

Climate Program

Flughafen Zürich AG

UPDATE 2024



Zurich Airport

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Status: December 2024

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Our responsibility

The far-reaching consequences of man-made climate change pose a particular challenge for humanity. According to the Intergovernmental Panel on Climate Change (IPCC), the transportation sector accounted for around 15 percent of global greenhouse gas emissions in 2019. However, the population's need for mobility is not only unbroken in Switzerland, but also globally, and continues to grow. This requires special attention.

Switzerland has set itself the goal of achieving a net-zero greenhouse gas balance by the middle of the century – in line with the 2015 Paris Climate Agreement. From a scientific perspective, reducing global greenhouse gas emissions to net zero is imperative in order to keep global warming below the critical threshold. This net-zero target means that from 2050, no more greenhouse gases are emitted into the atmosphere than are absorbed by natural or technical reservoirs.

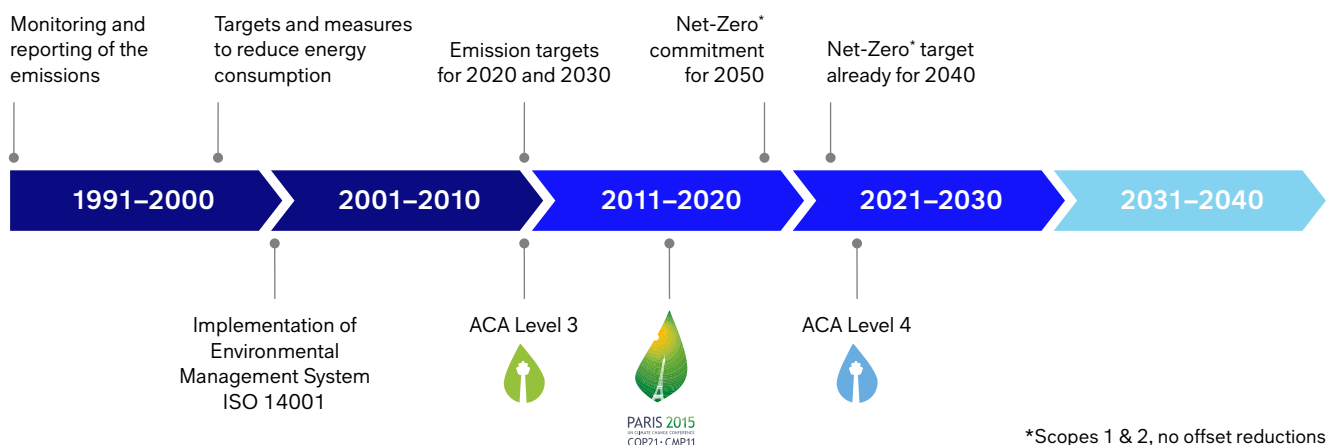
As the largest airport in Switzerland, Zurich Airport bears a special responsibility. An average of 90,000 passengers and over 50,000 employees, customers and visitors travel through the airport every day. As the owner and operator of the airport, Flughafen Zürich AG is aware of this responsibility and has set itself the goal of achieving the net-zero target by 2040. This target relates to the company's own emissions and is to be achieved at least 90 percent with its own measures and at most ten percent with the removal of CO₂ from the atmosphere and without reduction certificates.

Flughafen Zürich AG recognized the need for climate protection at an early stage and began calculating and reporting emissions as early as 1991. The first targets and measures to reduce energy demand were defined in 1997 and integrated into the ISO 14001 environmental management system in 2001.

In 2010, long-term climate targets were set for 2020 and 2030. The implementation of the corresponding measures was supported by joining the global climate management system of the international airport association ACI EUROPE, the Airport Carbon Accreditation (ACA) directly at the highest level 3 at the time. This certificate confirms the commitment to climate protection. Since then, the company's climate targets and the implementation of its measures have independently from us been audited using globally standardized methods. Around 600 airports worldwide are now accredited under the ACA program.

In line with the Paris Climate Agreement, Flughafen Zürich AG has further tightened its climate targets to net zero emissions by 2050. This has been accompanied by an implementation plan that sets out how and at what cost this target will be achieved. The Board of Directors of Flughafen Zürich AG subsequently decided in 2022 that it wanted to achieve this target by 2040. Flughafen Zürich AG then had itself accredited in the global climate program at the next higher level 4, which has since been introduced. The responsibility and targets are also set out in a position paper on climate protection, which is supported by the entire company.

'We take our responsibility in international aviation and in the national context and reduce our self-generated greenhouse gas emissions according to Scopes 1 and 2 to 20,000 t CO₂e in 2030, with the ambition of subsequently reducing them to net zero by 2040 without offset reductions.'



Our climate impact

Flughafen Zürich AG has the greatest leverage in climate protection in reducing its own emissions, described as Scopes 1 and 2 (own direct emissions and emissions from external electricity procurement). The priority here is on its own energy production. As is common at airports, this accounts for the largest share of CO₂e emissions – followed by the airport's own vehicle and machinery fleets and various processes such as de-icing surfaces or operating air conditioning systems.

The other emissions generated at the airport and around flight operations are also of great importance. At 92 percent, air traffic accounts for the majority of emissions in the overall airport system. Land-side traffic to and from the airport accounts for a further six percent. The remaining two percent is made up of various sources: Flughafen Zürich AG's own emissions account for around one percent. The remainder is attributable to various other partners at the airport and the handling of aircraft on the apron.

