



# Environmental report 2022

 AVINOR OSLO AIRPORT

# **CONTENTS**

- 2 ENVIRONMENTAL STATUS**
- 3 ENVIRONMENTAL MANGEMENT**
- 4 TRANSPORT AND CLIMATE**
- 7 CONSUMPTIONS OF CHEMICALS AND EMISSIONS TO WATER AND SOIL**
- 9 AIRCRAFT NOISE**
- 10 ENERGY**
- 11 WASTE AND CIRCULAR ECONOMY**
- 13 PURCHASING, BUILDING AND CONSTRUCTION PROJECTS**
- 14 NATURAL ENVIRONMENT**
- 15 LOCAL AIR QUALITY**
- 16 KEY FIGURES**

# ENVIRONMENTAL STATUS

Oslo Airport is Norway's main airport and an important national and international hub. Avinor's environmental policy, strategy and goals form the framework for our environmental work. As the largest airport, measures here at Oslo Airport are essential for Avinor's environmental goals to be met. The goals are in line with the UN's sustainability goals and support the EU's Green Deal, where significantly increased attention to the environment and climate is expected. Today, sustainability is at the top of our strategy map.

Over the years, we have continuously developed good solutions and with our ISO14001 certification we have clear environmental management and control over the environmental status at the airport. For us, however, it is no resting pillow because we know that new challenges are constantly emerging. We are in a restructuring process and a time where we all must think differently and adapt to a new everyday life, not least when it comes to how we are going to deal with the environment and climate in the coming days.

We have an ambition of "zero waste" in 2030, which means that we must reverse our "buy and throw"- mindset and work more according to circular economy principles. We at the airport must also limit our consumption, adopt alternatives such as the sharing economy, rent and lease products and services instead of buying and owning. At the same time, we must adapt the reuse trend and test new alternative marketplaces.

We prepare our greenhouse gas inventory, we are accredited in the ACA scheme (Airport Carbon Accreditation), and we have a goal that our own activities, airport operations, should be fossil-free in 2030. Then we must not only take advantage of the climate-friendly solutions that are available, but also actively push development and demand solutions in markets where this is not yet mature.

Changes in climate have consequences for our operations, we are already experiencing that. Climate adaptation will be a particularly important parameter in all further planning. As the owner and operator of large areas, we also have a particular responsibility to avoid changes in land use that lead to emissions or reduced storage of CO<sub>2</sub>.

We must also take care of the nature and diversity at the airport. We have species of which there are only a few specimens left. It is both an honor, but also a particularly great responsibility that lies with us to take care of these.

Not least, we have a great responsibility not to degrade the condition of the recipients. Despite the large consumption of de-icing chemicals, partly due to much more "around zero" weather, we have good control through thorough monitoring and implementation of necessary measures.

With the air traffic, there is unfortunately still some noise. Figures from Eurocontrol, Europe's joint body for air traffic control, show that Oslo Airport is the best in Europe in terms of landings and departures that save emissions and reduce noise, but that is of course a poor consolation for those of our neighbors who are most troubled.

The most difficult and biggest challenges are probably ahead of us. And we are running out of time. From the EU's Green Deal a massive tightening of regulations and directives will come and we must prepare to meet and comply with those. Knowledge, strengthened mobilization, and willingness to finance will be more important than ever. Together with our partners at the airport, I am sure we will do our best!

After years strongly affected by the Covid19 pandemic with a large drop in both the number of passengers and aircraft movements, the level of activity in 2022 has risen again. The consumption and emission figures are then about to return to normal. Oslo Airport's environmental annual report for the year 2022 shows the status of the airport's environmental aspects.

Gardermoen, June 2023

Stine Ramstad Westby  
Managing Director



# ENVIRONMENTAL MANAGEMENT

Oslo Airport must maintain ISO14001 certification and ACA level 3+ accreditation.

## Environmental policy

To create a clear common direction in Avinor's environmental work, Avinor has adopted a group-wide environmental and corporate social responsibility policy.

### *Environmental and corporate social responsibility –policy*

This policy describes the general principles for environmental and social responsibility in Avinor. The purpose is to improve Avinor's own environmental performance, be a driving force in the environmental work in the aviation industry and be a leader in the work on corporate social responsibility in Norwegian aviation.

#### **Principles environment:**

- Avinor works to constantly improve its environmental performance and will work actively to reduce the impact of the enterprise on the environment
- Avinor must comply with regulatory requirements and its own requirements, and its environmental management must be in accordance with ISO14001, ensuring a systematic approach to coordination and follow-up of environmental work.
- Avinor must ensure there is a high level of environmental awareness and expertise throughout the entire group. Employees and partners at the airport must be aware of the group's significant environmental aspects.
- Avinor must emphasise and integrate environmental considerations early in the planning and implementation of projects and when purchasing products and materials. There must be strong emphasis on the environment in expansion projects.
- Avinor wishes to maintain open, constructive and proactive communication with partners, local communities, authorities, aviation organisations and other stakeholders to reduce environmental impact.
- Avinor seeks solutions to environmental challenges through cooperation with research and development communities, authorities and other organisations both nationally and internationally.

