



# Report 2021 TCFD



Lufthansa Group believes that governments, companies and investors have a responsibility to mitigate the impacts of a changing climate and facilitate a transition to a climate-resilient economy.

In 2020, the Lufthansa Group committed to aligning its climate-related disclosures with the **Taskforce on Climate-related Financial Disclosures (TCFD)** recommendations, to help understand the impacts of climate change on its business. The Group began the process of analyzing scenarios to further identify and analyze potential impacts from climate change related risks and opportunities on its business model. Despite the impacts of COVID-19, Lufthansa Group remains committed to transparent climate-related disclosure. The TCFD provides a framework to improve the disclosure of consistent, comparable, reliable, and clear climate-related financial information so that investors can make better capital allocation decisions in support of the transition to a low-carbon economy.

The 2021 disclosure builds on earlier disclosures made for previous years, which can be found in the corresponding sustainability and non-financial reports published by Lufthansa Group. The disclosure is also made in respect of Lufthansa Group's role as a globally operating air transport company that plays a leading role in its home markets in Europe.

For the financial year 2021, we have prepared the following table to summarize how the Lufthansa Group aligns with the TCFD recommendations.

**TCFD Recommendation**

**Lufthansa Group Approach**

**Further Disclosure**

GOVERNANCE

**A.**  
**Describe the board's oversight of climate-related risks and opportunities**

The Executive Board has ultimate oversight of climate-related issues and has been responsible for reviewing the Lufthansa Group's climate related risks and opportunities, strategy, measures and target setting. At the Executive Board level, the Chief Customer Officer (CCO) takes over the responsibility for the company's environmental, climate and social effects. In the reporting year, the Corporate Responsibility department, which reports directly to the CCO, was expanded considerably in terms of content and personnel in order to meet the growing demands and aspirations of the Lufthansa Group.

The definition of priorities and the further development of sustainability-relevant activities within the Lufthansa Group took place during the reporting year in the context of the Group Executive Board's meetings, as well as in the Group Executive Committee (GEC). The GEC, which is chaired by the Chief Executive Officer, is a senior management level entity and consists of the Executive Board of Deutsche Lufthansa AG, the CEOs of the segment parent companies, the senior executives of the Network Airlines and the heads of the Group's Strategy, Controlling and Communications departments. In the reporting year, the Group Policy Committee (GPC) was also established. It is also chaired by the Chief Executive Officer. The GPC discusses politically significant issues, also relevant to sustainability, and prepares decisions. Individual managers within the committees are responsible for implementing concrete activities and projects.

The Sustainability Circle, led by the Corporate Responsibility department, was also established in the reporting year. Its objective of this monthly

**Lufthansa Group Annual Report 2021**, - Report of the Supervisory Board (p. 10)  
**Annual Report 2021 (Combined non-financial declaration)**, - Organisational foundations and responsibilities (p. 97ff).  
**CDP Report 2021**  
C1.1- C1.1b

**TCFD Recommendation**

**Lufthansa Group Approach**

**Further Disclosure**

		<p>meeting is to promote a Group-wide exchange on sustainability topics, which also include "climate-related risks and opportunities" in particular. The members of this circle are the Corporate Responsibility Officers of the Group companies and relevant Group Functions.</p> <p>Moreover the Executive Board has also the final oversight of the combined non-financial declaration that includes the climate / environmental strategy, organization, management, measures and targets. The highest monitoring body in the area of sustainable management is the Supervisory Board. The Supervisory Board commissioned a limited audit review of the combined non-financial declaration.</p>	
GOVERNANCE	<p><b>B.</b></p> <p><b>Describe management’s role in assessing and managing climate-related risks and opportunities</b></p>	<p>Risk management is an integral part of all business processes, informing strategies, target setting, investment decisions and operations. The Head of Corporate Responsibility – as a direct report to the member of the Executive Board (Chief Customer Officer) - is responsible for assessing climate-related risks and opportunities as well as for the climate protection strategy. The Corporate Responsibility department is developing appropriate measures, while working closely with the various departments and business units of the Lufthansa Group. To address the growing importance of carbon accounting and environmental legislation and to provide relevant information such as regulations and interpretations to the potentially affected divisions and employees, the Corporate Responsibility and Group Controlling divisions have also established the Emissions Management Committee. This committee regularly discusses current developments in national and supranational emissions legislation and estimates their financial impacts. The risks and opportunities derived from a quantitative climate scenario analysis – which has been conducted by the</p>	<p><b>Annual Report 2021,</b> - Remuneration Report (p.273/274ff)</p> <p><b>Annual Report 2021 (Combined non-financial declaration),</b> Environmental Concerns (p.99ff.)</p> <p><b>CDP Report 2021,</b> C1.2, C1.2a</p>

**TCFD Recommendation****Lufthansa Group Approach****Further Disclosure**

## GOVERNANCE

Corporate Responsibility Department at Lufthansa Group in 2021/2022 for the first time - are being discussed with the departments involved and will be brought to the attention of management through established governance processes.