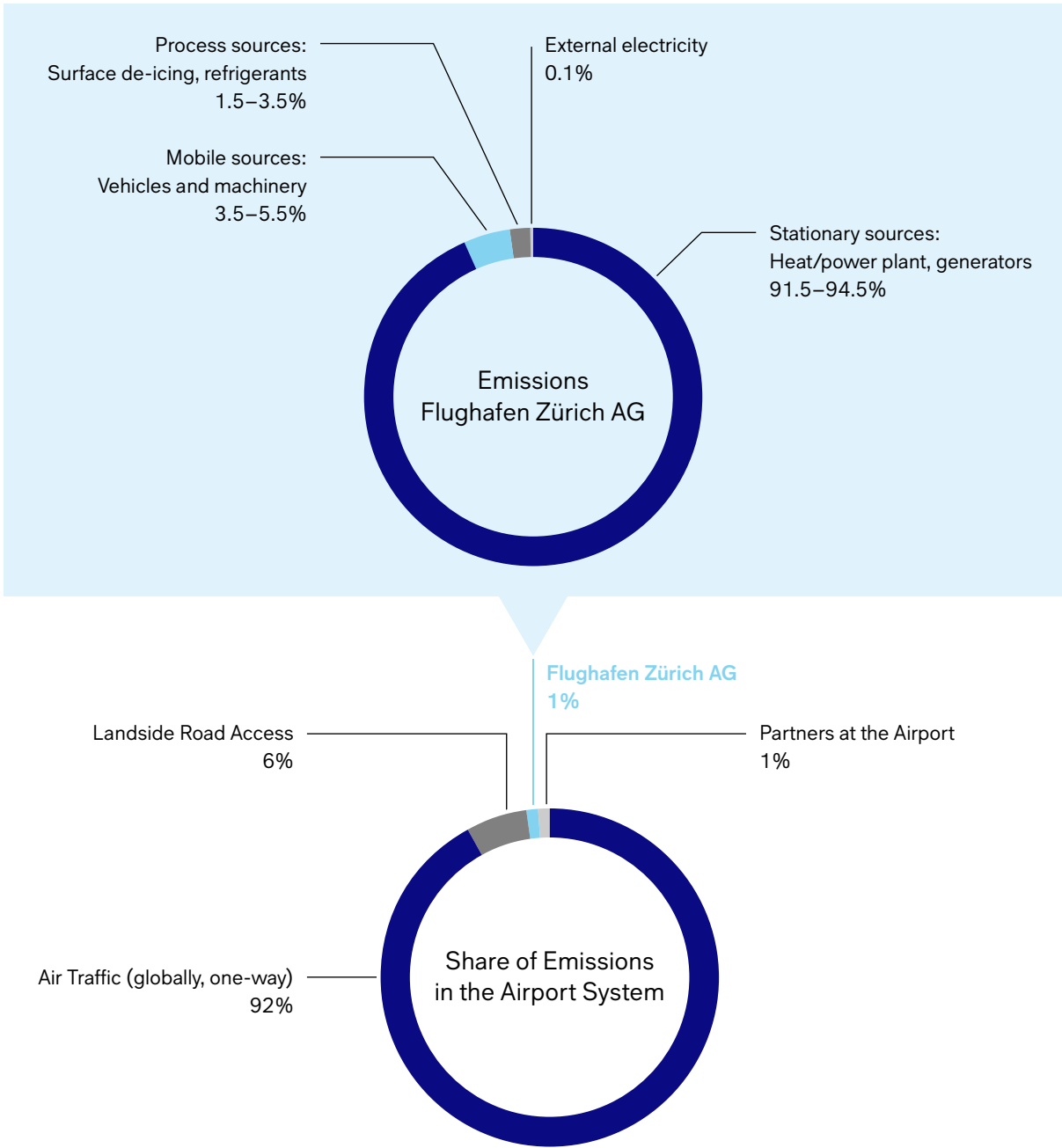
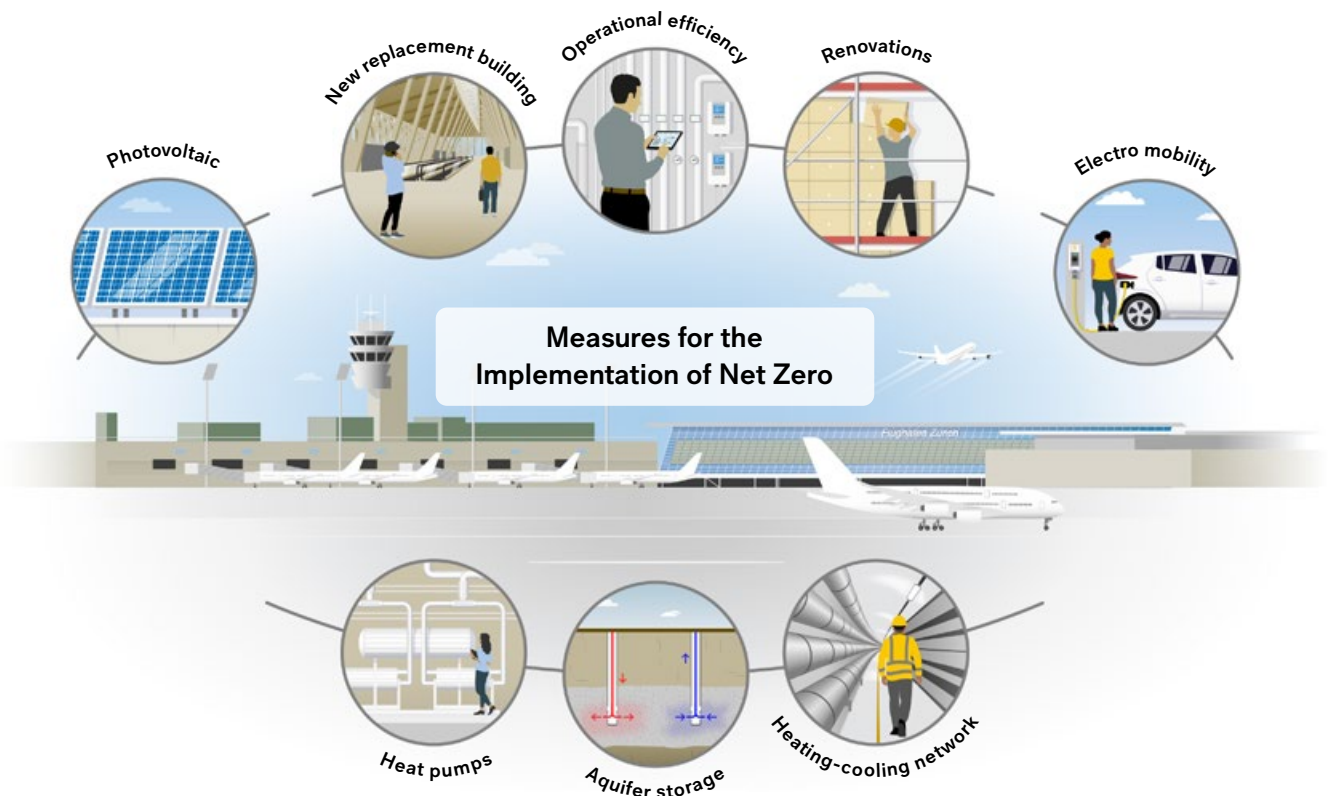