## Management of environmental work

Environmental management is an integral part of Avinor's management system. Oslo Airport was certified in 2014 according to EN-NS ISO14001: 2004 and is a part of a common Avinor certificate according to ISO 14001:2015.



Oslo Airport uses environmental management methodically to get an overall grip of environmental work both internally within the company and among other stakeholders at the airport. To manage environmental work, it is necessary to maintain a constant overview of the company's environmental impact and regulatory environmental requirements. The requirements relating the proportion of public transport, the discharge permit for water and soil from the Norwegian Environment Agency, and the Norwegian Civil Aviation Authority's noise prevention regulation are particularly important framework conditions for the airport operations.

Risk assessment is a valuable tool in environmental management and is used to prevent or mitigate potential adverse events. Through operational risk management, we have a well-updated survey and assessment of environmental risks at the airport, which forms the basis for implementing risk-reducing measures. Focus has been on environmental risk associated with tank storage of chemicals and other infrastructure related to potential discharges.

Oslo Airport has mapped the airport's environmental impact, and this is being addressed by means of Avinor's identified significant environmental aspects: Consumption of chemicals, transport and climate, noise from aircraft and helicopters, energy, purchasing, building and construction projects and finally natural environment.

For Oslo Airport, it is both about performing better, as well as understanding the mechanisms that affect our environmental reputation. Through changes in infrastructure and processes, we will reduce our environmental impact through continuous improvement, innovative solutions and with a focus on the measures that give the most effect. With open and active communication, we will strengthen our environmental reputation. On our websites and social media, we also share environmental information.

Close dialogue with those who depend on the airport's services or who are affected by our business in various ways is crucial for us to be able to make the priorities that serve our stakeholders and society in the best possible way. Through meetings, customer surveys and contract follow-up, we are in regular contact with the airlines, passengers, partners and suppliers at the airport, politicians, the business community, research communities and interest groups.

An Environment and Noise Committee has been established, involving the mayors of the Øvre Romerike municipalities and a representative from Oslo Airport. The purpose of this committee is to discuss challenges linked with noise and other environmental effects when expanding and running Oslo Airport. The committee also facilitate communication with the airport's neighbours by meetings with a forum of neighbours and other surrounding municipalities.



Silent night at Oslo Airport



# TRANSPORT AND CLIMATE

By 2022, Avinor must reduce its own total controllable greenhouse gas emissions by 50 percent, compared with 2012, and help to reduce greenhouse gas emissions from surface access and air traffic. Furthermore, Avinor has a goal that its own activities (airport operations) will be fossil-free by 2030.

Oslo Airport's proportion of public transport should be 75 percent by 2030.

## Greenhouse gas emissions in brief

Oslo Airport has mapped its climate impact annually in accordance with the Greenhouse Gas Protocol and the ISO14064 series and prepared a greenhouse gas inventory verified by a third party (except for 2020 due to the pandemic). The greenhouse gas inventory includes emissions linked with all the company's own activities categorised as direct or indirect emissions, along with a selection of indirect emissions from other sources.

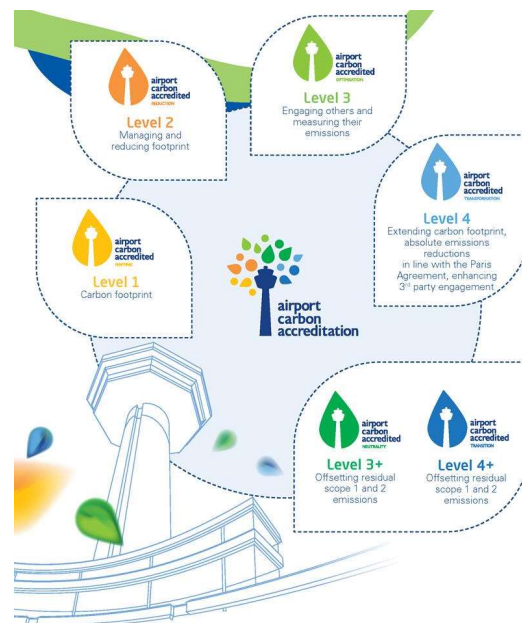
The major sources of emissions are the LTO cycle (i.e., emissions from aircraft below 3000 feet; approach, landing, taxiing, take-off and climb out) as well as the use of APUs and surface access (passenger's transport emissions when traveling to/from the airport). The remaining emissions are related to the operation of the airport as consumption of fuel on own vehicles and other ground operations/winter maintenance, energy, and runway de-icing.

Remote heating from Statkraft Varme AS is not included in the greenhouse gas inventory, neither is recovered heat from Oslo Airport's groundwater wells and heat recovery units. Nevertheless, these forms of energy help limiting the need for procured electricity. The use of runway de-icing chemicals is included because the chemicals are made from fossil carbon sources and therefore greenhouse gas emissions are calculated based on their degradation. In line with the usual calculation method in Norway, Oslo Airport assumes that greenhouse gas emissions from advanced biodiesel/biofuel are zero.

Several records in the greenhouse gas inventory are unpredictable and greatly dependent on winter conditions. This is primarily applicable to the areas of Oslo Airport-owned vehicles, thermal energy, and de-icing.

