Climate action plan

This version is no longer current.
A new plan is coming soon.

KLM Royal Dutch Airlines

Notice

Notice
This Climate Action Plan is currently being updated. As a result, it contains objectives and initiatives that are no longer fully up to date.
KLM is working on a revised version of this plan, which will replace the current document in the near future and will reflect the latest ambitions, targets and actions.
In the meantime, you are invited to consult the Universal Registration Document (URD) for the most recent overview of KLM's climate-related progress and disclosures.
View the **2025 - URD.**

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Preface

In 2022, KLM published its first Climate Action Plan. In it, we shared our climate strategy, targets, and actions, and showed how they align with KLM's purpose and strategy and the challenges of the aviation industry. Our ambitions were validated by the Science Based Targets initiative (SBTi), giving us a clear path towards 2030.

Since then, we've worked on translating our renewed strategy into tangible actions to decarbonize our flight operations. This has been a learning journey and we will improve our approach as we learn valuable lessons, as better technologies come to market and as the world around us changes. To account for our progress so far and keep our stakeholders informed, we have updated our Climate Action Plan to this new version. The main changes revolve around:

- KLM's renewed purpose and ambition.
- Further defining our pathway towards 2030 and specifying tangible actions in the areas of fleet renewal, operational measures, and SAF (alternative aviation fuel).
- Finalizing a first comprehensive screening of emissions in our value chain (Scope 3 emissions) and determining further steps.
- Describing our efforts to mitigate the non-carbon dioxide (CO_2) climate effects of aviation.
- Further defining our vision and outlook towards 2050.

We will continue to engage with all KLM departments to close the gaps in our projections, on top of the actions we are currently taking and the measures already in place. This means we will publish an updated version of the Climate Action Plan periodically.

Introduction

Introduction

KLM, the oldest airline in the world flying under its original name, has been connecting people, communities and economies since 1919. Operating from its hub at Schiphol Airport, KLM Royal Dutch Airlines, KLM Cityhopper and low-cost brand Transavia, transport leisure and business passengers between 92 European cities and 70 intercontinental destinations. In addition, KLM transports cargo and offers engineering and maintenance (E&M) services to customers worldwide. KLM is a partner in the SkyTeam alliance, which serves 1,063 destinations in 173 countries, and is part of the Air France-KLM Group.

In light of overwhelming climate research, the tangible effects of climate change, increasing competition in the industry and the impact of the COVID-19 pandemic, we have realized that the traditional way of doing business is no longer the way to treat our planet, our customers and each other.

Rather than developing a business strategy and a separate sustainability strategy, we put sustainability at the core of our strategy. This means balancing financial returns and customer satisfaction with our environmental performance, and in doing so connecting people globally . In light of this, we renewed our purpose, which is now:

“Creating memorable experiences, on the planet we care for”

This implies that only by taking responsibility for our actions and reducing our climate impact, can we continue to exist in the future.

Three strategic pillars

KLM's strategy is built on three main pillars. The first is to 'improve for the future, which encompasses our ambitions relating to our climate impact.

We generate value by moving people and vital cargo across the world, but this comes at a certain cost to our environment and society. As a part of our strategy, we aim to reduce our impact as soon and as much as possible, create transparency on what we are doing, show the progress we make, and involve our supply chain and wider ecosystem.

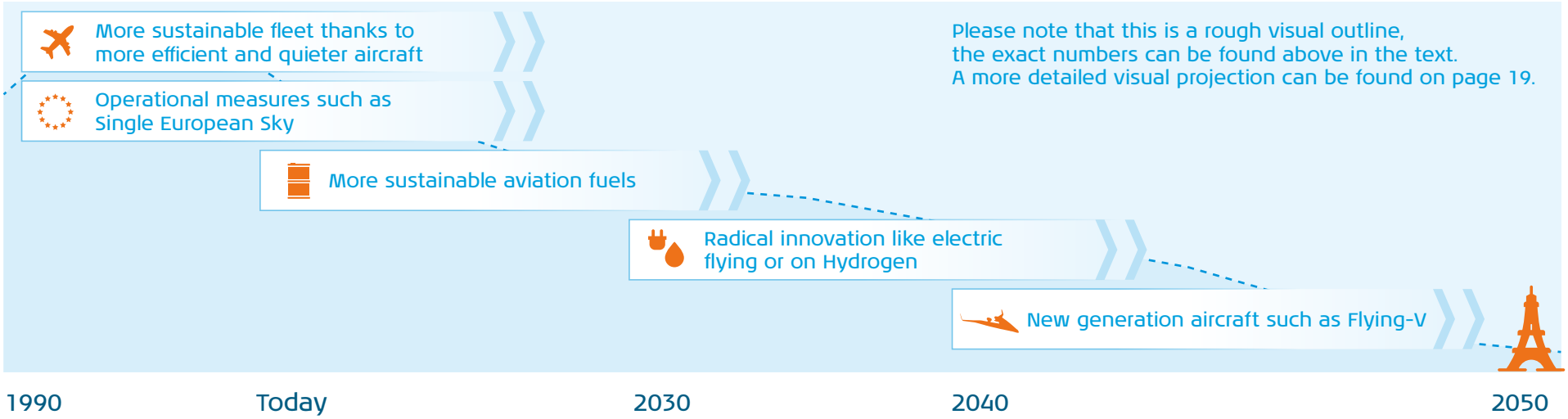
To achieve this, we need to go beyond where we are today and 'innovate with technology. This second pillar of our strategy focuses on the future of aviation, and more specifically zero CO_2 emission aviation. It also includes improvements to current processes and IT foundations essential to decarbonizing air travel.

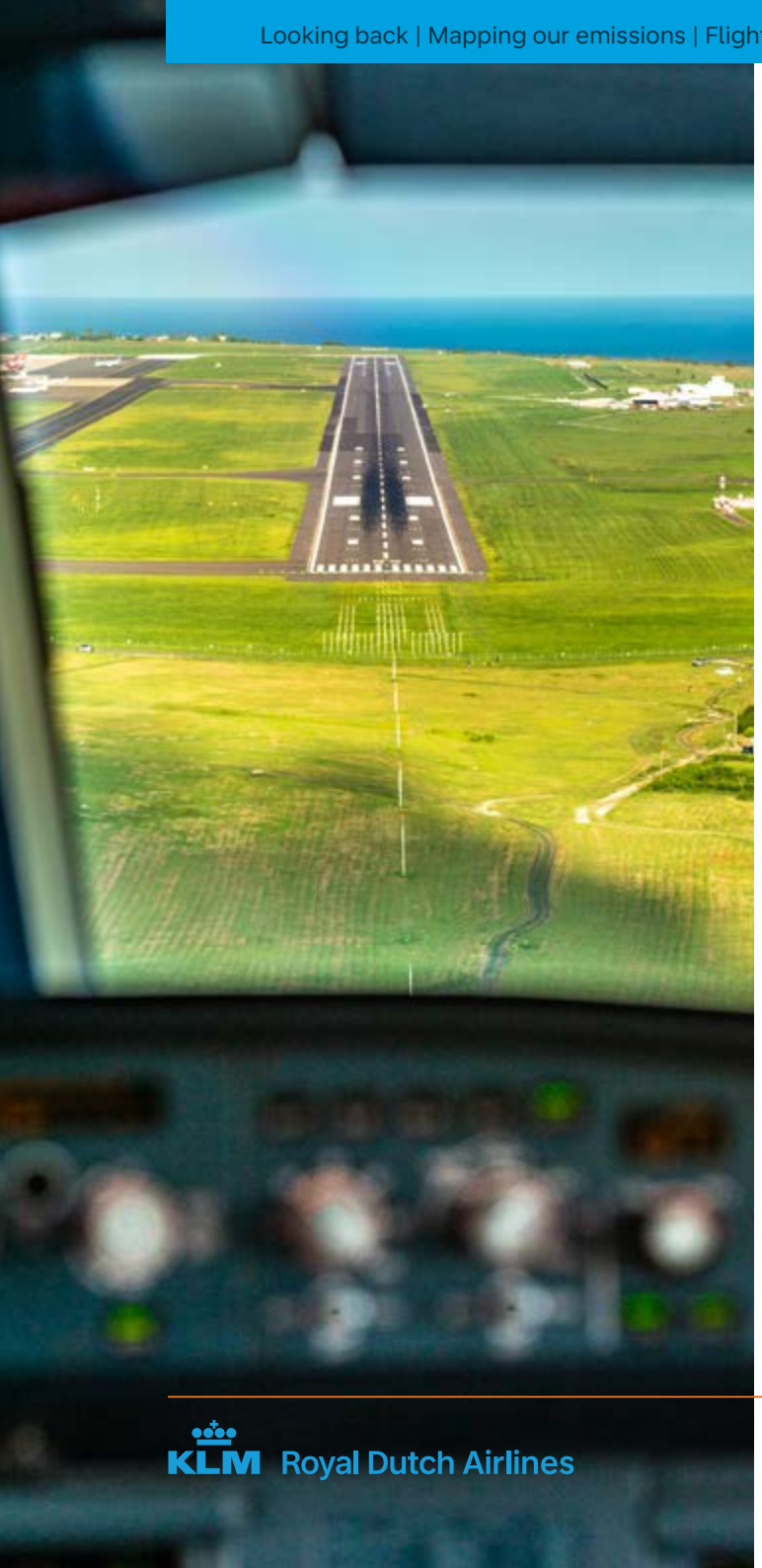
We continue to believe in the need for and viability of global aviation. We aim to improve our environmental performance and achieve technological advancement, but we will continue to 'fly a great airline for our customers and employees'. This third and final pillar of our strategy means we will sometimes make difficult trade-offs between our objectives.

There are four areas in which we will focus our efforts to reduce our emissions:

1. Fleet renewal and radical innovation. Reducing our fuel consumption is the most effective way to reduce our emissions. We have a fleet renewal plan in place until 2040, which will enable us to reach 12% of our 2030 goal to lower our relative CO_2 emissions by 30% compared to 2019. This fleet renewal plan includes the introduction of the new A320/321Neo aircraft[1] for our medium-haul fleet, which will be around 20% more efficient per passenger compared to the aircraft type they replace, and four new A350F freighter aircraft[2], which will reduce our full freighter CO_2 emissions by 40% on an absolute basis. In addition, it is our ambition to operate a zero CO_2 emission flight in this decade.
2. Flight operational efficiency. Increasing operational efficiency will help us reach our 2030 intensity target by 2-4% in 2030, compared to 2019. Route optimization, weight reduction and measures to increase fuel efficiency could account for 2%. Redesigning the EU airspace can increase operational efficiency by another 2%[3], although we acknowledge this is not within our control.
3. SAF. Our ambition is to use 10% of SAF worldwide in 2030 with a minimum life cycle CO_2 reduction of 65% compared to fossil kerosene. In 2022, we have already secured half of that ambition[4]. We have begun to purchase significant volumes of SAF[5] and are in volved in the development of SAF through a growing number of SAF supply partnerships. The use of 10% SAF will add another 8% to our 2030 intensity target.
4. Other measures. Some areas of our decarbonization strategy still need to be finalized, including measures to boost operational efficiency and increase the uptake of SAF.

Beyond the focus on our own actions, we are involving our customers and suppliers. Nudging our customers towards travel options and working together with suppliers to develop products both with a lower climate impact is key to achieving our environmental goals.