The Head of Corporate Responsibility is the Risk Owner of climate-related risks, including those estimated in the quantitative scenario analysis. Climate-related risks are reported and monitored within the Lufthansa Group's Risk Management System. The risk assessment is conducted quarterly. The top risks are reported to the Executive Board on a regular basis and discussed annually in the Audit Committee of the Supervisory Board. In the long-term variable remuneration for the Executive Board of Deutsche Lufthansa AG, emission reduction targets have been taken into account by the Supervisory Board of Deutsche Lufthansa AG since 2011 to promote the management of climate-related risks and opportunities.

The Supervisory Board defines an environmental goal as a focus for the strategic and sustainability goals in the context of the multi-year variable remuneration (MVR) for the Executive Board, which is included in the target achievement of the MVR with 15 per cent. Ecological sustainability remains a key objective of the long-term corporate strategy, notwithstanding the crisis. A reduction in the fleet's specific CO<sub>2</sub> emissions per passenger-kilometer flown was retained as a target for the four-year period. The annual target reduction in 2024 is measured in comparison with the pre-crisis year 2019.

**TCFD Recommendation**

**Lufthansa Group Approach**

**Further Disclosure**

STRATEGY

**A.**  
**Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term**

Climate change can influence Lufthansa Group’s business strategy in two distinct ways. First by causing climate related business risk, whether physical, political, market or reputational. Second by creating business opportunities that could arise from the transition to a low- fossil-carbon future.

The transition to a low-fossil-carbon future poses fundamental strategic challenges for the aviation sector, and thus the aviation sector was classified as “difficult to decarbonize”. This transition could affect Lufthansa Group’s financial outlook, whether directly e.g. through changes in taxation and regulation, or indirectly through changes in customer behavior. The following risks and opportunities over the short, medium and long term have been identified:

**Transition risks**

Early in 2021, in a qualitative analysis of transition risks based on the IEA ETP 2020 Sustainable Development Scenario, Lufthansa Group has analyzed climate-related risks with a timeframe of up to 10 years. Climate-related risks to the company could be market, reputation, policy and legal as well technology related.

A high **market risk** impact could result from a modal shift to (high speed) rail and lower than expected passenger growth in certain regions (e.g. within Europe). Furthermore, competitive pressure and higher fuel costs poses the material risk that older and less efficient airplanes will have to be retired earlier than originally planned, resulting in an impairment of their residual value.

**Annual Report 2021,**  
- Opportunities and risk report (p. 80-82, 89-90ff.)

**Annual Report 2021 (Combined non-financial declaration),** - p. 90

**CDP Report 2021,** C2.1 - C2.4

## TCFD Recommendation

## Lufthansa Group Approach

## Further Disclosure

### STRATEGY

There may also be a **reputational risk** as “flight shame” may increase and/or corporate customers reduce/shift business travel away from flights e.g. by introducing carbon budgets for their employees.

A high **policy risk** impact might come from increased carbon pricing, fuel taxes, energy efficiency standards and a stronger policy focus on rail, making aviation less competitive.

These risks could increase significantly with heterogeneous CO<sub>2</sub> prices and sustainability support schemes across countries/regions.

**Technology risks** and **opportunities** include new aircraft technologies and retrofits as well as sustainable aviation fuels (SAF). In consequence, capital expenditures and expenses may increase. Currently certified sustainable aviation fuels can be used without modification in existing aircraft and supply infrastructure.

Most of the material risks have a long term impact (>6 years), whereas policy risks may already materialize in the nearer future. Lufthansa Group’s risk management system ranks “regulatory risks resulting from climate change” as a top risk for Lufthansa Group in the 2021 Lufthansa Group’s Opportunities and Risk Report. It is classified as a qualitative risk with a substantial significance and a high magnitude. In more detail, this refers to the risk that emission-related costs will increase. Since 2012, air traffic within the EU has been part of the EU Emissions Trading Scheme (EU ETS). The emissions trading schemes of Switzerland (CH ETS, since January 2020) and the United Kingdom (UK ETS, since January 2021) for flights between the EEA and Switzerland and the United Kingdom impose additional obligations to surrender emission allowances.

## TCFD Recommendation

## Lufthansa Group Approach

## Further Disclosure

### STRATEGY

Furthermore, there is a risk of rising costs or additional requirements in the course of the legislative package "Fit for 55" published by the EU Commission in July 2021, which aims to ensure the reduction of CO<sub>2</sub> emissions by 55% compared to 1990. Aviation is particularly affected by the revision of the Emission Trading System (ETS), the proposal to introduce a blending quota for Sustainable Aviation Fuels (SAF) as well as the proposal for the abolition of the mandatory exemption for taxation and the introduction of a uniform minimum taxation on aviation fuels, used for intra-EU flights.

The harmonization of EU-ETS and CORSIA<sup>1</sup> also has not been clarified yet, and the risk that emissions related to the same flight need to be offset under both schemes persists. The EU ETS has already led to a distortion of competition due to higher cost related to EU regulation, which would be exacerbated by the aforementioned measures.