Oslo Airport has held accreditation to the Airport Carbon Accreditation scheme (ACA) at the level "Neutrality" since 2009. This requires Oslo Airport reducing its own greenhouse gas emissions from year to year (relative to the number of passengers), taking the initiative to involve other parties at the airport in a joint effort to reduce the airport's total greenhouse gas emissions, and investing in climate quotas to compensate for remaining emissions. 446 airports are now certified in the ACA, of which 44 are

on level "Neutrality", 23 on level Transformation" and 33 on level "Transition" (February 2023).



Levels of accreditation in the ACA scheme

To compensate for the remaining greenhouse gas emissions under Oslo Airport's control, annual investment is made in emissions allowances.



For 2022 investments were made in a landfill gas project in Brasil (PoA 6573: Caixa Econômica Federal Solid Waste Management and Carbon Finance Project)

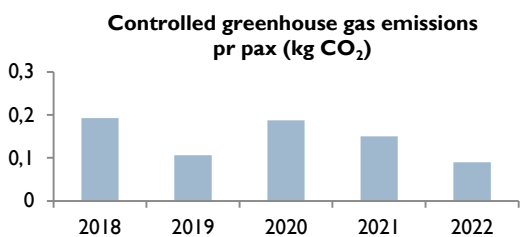
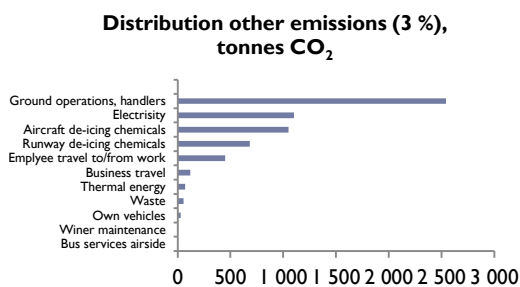
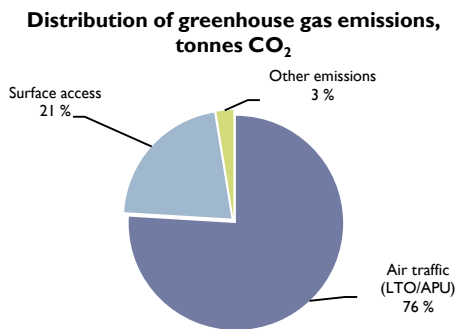


# Status, climate 2022

The greenhouse gas inventory for Oslo Airport 2022

<b>Control</b> <i>Directly controlled by the airport operator</i>	<b>Guide/manage</b> <i>Carried out by a third party, but central to the operation of the airport</i>	<b>Influence</b> <i>Independently carried out by a third party</i>
Own vehicles (including airside bussing and hired winter maintenance) Thermal energy Runway de-icing Fire drills Purchased electricity Business travel	Aircraft operation: taxiing Ground operations Aircraft de-icing Waste: transport from airport to processing plant APU	Aircraft operation: movement in the air up to approx. 3 000 feet above airport level Surface access Employee commuting  Not mapped: Business operations for tenants and lessees Transport of goods and services
<b>2 012 tonnes</b>	<b>75 187 tonnes</b>	<b>160 301 tonnes</b>

In 2022, Oslo Airport's own, controllable greenhouse gas emissions from airport operations were 2 012 tonnes of CO<sub>2</sub>, which means that there has been an increase in emissions of 43 percent compared with 2021 and 19 percent compared with 2020. The increase is due to that operations and activity have increased again after the pandemic.



## Vehicles

An important measure for reducing greenhouse gas emissions from own operations is the introduction of advanced biodiesel, as a large proportion of Oslo Airport's greenhouse gas emissions came from the vehicles. Through a framework agreement, advanced biodiesel is purchased that meets the EU's sustainability criteria and is also guaranteed without palm oil or palm oil products. Advanced biodiesel is used in vehicles that cannot be easily electrified, such as snow blowers and sweepers. At Oslo Airport, there has been a gradual phasing in of advanced biodiesel from a test project initiated in 2015 to 98 percent phasing in of its own vehicle fleet in 2022.

When procuring vehicles, an assessment must always be made as to whether fossil vehicles can be replaced by electric vehicles or biogas. The bidder is invited, regardless of the group of machines to be purchased, to come up with solutions to reduce the greenhouse gas emissions related to own vehicle fleet.

In 2022, eight new electric cars were purchased. At the end of 2022, the vehicle fleet of administrative vehicles at Oslo Airport consisted of 34 zero-emission vehicles and the electric car park went a total of 113 157 km. Together with fueling biodiesel, this combined resulted in a reduction in greenhouse gas emissions of 1 913 tonnes of CO<sub>2</sub>.

12 new runway sweepers of the RS 600 type were delivered to Oslo Airport. The new ones have a larger clearing width, which means that the runways can be cleared faster and reduce the number of vehicles that are used. The RS 600 uses 100 percent advanced biodiesel. The goal is that sweeping should be carried out autonomously and more efficiently in the future, and thus also reduce engine idling.



New equipment provides more efficient runway sweeping

In the coming years, it is important to follow the market, be a driving force in bringing in zero-emission vehicles/biogas vehicles and enter cooperation with various partners so that it becomes possible to test new concepts.