Figure above: Overview of Flughafen Zürich AG's own emissions
Figure below: Share of direct emissions in the airport system by polluter

Our measures

The goal of net zero greenhouse gas emissions by 2040 will be achieved through various measures, mainly set out in the Energy and Decarbonization Masterplan Infrastructure 2040 and the Roadmap Vehicles and Machinery. They can be roughly divided into four pillars: Firstly, the reduction of energy consumption in buildings that are optimized and refurbished or newly built as replacements.

Secondly, the energy supply itself will be converted to renewable sources – for example by establishing geothermal energy and a new heating and cooling network. Thirdly and fourthly, there is the expansion of electricity production through photovoltaic systems and the conversion of the company's own vehicle fleet to electromobility.



Reduction in consumption



The Circle meets the standards of both labels – LEED Platinum and Minergie.

New replacement buildings

Every year, Zurich Airport requires almost 90 GWh heat and 165 GWh electricity. To reduce this energy demand, buildings are to be built and replaced in accordance with the latest standards. Examples of this include the Circle, which opened in 2020, and the planned new Pier A. Both meet the highest sustainability requirements with labels such as LEED or the Swiss energy standard Minergie, both for the construction and the subsequent operation of the buildings. Overall, new replacement buildings will help to reduce the heat requirement at the airport by 7.7 GWh per year by 2040 – that is just under a tenth of the total heat requirement.



The planned new Pier A should meet the requirements of at least LEED Gold and Minergie.

Building refurbishment and operational optimization

As part of the energy-related renovation projects, the aim is to renovate the building shell (for example by improving insulation) and optimize operations in order to save heat and electricity. In total, Flughafen Zürich AG manages an energy area of over one million square meters, which has been built over several decades. Around 60 percent of the energy demand is accounted for by passenger areas, offices and hotels and around 40 percent by industrial buildings such as workshops, warehouses, cargo areas and hangars.

Most of the buildings in the passenger area are in good condition in terms of energy efficiency. Refurbishment is therefore not necessary for the time being. However, operational optimizations can still save five to ten percent in heat and/or electricity. Energy-efficient refurbishment of the heating and ventilation system is only planned for the airport shopping center above the train station, as this building has a high heating demand.

In the office and hotel areas, the heat demand is generally higher. In terms of energy measures, the focus is on the Operation Center

next to the cargo area. Here, it is being examined whether a refurbishment or a new replacement building is a suitable measure.

Due to the age of the existing buildings, the largest potential for savings lies in the industrial buildings. The focus here is on buildings on the aircraft maintenance site with a wide variety of uses. Energy-efficient refurbishment is planned for some of these buildings and is being examined for others.

If the measures for building refurbishment and operational optimization are implemented, there will be a huge potential for heat savings by 2040: 6.6 GWh per year from operational optimization alone and 5 GWh per year from energy-efficient building refurbishment – together, this corresponds to almost 15 percent of the airport's total heating requirements to date. In addition, operational optimization will result in electricity savings of 4 GWh – around 2.5 percent of previous electricity consumption.

How energy demand at the airport will develop by 2040

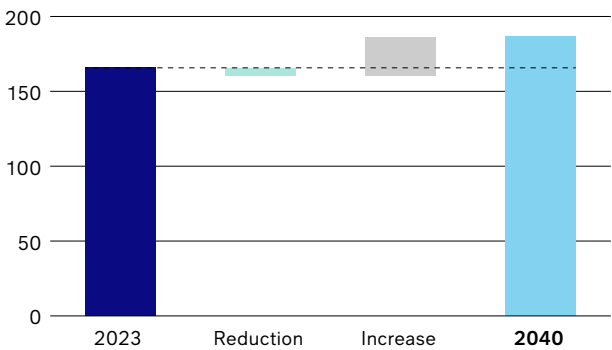
Energy demands at the airport are likely to change significantly by 2040. This is due not only to the planned measures to reduce consumption, but also to the planned change to electromobility and the effects of climate change.