The planned introduction of a SAF blending quota could also lead to further distortion of competition depending on its design, as competitors could circumvent this by "tankering", i.e. carrying fuel on outward flights in excess of their requirements, or by operating multi-sector flights or transfers at non-European hubs.

---

<sup>1</sup> = **C**arbon **O**ffsetting and **R**eduction **S**cheme for **I**nternational **A**viation, which was concluded with the International Civil Aviation Organization (ICAO) in October 2016, has offset growth-related CO<sub>2</sub> emissions in international air traffic by the purchase of certificates since 2021



## TCFD Recommendation

## Lufthansa Group Approach

## Further Disclosure

### STRATEGY

#### Physical risks

In a preliminary analysis, Lufthansa Group has identified both potential chronic and acute physical risks. **Chronic physical risk**, such as a higher average temperature, can potentially lead to lower passenger and cargo loads due to aircraft performance restrictions. For example, temperature-related take-off weight limitations and /or the need for increased fuel up-lift to cope with unexpected weather-related rerouting due to more frequent and severe thunderstorms might reduce the available payload on those flights.

A shift of large-scale circulation patterns, such as jet stream, could lead to changes of flight time and flight routings. Especially in conjunction with increased atmospheric turbulence, longer flight times occur. **Acute physical risk** can potentially impact aircraft during take-off and landing as well as en-route. An increased number of local thunderstorms, stronger surface winds, more frequent fog conditions and heatwaves, more frequent cyclones and atmospheric turbulences could affect passenger comfort and safety as well as induce large-scale re-routings or flight cancellations.

Overall, physical climate risk could affect aircraft performance, cause re-routings and temporary closure of airspaces and airports as well as damage / destruction of infrastructure and aircraft with negative effects on cost and earnings for Lufthansa Group.

## TCFD Recommendation

## Lufthansa Group Approach

## Further Disclosure

### STRATEGY

#### Opportunities

As **short** and **medium-term opportunities**, Lufthansa Group identified more efficient production processes, e.g. using more efficient, lower emissions aircraft (airframes and engines), improved air traffic management based on international agreements and taking part in upcoming national research projects and EU projects linked to the EU Green Deal, such as the EU ETS innovation fund. Intelligent routing and smart technologies could reduce energy intensity and operational expenses and support climate-optimized flying. Driven by the current climate change discussions, further opportunities may also arise from accelerated railroad infrastructure projects at hub airports, having the potential to increasingly replace cost- and CO<sub>2</sub> intense short-haul feeder flights with train services. Lufthansa Group is seizing this opportunity by stepping up its cooperation not only with Deutsche Bahn but also with Austrian Railways, Schweizerische Bundesbahnen and various bus operators.

**Long-term opportunities** include the use of lower-emission sources of energy, i.e. sustainable aviation fuels and the reduction of the use of fuel by investing in a modern and efficient fleet and working together with Lufthansa Group's upstream supply chain, i.e., contributing practical know-how to developing new types of aircraft or the innovation generated by the Lufthansa Group CleanTech Hub.

**TCFD Recommendation**

**Lufthansa Group Approach**

**Further Disclosure**

STRATEGY

**B.**  
**Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning**

Lufthansa Group is convinced that a lower carbon footprint will make the company more competitive in the future. Therefore, the necessity to contain climate change has major impact on both short- and long-term decision-making at the Lufthansa Group.

In order to better assess the effects of climate-related risks and opportunities on the Lufthansa Group's business, the Lufthansa Group conducted a targeted quantitative scenario analysis for the first time in 2021/2022. The results of the scenario analysis will be considered in strategic and financial decisions.

Two selected climate scenarios (1. Well-below 2 degrees (~1.8°C), 2. Stated policies scenario (~2.7°C)) developed by the International Energy Agency (IEA) were chosen to assess the quantitative effects selected risks have on Lufthansa Group's financial performance. These scenarios use concrete assumptions such as global GDP growth, population developments, the relative use of different energy sources (renewables vs fossil), CO2 price development and the penetration of SAFs in air traffic to model energy systems and industries consistent with the respective underlying level of global warming.

These scenarios were linked to hot spots defined by the Lufthansa Group and corresponding parameters of a previously created qualitative scenario heatmap. The Lufthansa Group's climate goals adopted in 2021 (for 2030 and 2050, with 2019 as the base year) were defined as time frames. Several further internal and external sources were also used to analyse the effects on passenger as well as on freight transport. The two hot spots that were subjected to quantitative analysis are:

**Annual Report 2021,**  
- Goals and strategies (p.18)  
- Opportunities and risk report (p.80/81, 89/90)

**Annual Report 2021 (Combined non-financial declaration),** - p.100ff.

**CDP Report 2021,**  
C2.3a - C3.1f.

**TCFD Recommendation****Lufthansa Group Approach****Further Disclosure**

## STRATEGY

1. A potential increase in operating costs due to rising CO<sub>2</sub> and increased use of sustainable aviation fuels (SAF) and
2. A potential change in market demand driven by higher ticket prices (from hot spot 1) and subsidies for other modes of transport which could increase modal shift e.g. to rail.