Testing electric truck

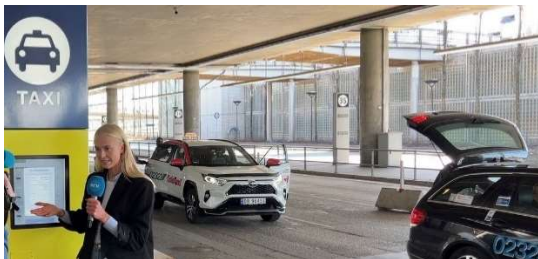


*Demo electric street sweeper*

Electric buses are in use to carry passengers between terminals and remotely parked aircraft. The buses are depot charged at night and fast-charged with pantograph when needed. Work is also underway to develop an infrastructure for charging on the airside and around the airport to cover an increasing need for charging of electric commercial vehicles.

### Surface access

By surface access is meant how our passengers travel to and from the airport. To strengthen the offer to travelers, reduce greenhouse gas emissions and improve local air quality, Oslo Airport wants to be a driving force and facilitator so that as much of the transport to and from the airports as possible can take place by public transport and with emission-free means of transport.



*Travelers can choose zero-emission taxi*

The four diesel buses that transport passengers to and from the car parks were replaced in 2022 with electric buses, which leads to a reduction in CO<sub>2</sub> emissions of approximately 300 tonnes/year.



*New el-shuttlebuses*

The public transport share at Oslo Airport has been up to 72 percent, which is among the highest in the world. Due to the pandemic and the authorities' recommendation to avoid public transport, it is not relevant to compare 2022 with previous years.



*The airport train (Flytoget) contributes to a high public transport share*

Not everyone can travel by public transport to the airport. It has therefore been important to facilitate the charging of electric vehicles in the parking areas so that those who must drive can do so with the lowest possible greenhouse gas emissions. Oslo Airport has more than eight hundred charging options for electric cars.



*Charging possibilities in the parking garages*

### Air traffic

From 2020, a requirement of 0.5 per cent advanced biofuel as a proportion of all aviation fuel traded in Norway was introduced (with the exemption on the Air Force). The most important emissions-reducing measures for air traffic are related to fleet replacement, airspace efficiency, sustainable aviation fuel and the introduction of electric and hybrid electric aircraft. Furthermore, hydrogen as an energy carrier in aviation has been brought up to date.

On average, almost 6 out of 10 aircraft fly so-called CDO landings at Oslo Airport (i.e., fly "at idle" and almost glide into the airport without having to flatten out at altitude en route at Oslo Airport.). This reduces engine use, the airlines save fuel and costs, emissions go down and the planes make less noise. Curved approaches make it possible to fly shorter and thus reduce fuel consumption and greenhouse gas emissions. There was an average of 8 percent curved approaches per month to Oslo Airport in 2022. The target is 15 percent.

Digital tools for traffic management and information sharing (Collaborative Decision Management - CDM) are important. The use of satellite navigation (Performance Based Navigation - PBN) also provides shorter and more direct routes, as well as more energy-efficient arrivals and departures.

### Runway de-icing

There is a desire to phase in runway deicing chemicals made from non-fossil carbon sources when they become available. Firstly, it is most important to reduce formate consumption using new tools that determine to a greater extent when and how much chemicals are needed on the runway.



# CONSUMPTION OF CHEMICALS AND EMISSIONS TO WATER AND SOIL

*Activities at Avinor airports must not cause new contamination of the ground or reduce the environmental status of the water environment.*

*Avinor will reduce the leakage of priority environmental toxins from the airports.*

## Water and soil in brief

Oslo Airport is located on parts of the Romerike aquifer. About half of the east runway to the north is in contact with the part of the groundwater reservoirs that has the potential to become a future source of drinking water. The airport borders three protected landscape areas. The area south-west of the airport is a characteristic ravine landscape. In this landscape the rivers Sogna and Vikka are located.

In general, surface water is handled locally at the airport. In the case of major run-offs, particularly during snowmelt, there will be some influx of unprocessed surface water from the west runway to the river Sogna. The first melt-water contains a quantity of de-icing agent, and this is collected and treated. The natural groundwater level has been lowered along the western runway and the railway route to safeguard the infrastructure. Groundwater pumped out is released into the Sogna or re-infiltrated into the groundwater reservoir.

Much of the glycol used will be collected at a de-icing platform. The proportion with the highest concentration is delivered to a local recycling plant, where it is up-concentrated before transported to a facility and reused as industrial glycol. Wastewater and some of the collected de-icing chemicals (glycol and formate) are used or treated at the Gardermoen treatment plant.

Climatic conditions vary considerably between the individual seasons: snow volume, days involving frost on aircraft, temperatures, wind, etc. This manifests in differences in the consumption of de-icing chemicals – in terms of quantity, mixing ratio and the use of different liquid types – and how this drip off the aircraft or remains on the aircraft and is collected or spread with the wind. All these conditions result in yearly variation in collection levels. Chemical residues from de-icing degrades locally in the ground and soil along the runway systems.

