33% to 50%, this can lead to significant additional emissions of around 28,000 t CO_2 eq.

4 Options to prevent emissions

4.1 Background

Concerning prevention options, the aim was to develop practical measures that can contribute to a climate-friendly, greenhouse-gas-neutral organisation of the EURO 2024 tournament. Specifically, actions by which to reduce and prevent GHG emissions were developed for all climate-relevant fields of action of EURO 2024, including host cities (environmentally sound mobility, energy, catering, etc.). This work is intended to provide the organisers of EURO 2024 and the host cities with orientation and corresponding know-how for the preparation and implementation of a climate action plan for EURO 2024.

The focus of prevention measures is thus on actions that contribute to preventing and reducing the GHG emissions of EURO 2024. Other environmental areas such as water consumption and waste management are also classic topics of environmental action plans, but play a negligible role for the climate action plan of EURO 2024.

As an introduction, the following section provides a comprehensive overview of the prevention measures. Basically, measures in the area of responsibility of EURO 2024 GmbH and the host cities were addressed. Due to the high relevance of transport for the GHG balance, one focus of the abatement options was on mobility; see Section 4.3. Further selected climate action measures in other areas are described in Section 4.4. A detailed list of all measures developed can be found in the recommendations for action as a separate volume (“Selected recommendations for action to minimise carbon footprints at major sporting events”) appended to this report. A range of measures are described in more detail in the text below.

4.2 Overview of prevention measures

The prevention measures were structured in accordance with the fields of action defined in the scope of the carbon footprint. Measures were defined for the following fields:

- Energy: energy supply and energy efficiency,
- Transport: individual mobility, public transport, campaigns,
- Material use (e.g. merchandising, temporary structures, paper use),
- Catering,
- Overnight stays.

The following Table 4-1 provides an overview of the fields of action and the associated climate action measures.

Table 4-1: Overview with a selection of climate action measures in the fields of action

	Energy supply	Energy efficiency of temporary structures
ENERGY	• No diesel generators, but mains power / batteries • PV array construction	• Equipment with highest energy efficiency for video wall, sound, lighting, catering, ventilation/heating/cooling (stadiums, IBC, fan zones) • Controlling on the match days by an employee on site: problems rectified at short notice • Temperature control and ventilation: demand-oriented and outside temperature-dependent

	International	Within Germany	Host cities	Bicycle & on foot
TRANSPORT	• Fans, teams etc. travel by train (special tickets, special trains, night trains) instead of airplane • Use of alternative fuels for aircraft	• National combined ticket (spectators) • EURO 2024 Bahncard100 (officials etc.) • Additional trains (after the end of the match), special trains • On-demand buses	• National combined ticket (spectators) • Public transport: increase capacity, higher frequency, shuttle buses, use e-buses • No individual car traffic to the stadiums / fan zones • Permanent rededication of parts of the stadium parking lot areas for PV systems • Environmentally sound vehicle fleet (exclusively BEV[13])	• By bike to stadium and fan zone • Bicycle projects and campaign • "Red carpet" to the stadium and fan zone

[13] Battery Electric Vehicle; battery-powered electric vehicle, all-electric vehicle

Reduction of the use of materials		
Material	• System construction for temporary structures (tents, stands, etc. for stadiums and fan zones) • Furniture, carpets, decoration materials, lighting, electrical fittings, other infrastructure, etc. are rented. • Electronic media channel for media representatives instead of paper • No use of give-aways, flyers, etc. in stadiums and fan zones • Reusable (transport) packaging • Reuse of materials (upcycling, material exchange, auction)	
Overnight stays		
Accommoda-tion	• Energy management in hotels: advisory and information campaign by host cities and the German Hotel and Restaurant Association to improve energy efficiency • Selection of accommodation according to ecological criteria (EMAS etc.); list sustainable hotels in information portals preferentially • Selection of team accommodation: Choice of location takes into account accessibility of venues and rail access; as well as EMAS, energy management, etc.	
Food and beverages		**Catering**
Catering	• Vegetarian and vegan alternatives • Reduction of meat products • Seasonal-regional food • Organic food	• Exclusive use of reusable materials (beverage cups, other cups, cutlery, plates, bottles, kegs, beverage crates, etc.) in all areas: stadiums, fan zones, etc.

Source: Oeko-Institut e.V.

4.3 Environmentally sound mobility

Evaluations of major sporting events such as the past European Football Championships and the ex-ante carbon footprint of EURO 2024 presented here show that GHG emissions from the transport sector account for the major share of GHG emissions from EURO 2024, but also from international matches, DFB Cup and Bundesliga matches in general. Therefore, it makes sense to treat mobility and the reduction of GHG emissions in the transport sector as a focus of efforts to plan and execute EURO 2024 in the most climate-friendly way possible. Accordingly, the focus of the climate action measures described here is on the transport sector. Travel to and from the event by players and officials, but especially by spectators, is of the greatest importance. A further reason underpinning this focus is that it has not been possible to reduce emissions in the transport sector in recent years in line with Germany's climate targets.

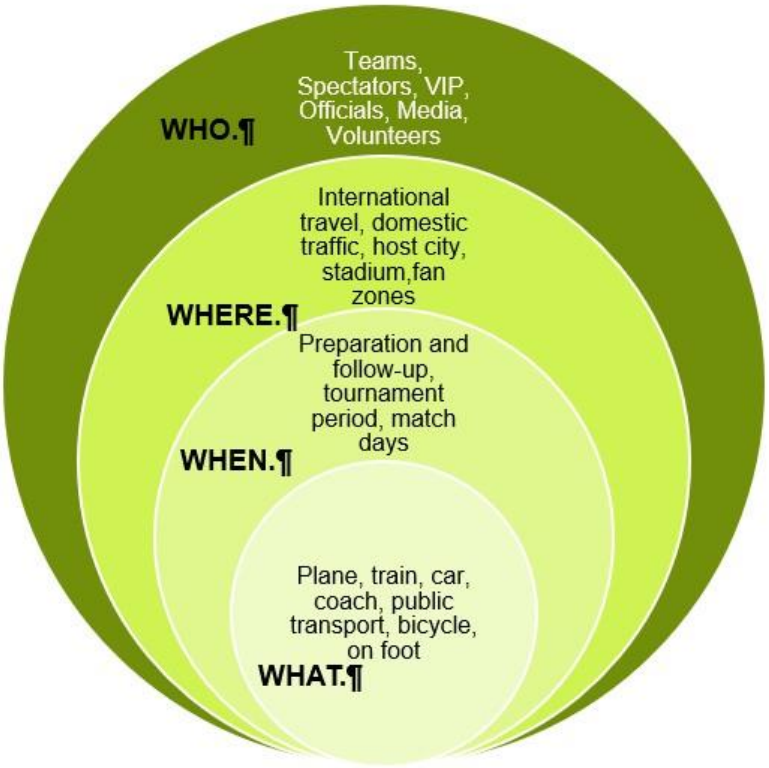
While technical measures are often "only" a question of money, and organisational measures can be implemented through clear guidelines, the transport sector with spectator traffic to the matches presents a different challenge. With the help of appropriate offers and awareness-raising, the aim is to achieve a change in awareness. Actions should be tailored to supporting changes in the mobility behaviour of spectators, teams and officials: away from motorised individual transport and towards environmentally friendly public transport and mobility.

For a transport action plan, a fundamental concept is that transport volumes must be considered and planned from the beginning of journeys to their end in the host city with arrival at the stadium or fan zone and back again. At the same time, environmentally friendly transport must be seen as a joint effort of all stakeholders in EURO 2024 GmbH, embracing host cities and stadiums, at both national and international level. In addition to challenges, a sustainable transport action plan for EURO 2024 also offers opportunities: pointing the way for a transport transition in Germany and mobility in the entire sports sector, and creating a German lighthouse project visible throughout Europe. Last but not least, environmentally friendly transport is indispensable for the reduction of GHG emissions; it is in this field that the climate neutrality of EURO 2024 will be decided.

The following Figure 4-1 shows the various dimensions that can in principle be addressed by climate action measures in the transport sector during a European soccer championship. In the following section, the concrete transport measures are presented. They are structured in such a way that, based on the "WHERE?, all transport flows are considered, from international to local.

Two different types of measures can be distinguished in the transport sector, but also in the other fields of action. First, climate action measures with the clear goal of achieving the highest possible savings in GHG emissions. And then a second type of measure with a focus on raising awareness and acting as a role model. In the measures described in the following sections, both types are applied to varying degrees.

Figure 4-1: The dimensions of possible climate action measures in the transport sector



Source: Oeko-Institut e.V.

4.3.1 Transport measures for a climate-neutral EURO 2024

4.3.1.1 International arrival and departure to Germany

On the basis of the ex-ante carbon footprint in Section 3 it is assumed that around 33% of all 2.8 million stadium spectators (tickets) travel from abroad. Due to the geographical location and the distances to Germany, air travel is inevitably the main mode of transport to Germany. This means that around 60% of GHG emissions (spectators, national teams, officials, etc.) from the transport sector are attributable to international travel to/from Germany.

With regard to the reduction of GHG emissions from international transport, there are two basic starting points for climate action measures: the choice of transport mode and the reduction of specific GHG emissions from flights or aircraft.

The first measure presented is the **use of trains instead of airplanes to travel to Germany.**

The basic starting point is to reduce GHG emissions by replacing as many flights (and car trips) as possible with train trips. There are many destinations that can be reached by train in a reasonable amount of time (especially from directly neighbouring countries); cf. Table 4-2.