Important parameters relevant for the quantitative results were e.g. CO<sub>2</sub> and oil price development. Basic macroeconomic factors affecting transport demand were also included in the analysis. Likewise, technological assumptions relevant to the quantitative results such as continuous fleet modernisation and increasing SAF quotas were considered.

By calculating external costs, different impact categories can be compared and their relative relevance can be assessed. The analysis showed that for Lufthansa Group the most dominant cost driver is the development of oil and SAF price, which exceed the costs for carbon emissions especially in the medium term.

In the 1.8°C scenario, which is based on an ambitious decarbonisation pathway, the costs associated with this decarbonisation increase significantly by 2050. However, assuming no regulatory interference in market pricing, oil prices decrease because of lower general market demand in this scenario. SAF shares increase to almost 50% by 2050. In sum, these effects could lead to only a slight increase in OPEX in the medium-term for the passenger fleet of the Lufthansa Group. The long-term effects on OPEX are remaining insignificant.

**TCFD Recommendation****Lufthansa Group Approach****Further Disclosure**

## STRATEGY

In the 2.7°C scenario, CO<sub>2</sub> prices rise more slowly. However, higher demand for crude oil in this scenario means that fuel costs increase potentially inducing a significant increase in OPEX both in the medium and long term.

In both scenarios, the global demand for passenger transportation volume increases with global population and economic growth (especially in economically developing regions). Increased OPEX originating from hotspot 1 might threaten this development. Moreover, in this model a homogeneous implementation of CO<sub>2</sub> prices across regions and sectors was assumed. The risks related to regional differences in policy approaches and the related distortion of competition therefore exists and should be examined more closely in a further analysis.

With regard to the quantitative impacts of changing transportation markets resulting from shifting demand patterns and subsidy structures, both climate scenarios show an increase in demand for passenger transportation. In the 2.7°C scenario, less emphasis is put on the extension of regional rail networks and subsidy structures for alternatives to air transport compared to the 1.8°C scenario. Thus, higher demand increase can be expected in the 2.7°C scenario.

These results, which are relevant for the Lufthansa Group, will be considered in risk management in the future and the analyses will be further refined.

In 2020, ambitious CO<sub>2</sub> reduction targets for the period up to 2030 / 2050, were approved by the Executive Board and submitted to the Science-

**TCFD Recommendation****Lufthansa Group Approach****Further Disclosure**

## STRATEGY

based Targets Initiative (SBTI). From the Lufthansa Group's perspective, these science-based reduction targets are intended to provide a clearly defined path to future-proof growth. Lufthansa Group's climate roadmap explains the plan to achieve this and how the business will develop accordingly.

Increasing climate regulation like carbon pricing, energy efficiency standards as well as aviation (and fuel) taxes may lead to increasing expenditures for buying new airplanes and to higher operational costs especially for older (less efficient) aircraft. Higher operational cost and lower margins could also result from mandatory sustainable aviation fuel blending quotas which might be more expensive than conventional fuels. Policy constraints (e.g. regarding the energy efficiency of the fleet, ban of short flights) may lead to early write-offs of equipment and an expansion of Lufthansa Group's research and development investment. The above-mentioned risks generally affect the entire aviation sector, but due to geographically heterogeneous regulations in the individual countries/regions, the effects on competitiveness are likely to be significantly different, e.g. EU vs. non-EU carriers. In addition, there is a risk that ground-based means of transport, especially rail-based transport, will be significantly less affected by the regulations and thus gain competitive advantages. Both the qualitative and quantitative scenario analysis conducted in 2021/2022 showed that Lufthansa Group's current strategy already reflects many of these findings with climate-related issues affecting its products and services, its value chain, investments in R&D and its operations. Some of its key strategic initiatives are the following:

## TCFD Recommendation

## Lufthansa Group Approach

## Further Disclosure

### STRATEGY

**Investing** in fuel-efficient aircraft: Fleet renewal is currently the key driver for reducing CO<sub>2</sub> emissions from flight operations. The Lufthansa Group continuously invests in modern, fuel-efficient aircraft and engine technologies, which represent the most important element in reducing CO<sub>2</sub> emissions from flight operations in this decade. Alongside one used aircraft, ten new aircraft went into service with the Lufthansa Group airlines in 2021, including more Airbus A220-300s, A320neos, A321neos and Boeing 777Fs, which are powered by modern engines. A total of 55 older aircraft were removed from the Group fleet in exchange. Measures to technically modify the existing fleet are also constantly examined and implemented in cooperation with partners from research and industry where appropriate.

**Increasing the use of sustainable aviation fuel:** Lufthansa Group uses partnerships to drive research projects on sustainable aviation fuel. In this context, Lufthansa Group focuses on synthetic kerosene based on waste materials, ligneous biomass and renewable electrical energy (power-to-liquid – PtL) as well as research into the direct use of sunlight for fuel synthesis.