Flughafen Zürich AG expects a further increase in electricity demand by 2040 – specifically by around 13 percent. This is made up of rising electricity demand due to new buildings and the increasing demand for cooling, the expected increase in traffic at the airport in line with economic and population growth and the change to electromobility and heat pumps. This additional demand will more than compensate for the expected savings of around five percent through optimization and renovation measures.

The demand for heat will not remain constant either. It is expected to decrease by up to 35 percent to around 55 GWh by 2040. This reduction will be the result of optimizing operations and renovations, new buildings and climate change itself, which means that less heating will be required.

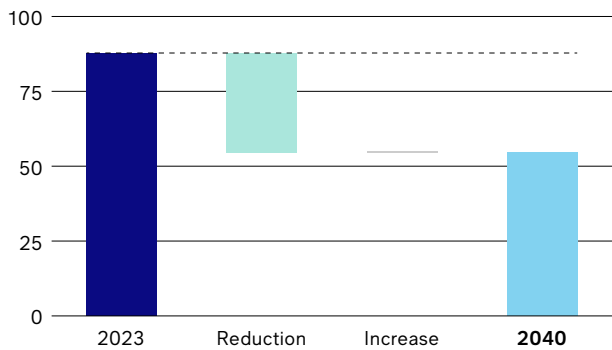
The ratio of energy demand for heating to cooling is currently 2:1. Due to the decreasing demand for heating and the simultaneously increasing demand for cooling – a 23 percent increase in cooling demand of almost 40 GWh is expected – the ratio of heating to cooling should be balanced by 2040.

Development of Electricity Demand in GWh/a



Expected development of electricity and heat consumption until 2040

Development of Heat Demand in GWh/a



Conversion of the energy supply

However, it is not only the reduction in consumption that plays a significant role in decarbonization, but also the conversion of the energy supply at Flughafen Zürich AG from fossil fuels to renewable sources.

Heating and cooling supply

The central element of the strategy is the reorganization of the heat supply. The aim is to generate as much of the energy required in the future as possible ourselves: Instead of exclusively district heating from the power plant, which runs on gas and in some cases heating oil, large heat pumps will be used in the future to harness geothermal energy or waste heat.

To make this possible, Flughafen Zürich AG is pursuing an innovative and ambitious project. The aim is to store heat or cold in the ground: In summer, the surplus heat from the buildings is stored geothermally. This is then available in winter as an energy source for heat pumps. Groundwater in a glacial 'channel' beneath the airport can be used to store energy. This contains water-bearing gravel of great thickness and can serve as a so-called aquifer reservoir.

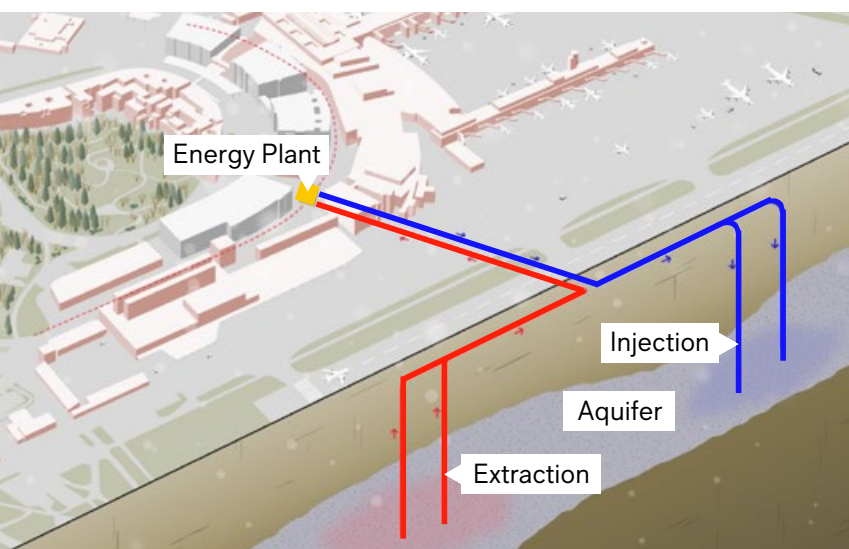
Flughafen Zürich AG has carried out several test drillings and drilled a first test well to explore the suitability of the channel 300 meters below the earth's surface as a storage facility. Provided that the assumptions made so far are confirmed, the plan is to use the channel productively from 2027 on. This is a pilot project for geo-energy that is unique in Switzerland and is being subsidized by the federal government.

Flughafen Zürich AG also relies on geothermal energy independently of the contribution of the aquifer to the expansion of the renewable heating and cooling supply. There is the possibility of installing further geothermal probe fields in the West of the airport. Flughafen Zürich AG already has experience with this closely related technology at the maintenance complex. Energy piles for seasonal energy storage have not only proven their worth in passenger Pier E since 2001, but also in the Circle.

The two central elements for the implementation of the geothermal projects are the construction of a new energy center in the immediate vicinity of the aquifer storage facility and the buildings as well as the conversion to a low-temperature heating grid. In the future, Terminals 1 and 2 are to be supplied predominantly with 50°C heat. This promotes efficiency, increases safety and reduces energy losses.