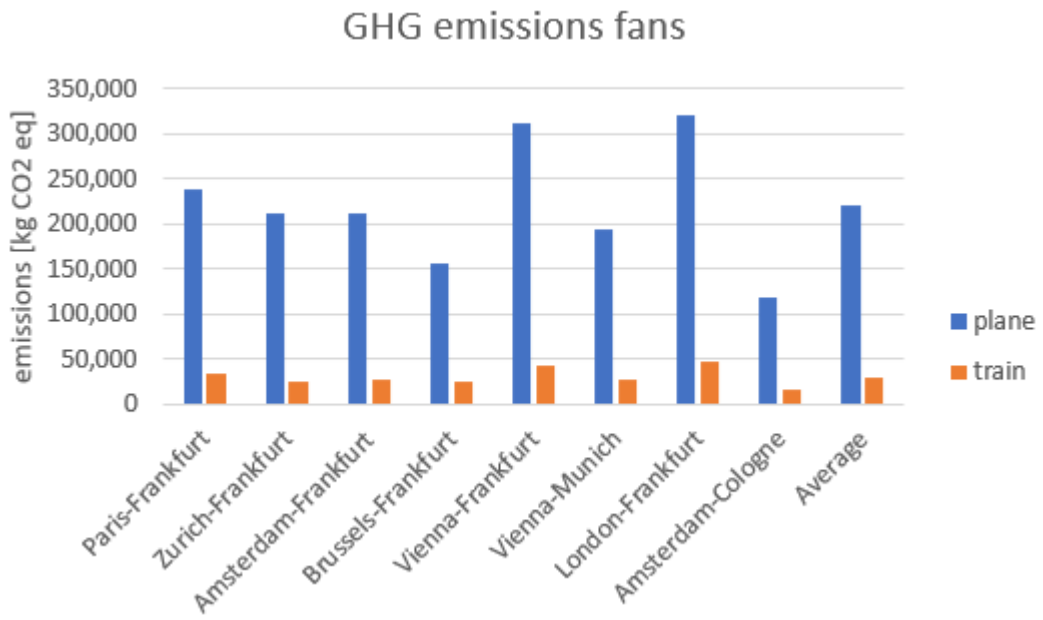
Table 4-2: Selected connections for travel to Germany by train

Train	Travel time
Brussels - Frankfurt	3.5 h
Copenhagen - Frankfurt	9 h
Copenhagen - Cologne	10 h
Zurich - Frankfurt	4 h
Vienna - Frankfurt	6.5 h
Vienna - Munich	4.4 h
Prague - Frankfurt	8 h
Warsaw - Berlin	7 h
Warsaw - Frankfurt	11 h
London - Frankfurt	6 h
Budapest - Frankfurt	10 h
Bratislava - Frankfurt	8 h
Paris - Frankfurt	4 h
Amsterdam - Frankfurt	5.5 h
Amsterdam - Cologne	3 h

Source: https://www.bahn.de/; Research Oeko-Institut e.V.

In order to estimate potential savings, scenarios comparing flights and trains were calculated for selected destinations. The GHG emissions for flights were calculated for 8 selected destinations with outbound and return flights for an assumed 2,000 spectators each. For comparison, it was then assumed that these flights were replaced by train trips. The results in Figure 4-2 show that the train trips result in significant savings compared to the flights. The assumed scenario with 8 selected destinations and 2,000 spectators each results in total savings of around 3 million kg CO_2-eq.

Figure 4-2: GHG emissions, plane and train compared



Source: Oeko-Institut e.V.

The realisation of such a scenario requires an **offer of attractive cross-border "special tickets" for EURO 2024 in** coordination with the domestic German rail offers (i.e. a national combined ticket) as well as extensive communication. The greatest savings potential for replacing flights with train journeys exists among spectators due to their high number. However, national teams also play an important role because of their role-model function. If national teams, e.g. the national teams of France, Switzerland, Belgium or the Netherlands, use the train to travel to and from Germany, this can help to raise awareness and motivate spectators to travel by train.

Travel to Germany by train is of course also relevant for all other stakeholders, such as UEFA or journalists. Special trains can also be useful for larger groups of fans. It should be examined whether special trains should be used for certain matches (e.g. with arrival/departure on the day before or after the match or on the match day itself).

In general, however, train offers should not be limited to Germany's neighbouring countries. With appropriate ticket and connection offers, longer train routes are also attractive and can be an alternative to air or car travel. Night trains are also an option, especially for long distances. New night train lines, for example Berlin-Paris/Brussels or Berlin-Prague-Vienna-Graz-Ljubljana/Zagreb, are to go into operation and would be available for EURO 2024.

In addition to switching to rail, reducing GHG emissions from aircraft is an option for action. The use of **PtL fuel[14] to reduce GHG emissions from international flights is** presented below.

The use of alternative fuels (PtL) for aircraft represents a lighthouse or demonstration project. It is assumed that by 2024, at best, selected flights can be realised with alternative fuel (mix: conventional kerosene with a small proportion of PtL fuel). Alternative fuels are of high importance, however, as they offer a technical possibility to carry out a flight in at least an approximately climate-neutral

[14] PtL = Power to Liquid. Green hydrogen generated from water and renewable electricity is used together with carbon dioxide to produce alternative kerosene.

manner. The possibility of national teams arriving/departing from, for example, Portugal or similar destinations should be examined.

PtL fuel could potentially be sourced from an existing or planned PtL plant[15]. A substitution solution could be considered: a certain amount of PtL kerosene is purchased and then used on other flights; but the emissions saved are allocated to EURO 2024.

4.3.1.2 Environmentally friendly public transport in Germany

Switching to environmentally friendly public transport plays a key role in reducing GHG emissions from trips within Germany.

National teams: Use of train (bus) instead of plane in Germany

As a measure to raise awareness and serve as a role model with a broad reach, it is proposed that all national teams commit to using only trains or coaches within Germany. Such a voluntary commitment by all national teams to forego flights within Germany could have a major signal effect for fans and other stakeholders of EURO 2024, but also beyond that for organised sport.

To support the implementation of this measure, Deutsche Bahn, for example, could offer attractive special compartments for the national teams for all journeys. If possible, the match schedule should be optimised in such a way that travel distances are reduced as much as possible. Long trips such as Hamburg-Munich, especially during the group phase, should be avoided. Depending on the route and the teams' quarters, a train/bus combination may be necessary and useful. Some teams (e.g. Germany, France, Switzerland, Netherlands) could participate in EURO 2024 in a completely "flight-free" manner.

GHG emissions of national travel – spectators travel by train

Around 2.8 million spectators are expected to attend the 51 EURO 2024 matches in June/July 2024. Therefore, there is a correspondingly high potential for savings in this stakeholder group if domestic German flights are replaced by train journeys.

In the ex-ante carbon footprint in Section 3 it is assumed that around 4% (German) and 25% (foreign spectators) of domestic German trips (in passenger kilometres) are made by air[16]. If these spectator flights were completely replaced by train journeys, around 15,000 tons of CO_2 eq. could be saved.

In order to tap this potential as much as possible, and also to encourage spectators to switch from car to train, a number of different measures are necessary:

- National Combi-Ticket for spectators on match day: validity of the national Combi-Ticket also 1 day before and after the match day; the national Combi-Ticket includes free rail travel throughout Germany (there and back) to the match venue and further includes public transport in the host cities.

[15] https://fairfuel.atmosfair.de. Roughly 90% GHG emission savings compared to conventional kerosene; produces 350 metric tons of PtL fuel per year. https://www.hessen.de/presse/pilotanlage-fuer-synthetisches-kerosin-in-planung; world's largest pilot plant for synthetic kerosene in Frankfurt-Höchst Industrial Park; construction scheduled to start in 2022.

[16] For fans residing in Germany, the 4% flight share refers to travel from the place of residence to the stadium and back. For fans residing outside of Germany, the 25% flight share refers to trips made by fans who have already seen at least one match at the stadium and are travelling from host city A to host city B.

- Additional train service in the late evening/night hours to allow for travel home after the match (including to more distant destinations).
- Offer of special trains for fans of different countries of origin to their matches (also for international trips).
- Development of on-demand bus service; see the measure below.
- No parking facilities for motorised private transport at the stadium and in the wider area. Parking spaces only for people with disabilities and for buses.
- Restricting parking for private motorised traffic in the host city; e.g. by drastically increasing parking fees if parking exceeds 2.5 hours on match days.

The national combined ticket is a pivotal element of the transport action plan and was already part of the DFB's bid for EURO 2024. It is indispensable for reducing the GHG emissions of EURO 2024 and pioneering future mobility in the sports sector. At the same time, a national combined ticket represents advertising for the railroad with a view to the goal of "doubling passenger numbers by 2030" and enables an image boost for Deutsche Bahn and Germany in the sense of a community experience with the railroad as a place of encounter and meeting place for nations. A combined ticket and, for example, additional trains geared to the needs of the fans also express appreciation and an offer to the spectators. Last but not least, this will relieve the roads and avoid traffic jams.

Alternative to private motorised transport: on-demand bus service

Rail as the sole alternative to airplanes and private cars will not be enough to make fans change their minds. Particularly in areas with insufficient or unattractive local and long-distance public transport services, an additional offer for environmentally friendly public transport is necessary. Against this backdrop, the "on-demand bus service" measure idea was developed as part of this study.

To reduce motorised private transport, an on-demand bus service offers flexible shuttle buses that drive fans to the stadium or train station on demand via app. Passengers with similar routes are automatically bundled into "pools" in one vehicle with the help of an algorithm. Depending on demand and distance, (tour) buses and minibuses are used. The vehicles pick up passengers at certain hubs and drive directly to the stadium or to the nearest train station with good connections to the host city. At the end of the match, they return the same way. The on-demand bus service can be offered throughout Germany; for routes from the region around a host city / stadium or train station and for routes (from areas with poor transport connections) with a long distance to a host city.

The app enables the passenger to register, book and pay. Exact departure and arrival times as well as possible delays are communicated immediately. Bus drivers receive all the important information for the journey, including the specific route, in real time via the app.

The on-demand bus service represents an idea that would have to be developed as a pilot project. This would require cooperation between the app developer, bus company and Bundesliga club. An important part of the project and implementation would be communication and information about the service. The starting point would be the preparation of a preliminary analysis of mobility needs, e.g. through surveys of the DFB (international matches) and Bundesliga clubs (1st Bundesliga matches) as well as spectators. A pilot phase with a selected Bundesliga club, a stadium and an accompanying

communication/information campaign could be used to test the system in Bundesliga operations in 2023, at international matches and then at EURO 2024.

4.3.1.3 Environmentally friendly mobility in the host cities

Following international travel to and from Germany and travel within Germany, travel in the host cities is discussed below. As a focal point of environmentally friendly transport in the host cities, measures relating to bicycle traffic are presented.