In order to safeguard the supply of SAF in the long term, Lufthansa Group has developed a three-pronged strategy: 1. In the short term, up to USD 250m has been released for the procurement of SAF on the spot market by decision of the Executive Board. 2. In the medium term, options for long-term supply commitments are under consideration around the world. These offer significant production volumes and security of supply from around 2025 onwards. 3. In the long term, the CleanTech Hub established at the Lufthansa Group will provide support for innovative supply concepts

**TCFD Recommendation**

**Lufthansa Group Approach**

**Further Disclosure**

STRATEGY

with the goal of transforming today’s start-ups and developers into tomorrow’s suppliers.

**Expansion of intermodal traffic:** Since the 1980s, the Lufthansa Group has been developing ways of combining various means of transport (air, rail and road) intelligently, a concept known as intermodality, also to reduce the environmental impact of flights. The Lufthansa Group, in cooperation with the national railway companies (Deutsche Bahn, Österreichische Bundesbahnen and Schweizerische Bundesbahnen) and some bus operators in the home markets, offers a variety of other alternatives for travel to and from the hubs in addition to flights.

In addition to the wide-ranging measures to limit CO<sub>2</sub> emissions, the Lufthansa Group participates in the public debate – sometimes together with other European airlines and industry associations – and endeavors to prevent any regulations that could distort competition.

**Innovation & Research:** The CleanTech Hub was founded by the Lufthansa Group in 2021 and provided with financial resources to promote innovative projects in the field of sustainability. Also in 2021, the Lufthansa Group and partners designed a research project on the feasibility of climate-optimised flight routes and applied for funding from the German Federal Aviation Research Programme. The goal of the project is to identify ways to prevent contrails, whose climate impact was quantified for the first time in 2020.



**TCFD Recommendation****Lufthansa Group Approach****Further Disclosure**

STRATEGY

**C.**  
**Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario**

As part of the strategy process, Lufthansa Group analyzed various industry- and macro trends to model different possible future states of the aviation industry. One key trend considered in all future states is sustainability, largely driven by climate-related market and policy risks (e.g. changing customer behavior, emissions-based taxes/ fees, potential ban of ultra-short-haul flights). The base case assumes a gradual evolution of all relevant trends, whereas the "sustainability and social responsibility" case assumes that such trends (e.g. ban of domestic flights) become more relevant quickly or even turn dominant. The analysis identified success factors and key skills necessary to successfully master the transition. Taking into consideration intense cost competition and the so far limited willingness of customers to pay for environmentally friendly flying, turning sustainability measures into value contributing business cases will be key to achieve Lufthansa Group's targets of being CO<sub>2</sub>-neutral by 2050 and reducing net CO<sub>2</sub> emissions by half by 2030.

In 2021/2022, Lufthansa Group has conducted a qualitative and quantitative scenario analysis to help Lufthansa Group to understand the potential impact of climate change on its business and to inform its strategy and financial planning, hence increasing the resilience of the Lufthansa Group. Lufthansa Group used two recognized IEA climate scenarios (IEA "Well Below 2°C Scenario (~1,8°C)" and the "Stated Policies Scenario (~2,7°C)") to model the potential business and financial impact of two selected hot spots on its business in 2030 / 2050. Measures to strengthen and more closely integrate risk management and strategic planning were identified and discussed. In the next step, Lufthansa Group will incorporate the most relevant aspects into the established risk management and financial planning structures.

**Annual Report 2021,**  
 - Goals and strategies  
 (p.18)

**Annual Report 2021  
 (Combined non-financial declaration),** -  
 p.100ff.

**CDP Report 2021,**  
 C2.3a - C3.1f.

TCFD Recommendation	Lufthansa Group Approach	Further Disclosure	
RISK MANAGEMENT	<p><b>A.</b>  <b>Describe the organization's processes for identifying and assessing climate-related risks</b></p>	<p>The results of the quantitative scenario analysis confirm that Lufthansa Group's strategic initiatives (see above) are suitable to minimize the respective risks and to create opportunities.</p>	<p><b>Annual Report 2021,</b>  - Opportunities and risk report (p.76ff.)   <b>CDP Report 2021,</b>  C2.1 -C2.2a</p>
RISK MANAGEMENT	<p>Risks are assessed by the respective risk owners and aggregated in a risk map by the risk management function. This process takes into account all kind of risks, i.e. also risks related to climate change – including physical and transitional risks. The risk map is updated quarterly in close cooperation with different committees/departments throughout the Lufthansa Group. Thereby it is ensured that various professionals and environmental experts evaluate the climate-related risks/ opportunities. Based on their assessment the financial and strategic impact on the Group from climate-related risks is made transparent. The methodological evaluation of risks within the Enterprise Risk Management at Lufthansa Group distinguishes between qualitative and quantitative risks. Financial impacts of climate-related risks are quantified if possible; otherwise, they are described as qualitative/ strategic risks. Qualitative risks are long-term developments</p>		

## TCFD Recommendation

## Lufthansa Group Approach

## Further Disclosure

and challenges with potentially adverse consequences for the Lufthansa Group.

At Lufthansa Group there are several processes in place to identify and assess different kinds of climate-related risks both on company level and on individual subsidiaries:

1. **Regulatory risks:** Lufthansa Group has a dedicated department (Corporate Responsibility) that regularly monitors environmental policy and regulative developments (e.g., through regular dialog with relevant authorities and policy makers) and analyses these developments for potential implications for the Lufthansa Group and its subsidiaries.