The biggest challenges in water and soil are linked with increased traffic volumes in combination with a wilder, humid winter climate. This increases the consumption of de-icing chemicals, which in turn means that larger

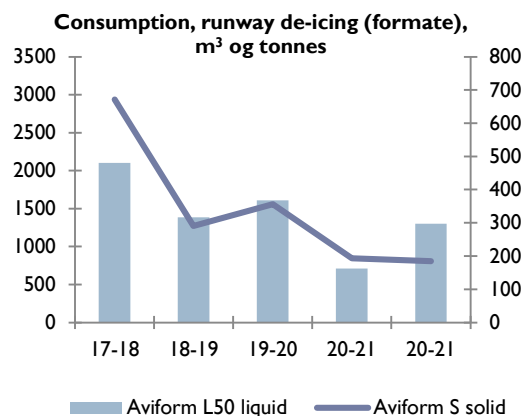
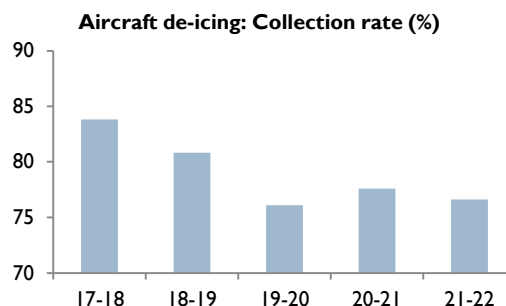
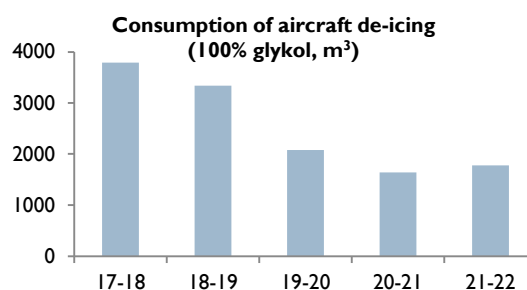
volumes of de-icing chemicals must be degraded in the soil above the groundwater. Contaminated soil from activities prior to the opening of the airport also presents challenges in local areas.

## Status water and soil (season 2021/22)

### De-icing

The pandemic has in the last two years led to a decrease in air traffic and thus also the total use of de-icing chemicals. This applies to both aircraft and runway de-icing chemicals.

Total consumption of aircraft de-icing chemicals during the 2021/2022 season is slightly higher than last season. The collection rate for aircraft de-icing liquid was 76,6 percent in the 2021/2022 season. For runway de-icing chemicals, consumption was also somewhat higher than last season.





Oslo Airport had a breach of the recipient-based discharge permit four times during 2022. Two were exceeding the limit value for oil in groundwater and were in connection with two known, old oil-contaminated sites. These are then not considered new deviations but are still reported to the Norwegian Environment Agency. An exceedance of the weekly mean limit value for alcohol polyethoxylates was detected in Sogna, but not detected in a follow-up sample. The last deviation was an incident involving the release of glycol from a de-icing truck due to a damaged pipe on the truck. The discharge went to an asphalt surface and to a surface with paving stones. Most of the discharge was collected, but a smaller amount went to the ground under the paving stones. This was considered so small that the soil had sufficient decomposition capacity to break down the glycol. No violations of the limit values for de-icing chemicals were detected in 2022.

Oslo Airport has discharge agreements for wastewater with the municipalities of Nannestad and Ullensaker. The wastewater from the airport that goes to Nannestad municipality's pipeline network is delivered to the pipeline network to Ullensaker municipality and then to Gardermoen treatment plant for treatment. According to the discharge agreements, no more than 20 mg/l oil per day shall be discharged from the airport's fire drill training field, which is an annual average. The annual average for 2022 was lower than this limit and it is therefore not a violation of the discharge agreements.



*Comprehensive sampling program*

A limiting factor for degradation in the most critical areas is access to oxygen. In 2011, a pilot project began, with the aim of looking at the effect of injecting air to soil and groundwater. The pilot project showed good results and demonstrated that in the long run it will help re-establish natural conditions in the ground if enough oxygen-rich air is added to the ground. The project was expanded to a total of 65 air wells and started in spring 2016. Air is now injected in the most stressed areas along the western runway, and results from groundwater monitoring show that the measure has a good effect.



*Air is pumped into the soil and groundwater to increase decomposition*

During the de-icing season, other measures are also considered and implemented. One of these is the fertilization of the relevant areas. This will give the bacteria enough nutrients to break down the de-icing chemicals. Another measure is to remove chemical-contaminated snow from some highly loaded areas along the runway, which is to reduce the burden to the ground.

## Contaminated soil

There is ongoing follow-up of sites with contaminated ground due to activities from before the establishment of the main airport, as well as of contaminated soil and groundwater encountered in recent times. There have not been any acute incidents with contamination of soil in 2022 except the one described above.

PFOS (perfluorooctyl sulphonate) was previously a legal additive in fire foam. Today, PFOS is classified as an environmental toxin that is not degraded in nature, is accumulated in food chains, and has harmful effects even at low concentrations. Oslo Airport has areas that are contaminated with PFOS due to historical use of PFOS-containing fire-fighting foam. The highest concentrations have been measured in ground and groundwater in the fire drill fields. There is also a PFOS contaminated area from an accidental discharge at a hangar back in 2010.