By bike to the stadium and fan zone

The fundamental goal is to strengthen the bicycle as an environmentally friendly mode of transport and to increase its share in the modal split. Host cities could support and promote this approach by committing to a target: a specific target of e.g. **10% bicycle share for transport to the stadium.**

In order to strengthen bicycle traffic and to achieve possible targets, a bundle of measures in a wide variety of areas is presented below. The measures address stadiums and fan zones alike:

- Create sufficient numbers of secure bicycle parking spaces (e.g. multi-storey bicycle parking structures).
- Establish (temporary) "bicycle repair shops"/service points.
- Charging stations for e-bikes.
- Increase number of sharing/loan/rental bicycles in host cities (during EURO 2024).
- Offer bicycle rickshaws; especially as a tourist option.
- Use transport bicycles for logistics transport in host cities wherever possible; by host city organisation team during planning, preparation and implementation of EURO 2024. After EURO 2024, transport bicycles can be transferred to a city project; one example is the "Heinerbike" scheme of the city of Darmstadt (free cargo bike rental for all).
- Creation of inner-city bike lanes to the stadium. Short-term (pop-up) and permanent bike lanes; coordinate with each host city's bike lane concept; consider accelerating/advancing stadium routes to 2024.
- Regional bike paths to the host city / stadium. Connection of the surrounding communities; coordination with the cycle path concept of the respective host city and region (e.g. cycle fast lanes). Check whether relevant routes can be accelerated/advanced until 2024. Permanently increase the proportion of spectators who travel further distances to the stadium by bicycle. Nowadays, distances of 10 km and more are feasible with e-bikes.
- Comprehensive (permanent) signage of bike paths (to stadium and fan zone) in the host city and region.
- Communication and information on bicycle use at EURO 2024.
- Possible incentives when using the bike; e.g. a coupon at gated bike parking for a discounted drink.

The measures presented are not limited to the planning of EURO 2024 and its realisation in summer 2024, but serve in general to support bicycle use in cities and to increase the share of bicycles in urban traffic. In terms of sustainable development, the measures for bicycle transport at EURO 2024 can and should also contribute to future environmentally friendly mobility in (soccer) sports. With regard to the German Bundesliga, it can be assumed that the average distance of travel to the stadium for a league match is shorter than for a European Championship match. Many spectators come from the catchment area of the city. Accordingly, the potential for bicycle travel to stadiums in the Bundesliga can be assumed to be higher than that for EURO matches.

Against this background, further measures in the area of projects and campaigns are presented below, whose impact goes beyond the time frame and reference area of EURO 2024.

Use of bicycles and public transport in popular sports

In the following, under the motto "Host Cities – Environmentally Friendly to Training, Sports and Games", some project ideas are presented that are intended as measures to support environmentally friendly mobility in the sports sector of the host cities and the local sports clubs. The projects aim to promote bicycle use and also the use of public transport for training and sports activities. These include:

- Create new or improve existing safe bicycle routes to all sports facilities (club-owned and municipal).
- Continuous routing and signage of bike lanes to sports facilities; adequate lighting must be provided.
- Create secure bicycle parking at all sports venues in the host city.
- Improve public transportation access to sports venues in the host city; especially during the winter months; e.g. coordinate schedules with evening training hours.
- "Club ticket" for public transport: creation of a specific offer for clubs of discounted tickets for travel by public transport to training and matches.
- Round table: Development of a joint initiative by clubs, the city and transport companies for environmentally friendly mobility in sports. Coordination of the needs of the clubs and athletes on the one hand and service provision by transport companies on the other.

"Sport-Germany rides a bike" bicycle campaign

To motivate all sports enthusiasts – active participants and spectators – to use bicycles, a campaign could be initiated under the motto *"Sport-Deutschland fährt Rad"* (Sport-Germany rides a bike). The campaign could be carried out as a joint action by e.g. host cities, DFB and the German government in the run-up to EURO 2024. A focus or starting point of the campaign could be in the host cities.

The campaign and the awareness it seeks to raise are aimed at various aspects. First, it is intended to support the goal of increasing the share of bicycles in trips to stadiums and fan zones during EURO 2024. Secondly, it is about promoting the bicycle projects "Host Cities – environmentally friendly to training, sports and games". In general, the aim is to raise awareness of the potential of bicycles in popular sports, for example the bicycle as an alternative to the parents' cab for trips to training, or to the forest parking lot for jogging.

For the concrete design of the campaign for the use of bicycles, the ongoing campaign for city cycling (https://www.stadtradeln.de/home) could provide guidance. However, there would have to be a specific focus on sports clubs. A campaign in the form of a competition with a joint Internet portal in which all sports clubs throughout Germany can register would also be conceivable. Each club (or team) registers and enters its bicycle kilometres travelled to training or matches over the duration of the campaign. There are different evaluation categories: e.g. absolute kilometres travelled, kilometres per athlete. The GHG emissions saved by cycling compared to driving a car are calculated and reported. Attractive prizes are awarded to the winners in various categories. Comprehensive communication support for the campaign is necessary, e.g. with well-known athletes as "faces" of the campaign.

Walking to the stadium and fan zone

In addition to public transport and bicycles, the routes to stadiums and fan zones in host cities can also be covered in an environmentally friendly way on foot. In the following, a pedestrian project with the aim of increasing the proportion of pedestrians to the stadiums and fan zones is presented. The project involves the construction of "fan paths" to the stadium and fan zone. The footpaths are to be visually conspicuous, e.g. as a "red carpet. One or more main routes from the train station or the city centre to the stadium or the fan zone should be designated. Experience during the 2006 FIFA World Cup showed that many fans also walked long distances to the stadium. The Figure 4-3 shows the "red carpet" on the path to the stadium in the host city of Dortmund during the 2006 World Cup.

Figure 4-3: "Red carpet" at the 2006 FIFA World Cup in Dortmund, Germany

Photo Oeko-Institut e.V.

A number of aspects can be taken into account when promoting pedestrian traffic and planning fan paths:

- Attractive design of the fan routes; this includes offers of food and drink, free drinking water, seating, entertainment, culture and information.
- Wayfinding should take into account, if possible: Places of interest, attractive route in the "green" (parks), safe routes (clear demarcation of streets), attractive neighbourhoods (culture, entertainment), sufficient shading (climate adaptation, heat).

- Possibilities of citizen participation can be considered; the development and implementation of the schemes can, for example, be carried out by the respective districts and their population.
- When choosing the location of the fan zone, good accessibility by foot (and bicycle and public transport) is an important criterion.
- Good signage and communication of/about fan routes (to the stadium and fan zone) at EURO 2024 must be ensured.

Due to the distance between the train station and the stadium, Leipzig and Dortmund are particularly suitable for the implementation of a "red carpet" with distances of around two to three kilometres. For other stadiums and host cities, however, partial routes from central squares or other train stations/stops to the stadium may also be considered as fan routes. In addition to the routes to the stadium, the routes to the fan zones should also be considered as a "red carpet".

4.4 Further prevention measures

4.4.1 Stadiums

EURO 2024 will use 10 existing stadiums that are in operation. This means that no new stadiums will be built for EURO 2024. Construction measures and energy efficiency measures will not be discussed in detail here; instead, please refer to the recommendations for action in a separate volume of this report and to Green Champions 2.0 (https://www.green-champions.de).

In principle, many technical areas in stadiums and sports facilities can be addressed with individual measures. These include, for example, lighting, heating systems, ventilation systems, refrigeration systems and turf heating. At the recent soccer World Cups in 2006 and 2011, a number of climate action measures were presented as part of the "Green Goal" projects. At the same time, today's soccer stadiums and arenas represent complex buildings. Individual measures help to reduce GHG emissions, but to achieve minimisation and optimisation of energy consumption, a comprehensive consideration of the entire system is necessary[17]. This includes a detailed overall analysis of the building, a demand analysis of temporal energy demand (match days, events, everyday operation) and power demand, the identification of energy efficiency measures (technical and organisational) in the interaction of the individual areas (e.g. air/heat) and energy supply from renewable sources.

Stadium operators have in-depth knowledge of their technical systems and building management, so that the stadiums are aware of the starting points for energy savings and the corresponding solutions. As part of this study, the stadiums presented an idea for a joint project. In each of the EURO 2024 stadiums, an important specific energy-saving measure is to be identified and, if possible, implemented before EURO 2024. Although the stadiums and arenas are individual buildings, possible savings measures are in principle transferable to other types of buildings. The EURO 2024 stadiums joint project is therefore intended as a demonstration project to raise awareness among building operators in other areas and motivate them to reduce their carbon footprint.

[17] *Energieeffizienz in Stadien und Sportarenen*, Fach.Journal 2012, R. Detzer. https://www.ihks-fachjournal.de

4.4.2 Renewable electricity

The energy supply of the stadiums from renewable sources is an important building block for a climate-neutral infrastructure of EURO 2024.

With regard to the objective of this study, the feasibility of a "climate-neutral" EURO 2024, it needs to be borne in mind that the purchase of certified "green electricity" must be calculated in balance sheet terms using the specific GHG emissions of the average German electricity mix (WRI 2015).

In the following, the generation of electricity from renewable energies with photovoltaic systems (PV systems) is presented as a climate action measure. It needs to be taken into account that both subsidised and certified "green electricity" under Germany's Renewable Energy Sources Act (EEG) cannot be counted as "climate-neutral". In the following, therefore, the focus is on self-financed renewable energy plants and, consequently, on own consumption of the electricity produced from these sources. The electricity from these renewable energy plants can be considered "climate-neutral", i.e. to have zero GHG emissions, except for the inputs in upstream chains (e.g. production of the plants).

The following options for the construction of PV plants can be considered in the context of EURO 2024:

- Construction of new PV systems or expansion of existing systems at the stadium (stadium roof, other building roofs, footpath roofing, etc.).
- Construction of new PV systems on neighbouring buildings in the direct vicinity of the stadium (e.g. multi-storey bicycle/car parks).
- Rededication of parking areas of stadiums for the construction of new PV systems (elevation of the PV panels above the parking areas should also be examined). The goal of future environmentally friendly mobility in (soccer) sports is to minimise motorised individual traffic. This would free up parking areas that could be reused.
- Host Cities Initiative: build new PV systems on other host city sites, such as school and sports club gymnasiums, indoor pools, and other sports facilities.