2. **Physical risks:** Lufthansa Group has dedicated experts within the Corporate Responsibility department who are in a continuous dialogue with climate scientists and institutions (e.g. German Aerospace Centre (Deutsches Zentrum für Luft- und Raumfahrt; DLR). Since 1994, Lufthansa Group actively participates in research projects aiming at understanding climate and atmospheric changes and their effect on air traffic. Examples see above. By these processes, Lufthansa Group experts (engineers, active pilots, profound scientists up to Ph.D.) are able to identify and assess potential physical long-term climate change risks for Lufthansa Group as well as potential measures to reduce, counter or adapt such risks.

3. **Reputational Risks:** To identify and assess potential reputational environmental/climate risks Lufthansa Group regularly conducts broad stakeholder surveys (10,000 participants in 2018) on sustainability. The responses of the stakeholders are combined with top management's

TCFD Recommendation	Lufthansa Group Approach	Further Disclosure	
		<p>assessments in a materiality matrix, which is being updated on a yearly basis. Additionally Lufthansa Group is monitoring relevant media reporting on climate and aviation related topics to identify potential reputational risks for the Lufthansa Group and its subsidiaries.</p>	
RISK MANAGEMENT	<p><b>B.</b> Describe the organization's processes for managing climate-related risks</p>	<p>Key business units and climate risk owners cooperate in managing climate-related risks and opportunities as part of Lufthansa Group's integrated approach.</p> <p>Additionally, specialists from the Corporate Responsibility department coordinate climate-related research activities and support and facilitate climate risk and climate opportunity management activities across the Group.</p> <p>As and when required, the GEC (Group Executive Committee, see GOVERNANCE A.) handles climate-related issues on board level.</p>	<p><b>Annual Report 2021</b>, - Opportunities and risk report, (p.76ff.)</p> <p><b>Annual Report 2021 (Combined non-financial declaration)</b>, - p.89ff.</p> <p><b>CDP Report 2021</b>, C2.2a</p>
RISK MANAGEMENT	<p><b>C.</b> Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's</p>	<p>The systematic Enterprise Risk Management of the Lufthansa Group as described above takes into account all relevant risks, i.e. also risks related to climate change - including physical and transitional risks and opportunities.</p> <p>The results of the quantitative scenario analysis mentioned above contribute, among other things, to a better assessment of the previously identified climate-related risks. Furthermore, the scenario analysis highlights that climate-related risks and opportunities must be analysed with regard to their short-, medium- and long-term effects. These findings</p>	<p><b>Annual Report 2021</b>, - Opportunities and risk report, (p.76ff.)</p> <p><b>CDP Report 2021</b>, C2.2</p>

TCFD Recommendation	Lufthansa Group Approach	Further Disclosure
overall risk management	will be considered for further development of risk management processes at Lufthansa Group.	
METRICS AND TARGETS	<p data-bbox="384 444 653 862"><b>A.</b> <b>Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process</b></p> <p data-bbox="674 444 1612 581">In order to measure and manage climate-related risks and in line with its strategic target to reduce the net carbon footprint by half in 2030 and reach carbon-neutrality in 2050, Lufthansa Group monitors its CO<sub>2</sub> emissions, (specific) fuel consumption and specific carbon emissions.</p> <p data-bbox="674 623 1612 760">The Lufthansa Group factors specific carbon emissions into its management system in order to enable sustainable value creation that does not come at the expense of a higher environmental impact. In fact, the aim is also to reduce specific carbon emissions continuously.</p> <p data-bbox="674 802 1612 1010">Absolute CO<sub>2</sub> emissions of Lufthansa Group aircraft in 2021 increased by 20% to 13.7 million tonnes (previous year: 11.4 million tonnes, 2019: 33.1 million tonnes). CO<sub>2</sub> emissions per freight tonne-kilometre were reduced by 1% to 869 grammes (previous year: 880 grammes). Specific CO<sub>2</sub> emissions per passenger-kilometre were 3% lower than in the previous year at 101.6 grammes (previous year: 105.2 grammes).</p> <p data-bbox="674 1052 1612 1227">The decline in the Group fleet's specific consumption compared with the previous period was mainly due to changes in the route network and the resulting increase in average flight length. Longer flight segments have a better specific consumption because the energy-intensive take-off and landing account for a lower proportion of the total flight length.</p>	<p data-bbox="1635 444 1940 581"><b>Annual Report 2021 (Combined non-financial declaration)</b>, - p.100ff.</p> <p data-bbox="1635 623 1940 727"><b>Annual Report 2021</b>, - Goals and Strategies (p.20f.)</p> <p data-bbox="1635 760 1940 831"><b>Factsheet Sustainability 2021</b></p> <p data-bbox="1635 863 1940 967"><b>CDP Report 2021</b>, C4.2, C9.1, C-T09.3/C-TS9.3</p>