On the fire drill field at Oslo Airport, the spread of PFOS to surrounding areas is halted by the establishment of facilities that purifies PFOS from groundwater and stormwater with good results. The cleaning has produced good results. In 2022, the facility will have cleaned 4 116 g of PFAS, and in total since its inception in 2015, the facility has removed 23,41 kg. The measure is followed up with regular sampling to monitor any spread from the area to groundwater and recipients downstream. In 2019, the Norwegian Environment Agency granted permission for excavation of parts of the intervention area that are heavily PFOS-contaminated (areas with an average concentration above 1000 µg/kg). The excavation project is included in Avinor's group project for handling PFOS-contaminated soil at Avinor's airports and will be carried out according to the order of priority set in the group project.

# AIRCRAFT NOISE

*Avinor must work actively to limit noise levels (from aircraft and helicopter traffic) for residents in areas close to the airports at 10 of Avinor's most noisy airports by 2020 (including Oslo Airport).*

## Aircraft noise in brief

Aircraft noise affects the local areas around the airport. Oslo Airport is working actively to ensure that aircraft noise is predictable for its neighbours. Therefore, the monthly reports on traffic development and noise levels sent to the authorities are also made available to neighbours on our website. The Noise and Track Monitoring System (NTMS) records aircraft movements and carries out continuous noise measurement near the airport. This data is assessed for compliance with the regulations for arrivals and departures to highlight any deviations from the regulations.



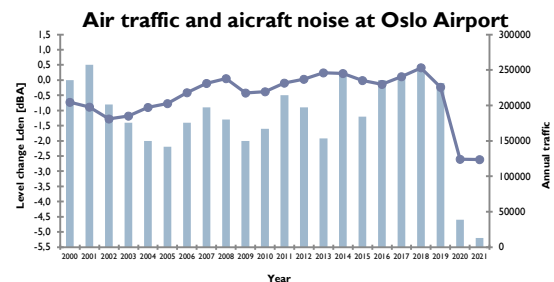
*Oslo Airport's NTMS records the aircraft noise level continuously at 11 sites around the airport.*

Oslo Airport's website for neighbours is designed to help the airport's neighbours find information on the regulations on traffic management and the airport's aircraft noise zone map and contact Oslo Airport about aircraft noise. Oslo Airport also has a separate phone number for enquiries relating to aircraft noise. A summary of the enquiries and how traffic management affects the noise situation at the airport are reported to the Norwegian Civil Aviation Authority in the monthly report from the NTMS.

In 2016, a revised noise regulation prepared by the Civil Aviation Authority came into force for Oslo Airport. The purpose of these regulations is to avoid unnecessary noise levels in the areas around the airport, while also meeting requirements in terms of safety, operational conditions, capacity, and other environmental conditions. The regulations allow for permanent use of curved approaches, where the routes are directed outside densely populated areas. Furthermore, the regulations indicate an adjusted departure corridor from the airport's north-eastern corner. Compliance with the new departure corridors exceeds 95 percent. This adjustment will make it possible to maintain the departure capacity at the airport, whilst preventing aircraft from flying over the most densely populated areas.

## Status, aircraft noise 2022

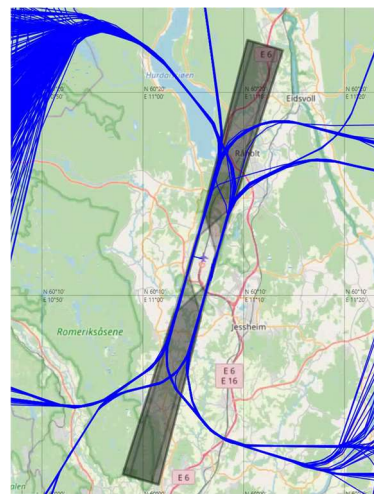
The figure shows the development of aircraft noise and air traffic volumes at Oslo Airport between 2000 and 2022. Total noise emissions ( $L_{den}$ ) from all registered traffic are calculated for each year. According to this, there are changes in level calculated for every year from 2000, and these are plotted together with total traffic development. This provides a view of noise development independently of the geographical areas affected.



The combined aircraft noise impact around Oslo Airport was increased by 2,5 dB from 2021 to 2022, while the number of aircraft movements increased by 0,3 percent. The noise level for 2022 was 2,7 dB below the 2000 level, based on calculations for all registered traffic. The traffic increase for 2022 was 2,500 flights compared to the traffic in 2000. This corresponds to a stable level compared to the 2000 traffic. This means that new, modern aircraft types have more than compensated for the change in traffic.

In 2022, 8 067 curved approaches were completed, i.e., 8,9 percent of all. The total number of curved approaches since 2012 is 60 765.

Oslo Airport had aircraft noise complaints from 123 people in 2022. The inhabitants of Ullensaker, Eidsvoll and Nannestad account for the largest share. The number is at the same level as in 2020 and 2021 combined.



*Curved approaches*

# ENERGY

For the period 2019-2025, Avinor aims to reduce purchased energy for buildings and construction at its airports down to 225 GWh by the end of 2025. (Purchased energy for charging vehicles, buses and aircraft is excluded from the target.)