In addition to roof surfaces, facades can in principle also be equipped with PV modules. Some stadium roofs are not suitable for conventional PV systems. Here, PV films can be an alternative due to their lighter weight and flexibility. However, these solar films are also less efficient than conventional modules.

To enable greater own consumption of the PV electricity generated, the use of battery storage is an option. The cost-effectiveness of such storage needs to be checked for the individual case.

Power Purchase Agreement (PPA) – supply of electricity from renewable sources

A PPA is a contract between an electricity supplier and an electricity purchaser for an agreed amount of renewable electricity. Such a long-term power supply agreement could be between a plant developer and operator of a wind power or PV plant and a stadium over an extended supply period. Part of the contractual agreement is also that the "zero emissions" (except for upstream chain emissions) of the electricity generated are transferred to the electricity purchaser. In terms of electricity, this makes it possible to operate a stadium in an almost "climate-neutral" manner.

A PPA may be considered if a stadium operator cannot or does not want to construct and operate its own PV system. The renewable energy systems (e.g. ground-mounted PV) can be erected and operated elsewhere where suitable land is available.

In order to better match the amount of electricity generated and supplied with the stadium's electricity requirements, it would also be conceivable for several stadiums to join forces. Thinking further, an option could be examined in which the German Soccer League (DFL) acts as the electricity purchaser or contractual partner and integrates all 36 Bundesliga / 2nd Bundesliga clubs via the DFL. This would allow the Bundesliga and 2nd Bundesliga to be supplied with "climate-neutral" electricity (except for upstream chain emissions).

4.4.3 Battery storage

Diesel generators for power generation cause high specific GHG emissions per kWh of electricity and air pollutants such as diesel soot (particulate matter). Accordingly, diesel gensets are not conducive to climate action and environmental concepts for large sporting events. Wherever possible, diesel generators should be avoided or replaced.

At EURO 2024, two applications of diesel generators need to be considered: uninterruptible power supply and provision of additional power where there is no or insufficient power supply. The avoidance and replacement of diesel generators affects fan zones and stadiums alike. The first priority should be to use grid power wherever possible. If this is not possible, the use of large battery storage is suggested as a replacement for diesel gensets.

The battery storage units serve as a replacement for **temporary** diesel generators, which can potentially be used in fan zones and in the stadium area. Stationary diesel generators, which are used in almost all stadiums anyway[18] (uninterruptible power supply), are discussed separately below.

Temporary, mobile battery containers could be used to replace temporary diesel generators during EURO 2024. 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 PV system. During the event or soccer match, 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 potential GHG emission savings when replacing diesel gensets with battery storage:

- Consumption of, for example, 100,000 litres of diesel[19]; 100,000 litres of diesel cause approx. 320,000 kg CO_2-eq.
- Diesel gensets generate approximately 380,000 kWh of electricity from 100,000 litres of diesel.
- With battery as intermediate storage, on the other hand, about 380,000 kWh of electricity from the German power grid cause only about 210,000 kg CO_2-eq.

[18] At the Allianz Arena in Munich, an alternative was implemented with a second independent power supply via the power grid.

[19] By comparison, UEFA EURO 2008 and 2012 consumed approximately 184,000 and 309,000 litres of diesel, respectively.

- The result is a saving of around 110,000 kg CO_2-eq.

The use of battery storage can be designed as a demonstration project, especially if second-life lithium-ion batteries from electric vehicles are used. Cooperation with a car manufacturer, e.g. VW as DFB sponsor, and the provision of battery containers with second-life batteries from electric vehicles is worth examining.

To be distinguished from a temporary battery container project during EURO 2024 is the permanent replacement of stationary diesel gensets in stadiums. In the permanent use of battery storage in stadiums in Bundesliga operations, batteries can perform various functions:

- Safeguarding the power supply in the event of power failures (uninterruptible power supply),
- Peak load capping (capping consumption peaks and minimising cost of service charge),
- Optimising own consumption of renewable electricity (using more of the self-generated (PV) electricity and thereby saving electricity costs) and
- Providing control capacity for the power grid.

So far, the Johan Cruyff Arena in Amsterdam[20] is the only stadium to use old batteries from the all-electric Nissan Leaf. However, in the present settings, the financing of battery projects in Bundesliga stadiums could be difficult or economically questionable.

4.4.4 Catering

Meat products cause higher GHG emissions than, for example, a vegetarian alternative. With this in mind, a number of action options are proposed for catering at EURO 2024 to reduce GHG emissions:

- Expansion of the food offering in stadiums and fan zones to include vegetarian and vegan alternatives. An increase in food waste due to the adapted offering is to be avoided, for example by allowing meat components to be prepared separately and combined flexibly with the other components.
- Food stands in the stadium and fan zones: For every meat-containing[21] offering, at least one vegetarian/vegan alternative is offered (e.g. 1 meat-containing meatball and 1 vegetarian meatball).
- Canteens for e.g. volunteers: completely meatless food or at most every second day food with meat.
- 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.

[20] https://www.mobilityhouse.com/de_de/magazin/pressemeldungen/johan-cruijff-arena-3mw-energiespeicher-am-netz.html; last visited on 14.4.2022

[21] Meat products here also include fish products.

- Hospitality area[22]: At least one separate vegetarian and one vegan alternative must be offered for each meat-containing offer.
- The amounts of meat per serving are generally reduced.
- More organic food is used.[23]
- Raising awareness and creating monetary incentives, for example via a CO_2 price surcharge for meat products in the hospitality area and for food stands in the stadium and fan zones: e.g. a flat €1 surcharge in the sense of a "climate levy" for meals containing meat in the hospitality area and a €0.50 surcharge for food stands.
- Communication and information on the climate levy: e.g. separate identification on the bill, and signs at the food counter.
- Use of the additional funds collected from the climate levy for climate action projects, e.g. in soccer clubs.

The example of bratwurst (fried sausage), which can be offered in stadiums and fan zones, is used to explain the project idea for climate action in more detail, with elements for raising awareness and monetary incentives. The production of a conventional bratwurst made of meat, a vegetarian bratwurst and a vegan bratwurst result in different levels of GHG emissions, cf. Figure 4-4. For an 80-gram bratwurst, the variant based on pork results in the highest GHG emissions at around 0.56 kg CO_2-eq. The vegan bratwurst performs best with around 0.24 kg CO_2-eq. At 0.34 kg CO_2-eq., the vegetarian bratwurst is associated with slightly higher emissions than the vegan variant. As a monetary incentive and in the spirit of raising awareness, the pricing at the food stands is proportional to the CO_2 footprint of the respective bratwurst. The price ratio of the bratwursts to each other thus reflects their CO_2 footprint.

[22] A total of around 130,000 hospitality tickets are available, which can basically be purchased by anyone. The package usually includes a seat for the match, a three-course meal in the pre-match restaurant and, if applicable, entertainment.

[23] Due to a lower yield per hectare, 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 strongly recommended due to the clear advantages in the areas of pesticide use, nature conservation, biodiversity, animal welfare, etc.

Figure 4-4: GHG emissions and pricing of bratwursts

Source Oeko-Institut e.V., based on Oeko-Institut (2021)

5 Climate compensation or climate responsibility

Climate change is one of the most pressing global problems. In order not to exceed 1.5°C, the world must be climate-neutral by 2070 (Huppmann et al. 2018), i.e. no more GHG emissions may be produced than are bound elsewhere by greenhouse gas sinks such as forests or oceans. To achieve this, CO_2 emissions must be reduced to net zero as early as 2050. Against the background of the decision of the Federal Constitutional Court in April 2021[24], climate neutrality in Germany must be achieved by 2045 in accordance with Section 3 (2) of the Federal Climate Protection Act. Various studies show which policy instruments can be used to provide the appropriate incentives to achieve this goal (Prognos, Oeko-Institut, Wuppertal-Institut 2021, ISI 2021, PIK 2021, dena 2021). Beyond these incentives, individuals and organisations want to make an additional voluntary contribution to GHG mitigation and to achieving climate goals. In the following sections, we discuss which strategies can be considered for this and which challenges are associated with each.[25]

5.1 Priorities of climate strategies

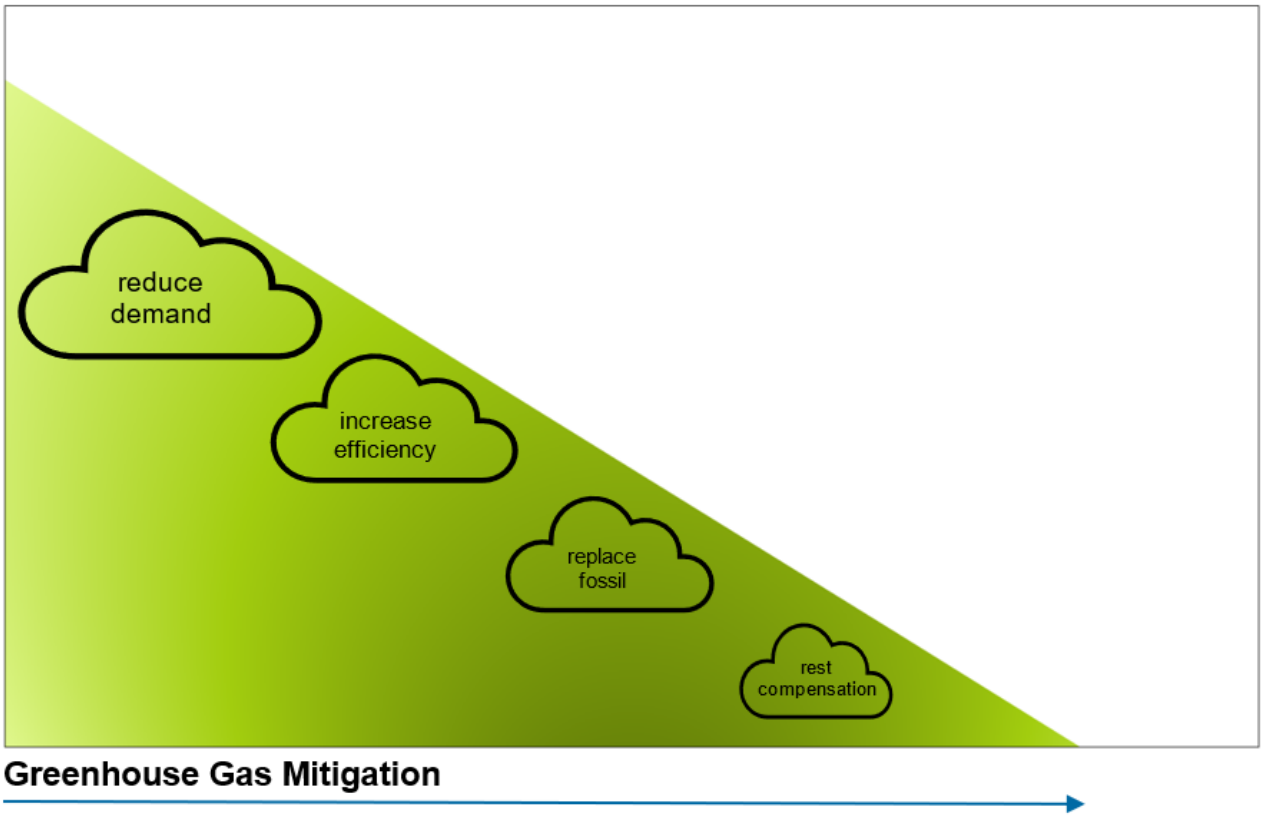
From an environmental perspective, there is a clear priority for the various greenhouse gas mitigation strategies:

1. Reduce demand
2. Increase efficiency
3. Substitute fossil energy sources
4. Offset unavoidable emissions

[24] Constitutional complaints against climate protection law partially successful, https://www.bundesverfassungsgericht.de/SharedDocs/Pressemitteilungen/DE/2021/bvg21-031.html.

[25] Sections 5.1 - 5.4 are based on an unpublished document for the German Olympic Sports Confederation (DOSB) and have been updated and expanded for this report.

Figure 5-1: Priorities of climate strategies



Source: Based on Oeko-Institut (2010)

The first strategy is initially relevant for individuals. It is about the question of whether or how satisfaction and happiness can also be achieved with fewer or different goods or services, e.g. by choosing housing that travel to it is short and it can be reached by public transport or by choosing vacation destinations that can also be reached without an airplane. For service providers, this category is relevant insofar as, for example, it should be questioned whether supply or equipment elements that are particularly climate-intensive are actually necessary or whether they can be dispensed with.

The search for applications and processes that consume less energy or cause fewer emissions is the classic strategy that often takes centre stage (e.g. LEDs instead of incandescent lamps). However, it should be borne in mind that higher efficiency always invites an increase in the demand for goods or services, e.g. by illuminating more area or increasing brightness (this is known as “rebound”).

To the extent that the energy demand reduced by improving efficiency is still provided by fossil energy sources, these should be converted to renewable energy sources. It is important to consider the entire process chain in order to prevent GHG emissions from being reduced locally but increasing indirectly elsewhere, e.g. when high-carbon forests are cleared to provide biomass.

Even if these three mitigation strategies are considered and implemented, it can be assumed that self-generated or induced GHG emissions are not zero. If emissions are to be further reduced or a product or service is to be offered in a carbon-neutral manner, the remaining emissions can be offset or compensated for by financing GHG mitigation elsewhere.

From a purely economic perspective, there is often a different ranking compared to the ecological priorities mentioned. Substituting fossil fuels, for example, can be more favourable in monetary terms than improving the energy efficiency of one's own facilities. And depending on the cost of offsetting the remaining greenhouse gas emissions, it may also be cheaper to offset rather than substitute energy sources or improve efficiency. In this respect, it becomes obvious that the price of offset certificates is a conceivable criterion for distinguishing between self-avoidable and unavoidable GHG emissions. However, the question arises whether the price, or what price, is an appropriate criterion for determining which mitigation is judged to be avoidable or unavoidable. In addition, there is the question of whether climate neutrality can be achieved or proclaimed at all in the short term, or whether it is more of a long-term goal that cannot currently be achieved for individual products or services.

5.2 Challenges of compensation strategies

With 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. This is usually demonstrated by certificates (reduction credits or emission rights). According to demand and supply, a price is formed for the certificates, which the demanders pay to the suppliers of mitigation certificates. The suppliers use the revenues to refinance their mitigation activities.

Figure 5-2: Functional schematic of climate compensation

Source: Illustration Oeko-Institut e. V.[26]

What appears simple in theory is confronted with various challenges in practice. The central prerequisite is that allowances are only issued for emissions that are actually prevented, and that prevention is:

- **additional,** i.e. would not have happened anyway because it is required by law or is economical under the given conditions anyway, and

[26] Öko-Institut (2020): *Wie funktioniert Kompensation?* https://fliegen-und-klima.de/wie-funktioniert-kompensation.html.

- **permanent**, i.e. it is not emitted again at a later point in time, as is possible with forests, for example, which initially bind CO_2, which can be released again in the event of a forest fire.

With the launch of the Clean Development Mechanism (CDM) under the Framework Convention on Climate Change a good 20 years ago, much practical experience has been gained with such projects and various weaknesses have been identified. These weaknesses have resulted in fewer emissions being avoided than mitigation credits being issued. Here are just a few examples (Oeko-Institut 2016):

- **Baseline**: Reduction credits are determined as the difference between actual emissions and a hypothetical development of emissions without the project. If this so-called baseline is overestimated, more allowances are issued than emissions are reduced. Since providers have an interest in being issued as many allowances as possible, they have an incentive to present the project in such a way that more allowances are issued. To mitigate this incentive, both the baselines and the actual project emissions must be verified by accredited certifiers.

- **Leakage**: Emissions are reduced in the specific certified project, but additional emissions are generated elsewhere, so that globally, fewer emissions are reduced than certificates are issued.

- **Perverse incentives**: if the proceeds from the abatement credits are significantly greater than the cost of the emission-generating product, including abatement costs, this can lead to increased production beyond the needs of the actual product, thus artificially increasing emissions. This has been the case in the past with some industrial gas projects.

- **Double counting**: certificates that meet all quality criteria and have actually achieved the mitigation that was certified can be issued multiple times in different crediting schemes or used multiple times as mitigation evidence in different mandatory mitigation regimes or in the voluntary market (Schneider et al. 2019).

Some of these weaknesses have been eliminated or mitigated in the past by improving the calculation methods for the number of credits to be issued. But the fundamental dilemma, that the providers of emission reduction projects have an interest in as many certificates as possible, remains and can only be addressed by sufficiently strict rules and their implementation, for which, however, there is often not the necessary support at the international level. Additionality depends strongly on the type of project. Renewable energy projects intuitively appear to be additional. In many cases, however, they are not, as they are either the most economical option anyway or their use is mandated by law. In light of this, some crediting systems have moved to completely exclude from their systems project types for which additionality cannot be determined with very high certainty.

It would also be conceivable to compensate with emission rights from emission trading systems instead of reduction credits (Doda et. al. 2021). If, for example, emission rights were withdrawn from the European Emissions Trading Scheme, the companies covered would have to reduce their emissions more, so that compensation for their own emissions could be achieved through the purchase of emission rights. In this case, the price of emission rights could be considered an objective indicator of the reliability and ambition of the emissions trading system. Nevertheless, the price may fall drastically in the future, e.g. due to a recession, which would subsequently call into question the quality of emission reductions.

As a result of these considerations, it appears that offsetting – be it through mitigation credits or carbon credits – faces significant challenges in its own right, each of which can lead to offsets being

called into question. Ultimately, it is often not possible to determine with sufficient certainty whether emissions that have not themselves been avoided have been reliably offset elsewhere.

5.3 Climate compensation in the era of the Paris Agreement

Climate offsetting dates back to the beginnings of global greenhouse reduction policy in the early 1990s, when the need to become completely climate neutral was still a distant prospect. At that time, the focus was on cost-effectiveness. The hope was that more emissions could be mitigated at the same cost if reductions were made where mitigation costs were lowest. Today, however, offsetting one's own emissions is no longer enough. Emissions must be reduced to zero in all sectors and areas to still meet the goals of the Paris Agreement. Here's what has changed as a result:

- **Reduction contributions from all countries**: In Paris, all countries committed to reduce their GHG emissions. In contrast to the Kyoto Protocol, where a distinction was made between industrialised and transition countries, which had quantitative reduction commitments, and other countries, which had no reduction commitments, this distinction no longer exists since the Paris Agreement came into force. All countries have formulated contributions to the global mitigation effort and have committed to “sharpening” them every five years. While there are currently still sectors in some countries that are not covered by mitigation contributions, these sectors are gradually shrinking. Since the demand for mitigation certificates from the voluntary market has so far been met mainly from this segment, the supply will decrease significantly. In addition, countries will consider more carefully whether they want to sell reduction certificates or prefer to have the reductions achieved credited to their own contributions.

- **Decarbonisation instead of GHG reduction**: While GHG emissions in industrialised and transition countries had to be reduced by a few percentage points from the 1990 baseline by 2020 under the Kyoto Protocol, the member countries of the Framework Convention on Climate Change are now aiming for complete decarbonisation within an equally 30-year timeframe. This will require investment in transformative technologies and emission reduction strategies at a cost far higher than today's offset prices. The idea that the cheapest mitigation options should be implemented first is now taking a back seat to the idea that all conceivable mitigation options must be realised in this timeframe. This will incur specific mitigation costs that are many times higher than the previously known costs of offset certificates in the range of €1 to €25/ton. Compensation based on certificates with very favourable prices must therefore be considered questionable in the future with regard to the contribution to achieving climate neutrality.

- **Climate neutrality as a future goal or as a current aspiration**: In Article 4.1 of the Paris Agreement (UNFCCC 2015) member states have committed to climate neutrality. Many states have set target dates for when they want to achieve climate or CO_2 neutrality (e.g. by 2050, and in some cases earlier). This also means that no state is currently climate neutral. However, some organisations or companies want to move faster and achieve climate neutrality today. Yet technically this is usually not possible for the emissions for which they are responsible themselves, and for the emissions in the upstream chain, e.g. those induced by the construction and maintenance of infrastructure, there is practically no possibility of influencing these emissions to zero. To this extent, these emissions are offset by investments in certificates, mostly through very favourable mitigation credits. However, achieving climate neutrality within 30 years will only be achievable with specific mitigation costs that are many times higher than the current prices of mitigation credits. The Carbon Pricing Leadership Coalition (CPLC 2017) expects that allowance prices will need to

rise to $50-100/t (€45-90/t) by 2030 to get on a Paris-compatible path. The German Federal Environment Agency (UBA 2020a) puts the climate costs for 2030 at 215 €/t.