KLM's climate strategy

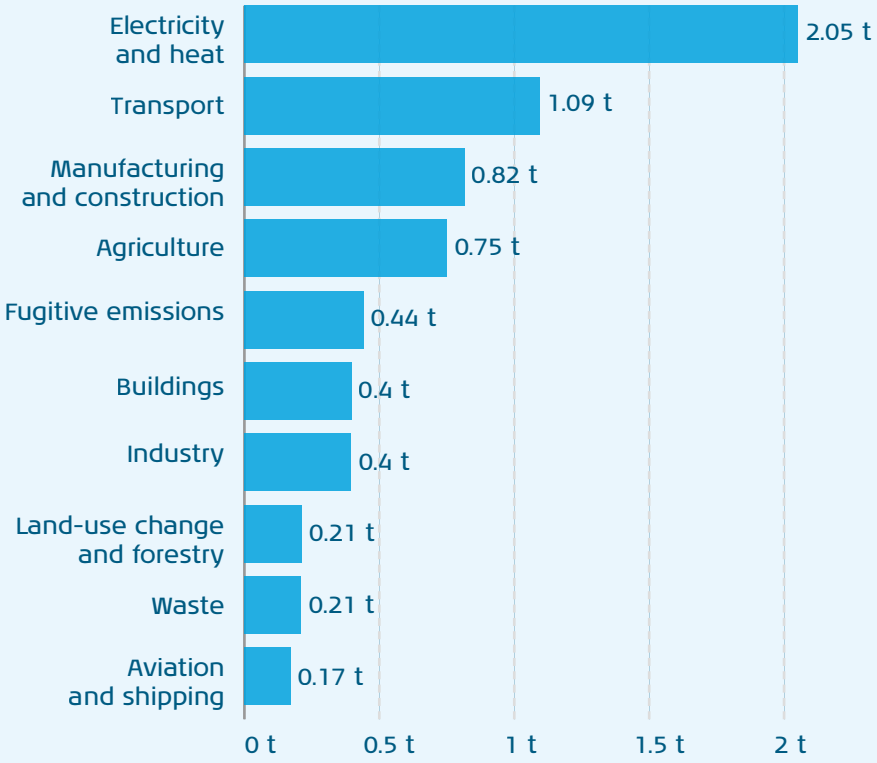
In 2021 aviation accounted for over 2% of global energy-related CO_2 emissions, having grown faster in recent decades than road, rail or shipping. As countries emerged from COVID-19 lockdowns, aviation emissions reached around 720 Mt in 2021, regaining nearly one-third of the drop in 2020[6]. Taking other greenhouse gases (GHGs) and warming effects into account, including non-CO_2 climate effects, the total impact of aviation on global warming may be up to three times that of CO_2[7].

The aviation industry acknowledges it is responsible for reducing its impact but is considered a hard-to-abate sector due to a lack of alternatives and a rise in demand for flying. The industry's main obstacle to reducing its impact is the absence of readily-available zero CO_2 emission technology, which is likely to persist until at least 2035.[8] This does not preclude us from taking our responsibility, so in the meantime, a mix of measures is necessary to achieve emission reductions. KLM is taking responsibility for pushing the boundaries and finding adequate solutions and is taking a prominent role in the industry towards decarbonizing aviation.

In 2023 KLM's direct CO_2 emissions from flight operations were 10.11 Mt (2019: 12.03 Mt)[9]. We realize our impact extends beyond CO_2, but non-CO_2 climate effects are currently not included in our quantitative target. While there is consensus on the fact that non-CO_2 emissions have an impact, there is disagreement on the exact magnitude of this impact and the mitigation measures that are needed. Actions to limit non-CO_2 climate effects often result in increased CO_2 emissions, and because of a lack of scientific pathways, we prioritize decarbonizing our operations. Nonetheless, we will address non-CO_2 as well as other types of impact in this plan.

Global greenhouse gas emissions per capita by sector, 2019

In tonnes of carbon dioxide-equivalents[2] per person per year.

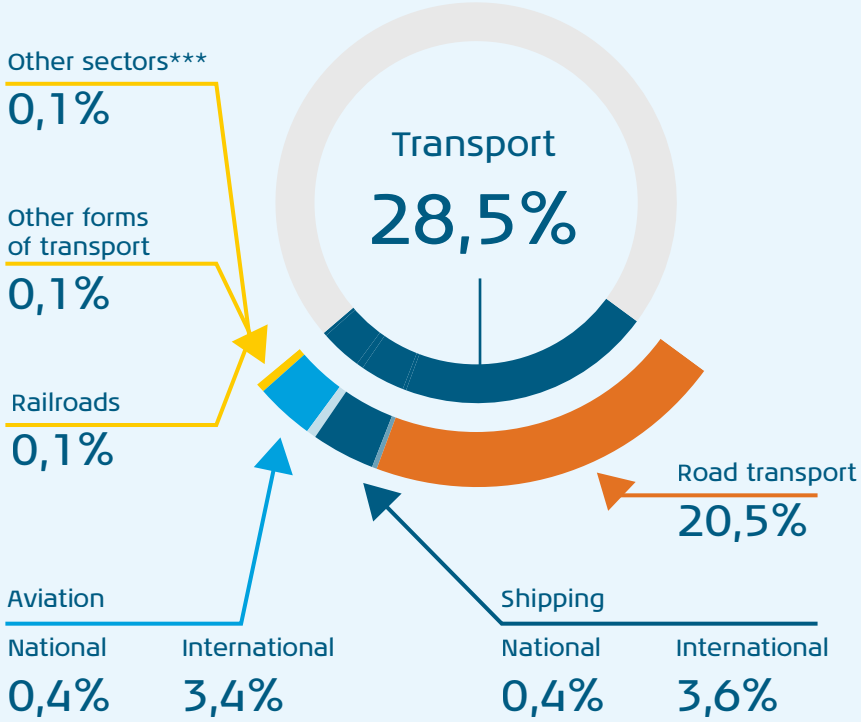


Source: Our World in Data based on Climate Analysis Indicators Tool (CAIT).

OurWorldInData.org/co2-and-greenhouse-gas-emissions · CC BY

Transport emissions

As part of the total greenhouse gasses in the EU* (2019)**



Source: Europees Mileuagentschap (2022)

*Excluding the United Kingdom (EU-27)
**Excluding Land Use, Land Use Change and Forestry (LULUCF)
***Energy, industry, housing, commerce, institutions, agriculture, forestry, fisheries and others

Looking back: what have we done so far?

KLM's climate actions date back to the 1990s when we started our environmental reporting. In the early 2000s, KLM began publishing annual Corporate Social Responsibility (CSR) reports and became ISO 14001 certified. Since 2007, KLM has been studying and supporting innovations related to our environmental impact, specifically the development of new aircraft and SAF. That year, KLM collaborated with WWF Netherlands to conduct research into SAF and in 2008 KLM took part in a pilot project that delivered the first samples of pure algae kerosene. In the same year, together with Air France, KLM joined the Roundtable on Sustainable Biofuels (RSB), which supported the development of a comprehensive and internationally accepted sustainability certification scheme. The European Union officially recognized the RSB standards in 2011. In 2012, KLM developed a long-term sustainability vision that further integrated CSR into our business strategy and operations. Furthermore, in 2012 KLM started adding a small percentage of SAF on commercial flights. Around 100 commercial flights from Amsterdam to Paris were flown using a small amount of SAF mixed with kerosene. That year, KLM also succeeded in flying the first transatlantic flight to Rio de Janeiro on conventional fuel mixed with a small amount of SAF.

We also became the first in the industry to launch a SAF program for corporate clients, allowing them to reduce their business travel carbon footprint by purchasing SAF. For private customers, the option to voluntarily purchase SAF was introduced in 2022. Since 2008, KLM has been enabling private customers to voluntarily address their CO_2 emissions through the CO_2 Impact Programme.

In line with the long-term sustainability vision determined in 2012, we committed to two CO_2 reduction targets for 2020. Firstly, we aimed to reduce our CO_2 emissions per passenger-kilometer (pkm) by 20% in 2020 (relative to the 2009 level). We achieved this target and reported a reduction of 21.6% by 2019, which was achieved through fleet renewal, operational measures, a small amount of SAF and nature-based solutions . However, we did not reach our target in 2020, because of the impact of COVID'19. Secondly, KLM set itself a 20% improvement in ground operation energy efficiency by 2020 (relative to the 2011 level), by optimizing energy consumption and increasing the use of renewable energies. This target was achieved in 2020.


KLM
AIRBUS A321neo

The graph in Figure 1 below shows the reduction in absolute CO_2 emissions since 2005. This portrays a gradual decrease in emissions, with a huge drop in 2020 and 2021 due to the pandemic. Figure 2 shows a decline in emissions per pkm over time, illustrating KLM's increasing efficiency. Both figures portray only a decrease and efficiency in Scope 1 emissions, thus direct emissions from flight operations.

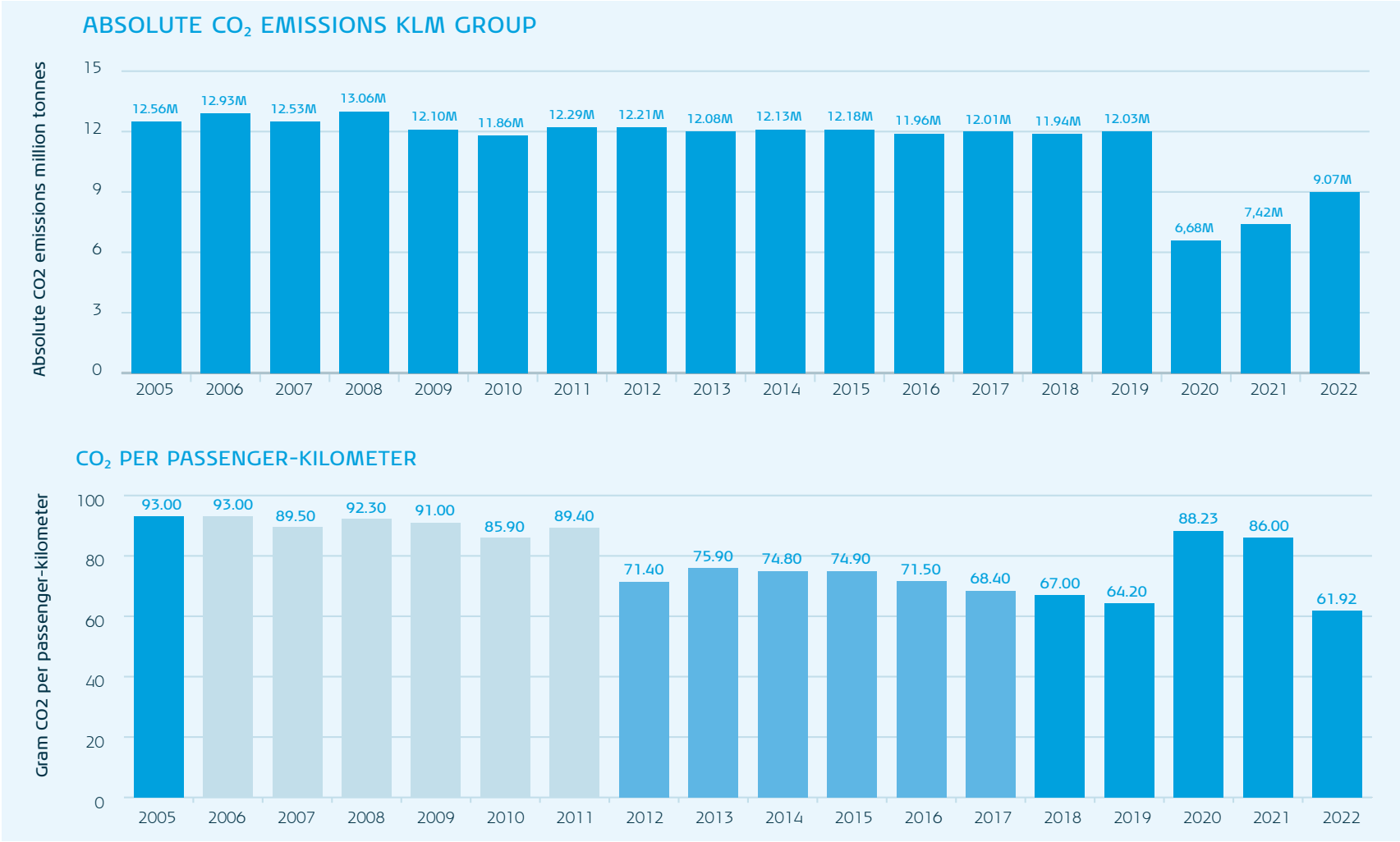


Figure 1 and 2. 'Absolute CO_2 Scope 1 emissions KLM Group 2005-2022.' and 'CO_2 Scope 1 emissions per passenger-kilometer of KLM and KLM Cityhopper (2005-2022). Transavia is included from 2012 onwards. Including market based measures (EU ETS introduced in 2012), compensation and SAF.