## Energy in brief

Oslo Airport has a high share of renewable energy. A separate district heating and district cooling system ensures that the buildings at Oslo Airport maintain the correct temperature throughout the year. The heat and cooling are mainly produced by heat pumps, which draw energy from several different sources: The return heat in an own energy circuit, the groundwater plant which consists of nine hot and nine cold groundwater wells, where surplus energy can be stored and recovered, recovered energy from the wastewater to Ullensaker municipality's treatment plant (DA8), clean snow is collected in the winter in a large snow storage which is insulated with wood chips and where the melt water is used to cool the terminal on days in the summer with extra large cooling needs, as well as geothermal plants with deep energy wells. In addition, district heating with wood chip heating from Statkraft Varme AS is used.

All fossil fuel oil for heating buildings is phased out and replaced with biodiesel, and only the reserve power units still use fossil diesel.

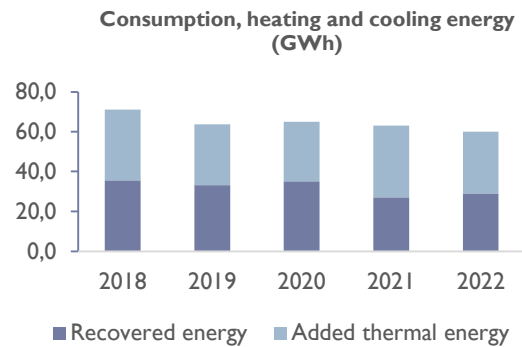
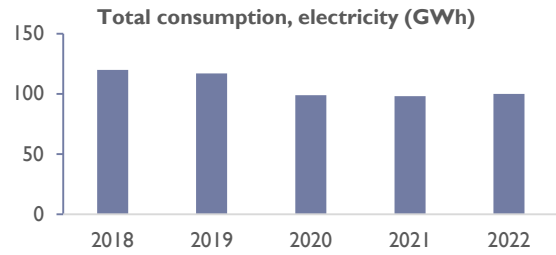
## Status, energy 2022

To achieve the goal, efforts are being made to increase awareness and competence related to energy work. This is done by increasing the use and competence in EMS (energy monitoring system), working according to the energy plan, identifying innovative energy solutions and profitable reinvestments.

Due to sky-high electricity prices and the energy crisis in Europe, saving electricity has had a high priority. It was decided in September that Oslo Airport would reduce the normal indoor temperature in the terminal and other buildings by 1-2 degrees Celsius as far as possible. With this, Oslo Airport saves energy equivalent to the consumption of around 75 detached houses (1,5 GWh) annually. Other measures are related to lighting and ventilation. Heating/cooling and ventilation are reprogrammed to smooth transitions, and ventilation is stopped at night where it can be allowed. An internal campaign was also launched among all employees at the airport where they were asked to submit ideas for possible measures to save electricity.

There are two reasons why the airport must focus on the efficient use of electricity and energy in the future. New

technology and automation will need a lot of energy, and the loading of electric vehicles at the airport will require much more electricity.



Stored snow is used for cooling the terminal in the summer



The temperature in the terminal is lowered to 18-19 degrees Celsius



# WASTE

The airports will together halve the amount of unsorted waste from ordinary operations by 2025, with zero vision for unsorted waste in 2030. (By this we mean zero residual waste - i.e., 100 percent for reuse or material recycling (of what is suitable and/or possible to sort out)).

Food waste shall be reduced by 50% per passenger by 2030 and 30% by 2025.

For construction waste, the degree of recycling and reuse shall be increased. Minimum 70% material recycling / reuse by 2025.

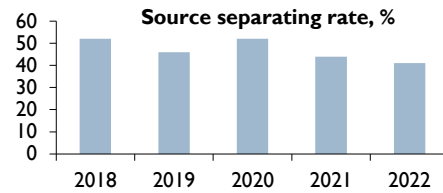
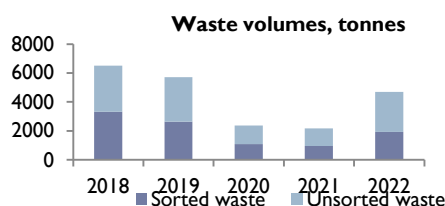
## Waste in brief

Airport operations generate waste from public areas with security control, serving, shops and waiting areas, but also from aircraft cleaning, from operating companies, airlines, catering, cargo, workshop, garages, office space and not least from construction projects.

All companies at the airport participate in a joint waste management scheme whereby all waste is handled by the same waste handling company. The waste management scheme is flexible, and waste fractions, container sizes and collection rates are adapted according to set requirements. Waste is separated at source and dropped off at waste collection points. The waste handling company deals with the waste and delivers it to approved final disposal and recycling plants. The waste handling company reports monthly the source separation rates and tonnages for all collection points. Oslo Airport is responsible for organising the waste management scheme at the airport and acts as a driving force, ensuring that the airport achieves good results in terms of waste. Waste from the building and construction project activities is reported separately.