As part of the conversion, the existing combined heat and power plant can be converted and optimized. Thanks to the reversible heat pumps and the newly installed cooling grid, the central chiller plant will no longer be needed in future. And the combined heat and power plant will be operated with renewable fuels for the remaining energy demand.

How the channel should work (winter operation).



Energy piles are already in use for the Circle.



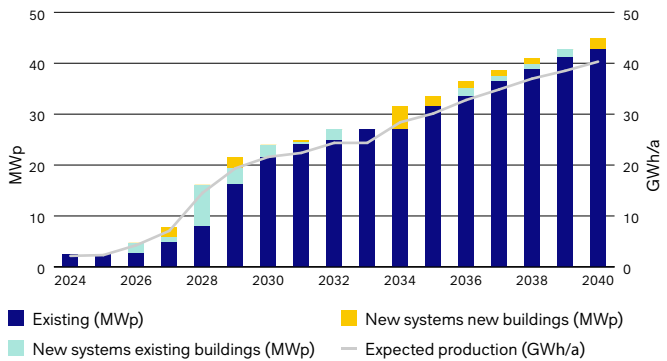
Expansion of photovoltaic systems

In addition to renewable heat production, renewable electricity production at the airport is also to be stepped up through the expansion of photovoltaic systems. The externally sourced electricity at Flughafen Zürich AG will be 100 percent renewable from 2025 on. However, in order to reduce dependence on external suppliers and expand independent, sustainable energy generation, further photovoltaic systems are going to be installed on the airport site. These are planned mainly on the roofs of existing and new buildings, but also on the façades of existing buildings. By 2040, approximately 20 percent of the expected future electricity demand will be covered by photovoltaics. In absolute figures, this means an almost twenty-fold increase in PV production by 2040 compared to the base year of 2024.

Overall, the change to renewable electricity production at Flughafen Zürich AG is associated with greater energy self-sufficiency. The degree of self-sufficiency is expected to increase from 16 percent (2023) to almost 20–25 percent in 2040. Nevertheless, the company will not be able to achieve complete independence from external energy sources. While photovoltaic systems can supply enough electricity in summer, the yield in winter is not sufficient to

cover the demand. In order to close this gap, external energy suppliers must be used. In addition, the airport is also dependent on external energy at night during the summer.

Roadmap Development PV-plants Zurich Airport
(Capacity and Production)



Photovoltaic areas are being massively expanded

Conversion to electromobility

The conversion of the company's own vehicle fleet to alternative energies is also crucial to achieving the net zero target. The majority of Flughafen Zürich AG's current 380 vehicles are to be converted from diesel, petrol and natural gas engines to electric drives. This is expected to be possible for around 90 percent of the fleet by 2040.

This changeover is comparatively easy, especially for cars and vans, which make up almost two thirds of the vehicle fleet. However, the fleet also includes buses, trucks and over one hundred special vehicles for maintenance and construction work. If it is not possible to convert these vehicles to electric drive (especially heavy commercial and winter service vehicles), the plan is to run them on synthetic diesel or diesel from waste and residual materials (HVO). A few years ago, Flughafen Zürich AG had the regulatory requirements put in place to enable the import and purchase of synthetic fuels at Zurich Airport. A purchase agreement for synthetic diesel was signed with the company Synhelion from 2027.

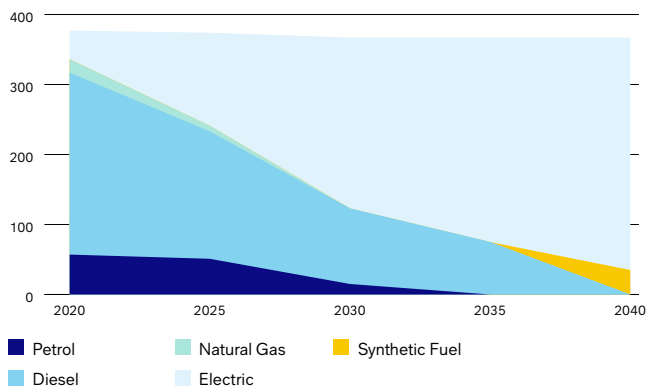
With the expansion of electromobility, the need for charging infrastructure is also increasing. This is constantly being expanded at the airport, both for customers and for the own needs of Flughafen Zürich AG and its partners and includes several hundred individual charging stations and fast charging stations.

This goes hand in hand with increased electricity consumption, which has already been taken into account in the airport's demand

planning. The airport's own fleet of electric vehicles alone results in an annual electricity demand of 4.7 GWh. The estimated electricity demand for the other electric vehicles is a further 5 GWh.

Intelligent load management and an expansion of the electricity grid are required to enable the simultaneous charging of many electric cars. This is also already planned.

Vehicles by fuel type



Number of vehicles by fuel type and year

What our measures cost

The total investment costs for Flughafen Zürich AG's climate program up to 2040 amount to approximately CHF 300 million. A good 40 percent of this is attributable to the transformation of the heating and cooling supply. A further quarter is attributable to the construction of photovoltaic systems and long-term power purchase agreements.