Against this background, it can therefore be questioned whether the claim today that products, services or entire companies or organisations are climate-neutral is justified. If this is answered in the negative, the question then arises as to 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 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 (UBA 2020b), without claiming that climate neutrality has already been achieved today. For this purpose, 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 (GS, CDP 2018).

5.4 Possible climate strategies

This raises the following key questions for an institution’s own climate strategy:

- **Applicable price**: What price should be applied for deciding which mitigation options are to be classified as avoidable or unavoidable in one's own area of responsibility?
- **Unavoidable emissions**: How should emissions that are considered unavoidable according to the previous question be dealt with?

Empirical data and plausibility considerations can be used to answer both questions. Ultimately, however, they are both normative questions which cannot be scientifically justified in the final analysis, but must be decided “politically” by those responsible in each case. Various criteria can be considered for determining the applicable price, e.g.:

- **Climate costs**: Costs caused by the emission of greenhouse gases. In the period 2020 to 2030, these costs increase from €195/t to €215/t according to UBA (2020a).
- **Abatement costs**: Allowance prices necessary to finance investments that enable compliance with a Paris-compatible mitigation pathway. The CPLC (2017), led by Nicolas Stern and Nobel Laureate Joseph Stiglitz, estimated that this would require a price range of $40-80/t in 2020 and $50-100/t (€35-70/t and €45-90/t, respectively) in 2030.
- **Empirically determined prices**:
  - The prices for emission allowances in the European Emissions Trading Scheme (EU-ETS) are determined daily. The average value for 2020 was €24.61/t and rose to €52.50/t in 2021.[27]
  - The global average price for mitigation credits in 2020 was €2.20/t (ESMP 2021). atmosfair has been charging €23.00/t for many years.[28]

[27] DEHSt (04.01.2022): Emissions trading in 2021 with record revenues of over 12 billion euros, https://www.dehst.de/SharedDocs/pressemitteilungen/DE/2022-001-Jahresanschluss_Emissionshandel_2021.html.

[28] "The Emissions Calculator sets a price of 23 euros per ton of carbon dioxide. These 23 euros are currently needed to save one ton of CO_2 in high-quality climate protection projects in developing countries." https://www.atmosfair.de/de/faqs/zur_co%E2%82%82-berechnung/.

The prices still considered necessary by the CPLC in 2017 for 2020 have since been far overtaken by the real market data in the EU ETS and reached in early 2022 the upper limit of the range that the CPLC had considered necessary for 2030. In the period from 10 January to 13 April 2022, emission allowances were auctioned at an average price of €79/t with a price range of €58-98/t.[29] In this respect, the question arose as to whether price projections provide an adequate orientation for the price that can be applied.

It would therefore be conceivable to base the calculation of the responsibility budget on the historical prices in the EU ETS. However, there is a possibility that allowance prices could collapse again drastically, e.g. due to a global recession. Article 4.3 of the Paris Agreement (UNFCCC 2015) provides that countries may not decrease their contributions, but only increase them. Transferred to voluntary contributions by organisations and companies to global mitigation efforts, this would mean that the most recently applied price would continue to be applied if the price in the EU ETS falls below this value, or the respective price would be applied until it is higher than in the previous year.

For the question of which mitigation options can be implemented within one's own area of responsibility, climate costs could be applied, for example. Since these are considerably higher than the empirical prices, more internal mitigation measures would tend to be implemented and the remaining other options reduced. For this purpose, possible mitigation measures would have to be calculated and ranked in descending order according to their specific abatement costs. It would also be conceivable to implicitly set the applicable price on the basis of this list, e.g. somewhere between the empirical prices and the climate costs, by deciding which measures are implemented and which are not.

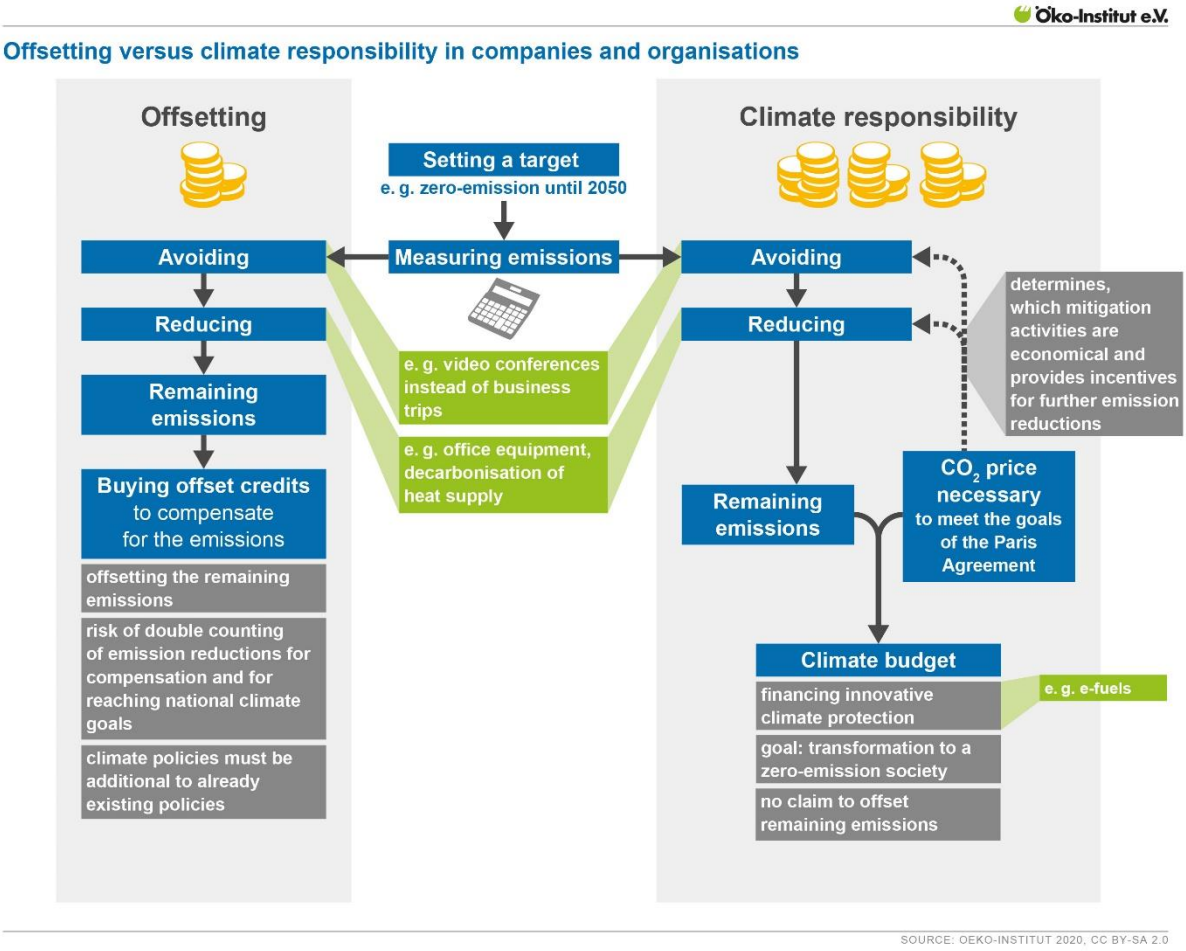
There are also several options for dealing with unavoidable emissions:

- **Offsets**: Purchase of mitigation credits or emission rights to offset emissions.
- **Climate responsibility**: The remaining emissions are multiplied by an applicable price. The climate responsibility budget calculated in this way is used to finance climate action measures, possibly also to finance measures in the institution's own area of responsibility, as decided by the DAV, for example.[30] At the same time, the claim of “climate neutrality” is replaced by “climate responsibility”.

[29] EEX (2022) EUA & EUAA Auction Results 2022, https://public.eex-group.com/eex/eua-auction-report/emission-spot-primary-market-auction-report-2022-data.xlsx.

[30] *Klimaneutralität als Ziel der Klimaschutzaktivitäten im DAV* (Climate neutrality as a goal of climate protection activities in the German alpine mountaineering association DAV, https://www.alpenverein.de/natur-klima/wir-fuers-klima/klimaschutz-im-dav/klimaneutralitaet-als-ziel-der-klimaschutzaktivitaeten-im-dav_aid_37567.html.

Figure 5-3: From climate compensation to climate responsibility



Source: Illustration based on Oeko-Institut e. V.[31]

The advantages of the concept of climate responsibility are:

- **Quality criteria**: Additionality and avoidance of double counting are no longer in the foreground, as the compensation claim is not made. This expands the range of measures that can be used, provided that the budget funds are not used in their own area of responsibility anyway.
- **Transformative technologies**: Innovative measures can be promoted that currently deliver small mitigation contributions but have a high potential to deliver large mitigation contributions in the future, e.g. fully renewable synthetic kerosene for aviation. Demand for these technologies can accelerate development so that they become available as mitigation options sooner.

It is also conceivable that funds could be used both to finance mitigation measures and to purchase certificates. If, for example, the price of certificates with high environmental integrity is below the applicable price, certificates could be purchased for the remaining emissions and internal measures financed from the remaining budget. Alternatively, internal measures could be financed first and certificates purchased for any unused climate budget.

[31] Öko-Institut (2020): *Klimakompensation und Klimaverantwortung* (Climate compensation and climate responsibility), https://fliegen-und-klima.de/kompensieren.html.

For example, the DAV has set 90 €/t as an internal investable price. The climate responsibility budget calculated from this for each individual section of the DAV is to be used to implement climate action measures in the respective section.

As this debate on climate responsibility is in its early stages, there are no clear rules or common practice yet. Thus, there is some leeway for the concrete design of this approach.