## TCFD Recommendation

## Lufthansa Group Approach

## Further Disclosure

### METRICS AND TARGETS

ENVIRONMENTAL DATA <sup>1,2,3</sup>		2021	2020	Change
<b>Resource consumption</b>				
Fuel consumption	tonnes	4,324,746	3,507,461	+23.3%
Fuel consumption, specific, all types of transport	g/tkm	276	280	-1.6%
Fuel consumption, specific, passenger transportation	l/100 pkm	4.05	4.18	-3.1%
Fuel consumption, specific, freight transportation	g/tkm	216	214	+0.9%
<b>Emissions</b>				
Carbon dioxide emissions	tonnes	13,622,950	11,048,504	+23.3%
Carbon dioxide emissions, specific, all types of transport	g/tkm	869	880	-1.2%
Carbon dioxide emissions, specific, passenger transportation	kg/100 pkm	10.16	10.52	-3.4%

**1** The following companies are included in the 2021 reporting year: Lufthansa (including Lufthansa CityLine, Eurowings Discover and Air Dolomiti), SWISS (including Edelweiss Air), Austrian Airlines, Eurowings (including Germanwings), Brussels Airlines and Lufthansa Cargo. Other flights are excluded, as are services from third parties as the Group's influence over their performance is limited. **2** Types of flights considered: all scheduled and chartered flights (excluding ground services). **3** Actual fuel consumption/carbon dioxide emissions from flight operations, in tonnes, based on all flight events under the relevant operating flight number. This includes consumption/carbon dioxide emissions from gate to gate, i.e. including taxiing, holding patterns and flight detours.

**TCFD Recommendation**

**Lufthansa Group Approach**

**Further Disclosure**

Lufthansa also monitors the split of CO<sub>2</sub> by passenger and freight.

**CO<sub>2</sub> EMISSIONS<sup>1</sup> 2021**

in tonnes

	<u>Passengers</u>	<u>PY</u>	<u>Freight<sup>2</sup></u>	<u>PY</u>	<u>Total</u>	<u>PY</u>
CO <sub>2</sub>	9,100,317	+27.9%	4,522,633	+15.0%	13,622,950	+23.3%

<sup>1</sup> For the 2020 reporting year, the following applies: all routes and charter flights operated by Lufthansa (including Lufthansa CityLine, Eurowings Discover and Air Dolomiti), SWISS (including Edelweiss Air), Austrian Airlines, Eurowings (including Germanwings), Brussels Airlines and Lufthansa Cargo. Services provided by third parties are excluded, as their performance can only be influenced to a limited degree. Absolute emissions from flight operations, in tonnes (all routes and charter flights). This includes emissions from gate to gate, i.e. including taxiing, holding patterns and flight detours. <sup>2</sup> Based on freight tonne kilometres (FTKT), transported in both cargo and passenger aircraft.

METRICS AND TARGETS

**B.**  
**Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks**

Most of Lufthansa Group’s CO<sub>2</sub> emissions are direct emissions (Scope 1) from its own operations. However, greenhouse gas emissions are also generated in other parts of the value chain and the Group takes all CO<sub>2</sub> emissions into account and accordingly discloses Scope 1-3 emissions.

The Lufthansa Group determines its CO<sub>2</sub> emissions on the basis of the Greenhouse Gas Protocol (GHG Protocol), which divides emissions into three main categories (scopes).

**Factsheet Sustainability 2021,**  
p.21

**CDP report 2021,**  
C6.1, C6.3, C6.5

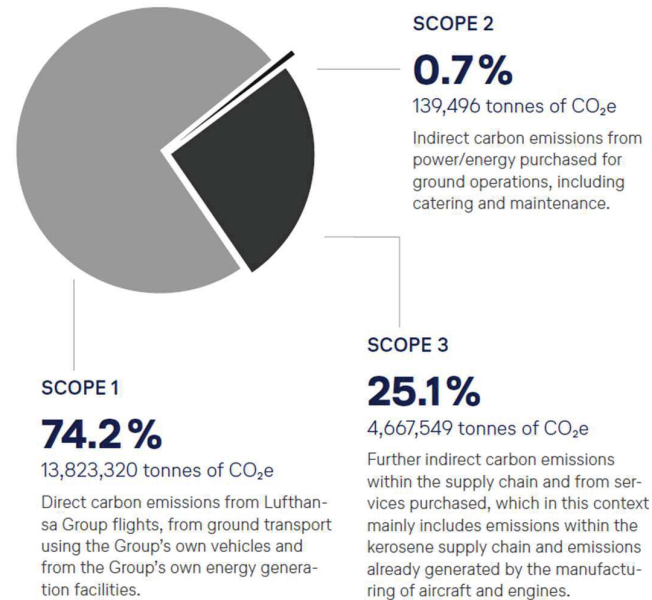
## TCFD Recommendation

## Lufthansa Group Approach

## Further Disclosure

### METRICS AND TARGETS

#### DIRECT AND INDIRECT CO<sub>2</sub> EMISSIONS OF THE LUFTHANSA GROUP IN 2021



Since about 99% of the Scope 1 emissions result from Lufthansa's flight operations and within the recorded Scope 3 emissions about 65% originate from the upstream supply chain of the kerosene used, the main risks lie in the emissions from the extraction, transport and consumption of the kerosene used. For detailed risk description see Chapter "Strategy A."