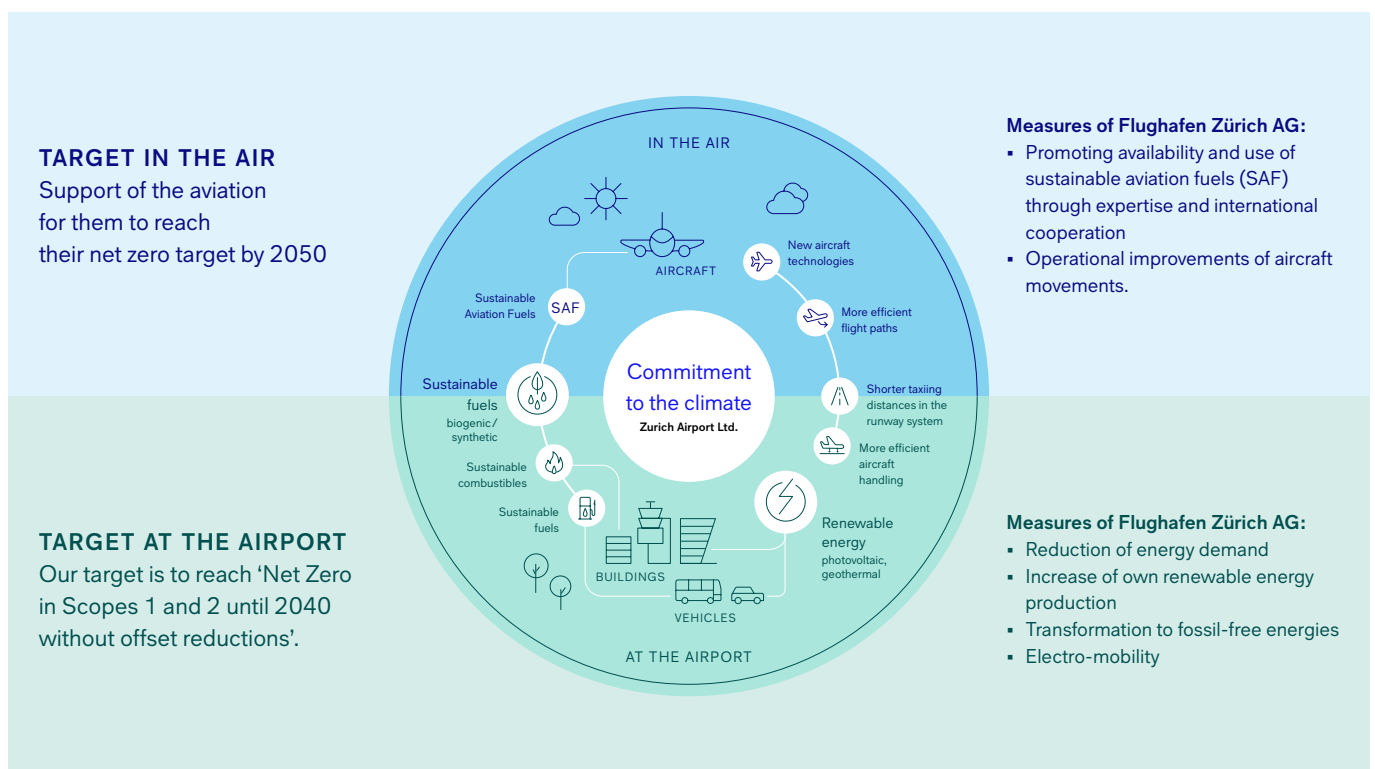
The remainder is divided roughly equally between the expansion of electromobility and energy-efficient building renovations and operational optimizations.

Around CHF 70 million of the investment costs will be incurred as 'anyhow costs' regardless of specific measures. Examples of this include the obligation to install photovoltaic systems on large new buildings, building renovations that must be carried out or the expansion of district heating. In return, a reduction in annual external energy procurement costs can be expected.

How we reduce emissions with our partners at the airport

Flughafen Zürich AG is not only fulfilling its responsibility to reduce its own climate emissions to net zero by 2040. It is also influencing the emissions generated by its partners through the use of the infrastructure at Zurich Airport. To this end, the company has developed a dual strategy that divides emissions according to their sources on the ground and in the air and takes appropriate measures to reduce CO₂e emissions.

Flughafen Zürich AG is committed to helping airlines reduce their emissions. One example is its support for airlines in importing and supplying sustainable aviation fuel to Zurich Airport. The first flight using SAF took off from Zurich Airport in 2020.



Dual climate strategy of Flughafen Zürich AG



The yellow hoses supply conditioned air from the pier into the aircraft, which is also provided with stationary electrical energy.

Flughafen Zürich AG has also implemented measures to reduce aircraft emissions not only in the air, but also on the ground. During handling at the pier, aircraft are supplied with stationary electrical energy and air-conditioned air from the building. This prevents the aircraft from having to operate their auxiliary power units, which in turn reduces CO₂e emissions at the airport. The airlines are required to make use of the system. This can save up to 60,000 tons of CO₂e per year. That is more than twice as much as Flughafen Zürich AG's own emissions.

Flughafen Zürich AG provides partners in ground handling with electric charging stations for vehicles and assists them in calculating their own CO₂e-inventory. It also advises the companies on the development of measures and issues environmental protection regulations that apply to all of them.

A large public transport hub has been established at Zurich Airport to reduce individual emissions from passengers, visitors, employees

and suppliers traveling to and from the airport. Every day, 460 rail connections are offered as well as 420 tram and 740 bus connections (as of 2024). The aim is for 46 percent of all arrivals and departures to be by public transport by 2030. To encourage as many employees as possible to switch to public transport, Flughafen Zürich AG offers the use of public transport in the canton of Zurich free of charge. Contrary, employees have to pay to use parking spaces at the airport. Flughafen Zürich AG also provides electric charging stations in the public parking garages and is building charging stations for electric buses for public transport.