If certificates are to be used to compensate for remaining emissions, the question arises as to which certificates should be purchased. 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;[32]
- **Oeko-Institut, EDF & WWF**: The Carbon Credit Quality Initiative.[33]

The quality of the certificates tends to increase with the price, although certificates with a high price can have a lower contribution to global greenhouse gas reduction than certificates that are cheaper. In principle, however, certificates that are currently offered at single-digit euro prices are associated with a certain scepticism regarding their reduction contribution.

5.5 Sports climate fund

As part of a feasibility study for the DOSB, the Oeko-Institut developed a concept for a "sports climate fund" and examined possibilities for its implementation (Oeko-Institut 2013).

The DFB proposed the idea of a climate fund in its application "United by Football. In the Heart of Europe. SUSTAINABILITY CONCEPT UEFA EURO 2024 GERMANY": "German Sports Climate Fund. New mechanism to foster investments in climate friendly technologies in sport facilities" (DFB 2018).

The basic approach of the Climate Fund is that GHG emissions generated by sports activities should be offset again by measures in the sports sector. This is against the backdrop that German sports facilities are often in need of renovation and clubs are faced with rising energy prices and energy costs for their facilities. The focus is therefore on investments in climate action measures in sports facilities. Technologies to increase energy efficiency help to reduce costs as well as GHG emissions.

The following is a brief description of the basic features of the Sports Climate Fund. This brief description is based on an abridged version of the climate fund (DOSB 2013) and the long version of the feasibility study for the DOSB Climate Fund (Oeko-Institut 2013).

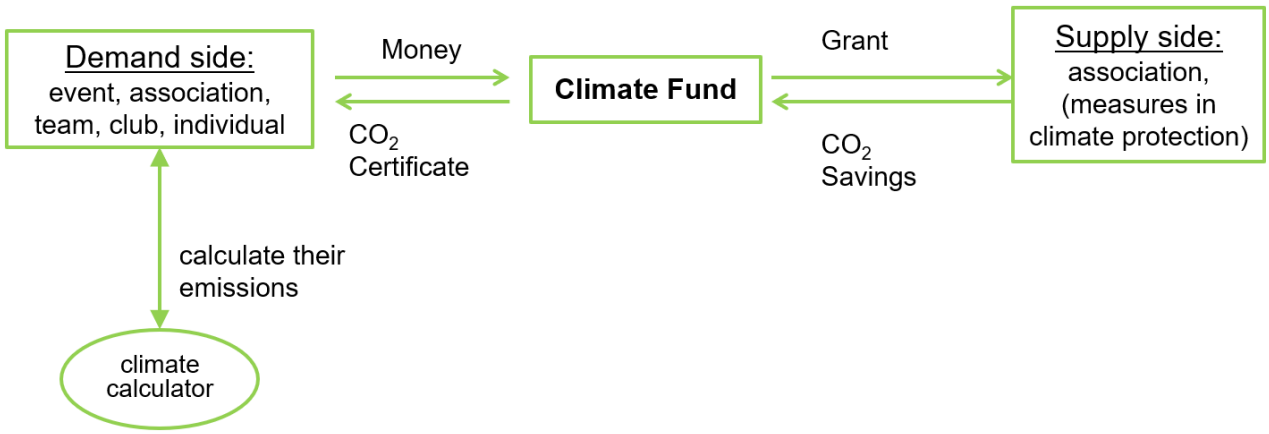
5.5.1 Brief description of the Sports Climate Fund

Demand side – making sporting events climate-friendly

Figure 5-4 provides an overview of the overall mechanism of the Climate Fund. For a better understanding, the Climate Fund and its interactions with the demand and supply side are briefly presented below.

[32] https://www.offsetguide.org/.
[33] https://carboncreditquality.org/.

Figure 5-4: Schematic overview of the Climate Fund and associated areas



Source: Oeko-Institut e.V.

Sports stakeholders such as tournament organisers, clubs and associations, and sponsors can purchase climate certificates from the Climate Fund (demand side). The Fund generates income through the sale of these certificates. These revenues are used by the Fund as grants for German sports clubs. The sports clubs can apply for the grants to implement climate action measures in their sports facilities. In return for receiving the grants, the club offers the Climate Fund its greenhouse gas savings achieved by implementing the climate action measures (supply side). The Fund, in turn, transfers the GHG savings to the demand side by selling the climate certificates[34]. The actors on the demand side can thus make their sports event or other sports activities "climate-friendly" through the purchase of these certificates.

For the development of the Climate Fund, a "climate document" (German: *Klimaurkunde*) is introduced as a new concept. The climate document confirms to demand-side actors the financial support provided for climate action measures in sports clubs. Climate documents in the Climate Fund are the counterpart to CO_2 certificates in climate compensation. The terms "climate-friendly" or a "climate-friendly" sports event replace the terms "climate-neutral" or a "climate-fair" event used in climate compensation.

It should be noted at this point that the mechanism of the Climate Fund should not be equated with climate compensation. The focus of the Climate Fund is on supporting energy-saving measures in German sports facilities in order to make a contribution to climate action. These measures are of great importance, as they enable sports to make a contribution to the energy transition in Germany. However, such national climate projects cannot be considered additional in the sense of climate compensation and should therefore not be used quantitatively for climate compensation. It is difficult to prove actual savings, if at all, in the case of the Climate Fund. A 1:1 offset of GHG emissions caused by sporting events, for example, as in the case of climate offsetting, is therefore not given via the fund.

[34] When the concept for the climate protection fund was developed in 2013, there was no consideration of the climate responsibility model. A possible link between the climate protection fund and climate responsibility is discussed in the following section.

Supply side – Promotion and implementation of climate action measures in clubs

The basic idea of how clubs cooperate with the Climate Fund in the implementation of climate action measures (supply side) is described below.

The first step for the club is to identify suitable climate action measures and estimate the associated savings potential. With regard to financial support from the Climate Fund, the next step is to register and apply to the Fund for the measures to be supported. For later monitoring, the club informs the Fund about the energy consumption of the past three years. After the application has been reviewed by the Fund, the club is granted the corresponding subsidies for the implementation of the climate action measure. Upon payment of the grant, the club transfers the "right of use" for the GHG emission savings to the Fund. After implementation of the measure, the club continues to inform the Fund about its energy consumption for five years.

On the club side, various renovation works in sports facilities are generally pending. In principle, only measures to reduce GHG emissions are to be supported by the Climate Fund. These include space heating, hot water, ventilation systems, building insulation, lighting, energy-saving equipment, fuel-saving club vehicles or PV systems (but not systems already subsidised under Germany's Renewable Energy Sources Act EEG).

5.5.2 Conclusions on the Climate Fund

The Sports Climate Fund is fundamentally different from all other compensation models. At the same time, it offers an ideal way to link up with the concept of climate responsibility. Thus, a budget for measures can be derived via the approach of climate responsibility and the price that can be applied. The Climate Fund then provides the opportunity to invest this budget in concrete climate actions in sports facilities.

Key benefits of the Sports Climate Fund are:

- It supports sports clubs in their climate action efforts and contributes to the refurbishment of club sports facilities.
- Broad awareness-raising takes place through public relations work within the framework of the fund.
- Other future (major) sporting events can pay into the fund, thereby contributing to and raising awareness of climate action in sports in the long term.
- Compared to climate compensation via certificates, these are concrete, tangible projects that are implemented locally in Germany.

On the other hand, however, the following aspects must also be considered:

- Saving GHG emissions domestically initially benefits the national carbon footprint and thus the achievement of political goals (climate neutrality in Germany).
- Since policy programmes also support goal attainment, the formal additionality requirement is not met.
- The development of the reference situation without measure ("baseline") and the proof of actual savings are – if at all – difficult to substantiate.

- Potential projects under the Climate Fund can not be considered and counted as true offsets.
- This also results in restrictions regarding the admissibility of terms such as "compensation" or "climate neutrality".

6 Costs of offsetting and climate responsibility

In this section, the costs of a possible EURO 2024 climate strategy are derived. The starting point for the cost analysis is the options described in the previous Section 5 as well as the range of possible CO_2 prices in € per metric ton of CO_2 eq. set out in this context.

In addition to the CO_2 prices that can be applied, the remaining GHG emissions in metric tons of CO_2-eq. represent the second important output variable for the cost analysis. Based on the results of the ex-ante carbon footprint in Section 3 possible costs of climate compensation or climate responsibility are calculated by multiplication with the applicable CO_2 prices.

For the applicable prices, representative prices of 25, 50 and 100 € / t CO_2-eq. are assumed for the cost analysis; see Section 5.4.

For EURO 2024 GHG emissions, the total is approximately 490,000 t CO_2-eq., see Section 3.1. In addition, based on the results of the carbon footprint scenarios in Section 3.6 a range of possible costs can be determined.

Table 6-1 shows the possible CO_2 costs for the total result of approx. 490,000 t CO_2-eq. depending on the CO_2 price that can be applied. A specific CO_2 price of 25 € / t CO_2-eq. would therefore result in costs of around €12 million. Four times the costs, around €48 million, would be incurred at a price of €100 / t CO_2-eq. and around €24 million at a price of €50 / t CO_2-eq.

Table 6-1: Possible CO_2 costs depending on applicable CO_2 prices

Total GHG emissions	Price per ton GHG	CO_2 costs
490,000 t CO_2-eq.	25 € / t CO_2-eq.	€12 million
490,000 t CO_2-eq.	50 € / t CO_2-eq.	€24 million
490,000 t CO_2-eq.	100 € / t CO_2-eq.	€48 million

Source: Oeko-Institut e.V.

The full range of possible CO_2 costs is shown in Table 6-2 below. For this purpose, the GHG emissions of the scenarios presented in Section 3.6 were varied with the three representative prices that can be applied. The lowest overall CO_2 costs of around €11 million (at a price of €25/t CO_2-eq.) result from the scenario in which international fans use trains 10% more than planes (shift in modal split). The highest costs, approximately €56 million (at a price of €100 / t CO_2-eq.), in turn, result for the first scenario, in which the share of tickets going to German fans is reduced from 68% to 60%. The costs for the scenario with "4 national teams incl. fans with a long distance" are in the same order of magnitude of approx. 56 million €.