Mapping our emissions

In order to take effective decarbonization measures, it is essential to have a thorough understanding of our emissions footprint. Our primary source of GHG emissions is CO_2 that derives from the use of jet fuel, which accounts for 99% of our Scope 1 emissions. The remainder comes from ground operations.

To expand our decarbonization target to cover all emission scopes, we have taken steps to enhance our methodology and data collection for Scope 3 emissions calculations. This will be explained in the following chapters. A first measurement shows that our Scope 3 emissions in 2019 were approximately 27% of our total emissions, of which 73% came from jet fuel and 27% from purchased goods and services.

In the following chapters we will explore the composition of the emissions from our flight operations, ground operations and our value chain, as well as our reduction targets and actions.

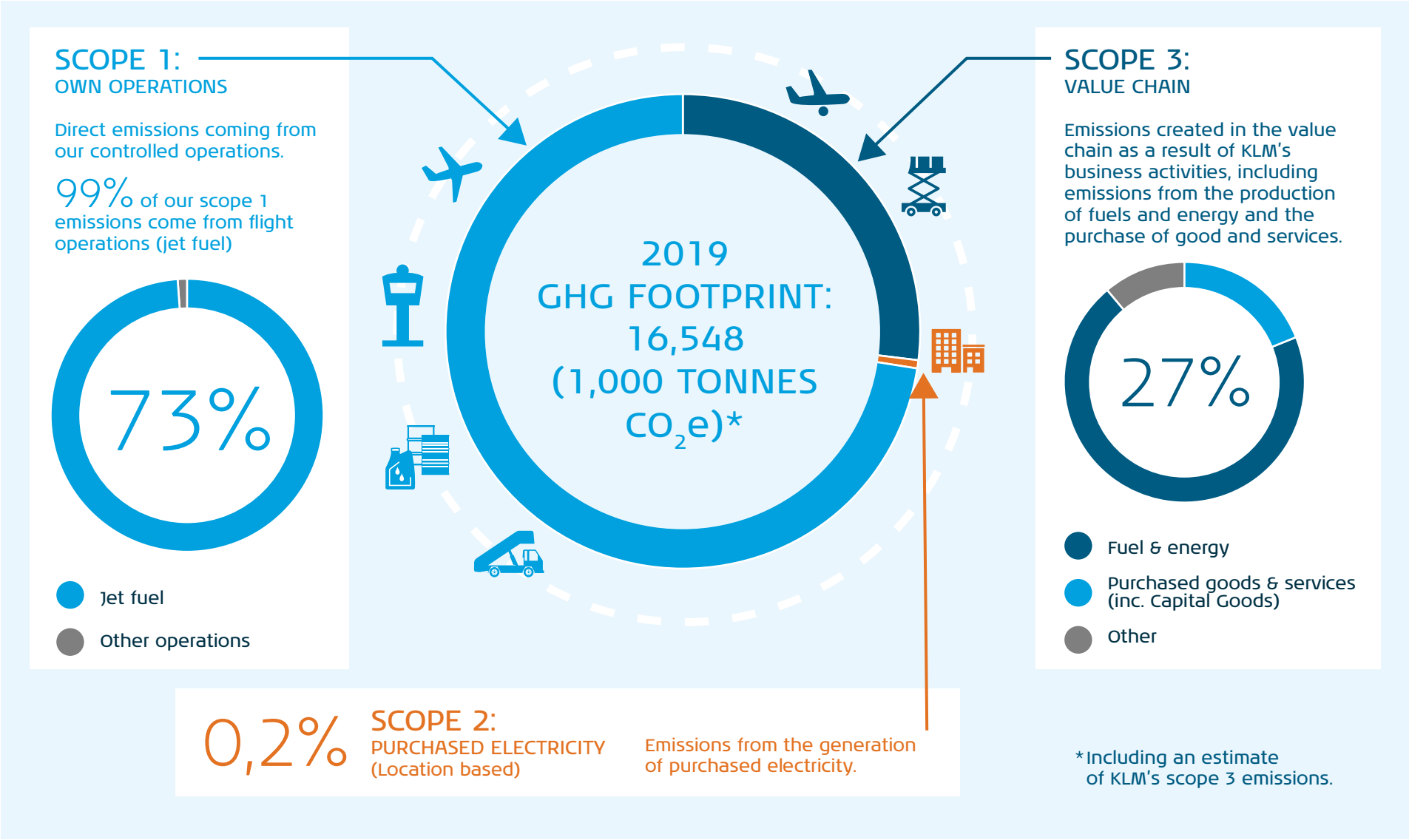


Figure 3. 'Mapping our emissions.'

Flight operations

Flight operation involves all activities required to operate an aircraft, such as dispatch, flight planning and the actual operation of the aircraft. The amount of fuel required for a flight depends on many factors, e.g. the aircraft type, the aircraft weight (including catering, crew, passengers and cargo), the route to be flown, weather conditions, fuel policy, aircraft speed and altitudes.

Targets

We have committed to reducing well-to-wake Scope 1 and 3 jet fuel CO_2 emissions by 30% per Revenue Tonne Kilometer (RTK) by 2030 from a 2019 base year. By setting an intensity target, we aim to reduce emissions per unit of activity, allowing us to seek improvements in efficiency.

Although the SBTi does not require an absolute target for aviation, we have derived an absolute reduction projection for 2030 that is separate from the intensity target. Based on our own calculations using the SBTi method, we need to reduce 12% of our absolute emissions in 2030 compared to 2019.

EXTERNAL VALIDATION OF OUR TARGETS: THE SCIENCE BASED TARGETS INITIATIVE

The SBTi is a partnership between four Non-Governmental Organizations (NGOs) and knowledge institutes: the Carbon Disclosure Project (CDP), World Resources Institute (WRI), UN Global Compact and World Wildlife Fund for Nature (WWF). SBTi helps private-sector organizations set climate targets in line with the Paris Climate Agreement, based on what science tells them is necessary and based on an industry's abilities to decarbonise. These guidelines are based on scientific data and assumptions from the International Energy Agency (IEA) and latest Intergovernmental Panel on Climate Change (IPCC) report and are developed in collaboration with industry experts. To keep the aviation industry's decarbonisation pathway aligned with a well below 2°C trajectory, the SBTi introduced guidelines specific for aviation in August 2021. These guidelines have been used to set KLM's target and we are in the process of studying interim guidelines that were published in February 2023 for a 1.5°C pathway. A first glance indicates that these new guidelines will only impact targets set after 2030 and that the current targets of KLM are in line with the interim pathway of 1.5°C up to 2030. However, the projections in this Climate Action Plan are based on a well below 2°C scenario.

There are a few things that need to be noted about these targets. Firstly, they cover KLM's Scope 1 and 3 jet fuel emissions (well to wake) generated by our flight operations. Secondly, following the SBTi guidelines, neither market-based measures nor carbon removals are counted towards the overall CO_2 reduction. Third, non-CO_2 climate effects that may also contribute to aviation-induced warming are not included in this target, per SBTi's guidance. However we are working on reporting on our progress [on reducing non-CO_2 climate effects] each year and seeking opportunities for mitigating them.

Table 1. 'Overview CO_2 Reduction Targets KLM Group.'

CO_2 reduction targets KLM group	CO_2 reduction in 2030 compared to 2019 (scope 1 & 3 from jet fuel)
Intensity target (pRTK)	-30%
Absolute reduction absolute reduction (based on SBT forecasts)	-12%

Intensity target

In Figure 4 we see the sector intensity pathway and the required KLM pathway. A KLM compound annual growth rate (CAGR) of 1.95% has been assumed (SBTi assumes 2.9%), based on the available seat/tonne kilometers until 2030 and an analysis of our network projections and fleet development.