In the upstream value chain of Flughafen Zürich AG, most emissions are caused by purchased goods and services, as well as buildings and capital goods. In order to save resources and reduce emissions from the construction of buildings, Flughafen Zürich AG focuses primarily on the circular economy and opportunities to use low-CO₂e materials.

How we engage internationally

Climate change is a global concern. Accordingly, Flughafen Zürich AG is also involved internationally in initiatives aimed at decarbonizing the aviation sector.

We participate in the development of software within the framework of the World Airports Association (ACI) – for example, for calculating greenhouse gas emissions at airports (ACERT), for modeling airport energy systems on the ground (AGES-S) or for the feasibility of solar system installations (ASPA).

We also support global working groups on decarbonization in the airport association ACI Europe, the global airport association ACI World and the International Civil Aviation Organization (ICAO).

Our target management

Our measures are leading us towards our goal of achieving net zero for our own emissions by 2040.

Since 1991, we have already reduced our emissions by around half – partly by converting the combined heat and power plant to gas. The second half of emissions will be eliminated by 2040. This will be achieved by implementing measures that have already been taken and those planned for the future. One milestone in this regard is the conversion of the energy supply to renewable sources. Energy-efficient renovations and the expansion of photovoltaics and electromobility are also having an ongoing positive impact.

This makes it possible to achieve the predefined reduction path. This envisages that emissions will amount to a maximum of 30,000 tons per year by 2030 and then decrease to a maximum of 20,000 tons before finally dropping to zero by 2040.

Robust data management forms the basis for the effective reduction of CO₂e emissions. The CO₂e data is compiled, calculated and analyzed at Flughafen Zürich AG on an annual basis. Flughafen Zürich AG uses the globally established Greenhouse Gas Protocol standard to balance these greenhouse gas emissions. This distinguishes between three categories of emissions.

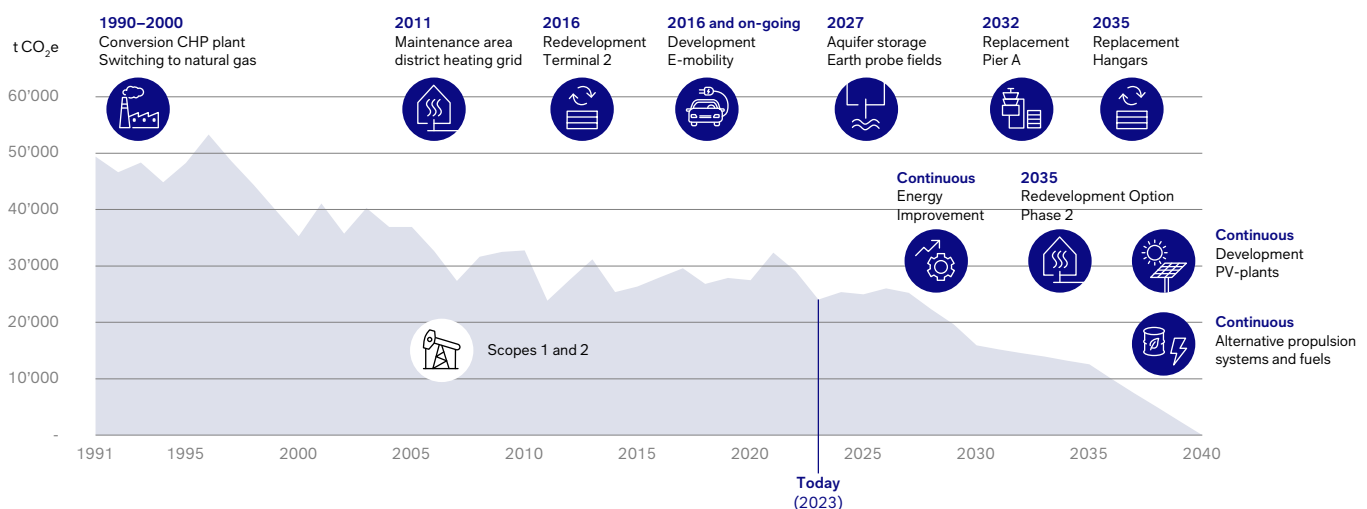
- **Scope 1** includes all direct emissions of a company
- **Scope 2** refers to indirect emissions from externally purchased energy (electricity, heating, cooling)
- **Scope 3** covers all other indirect emissions from the value chain of companies – from purchased goods and services or business travel (upstream emissions) to emissions from the use and disposal of the goods or services offered (downstream emissions).

The company publishes the results in relevant publications such as annual reports or special publications. The data is also presented annually to the Board of Directors to ensure that top management is involved.

The data and the climate management system are also regularly reviewed by external auditors – both as part of the ISO 14001 environmental management system and as part of the Airport Carbon Accreditation program. The data collected by Flughafen Zürich AG is therefore externally validated and provides a solid basis for the reliability of the information on the CO₂e reduction pathway.

Negative emission technologies

All these measures are expected to reduce the company's own greenhouse gas emissions (Scope 1 and 2 compared to the base year 2010) by 95 to 98 percent. Negative emission technologies are being examined for the remaining two to five percent of emissions. This involves extracting CO₂ from the ambient air, which can then be stored permanently. When assessing the suitability of such future technologies, Flughafen Zürich AG attaches great importance to their credibility and long-term viability.