Table 6-2 Possible CO_2 costs of various scenarios depending on the CO_2 prices that can be applied

Scenario	t CO_2-eq.	€ million (25 € / t CO_2-eq.)	€ million (50 € / t CO_2-eq.)	€ million (100 € / t CO_2-eq.)
Share of tickets to German fans: 68% → 60%.	557,000	14	28	56
Single distance German fans: 160 km → 100 km	472,000	12	24	47
4 national teams incl. fans with high distance	556,000	14	28	56
Modal split international fans: 10% more train instead of plane	448,000	11	23	45
Proportion of international fans travelling from home country after 1st match 33% → 50%.	514,000	13	26	51

Source: Oeko-Institut e.V.; rounded values

7 Financing options

As explained above, the level of compensation costs results from the various scenarios for the total sum of GHG emissions and the specific CO_2 prices per ton of CO_2-eq. This section of the report outlines individual options for financing climate compensation or the climate responsibility budget.

Due to the two variables – total GHG emissions and specific CO_2 prices – possible costs range widely between approximately €12 million and €49 million. For simplicity, the following assumes approximately 490,000 metric tons of CO_2-eq., see Section 3. Only the specific CO_2 prices per ton are varied in the presentation of the financing options, from €25 to €50 and €100 per ton of CO_2-eq.

Various source-based financing options are presented below.

7.1 Participating national teams

Each national team or participating country finances the CO_2 costs of the GHG emissions caused by the team at EURO 2024. This includes travel to and from Germany, travel within Germany and the team's overnight stays.

All 24 national teams together cause around 3,400 t CO_2-eq. or an average of around 140 t CO_2-eq. per team. This results in average CO_2 costs of around €4,000 (at €25 / t CO_2-eq.), €7,000 (at €50 / t CO_2-eq.) or €14,000 (at €100 / t CO-eq.) per team.

The practical implementation of this financing option could take place in such a way that UEFA or EURO 2024 GmbH contacts the national soccer associations of the participating countries with a request to meet the CO_2 costs of the national team.

The example of the FIFA World Cup 2010 South Africa. Compensation of the GHG emissions of participating teams "on their own responsibility" was already tackled at the FIFA World Cup 2010 in South Africa. There, the participating countries or their government representatives were contacted and asked to perform the climate compensation of their teams.

In principle, this variant would also allow for an expansion of the financing option with additional consideration of the CO_2 costs of the fans of the participating country.

7.2 EURO 2024 spectators

CO_2 levy per ticket

Approximately 2.8 million stadium spectators (number of tickets) cause around 330,000 t CO_2-eq. or around 0.12 t CO_2-eq. per ticket. These GHG emissions of all spectators at EURO 2024 only include transport and overnight stays. In this average analysis, a "solidarity" approach was chosen, i.e. no distinction was made between domestic and foreign spectators. Instead, the total GHG emissions from travel to and from Germany, travel within Germany, and all overnight stays were divided by the total number of all tickets.

Based on specific CO_2 prices of €25, €50, and €100 per metric ton of CO_2-eq., the total CO_2 costs for all spectators are approximately €8 million, €17 million, and €33 million, respectively.

A CO_2 levy on each ticket is presented below as a financing option. Converting the above total costs to around 2.8 million tickets results in CO_2 costs of around €3, €6 or €12 per ticket.

One conceivable variant of the CO_2 levy would be to take account of the different ticket prices. In this case, the CO_2 costs per ticket would be distributed as a percentage or in proportion to the ticket price. More expensive tickets would have higher CO_2 costs and cheaper tickets lower CO_2 costs.

A CO_2 levy on tickets can be implemented on a voluntary basis[35] or as a fixed component of the ticket price. In the case of a voluntary levy, it is unclear whether a larger number of spectators could be attracted and thus a relevant monetary sum raised.

Voluntary contribution via a carbon footprint tool

Another option for financing the spectators' GHG emissions is the following: each spectator can voluntarily calculate his/her GHG emissions and pay for his/her own CO_2 costs.

The example of the FIFA World Cup 2010 South Africa. During the 2010 FIFA World Cup, spectators were offered the opportunity to offset their own GHG emissions from travel to and from the event. For this purpose, a website and a CO_2 online calculator with compensation options were created and the compensation was advertised.

The CO_2 costs of EURO 2024 spectator activities are determined by the following: Travel to and from Germany, travel within Germany, overnight stays, and the consumption of food and beverages in the stadium. Two different options are presented as financing variants. The first option is the one already described for the 2010 FIFA World Cup, with a website and a CO_2 online calculator with compensation options. Each spectator can calculate and compensate his/her individual GHG emissions.

The second option relies on a low-threshold approach via a UEFA EURO 2024 app[36]. This app is extended by a "carbon footprint tool". Based on the carbon footprint, the app could show average

[35] For example, at the European Championships Munich 2022, there is the option of paying a CO_2 offset per ticket of €1.4. https://tickets.munich2022.com/showProduct.html?changeLanguageTo=de&idProduct=300; last visited 4 July 2022.

[36] It is assumed that an official app for EURO 2024 will be developed as an information portal (e.g. for travel to/from the stadiums).

GHG emissions per spectator and activity (trips differentiated by flight, car, train, overnight stays, food/beverages). Based on the current carbon footprint, the following average GHG emissions would result as an example:

Travel to and from Germany by an international spectator per match: 255 kg CO_2-eq.;

1 trip within Germany: 20 kg CO_2-eq.;

Food and beverages per spectator per match: 0.7 kg CO_2-eq.;

1 overnight stay in Germany: approximately 17 kg CO_2-eq.

By simply selecting and clicking in the carbon footprint tool of the app[37], the GHG emissions and resulting CO_2 costs are shown in total and the payment of the costs is carried out.

The compensation tool can be applied equally to spectators in stadiums and fans in fan zones in host cities.

In addition to the financial approach to support the CO_2 costs of EURO 2024, this financing option focuses on raising awareness of climate aspects among spectators and fans. It is uncertain whether larger amounts of money could be generated this way.

Such an app or its carbon footprint tool could possibly also be used to collect statistical data on travel to and from the event or overnight stays. This statistical data could be used to provide information for the ex-post GHG balance of EURO 2024.

7.3 Climate sponsors

As an option for financing the CO_2 costs of EURO 2024 and also the Sports Climate Fund, sponsoring by companies comes into question. With a view to EURO 2024, the function of "climate sponsors" could be created for this purpose.

Two basic models are presented here: a pool variant in which several climate partners act jointly as sponsors of climate compensation and a single company with the unique selling point of "Climate sponsor of UEFA EURO 2024" or "Climate sponsor of the Sports Climate Fund".

In view of the significantly increased importance and perception of the topic of climate action, sponsoring climate compensation represents a realistic financing option. Indeed, the topic of climate action can be an important decision criterion for sponsorship in the context of EURO 2024. The basic rule for both models, pool and individual sponsor(s), is that their rights and obligations must be precisely defined. It is important to coordinate this with the rules and regulations of the sponsorship agreements of UEFA and DFB or EURO 2024 GmbH within the framework of EURO 2024.

With a view to developing the climate sponsor concept for the Sports Climate Fund and conducting communication in the context of EURO 2024, it could make sense to win a EURO 2024 sponsor for the Climate Fund or to guarantee corresponding communication rights to a "non-official partner" of EURO 2024. Due to the long-term perspective of the Climate Fund, the sponsorship arrangement should be limited in time. It is conceivable that after EURO 2024, sponsorship of the Climate Fund could pass to partners of the DFB, the DFL, the DOSB or partners of future major sporting events in Germany.

[37] The app should offer various choices; e.g. number of matches, mode of transport (plane, car, train).

7.4 Other financing options

Analogous to the spectators and the participating countries, the fan zones and areas for which EURO 2024 GmbH is responsible can also be addressed with regard to CO_2 costs. GHG emissions that are not covered by the direct polluters such as teams or spectators could then, for example, fall under the responsibility of EURO 2024 GmbH or those responsible for the fan zones. EURO 2024 GmbH would then be responsible for the CO_2 costs not borne by the spectators themselves from travel to and from Germany, travel within Germany, overnight stays and the consumption of food and beverages in the stadium, or, for example, the CO_2 costs of transport by officials and of energy consumption in stadiums.

The example of the FIFA World Cup 2006 Germany. For the 2006 FIFA World Cup, the DFB and FIFA as well as official Green Goal partner Deutsche Telekom and Green Goal supporter PlasticsEurope together paid for the costs of offsetting all GHG emissions from the World Cup in Germany.

The EURO 2024 fan zones, for example, are expected to generate around 63,000 t of CO_2-eq. (fan zones with fan travel, electricity, catering, materials). Based on specific CO_2 prices of €25, €50 and €100 per metric ton of CO_2-eq., this results in CO_2 costs of around €1.6 million, €3.1 million and €6.3 million.

The total sum of GHG emissions minus the fan zones and, for example, the national teams, in turn amounts to around 420,000 t CO_2-eq. This would result in CO_2 costs of around €11 million, €21 million or €42 million for this entire remaining area.

7.5 Consideration according to compensation models

Previous funding options that considered individual spheres of responsibility have generally addressed CO_2 costs. It would also be conceivable to consider different compensation models depending on the geographical origin and emitter group of EURO 2024 GHG emissions.

As an option, the part of the GHG emissions that occur in Germany could be covered by the Sports Climate Fund. The "international" GHG emissions of the foreign spectators travelling to and from Germany could be offset via classic compensation with international high-quality climate compensation projects[38].

For example, international arrival/departure ("international" traffic; spectators incl. officials etc.) causes almost 250,000 t CO_2-eq. These international trips would result in CO_2 costs of around €6 million, €12 million or €25 million (at specific CO_2 prices of €25, €50 and €100 per metric ton of CO_2-eq.).

All other GHG emissions, around 240,000 t CO_2-eq., arise in Germany. All GHG emissions in Germany would result in CO_2 costs of about €6 million, €12 million or €24 million at specific CO_2 prices of €25, €50 and €100 per metric ton of CO_2-eq. respectively. These GHG emissions in Germany could be covered, for example, through climate responsibility and measures initiated through the Sports Climate Fund in Germany.

[38] The following platforms can be consulted for the selection of adequate certificates:
GHGMI & SEI: Carbon Offset Guide: https://www.offsetguide.org
Öko-Institut, EDF & WWF: The Carbon Credit Quality Initiative: https://carboncreditquality.org

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