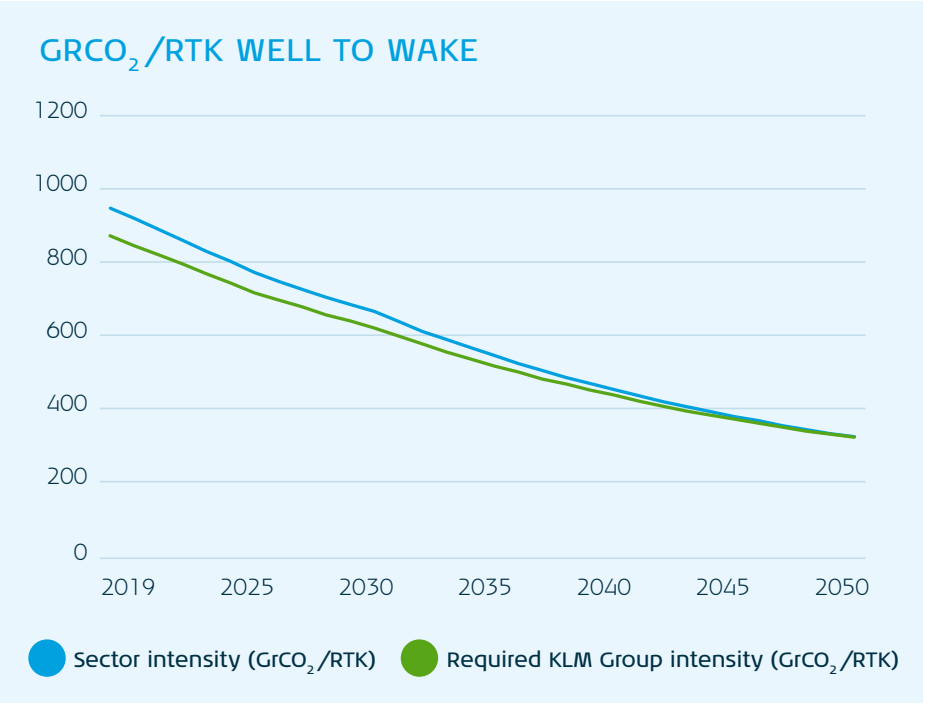
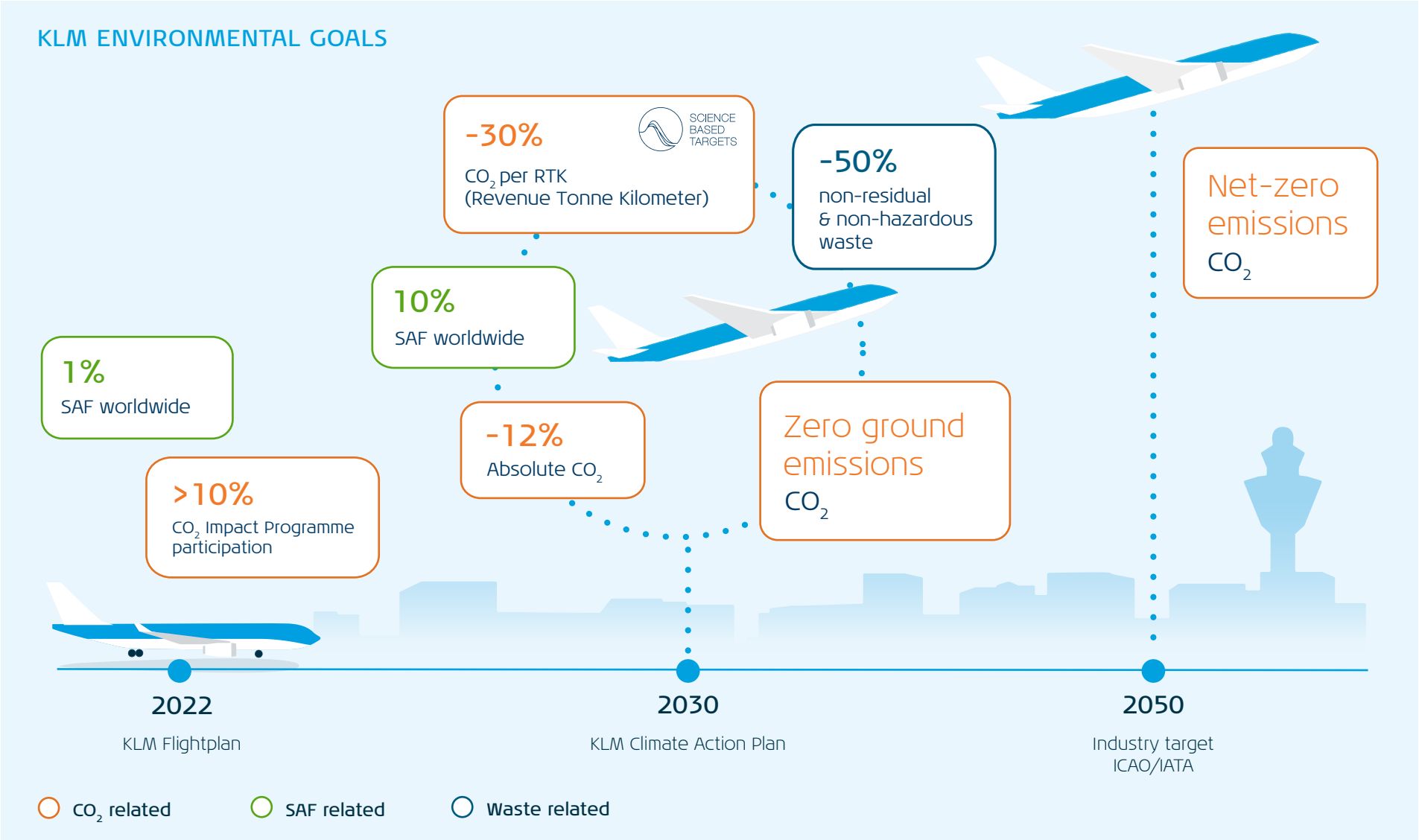


Figure 4. 'Intensity pathway SBTi including KLM intensity, sector intensity and KLM outlook.


KLM ENVIRONMENTAL GOALS
-30%
SCIENCE BASED TARGETS
CO_2 per RTK
(Revenue Tonne Kilometer)
-50%
non-residual
& non-hazardous
waste
Net-zero emissions
CO_2
10%
SAF worldwide
1%
SAF worldwide
-12%
Absolute CO_2
Zero ground emissions
CO_2
>10%
CO_2 Impact Programme participation
2022
KLM Flightplan
2030
KLM Climate Action Plan
2050
Industry target
ICAO/IATA
CO_2 related
SAF related
Waste related

The way forward

In order to reach our targets, we have developed an action plan towards 2030. This comprises multiple actions across four main domains. The following graph shows these levers and their capacity to reduce our impact.

The graph in Figure 5 shows the emissions per RTK of the KLM group from 2019 until 2030 for Scope 1 and 3. The top red line shows the 'do nothing' scenario and action in the four areas described below result in the target line for 2030 at the bottom.

The graph in Figure 6 shows the absolute emissions of the KLM group from 2019 until 2030 for Scope 1 and 3 of our flight operations. From 2020 we have used the same underlying assumptions as for the intensity target. The graph shows that our renewed projection in line with our SBTi decarbonization pathway requires additional CO_2 reduction to meet the SBTI goals, similar to what is portrayed in the first part of the intensity pathway in Figure 5. This means new measures need to be investigated and implemented on top of our current activities. Below we elaborate on this.

Figure 5 and 6. 'CO_2 emission per RTK (WTW) projection KLM group SBTi.' and Absolute CO_2 emission (WTW) projection KLM group SBT.'

1 Fleet renewal and radical innovation

Current activities

The most effective way to reduce our carbon footprint is to invest in a more fuel-efficient fleet. KLM is investing in more modern, high-performance aircraft with a lower environmental impact. In 2021, KLM welcomed the first of 25 new Embraer 195-E2 aircraft, which emit approximately 30% less CO_2 per passenger than the Embraer 190 they replace. The A321neo emits 21% less CO_2 per passenger than its predecessor (Boeing 737-800). In addition, we will replace the full-freighter Boeing 747-400 by new Airbus A350F freighters, which is expected to consume 40% less fuel[10]. By including the freighters, approximately 12% of our 30% intensity target for 2030 will be reached by fleet renewal (~40%). Beyond these measures, we are evaluating replacements for our oldest long-haul aircraft in the second half of this decade.

Activities towards 2030

We are investigating zero CO_2 emission aviation and our ambition is to operate a zero CO_2 emission flight in this decade. By pioneering such flights, which require not just different aircraft but possibly a new operational approach, we hope to inspire other airlines and catalyze zero CO_2 emission aviation in the wider industry.

2 Flight operational efficiency

KLM is pursuing ways to reduce fuel consumption by increasing the efficiency of our flight operations, such as measures to reduce weight and flying at optimal speeds. We expect to reduce 2-4% of CO_2 in 2030 compared to 2019 by implementing these and other measures.

Current activities

Many fuel saving initiatives are already in place, for example:

- Route optimization; International flights between point A and point B rarely go in a straight line, even though that would be the most fuel efficient. Instead, flight paths meander across the sky as they account for weather, airspace congestion, noise regulation, political and military restrictions and different procedures used by national air traffic control agencies. KLM is doing three things to make flight routes as fuel-efficient as possible:
  - KLM's advanced flight plan computer system calculates the most fuel efficient route.
  - KLM has been encouraging the European Commission to create a Single European Sky (SES), which would improve the capacity, safety, efficiency and environmental impact of Europe's airspace. We support the required reform of the European Air Traffic Management System at the institutional, operational, technological and control and supervision level. This could cut aviation emissions in the European Union by up to 10%.[11] For example, a flight from Zurich to Amsterdam could be 220 kilometers shorter.
  - KLM is involved in the Dutch Airspace Redesign Program (DARP) discussions, which enables the use of more efficient routes in the European and Dutch airspace. This redesign is expected to be completed in 2030, which should lead to optimized routing and less fuel consumption and noise pollution. Combined, SES and DARP could help us save 1-3 % fuel per year.
- Weight reduction; The lighter the aircraft, the less fuel it consumes. KLM is working hard to reduce weight and in recent years has successfully implemented the following changes:
  - The weight of catering and service equipment has been reduced saving 3.9 million kilograms CO_2 per year (~0.04% of our direct CO_2 emissions from aviation fuel).
  - Flights departing from AMS carry less drinking water, saving 2.7 million kilograms CO_2 per year (~0.03% of our direct CO_2 emissions from aviation fuel).
  - KLM's unique fuel model reduces the required reserve fuel for unforeseen circumstances by 15 million kilograms per year, saving approximately 47,000 tonnes CO_2 (~0.5% of our direct CO_2 emissons from aviation fuel). This is the equivalent of 3,000 B737 flights from Amsterdam to Barcelona.
- Fuel-efficient procedures; Pilots apply, when possible, the procedures that lead to the most efficient operations e.g. flying the most fuel efficient speeds, altitude and route.
  - In 2020, KLM introduced a new climb procedure (adjusted for the Noise Abatement Departure Procedure 2), reducing the fuel used during the climb by 2 million kilograms per year. Taxiing on one instead of two engines has been made standard for most aircraft, saving 700,000 kilograms of fuel every year or 2,000 tonnes CO_2 (~0.02% of our direct CO_2 emissions from aviation fuel).
  - When fuel is more expensive at a flight's destination than at our Schiphol base, it makes economic sense to depart from Schiphol with the fuel for the return flight. But this means more weight and thus CO_2 emissions, and we have decided to end this practice. This reduces absolute CO_2 emission by 14 million kilograms per year (~0.1% of our direct CO_2 emissions from aviation fuel).

- Mobile engine water wash; A cleaner aircraft engines is more fuel efficient. KLM in 2019 begun to use mobile engine washers to clean the engines more regularly, leading to fuel savings of 3.4 million kilograms per year and a CO_2 reduction of approximately 10,000 tonnes (~0.1% of our direct CO_2 emissions from aviation fuel).

Activities towards 2030

KLM has developed an operational efficiency roadmap to improve the operational efficiency until 2030. The plans will help us reach an absolute as well as relative reduction of 2% CO_2 on the total emissions of flight operations. The following initiatives are in scope:

- In-flight optimizers: KLM is testing new flight profile optimizers, IT applications that use more advanced aircraft performance and wind models to optimize the aircraft route, speed and altitude during the flight. We expect absolute CO_2 savings of 0.5-1% of the total CO_2 of flight operations per year.
- Implementing new flight planning systems with advanced route optimization algorithms.
- New efficient tools based on artificial intelligence are being implemented, in partnership with innovative start-ups and universities.
- Taxi operations aimed at reducing climate impact (i.e. electric taxiing).
- Implementing further weight reduction measures.

3 Alternative Aviation Fuel (SAF)

Current activities

In 2023 KLM used 49 kilotons of Alternative Aviation Fuel (SAF), compared to 3,150 kilotons of conventional aviation fuel. This represents a 1.5% SAF incorporation rate, which has saved 179 kilotons of scope 1 and 3 CO_2 emissions. KLM Group's total CO_2 emissions (across scopes 1, 2 and 3) was 12,709 kilotons.[12]

KLM runs SAF programs for corporate clients, passengers and cargo clients, which encourages them to purchase SAF for their flight. In 2022, the corporate program yielded almost 5.5 kilotons of SAF, compared to over 10 kilotons for the cargo program. Voluntary SAF additions by private passengers amounted to almost 0.5 kilotons of SAF. In addition, we began to add 0.5% of our total kerosene use for flights departing Amsterdam in SAF in 2022 and doubled that to 1% in 2023, ahead of the EU's SAF mandate schedule. In 2024, there is no minimum share of SAF required in the Netherlands by law. From 2025 onwards fuel suppliers are under the legal obligation to deliver 2% SAF to airports in Europe. In 2023 KLM did not receive SAF allowances under EU ETS for the use of SAF.