CO₂e reduction pathway of Flughafen Zürich AG

Our adaptation to climate change

Flughafen Zürich AG is not only taking steps to reduce its own emissions, it is also itself affected by climate change and its consequences. The company is therefore addressing the resulting risks and opportunities and taking appropriate precautionary measures.

The impact of climate change on Zurich Airport

Rise in temperature: The rise in temperature is expected to result in a higher cooling demand for buildings and increased heat stress for staff, service providers and passengers outdoors. At extreme temperatures, heat damage to asphalt surfaces is also possible, as well as lower aircraft performance with decreasing air density, which can lead to an increase in noise and gaseous emissions due to the higher engine power required. Climatic changes could also lead to an increase in the number of bird species that increase the risk of bird strikes.

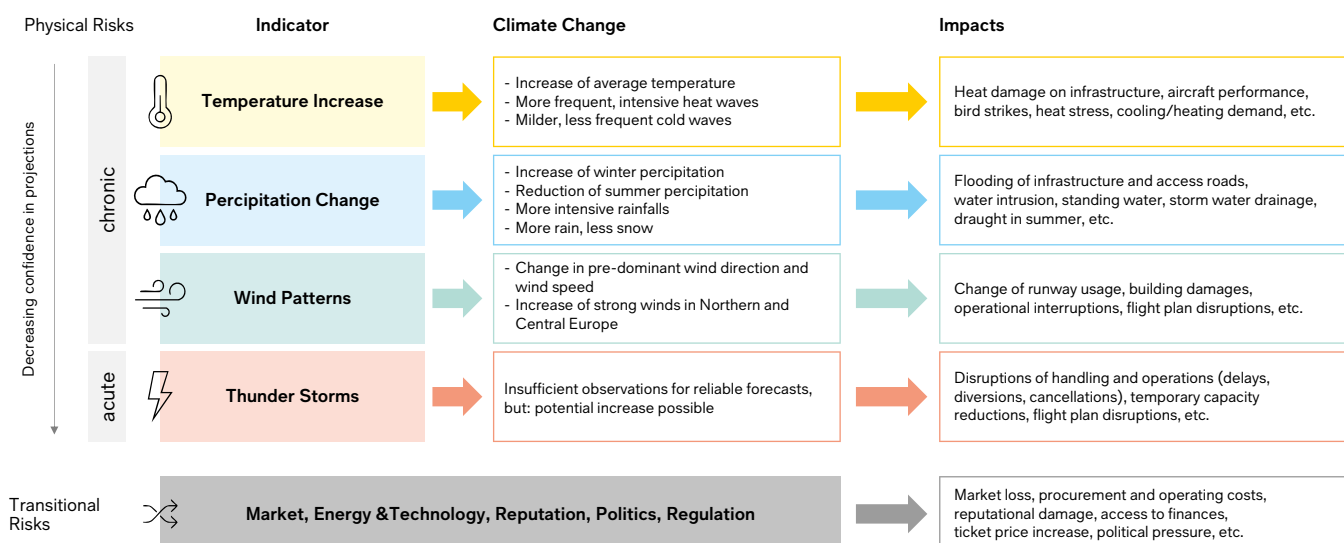
Changes in precipitation: The increasing frequency and intensity of heavy rainfall is accompanied by an increasing risk of water ingress into the infrastructure and flooding that endangers landside access roads or overwhelms the current drainage system. This could also

lead to an interruption in flight operations. The decrease in average rainfall in summer will also lead to longer dry periods in summer.

Wind conditions: Changes in wind direction and speed can disrupt planned flight operations and necessitate changes to approach and departure procedures. An increase in strong storms could lead to an increase in temporary operational restrictions and, in extreme cases, cause infrastructure damage. On the other hand, a decrease in ground fog can be expected to result in less frequent disruptions due to visibility restrictions.

Thunderstorms: An increase in thunderstorms and lightning strikes can lead to significant operational disruptions – through a handling and refueling stop for staff safety reasons, resulting capacity restrictions as well as delays and unforeseen flights during off-peak times.

Zurich Airport is also exposed to transitory risks arising from the shift towards a low-carbon economy and the associated regulations. This would include, for example, a loss of market share due to a change in customer behavior or an increase in the cost of air travel.



Risks of climate change and their impact on Zurich Airport



Damage to an aircraft due to strong gusts of wind in October 2014

How we adapt

Flughafen Zürich AG has defined measures to prepare for and adapt as well as possible to the identified physical risks.

These include, for example, taking increased temperatures or extreme weather events into account when building new infrastructure. These must also meet future increased requirements for ventilation, air conditioning and drainage. In addition, the surface on the operating areas should be replaced more frequently if necessary, or new and more resistant surfaces should be used.

In principle, comprehensive precautionary measures are in place at Zurich Airport with the aim of ensuring flight safety in all types of adverse weather conditions.

Glossary

ACA	Airport Carbon Accreditation, global climate management program for airports
ACI EUROPE	International Airport Association Airport Council International, Europe
APU	Auxiliary Power Unit, auxiliary power unit of the aircraft for power and air conditioning
Aquifer	Water-bearing rock layer in the underground
CO ₂ e	Carbon dioxide equivalents
FZAG	Flughafen Zürich AG, operator of Zurich Airport
GHG	Greenhousegas, international protocol on the calculation of greenhouse gas emissions
GWh	Gigawatt hours (= 1,000 megawatt hours)
HVO	Hydrotreated vegetable oil, diesel produced from waste oils, animal fats and waste
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
SAF	Sustainable Aviation Fuels, aviation fuels from renewable raw materials