**TCFD Recommendation****Lufthansa Group Approach****Further Disclosure**

METRICS AND TARGETS

**C.**  
**Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets**

Lufthansa Group has set several targets combined with concrete measures to reduce their climate change impact and to manage climate related risks and opportunities:

- Lufthansa Group expands its own emission reduction targets. As befits its pioneering role, in 2020 the Lufthansa Group defined its own carbon reduction targets, which in some cases are more ambitious. Net emissions are expected to be halved in 2030 compared with 2019. The Lufthansa Group plans to be carbon-neutral by 2050. In November 2021, the Lufthansa Group further specified its emission reduction targets, made a commitment to science-based targets and submitted an application for validation of these reduction targets for 2030 in accordance with the Aviation Sector Guidance of the Science-based Targets Initiative (SBTi). This initiative has defined science-based targets based on a remaining carbon budget. The Group also aims to switch to carbon-neutral mobility on the ground in its home markets by 2030.
  
- In March 2019, the Lufthansa Group Executive Board adopted the goal of transition into CO<sub>2</sub>-neutral mobility on the ground in Germany, Austria, Switzerland and Belgium until 2030. That means that Lufthansa Group aims to switch all own ground vehicles used at the airports in these countries to a low carbon energy. This is including also the switch to 100 % carbon neutral electricity at all Lufthansa Group facilities in these home market countries as soon as possible (see target below). The switch to 100 % carbon neutral electricity has been started in January 2020.

**Annual Report 2021 (Combined non-financial declaration), - p.101ff**

**CDP Report 2021, C4.1a-C4.2c**

## TCFD Recommendation

## Lufthansa Group Approach

## Further Disclosure

### METRICS AND TARGETS

- Reduce 25% of Scope 1 and 2 emissions at Lufthansa Technik production sites until 2025 (base year 2018). Target achievement was at 128% at the end of 2021. Thus Lufthansa Technik had even achieved a 32% reduction in Scope 1 and 2 emissions compared to 2018. This means that this goal has already been met 4 years before the set target date.
- 100% Carbon Offsetting offsetting of carbon emissions from work-related flights taken by Lufthansa Group employees around the world – over 25,000 tonnes of CO<sub>2</sub> were offset through the climate protection organisation myclimate.
- „Sustainable Choices“ gives business clients of the Lufthansa Group the option to offset carbon dioxide from individual shipments through climate projects or in combination with sustainable fuel.
- Lufthansa Group played a major role in setting ambitious climate related targets within the national and international airline associations of which the Lufthansa Group is a member, In October 2021 the International Air Transport Association (IATA) adopted a resolution for global aviation that commits the global aviation sector (IATA member airlines) to reducing its net carbon emissions to zero by 2050. This commitment is in line with the goal of the Paris Climate Agreement to limit global warming to significantly below 2 degrees Celsius. Via the European airline association (A4E), the Lufthansa Group is also involved in the Destination 2050 study – an initiative by five European air transport associations (A4E, ACI EUROPE, ASD, CANSO and ERA) which began in summer 2019.

**TCFD Recommendation****Lufthansa Group Approach****Further Disclosure**

METRICS AND TARGETS

As aviation is generally considered an industry that is “difficult to decarbonise”, the aim of this study was to examine emission reduction potentials, taking into account the current state of the art and science. The focus is on significant reductions by 2030 and achieving carbon neutrality by 2050. The aim is to never exceed the level of emissions recorded in 2019.

**About this report:** This report primarily contains information that have already been disclosed by Lufthansa Group (e.g. within its Annual Report 2021, the Factsheet Sustainability 2021 or as part of its CDP Climate reporting). Under “Lufthansa Group Approach”, the Group has primarily taken information from these existing disclosures and supplemented them selectively with additional information to provide a more accurate picture of the current state of its efforts. Potential climate risks and opportunities have been further analysed by conduction of a qualitative and quantitative scenario analysis.. Under “Further Disclosure”, Lufthansa Group references the key sources where the interested reader can find information relating to the specific TCFD recommendations within the Group’s disclosures.



## Editorial information

### **Published by**

Deutsche Lufthansa AG  
Venloer Str. 151-153  
D-50672 Cologne

Entered in the Commercial Register of Cologne  
District Court under HRB 2168

### **Copy deadline**

29. April 2022

### **Photo credits**

© Photographer: Jens Görlich, Oberursel

## Contact

### **Claudia Hügel**

+49 69 696 54050  
Deutsche Lufthansa AG  
ESG- Rating and Reporting  
Lufthansa Aviation Center  
Airportring  
D-60546 Frankfurt/Main  
claudia.huegel@dlh.de

You will find further information on sustainability  
within the Lufthansa Group at:

[www.lufthansagroup.com/en/responsibility](http://www.lufthansagroup.com/en/responsibility)

View the Annual Report 2021 including the non-financial  
declaration at:

<https://investor-relations.lufthansagroup.com/en>