Sustainability criteria for SAF

KLM has strict sustainability criteria for the SAF we use. We require a reduction of at least 65% of CO_2 emissions over the lifecycle of the fuel compared to fossil kerosene, a minimal impact on biodiversity, and no competition with food or animal feed production. Also, SAF cannot be sourced from soy or palm oil, as these can contribute to deforestation, and needs to be certified by the Roundtable on Sustainable Biomaterials (RSB) or the International Sustainability & Carbon Certification (ISCC) to the ISCC-EU or ISCC-Plus standard. KLM has been a member of the RSB since 2008, in its capacity as founding members of the Sustainable Aviation Fuel Users Group. The RSB considers 12 criteria when certifying SAF, ranging from food security to rural development, the quality of air, soil and water resources, and waste management. In 2022 KLM received its ISCC-EU certification, which allows us to blend our own SAF and issue Proof of Sustainability documents.

Innovating in the supply chain

In 2009, KLM was one of the founders of SkyNRG, which sources, blends and distributes SAF to airlines and increases the supply and production of SAF worldwide. In 2016, KLM began purchasing SAF produced by World Energy in Los Angeles and supplied by SkyNRG. KLM has also purchased SAF from Neste and partners for flights departing from Schiphol, London Heathrow and Arlanda in Sweden. Recently the Air France-KLM Group, signed two major, long-term purchase agreements for a total of 1.6 million tonnes of SAF with Neste and DG Fuels. The fuel will be delivered between 2023 and 2036 and these two deals represent 3% of the 10% KLM wants to blend by 2030[13].

In 2019, SkyNRG announced the construction of Europe's first dedicated plant for the production of SAF in Delfzijl in the Netherlands. KLM, as launch customer of the plant, committed to purchasing 75,000 tonnes of SAF annually, representing 75% of the plant's production capacity. The construction of this facility is scheduled to open between 2026-2028.

Stimulating the industry

In line with our strategic goal of 'creating technological advancement', KLM takes part in working groups and supports research projects aimed at the creation of a SAF market. For instance, we are an active participant in the Sustainable Aviation Roundtable, including the working group on alternative fuels. This roundtable is a collaboration between the Dutch Government, several private parties and knowledge institutes to stimulate the production of SAF in the Netherlands. We are also part of the Clean Skies for Tomorrow (CST) coalition, which

was established within the World Economic Forum to achieve a worldwide SAF proportion of 10% in 2030[14]. Finally, we are a member of the EU Renewable and Low-Carbon Fuels Value Chain Industrial Alliance (RLCF) that was set up in April 2022. This focuses on boosting production and supply of renewable and low-carbon fuels in the aviation and waterborne sectors.

Potential activities 2030

Our current commitment to blend 10% SAF by 2030 will not allow us to achieve our SBTi target. Unless we come up with alternative measures, our first estimates suggest we will need 15-18% SAF in 2030 to reach our SBTi target. This means KLM needs to explore other ways to reduce emissions or to purchase more SAF. Although the blending mandate, as proposed in ReFuelEU Aviation as part of the EU Green Deal 'Fit for 55' package, will help the market to mature, we need to push the boundaries of the market to source the SAF we need. The following actions will be carried out in the coming years.

- We will continue with strategic partnerships, including limited financial investments, with suppliers such as DSL-01 and Synkero.
- We will stimulate demand for and the production of SAF by purchasing substantial quantities of SAF relative to our position, improving our position ahead of mandates.
- We will sign long-term SAF purchase agreements with different suppliers with a diverse mix of technologies, like Alcohol-to-Jet, Gasification with Fischer-Tropsch and Power-to-Liquid to further develop the SAF supply chain.
- We will continue to explore the role we can take as an airline in the development of a global book and claim system for SAF. This would allow passengers to purchase SAF for their flight, even if it is not physically available at their airport. Instead, their SAF would be added to an aircraft at an airport with a SAF production facility nearby, allowing passengers to still claim the lifecycle CO_2 reduction.

4 Other measures: next steps to 2030

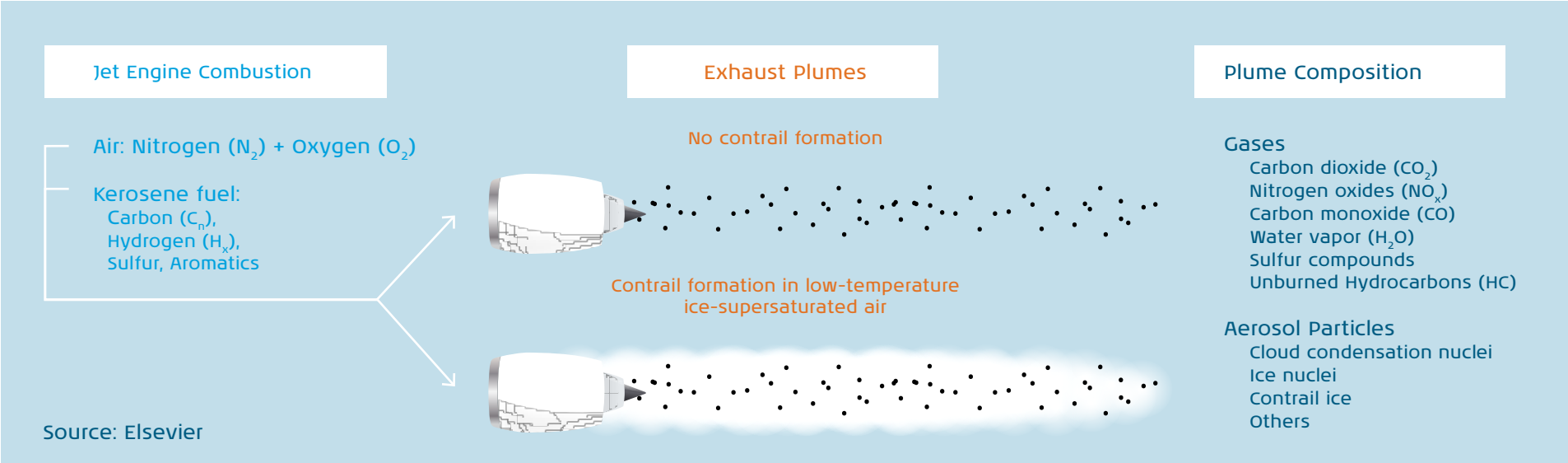
KLM has come a long way in the development of a clear and credible decarbonization pathway and in the years ahead we will report on the progress we make. However, there are still aspects of our plan that need more work. As mentioned earlier, our fleet renewal plan needs to be analyzed more thoroughly, some operational measures need to be scaled up, more ways to increase efficiency need to be found and certain partnerships, which are key to achieving our target, still need to be set up. Furthermore, all these measures influence one another, meaning the implementation of our Climate Action Plan is an iterative process that requires us to constantly adapt to changes.

Non-CO_2 climate effects

Whilst CO_2 remains the most commonly cited and arguably best-understood pollutant from aviation, its contribution to global effective radiative forcing (ERF) (i.e. global warming) is estimated to be just one third of the industry's total impact. Two thirds of aviation's climate impact is caused by other pollutants from jet engines[15]. For example, particulate matter has been linked to the formation of condensation trails, also known as contrails. These cloud-like stripes that form behind an aircraft last from a few minutes to a day, but can have strong climate effects. Nitrogen oxides (NOx) emissions from aircraft engines at altitude contribute to the formation of ozone but at the same time also the destruction of methane (both GHG) such that the overall effect is estimated to be warming although this is dependent on background surface air pollution levels.

Overall, there is consensus on the existence of these non-CO_2 climate effects although uncertainties remain about the nature and magnitude of their impact. Therefore, one must be careful with actions that can limit non-CO_2 climate effects as they may have an opposite effect. Furthermore, actions to reduce non-CO_2 climate effects remain untested, limiting the ability for individual companies to both measure their impact and take action. As a result, the SBTi pathway developed for KLM (and other airlines) only covers CO_2 emissions and other Kyoto GHGs. However, as the largest part of aviation's total climate impact comes from non-CO_2 emissions, KLM is actively working with solution providers to deepen the knowledge on non-CO_2 climate effects and identify the most effective countermeasures.

Having said that, there are a number of operational and technical measures that can be piloted to reduce contrails formation. During a 6 month period in 2023, for example, we began a pilot project with SATAVIA, whose software enables aircraft operators to forecast, prevent and quantify the warming effects caused by contrails, by adjusting flight paths to avoid ice supersaturated regions (ISSR). KLM is also looking at the kerosene it uses, as both SAF and hydrotreated Jet A-1 fuel result in reduced amounts of non-volatile Particulate Matter (nvPM), with scientific evidence suggesting the warming of contrails formed by both of these fuel types is lower than for conventional Jet A-1 fuel[16]. Further enhancing the share of SAF in our fuel mix should reduce our non-CO_2 climate effects.



Ground energy consumption

At Schiphol, our aircraft are supported by a range of ground equipment, such as de-icers, ground power units, conveyor belts, passenger buses and towing tractors. This equipment traditionally uses fuel. In addition, KLM uses gas and electricity for building operations and electricity for aircraft maintenance and tertiary activities. All of these ground operations generate direct and indirect GHG emissions (Scope 1 and Scope 2), although this is less than 1% of our total Scope 1 and 2 emissions.

Targets

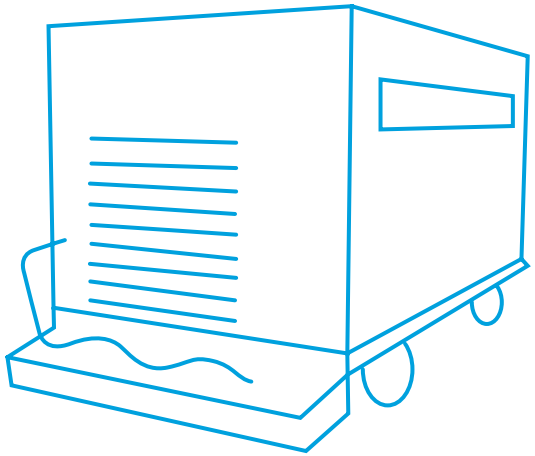
In 2019, KLM set a target of net-zero carbon emissions for all ground operations by 2030. In 2019, KLM took a major step towards this ambition by switching to green electricity. This initiative resulted in a CO_2-equivalent reduction of 50% from ground operations compared to 2018.

The way forward

2020 was the last year of KLM's third multi-year energy efficiency agreement with the Dutch Ministry of Economic Affairs, aimed at increasing energy efficiency by at least 2% a year. To comply with the Energy Efficiency Directive that replaces this agreement from January 1, 2021, KLM has obtained ISO 50001 certification for controlling the realization of energy efficiency improvements.

Electrification of ground support equipment is a major step towards reducing the impact of our ground operations. KLM is trialing electric alternatives to the traditional ground power units, push back trucks and towing equipment, of which 63% has already been electrified. In addition, all non-electric ground equipment now uses bio-diesel HVO100. This is 100% hydro treated vegetable oil and is a renewable fuel that can be used in diesel engines. Using this fuel, 98% less CO_2-equivalent (well-to-wake) is emitted from our ground equipment [compared to traditional diesel]. The support of the Dutch Government and the EU Horizon 2020 project TULIPS for the realization of green airports, can further accelerate this development.

In partnership with the industry, KLM wants to embrace forms of taxiing at Schiphol with reducing climate impact. This is not just for the sake of fuel and emissions reduction, but also to reduce the emission of NOx and Ultra Fine Particulates (UFPs). This improves the air quality for employees and people living in the wider Schiphol area. To this end, relevant protocols have been established and Schiphol has purchased two hybrid 'taxibots' to use for aircraft pushback, taxiing, and towing. KLM is eager to conduct more tests on the taxibots to see how they can be used in day-to-day operations.



Electric PCA's (airco-units)

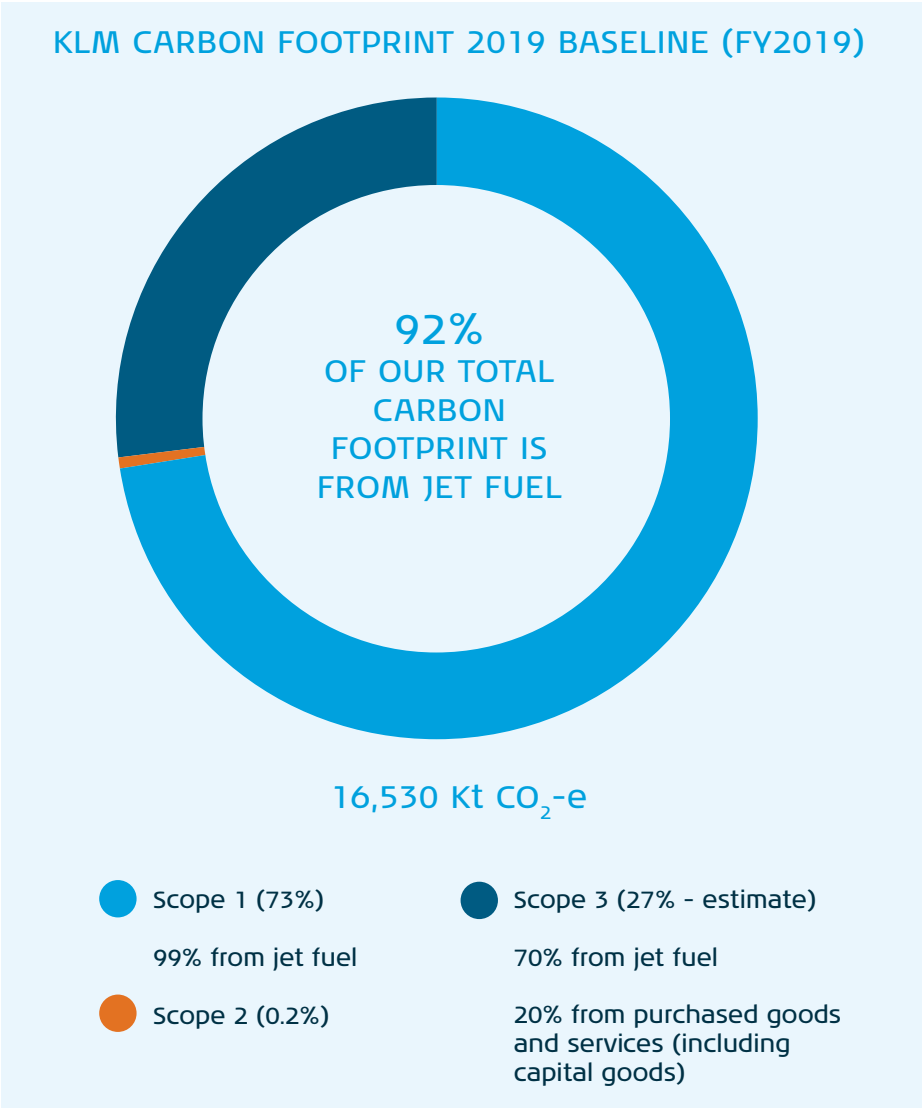
Value chain

At KLM, we are committed to reducing our GHG emissions, both from our own operations (Scope 1 and 2) and indirect ones associated with our value chain (Scope 3), in categories like purchased goods and services, waste processing, and business travel. In 2022, KLM finalized its first comprehensive screening of Scope 3 emissions for the 2019 base year. All relevant categories of Scope 3 emissions were assessed using methodologies consistent with the Greenhouse Gas Protocol (GHGP), Corporate Value Chain (Scope 3) Accounting and Reporting Standard and with reference to the additional guidance provided in the GHG Protocol Technical Guidance for Calculating Scope 3 Emissions.[17]

This screening provides a first indication of the magnitude of our Scope 3 emissions and identifies the most critical emission categories. The results of the Scope 3 screening indicate that around 27% of our total carbon footprint is in our value chain, which is consistent with the aviation sector. The main contribution to our Scope 3 emissions is jet fuel (70%), with purchased goods and services (including capital goods) accounting for around 20%. The remaining 10% of Scope 3 emissions are distributed across the remaining emission categories.

Targets

Our SBTi target only covers Scope 1 and 3 of jet fuel emissions. In the coming years, an overall Scope 3 target will be defined and published in our next Climate Action Plan.



The way forward

Besides our own commitment to reducing our climate impact, there is a need for increasing transparency and action towards GHG reduction. The exercise of establishing a Scope 3 accounting and reporting framework, underpinned by the key GHG emissions reporting principles, raises awareness within KLM about the need to focus on Scope 3.

Policy and Planning

The Scope 3 screening is a first step towards understanding our full impact in our value chain. In the coming years, we will develop a Scope 3 inventory applying the principles of completeness, consistency, transparency and accuracy. We have completed a Scope 3 inventory within KLM Inflight Services with plans to upscale to the other KLM business units in the coming years. In addition, we will engage with our highest emitting suppliers through the CDP Supplier Assessment, Climate Module, to make our target suppliers aware, encourage them to adopt a SBTi-validated target of their own and gather insights on their carbon strategy and performance.

The results of these activities help define our KPIs on Scope 3 and set the agenda for programs and sourcing strategies to reduce our Scope 3 impact.

Examples of what are we doing on Scope 3

Travel with reduced impact on the environment

KLM is encouraging its employees to reduce the environmental impact of their commute through the development of a business travel and commuting program. In the first half of 2023, KLM will formulate goals and measures to reduce GHG emissions associated with staff commuting. KLM has already taken the first steps by introducing a work-from-home policy and starting the electrification of the car fleet used by employees.

Examples of how we engage with our suppliers

- Trucking

  Air France KLM Martinair Cargo and Jan de Rijk Logistics have joined forces to take the new Long Heavy Vehicle (LHV) into operation. This completely new truck combination will run on HVO100[18].
- Catering

  KLM IFS has begun to serve more plant-based meals on board. In October 2022, we introduced a hybrid meatball as an option, with is made from 50% seaweed but offers the full flavor of meat. The GHG emissions of this product are reduced by 49%, while water and land use are reduced by 51% and 49% respectively.
- Uniforms

  In the selection of a new supplier for work clothing and uniforms, carbon emissions and waste reduction were important criteria, including the re-use and recycling of materials, lengthening of the uniforms' life cycle and emission-free transport within the Netherlands.

To measure is to know

KLM is undertaking the Herculean task of measuring its Scope 3 emissions in a bid to meet its reduction target for 2030. Claire Luiten, CSR and Process Engineer with KLM Inflight Services, explains what is being done to measure the emissions of everything that happens on board and to decide on better alternatives.

The 19th century British scientist Lord Kelvin, after whom the Kelvin scale of temperature was named, is quoted as saying that 'to measure is to know'. This adage now applies to KLM as it steers towards its ambitious target of 30% lower CO_2 emissions per revenue tonne Kilometer (RTK) in 2030 compared to 2019. In 2022, this target was validated by the Science Based Targets initiative (SBTi), which aligns it with climate science and the Paris Agreement goal of keeping global warming well below two degrees Celsius.

As part of the SBTi validation process, KLM measured its Scope 3 emissions, these account for around 30% of its total greenhouse gas inventory. Scope 3 emissions are calculated across 15 different categories; the most relevant to KLM include i) energy, ii) purchase and transportation of goods and iii) business travel - for example when crew stay at a hotel at their intercontinental destinations.

Reliable inventory

"To estimate emissions we initially made a high-level screening using spend-based methods, which takes the cost of something and multiplies it by a factor - the amount of emissions produced per financial unit. But this is not the most accurate method and we followed up with a pilot project in IFS to see how we could make a more reliable inventory."

An external consultancy is making the inventory this time around, but Claire explains KLM wants to master the expertise on Scope 3 so that it can conduct such measurements by itself in the rest of the organization. "This will be quite a challenge, because a different business may require a different approach. Seven of the 15 emission categories are relevant to IFS, but in another part of the business, say Engineering and Maintenance, different categories will apply, meaning we need to measure other things in other ways."

Measure, report and steer

While this approach to measuring Scope 3 is costly and laborious, it serves two important goals according to Claire. "In 2024, the EU's Corporate Sustainability Reporting Directive came into effect, mandating companies to report on and audit the impact of their activities on the environment and society. But we are also doing it because KLM wants to steer towards its 2030 target and make decisions and investments that have meaningful impact." At IFS, people have been working hard to do exactly that. "We look for lighter materials, and ways to reduce and recycle waste. For example, we worked with a supplier to develop a trolley that saves 400 kilograms on intercontinental flights and we replaced 50% of the meat in our meatballs with seaweed, which saves 3,500 tonnes of CO_2 per year in the lifecycle emissions of our catering product."

Decarbonize catering

Imagine the kind of work involved in replacing meat with seaweed, such as working with caterers, testing recipes and possibly dealing with a bunch of red tape. Now consider that in 2022 KLM flew 25.8 million people to 167 destinations and you will realize it is not easy to decarbonize KLM's catering. "On European flights, KLM sources meals for the outbound and return journey from Amsterdam, so it will be relatively easy to get data and measure results. But for the return flight of our 60 to 70 intercontinental destinations, we need to deal with dozens of local caters and catering regulations. This is much harder."

Luckily, Claire and her colleagues have other tools at their disposal to help KLM achieve its target. One is a life cycle assessment tool developed by TNO, a renowned Dutch applied research organization, which calculates the environmental impact of products and packaging across its entire life cycle, and the shadow price – the cost associated with the environmental impact of these materials. Claire is also working on a project run by KLM's Procurement Department, which is working with the CDP to assess KLM's top 100 suppliers. "Our goal is to encourage them to disclose their CO_2 emissions and hopefully steer them to set their own SBTi target. I know we will get there in time."

Outlook towards 2050

Committing to a near-term, validated target is important to us. We need to focus on reducing our negative impact now, as this is the decade of action. We also recognize the need for longer-term targets, in line with the Paris Agreement. In 2022, the International Air Transport Association (IATA) announced its commitment to be net zero in 2050, while the International Civil Aviation Organization (ICAO) has agreed to a long-term aspirational goal in line with a 1.5˚ C pathway. KLM supports these initiatives. However, we are convinced that a commitment to a net zero target is not enough and that without intermediate goals a net zero pledge is merely a point in time. Therefore, we are exploring the net zero pathway of the SBTi, to have our own validated goal for 2050. In the meantime, we are working on several initiatives to shape our outlook towards 2050, including:

Technological developments

Our vision for the future of air mobility looks at the timeframe up to 2030 and beyond. We are working with original equipment manufacturers and start-ups to understand the latest technological developments and their operational implications.

If we come across an aircraft with a small seating capacity and an alternative propulsion technology (such as electricity), we might consider operating it to learn how to use it, even though it will have a small impact on our total carbon footprint.

From 2035 onwards, it is expected that the first zero CO_2 emission aircraft with a capacity of around 75 seats could become available, allowing us to start replacing our current smallest regional aircraft.[19] By 2040, some single-aisle aircraft could also be replaced with a zero CO_2 emission alternative. For twin-aisle aircraft, the first versions, which will probably not be 100% zero CO_2 emission, are expected to come to market from 2043.

VISION FUTURE AIR MOBILITY & TECHNICAL FEASIBILITY

	Type	#Pax	Range	Energy source	Expected
	E VTOL	2-10 Pax	Short	Battery-Electric / Fuel cell / Hybrid-Electric	2025-2030
	Commuter	9 -19 Pax	Short	Battery-Electric / Fuel cell / Hybrid-Electric	2025 - 2030
	Regional	20 -100 Pax	Short Medium	Battery-Electric / Fuel cell / Hybrid-Electric	2028 – 2035
	Single aisle	100 -250 Pax	Medium	Hybrid H_2 turbine / H_2 turbine / Hybrid	2035 – 2040
	Twin aisle	250+ Pax	Long	New designs / H_2 turbine / Hybrid	2040 - 2045

The need for SAF up to 2050

We have already shared how we currently use SAF and how we plan to increase the use of SAF to reach our 2030 SBTi targets. However, we will be needing SAF well beyond 2030. Some 6% of European flights are long-haul (> 4,000 kilometers), but these flights are responsible for 52% of the CO_2 emissions from aviation[20]. The previous section showed that alternative propulsion technologies for the long-haul like electric or hydrogen are not likely to reach the market before 2045, which means we will probably be relying on SAF to reduce the environmental impact of these long-haul flights for a while.

The Netherlands Aerospace Centre (NLR) conducted a study into the availability of SAF in the Netherlands[21]. This study shows that the amount of SAF being produced until 2050 from the bio-based feedstock in the Netherlands can only meet a fraction of the anticipated demand. If feedstock is imported from other European countries and all feedstock is allocated to aviation, it might be possible to meet demand, but this is unrealistic. This means we need to shift from using bio-based SAF to synthetic SAF, also known as e-SAF or Power-to-Liquid. This can be made from captured carbon (either from a point source, or from ambient air) and green hydrogen that is produced using renewable electricity. The supply of this type of SAF is potentially unconstrained, although it depends heavily on the amount of excess renewable electricity allocated to the aviation sector.

Other climate contributions

Nature regeneration

KLM offers customers the opportunity to contribute to Nature Regeneration Projects. While nature regeneration won't reduce the climate impact of our flights, it's a way to help damaged ecosystems recover from harmful human activity. Nature regeneration projects address multiple issues, such as: soil infertility, biodiversity loss and food insecurity. Together with our partner FORLIANCE, we support 3 nature regeneration projects in Colombia, Panama, and Uganda. All selected projects are certified by the Gold Standard for the Global Goals label and the Forest Stewardship Council, and support job creation for the local population.

Internal CO_2 pricing

Another mechanism recently implemented to reach our 2030 targets is internal carbon pricing. This sets an internal price on carbon use, so that CO_2 emissions are explicitly considered in financial decisions. This promotes investments in low-carbon technologies and can help prepare institutions to operate under future climate policies and regulations[22]. At the start of 2022, KLM implemented its own internal CO_2 price, which was initially set at €60 per tonne CO_2 and has been updated to €80 per tonne CO_2 as of 2023. The internal carbon price is currently only used for fleet and fleet-related investment decisions. The effectiveness and use of the internal carbon price will be evaluated this year before deciding whether or not to expand the eligible set of investment decisions.

The Aviation Challenge

The transition that KLM needs to go through requires its leaders and employees to be engaged. In recent years, we have seen how our people have become personally invested in our renewed purpose and strategy. One recent example of this is The Aviation Challenge (formerly known as The Sustainable Flight Challenge), which was envisioned as a friendly race between airlines to see who could run a commercial flight with the lowest environmental impact. The brainchild of a group of KLM employees called Bold Moves, who, in a quest for ambitious ways to reduce the impact of flying on the environment, drew inspiration from the 1934 Greatest Air Race from London to Melbourne. During this race, flight pioneers proved long-distance commercial aviation was possible.

KLM approached SkyTeam, the global alliance of airlines of which it is a member, who agreed to organize the event. Sixteen airlines entered the challenge, including KLM and KLM Cityhopper, and their outcomes and innovations will be made available to the public, helping the industry reduce the environmental impact of air travel.

The competition was first held in May 2022, and KLM was able to reduce its CO_2/RTK by approximately 37% compared to its other flights that fly the same route. This was done by combining different measures: with the help of Neste, KLM performed its flight with a SAF blend of 39%, while Air Traffic Management (ATM) calculated the most efficient route. KLM CARGO achieved a 2,000 kilogram weight reduction, while ground operations used electric push back and other electric ground equipment. In 2023, another successful edition of The Aviation Challenge was held and in 2024 The Aviation Challenge first allowed non-SkyTeam members to join. Rather than launching new ideas the focus for 2024 is on adopting ideas sourced from earlier challenges and scaling them across the operation. KLM aims to implement all successful and scalable initiatives tested during The Aviation Challenge and will set the bar higher for future challenges.

Multi modalities

In July 2022, in the context of the Dutch Government's Action Plan for Rail and Air Service (Dutch: 'Actieagenda Trein en Luchtvaart'), KLM and Thalys launched their trial for the Amsterdam-Brussels transfer passengers. This initiative allows KLM to operate one less flight between Amsterdam and Brussels every day, thus contributing to KLM's strategy of reducing the amount of CO_2 it emits. The trial highlighted a number of issues KLM and Thalys need to work on before KLM can fully replace all flights to and from Brussels with train capacity. For instance, many KLM customers said the Thalys service was not explained well enough, while others experienced a lack of assistance with their luggage at the train station. Nonetheless, KLM has extended the program by purchasing seats on four more Thalys trains in both direction and will address these issues with the help of partners.

In a joint effort to reduce CO_2 emissions, the Dutch government and Dutch transport companies started to promote air-rail projects and partnerships. Since early 2023, KLM has been offering its customers the option to combine their air tickets with train tickets (in addition to the car rental and taxi service already proposed) from Schiphol to Amsterdam Central Station. This partnership with NS, the Dutch national rail company, aims to encourage foreign travelers to use rail transport and facilitate the overall process, as customers can plan their journey in one place.

Influencing the industry

KLM is fully committed to the decarbonization of air travel and believes that a unified global and European policy is key to this. At a European level, KLM works together with various stakeholders to advocate for its own and the industry's interests with regards to legislation on sustainability. At the national level, KLM is exploring intermodal solutions and further investment prospects, while opposing measures that negatively affect the level playing field within Europe and the rest of the world.

International

In 2015, the Paris Agreement was adopted, which agreed to limit global warming to well below 2°C while aiming to limit the increase to 1.5°C. However, because the international nature of aviation, it falls (like shipping) outside of the scope of Nationally Determined Contributions (NDC), meaning the supervision of decarbonization is entrusted to the International Civil Aviation Organisation (ICAO), a United Nations agency. The aviation industry was the first economic sector to have set ambitious long-term reduction targets and to have adopted a worldwide carbon offsetting system (CORSIA) within the framework of the ICAO to guarantee carbon-neutral growth for global air transportation from the 2020 baseline. At the 2022 ICAO Assembly, it was agreed that for the pilot phase (2021-2023), 2019 emissions would be used as the CORSIA baseline, and in relation to the first and second CORSIA implementation phases (2024-2035), 85% of 2019 emissions would be used as the CORSIA baseline[23]. In other words, 2020 emissions are not referenced and will be excluded from baseline calculations. Additionally, it was agreed that the percentage of an operator's growth factors would be revised – with an increased focus on sectoral rather than an individual operator's growth factors.

The Assembly also adopted a long-term global aspirational goal for international aviation of net-zero carbon emissions by 2050 in support of the Paris Agreement's temperature goal. KLM fully supports this. The goal does not attribute specific obligations or commitments to individual states, but instead recognizes that each state will contribute to achieving the goal in a socially, economically and environmentally sustainable manner and in accordance with its national circumstances[24].

European lobby efforts

KLM fully supports the EU climate goals and the EU Green Deal Fit for 55 proposals that help the aviation industry to decarbonize. However, we want to make sure that a level playing field is maintained to prevent the risk of competitive distortion and carbon leakage, which does not help reduce emissions, but merely shifts them elsewhere.

Since its publication in July 2021, KLM focuses on a number of key files in the Fit for 55 package. The first one is the RefuelEU Aviation proposal, which aims to introduce an EU-wide blending obligation for SAF starting from 2025. Moreover, we are involved in the discussions regarding the strengthening of the EU ETS, the Carbon Border Adjustment Mechanism (CBAM) and the discussions on the revision of the Energy Taxation Directive (ETD) that may lift the exemption for taxing kerosene.

In these discussions, we lobby to ensure a swift scale-up of SAF production capacity in Europe to ensure that SAF becomes more available and affordable. The positive climate impact remains the same, while we help to limit carbon leakage. In fact, when SAF becomes more affordable, we expect to see more uptake of SAF in Europe, also beyond the EU mandate, contributing to a more positive climate effect. We have also worked to ensure that the feedstock to produce SAF is "sustainable" in the sense that it does not compete with food and feed production, lobbying for example to have intermediate crops and palm fatty acid distillate removed from the list of accepted feedstock.

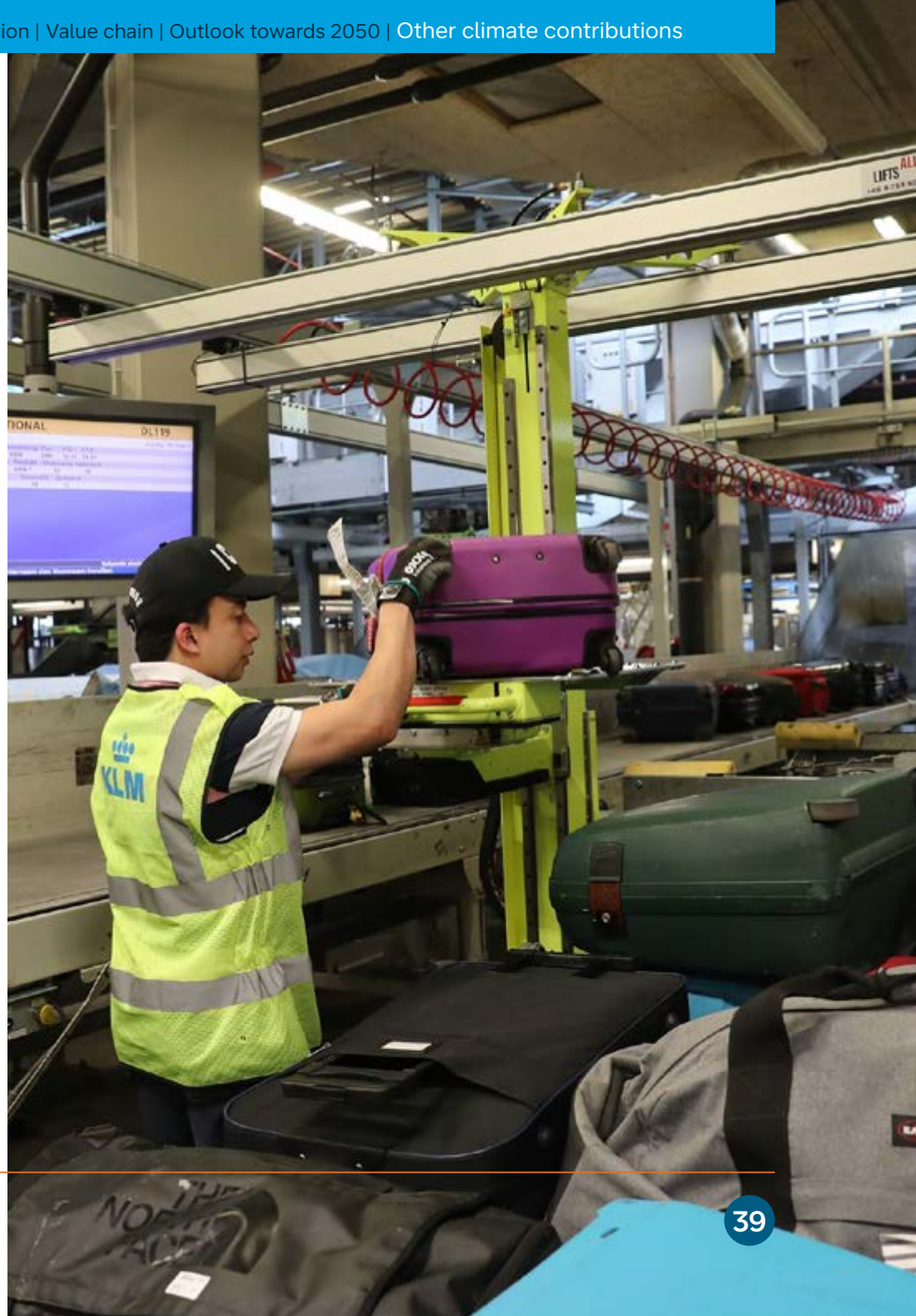
Moreover, KLM is encouraging the European Commission to explore the possibilities for the safe recycling and reuse of Category 1 international catering waste coming in from outside of Europe. Catering waste from intra-EU flights is recycled and reused efficiently, while EU legislation obliges airlines to incinerate

catering waste coming from outside the EU to avoid the risk of spreading animal diseases. Although KLM supports the prevention of animal diseases spreading, we wish to explore if we can do more with our international catering waste.

National lobby efforts

KLM is committed to substituting air connections up to 700 kilometer from its Amsterdam hub with train connections as part of its goal to reduce its CO_2 footprint. To facilitate this, KLM has lobbied in The Hague for public investments in luggage cabins in high-speed international trains and infrastructural investments at Schiphol. Additionally, KLM has advocated with Schiphol, NS and ProRail to exclude air-rail transfer passengers from the national ticket tax. This is to promote lower emissions travel and remove the discrepancy between regular and air-rail transfer passengers.

Investments are crucial for the transition towards reducing climate impact in the aviation sector. KLM is investing billions of euros through fleet renewal, the construction of a SAF factory, and electrification of ground equipment. KLM has asked to allocate parts of the national flight tax to investments that reduce the climate impact of aviation. Moreover, KLM believes in alternatives for the Dutch Government's plans to reduce flight movements at Schiphol to reduce noise impact. We believe there are better ways to achieve the same goal than cutting capacity. This reduction would limit KLM's capacity to invest in our transition to reduce our environmental impact. If implemented, the majority of flight movements will be moved to neighboring countries.



Our broader environmental impact

Besides our CO_2 reduction ambitions, KLM is also actively engaged in improving our broader environmental impact.

Waste and circular economy

KLM's operations generate roughly 15,500 tons of waste annually at its Schiphol hub. Most waste is catering waste (±65%), waste from on-board cleaning (±10%) and waste derived from processes at Engineering & Maintenance (E&M) and Cargo (both ±12.5%). Most non-separated waste concerns catering and cleaning waste. Waste at E&M and Cargo is mostly separated and recycled (68% and 87% respectively). Most non-separated waste concerns catering (of which only 17% was recycled) and on-board cleaning and sanitary waste (only 3% recycled), as EU regulation does not allow the recycling of waste coming from outside Europe

KLM has set a target to reduce non-hazardous, non-separated waste by 50% in 2030 compared to 2011. In 2019 a reduction of 19% was achieved. Unfortunately, due to the disruptions caused by the pandemic, 2019 remains the most recent reference year for waste processing performance. All divisions where the above-mentioned waste originates have drafted plans to reduce non-separated waste and increase recycling. For Inflight Services and KLM Catering Services reducing waste is priority. As mentioned above, EU legislation (Regulation 1069/2009) hampers circular practices significantly.

Regardless of these legislative challenges, opportunities remain to improve waste processing at KLM Catering Services from our European operations, especially for organic waste. KLM Catering Services had introduced anaerobic digestion for unconsumed sandwiches and coffee grounds. Also, at Inflight Services a Life Cycle Assessment tool was developed and adopted together with Dutch research institute TNO to support decision making for more sustainable packaging and to find alternatives to SUP items. Inflight Services introduced fully reusable food containers for the new Premium Comfort class, which are returned to the supplier and used again on a next flight.

Ground Services concluded a pilot with PreZero (waste processor at Schiphol), Klüh and Asito (cleaning companies) to increase recycling; several bottlenecks were identified that need to be addressed before KLM can decrease its cleaning waste. However, the efforts have had direct effect on subsidiary Transavia, which was able to decrease its onboard waste by 50%.

E&M works with suppliers, local companies and knowledge institutes to find new repair opportunities. In 2022, for example, an alternative repair for bi-fold tables was developed together with a local Dutch company. This has saved 500 tables thus far from being completely scrapped, instead, only the damaged parts of the tables are replaced.

At Cargo the cardboard beams that were tested last year as a lighter alternative to wooden beams used for the build-up of freight, have been accepted. This

innovation has been shown to be a gateway project for other initiatives in material substitution. For example, Cargo is testing circular plastics and other (more) circular packaging opportunities.

Noise

Fleet modernization and improved operational procedures are the two pillars of KLM's noise reduction strategy. All the aircrafts in the KLM fleet meet the criteria established by the ICAO Chapter 4 Noise Standard, the most exacting standard covering the acoustic quality of civil aircraft. Fleet renewal enabled a 67% reduction in KLM noise footprint between 2000 and 2020, while the number of aircraft movements increased by 46% over the same period.

Specific operational solutions are also sought to reduce the noise emissions from aircraft. Whenever possible, KLM implements continuous descent, which significantly reduces noise pollution. Furthermore, the Single European Sky ATM Research (SESAR) program aims to improve the management of noise and its impact through precision landing procedures using satellite navigation and optimized flight paths, including optimized climb and descent operations.

In 2020, KLM took part in the Minder Hinder (Dutch for 'less hindrance') program with Schiphol and Air Traffic Control the Netherlands to reduce noise hindrance and improve the quality of the local environment. KLM is committed to contributing to a 2% annual reduction in serious disruption around Schiphol airport.

Fine particles ($PM_{2.5}$) and ultra-fine particles ($PM_{0.1}$)

KLM is working with Schiphol airport to reduce the emission of particulate matter in order to improve the air quality for employees and people living in the Schiphol area. Key to this are investments in a new fleet, operational measures such as taxiing with a single engine, an emission-free ground operation, and the use of SAF. For our ground operations, KLM aims to operate completely emission-free by 2030. We do this by further rolling out electric vehicles (currently 63% of KLM ground equipment is already electrified), by using energy more efficiently and by switching to renewable energy where possible. KLM is also actively involved in national and international research projects that contribute to air quality.

Nitrogen

Aviation is responsible for somewhere between 0.7% to 1.1% of total nitrogen emissions and approximately 0.1% of the joint deposition of NOx and NH_3. Although the contribution of aviation is very small, aviation will continue to make its contribution to reducing nitrogen emissions and deposition. In recent years, much has been done in the aviation sector to reduce nitrogen emissions, such as fleet replacement, the use of electric ground vehicles at airports, operational measures such as taxiing with one engine and less use of auxiliary power units. KLM will continue with these measures to reduce nitrogen. Changes in flight procedures, such as glide flights, have also reduced fuel consumption and thus nitrogen emissions. KLM will continue with these measures and is working with knowledge institutions to identify other options for reducing nitrogen emissions.

List of abbreviations

APU	Auxiliary Power Units
ATM	Air Traffic Management
CAGR	Compound Annual Growth Rate
DARP	Dutch Airspace Redesign Program
CBAM	The Carbon Border Adjustment Mechanism
CDP	Carbon Disclosure Project
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CO_2	Carbon dioxide
CSR	Corporate social responsibility
CST	Clean Skies for Tomorrow
E&M	Engineering & Maintenance
ETD	Energy Taxation Directive
EU ETS	European Union Emission Trading Scheme
GHG	Greenhouse gas
GSE	Ground Support Equipment
GHGP	Greenhouse Gas Protocol
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICW	International Catering Waste
IEA	International Energy Agency
IFS	Inflight Services
IPCC	Intergovernmental Panel on Climate Change
ISCC	the International Sustainability & Carbon Certification
ISSR	Ice supersaturated regions
KCS	KLM Catering Services
LHV	Long Heavy Vehicle
MBM	Market-based measures
NDC	Nationally Determined Contribution
NGO	Non-Governmental Organization
NOx	Nitrogen Oxides
nvPM	non-volatile Particulate Matter
OEM	Original Equipment Manufacturers
PFAD	Palm Fatty Acid Distillate
pkm	passenger-kilometer
RLCF	Renewable and Low-Carbon Fuels Value Chain Industrial Alliance
RSB	Roundtable on Sustainable Biomaterials
RTK	Revenue Tonnes Kilometer
SAF	'Sustainable Aviation Fuel', the name our industry uses to describe a better alternative to regular aviation fuel
SBTi	Science Based Target initiative
SES	Single European Sky
SESAR	Single European Sky ATM Research
TTW	Tank-to-Wake
UFP	Ultra Fine Particulates
WRI	World Resources Institute
WTT	Well-to-Tank
WTW	Well-to-Wake
WWF	World Wildlife Fund for Nature

Footnotes

1. Press release “KLM Group chooses Airbus A320neo family for KLM and Transavia’s European fleet”, 2021
2. Press release “Air France-KLM continues to renew its fleet and places firm order for 4 Airbus A350F full freighter aircraft for Martinair (part of the KLM Group), and 3 A350-900 passenger aircraft for Air France”, 2023
3. Press release “6% to 10% less CO_2 with Single European Sky”, 2022
4. Press release “Air France-KLM pushes its sustainability targets forward with major multi-year Sustainable Aviation Fuel (SAF) purchase agreements”, 2022
5. Press release “Air France-KLM pushes its sustainability targets forward with major multi-year Sustainable Aviation Fuel (SAF) purchase agreements”, 2022
6. IEA report Aviation, 2022
7. EASA updated report of the non-CO_2 climate impacts of aviation, 2020
8. Airbus ZEROe concepts, 2023
9. Universal Registration Document AFKL, 2021
10. Press release “Air France-KLM continues to renew its fleet and places firm order for 4 Airbus A350F full freighter aircraft for Martinair (part of the KLM Group), and 3 A350-900 passenger aircraft for Air France”, 2023
11. EC Communicatie 2021, p.8.
12. AFKL URD 2023 airfranceklm.com/sites/default/files/2024-04/af_urd_2023_uk_vmel2_260424.pdf
13. Press release “Air France-KLM pushes its sustainability targets forward with major multi-year Sustainable Aviation Fuel (SAF) purchase agreements”, 2022
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15. The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018, 2021
16. Potential for reducing aviation non-CO_2 emissions through cleaner jet fuel, 2022
17. Building on the earlier GHG Protocol Corporate Accounting and Reporting Standard, the Scope 3 Standard and Scope 3 Guidance are published by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), and were developed with the aim of providing a standardized approach and set of principles for companies to use in preparing Scope 3 inventories. The Scope 3 Standard is the accounting standard used by the majority of those companies that report Scope 3 emissions.
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Thank you!