## Status, waste 2022

The total amount of waste for the entire airport in 2022 was 6 575 tonnes. The amount of waste invoiced via Oslo Airport was 4 799 tonnes. Sorted waste amounted to 1 934 tonnes and unsorted waste 2 765 tonnes, which gave a sorting rate of 41 percent. The development regarding sorting is going in the wrong direction. Low waste volume in 2020 and 2021 was mainly due to less activity, fewer passengers and many closed shops and restaurants during the pandemic.



Collection of recyclable beverage packaging in aluminium and PET (plastic) from the aircraft has continued in 2022. The parties participating in this scheme are SAS and Sodexo, and they distribute profits from the income from deposit and aluminium to charitable causes. With the efforts of employees and the public, cans and bottles from public areas in the terminal have also been collected. The airport cooperates with the Norwegian Red Cross, at the local branch Ullensaker, which again receives help from local school classes and different organisations to do some sorting activities. These get paid for the work they do, which means that the income is handed out to more than just the Red Cross. The bottles and cans are then picked up and taken to a recycling facility by Infinitem.



Incomes from deposit goes to charity

To reduce the consumption, Avinor's shopping bags are charged. Part of the profit from bag sales goes to "Handelens miljøfond". The rest of the profit goes into Avinor's own environmental fund and is earmarked for environmental measures directed by commercial partners in the terminal. The shopping bags are produced with 80 percent recycled plastic.

Together with our partners, we work to reduce food waste. Production and sale of food by the commercial partners in the terminal is by far the biggest source of food waste. An important preventive measure is planning the production of food throughout the day. The app "Too Good To Go" is also in use at restaurants and kiosks at the airport, where food, which would otherwise have been thrown away, is sold at a greatly reduced price.



In 2022 almost 13 000 bags with food were rescued



## Circular economy

Oslo Airport has started a process for a stepwise transition to a more circular airport. This involves the prevention of waste and a vision of zero waste, only resources in circulation. The resources must be used far more efficiently, so that we reduce the need to take out new resources, and the products last as long as possible, are repaired, upgraded, and used again. When the products cannot be reused in their original form, the waste material must be recycled and used as raw materials for new production. To increase focus, it is planned to establish a separate project "Zero Waste 2030".

Oslo Airport participates in the Romerike Circular Economy Network, which is a business network within the circular economy for public and private actors in Romerike with the aim of identifying future circular value chains and business ideas.

A significant contribution to the plan for implementing the circular economy at Oslo Airport is participation in the sub-project «Circular airports» which is part of a larger 4-year EU-funded project (TULIPS-Demonstrating lower polluting solutions for sustainable airports across Europe). Schiphol Airport leads the consortium as «Lighthouse Airport», and Avinor (Oslo Airport), is one of three "Fellow Airports". Based on a base-line survey, the project will see opportunities within waste/material flows with a focus on reducing waste in the terminal and more use of secondary materials in constructions, among other things.



*Analysis of waste from the airport terminal*

To gain insight into the airport's waste and resource flows, a "waste safari" has been carried out. Several rounds of both weight-based picking analysis and volume-based visual sorting provided useful information about the various types of waste generated, as well as identifying sources of where and why it occurs. Analysis of the results provides good insight and is a solid basis for identifying measures that can be implemented in the future. Some interesting findings were, among other things, that the single-use coffee cups are all over, that much of what is sorted cannot be recycled because it is contaminated or consists of mixed material, that much more waste is produced in the commercial units than in the passenger areas, that a lot of disposable items are used inside the eating places even if it is not for "take away", that much of the food

waste that is thrown away could have been eaten, and positively, that there is a fairly good sorting of deposits.



*Extensive use of disposable items is not circular*

Through a pilot project, a donation scheme has been tested where surplus food from some of the partners is collected and given away to a charitable organization, which then distributes it to people in need. It is a popular initiative that will be continued and expanded.



*Surplus baked goods for donation*

To become more circular, it will be important to strengthen the reuse culture. Testing of several different schemes, tools and apps has therefore been started to achieve more reuse of surplus material, redundant furniture and various objects that still have user value.



*Furniture is reused internally, given away or sold*

# PURCHASING, BUILDING AND CONSTRUCTION PROJECTS

## Consumption of products and materials in brief

Oslo Airport, through Avinor's centralized purchasing function, procures services, products, and materials in connection with normal operations or via construction projects for significant sums. The processes ensure that all purchases are made in accordance with regulations on public procurement. Environmental requirements in procurement processes are important elements in the environmental policy and contribute to reducing Oslo Airport's environmental impact. The possibility of waste reduction, reuse and material recycling is often already decided when purchasing products and services for the airport. Through the procurement process, we can influence suppliers and partners in several sectors in a more environmentally friendly direction.

There are requirements for the reduction of greenhouse gas emissions, waste management and minimization, mass handling, use of environmentally friendly products and chemicals, noise and safeguarding of the natural environment, as well as requirement for environmental certification or equivalent in the qualification step when relevant. Furthermore, quality requirements and award criteria are set where the suppliers compete to deliver the most environmentally friendly solutions, products, materials, and services.

In all contracts with partners operating in the airport area and in all our building and construction projects, various environmental requirements are included, and we work continuously to further develop the environmental requirements in line with the development of the industry. There is a focus on the environment throughout the projects' life cycle, as early identification of environmental challenges and possible environmental ambitions for the project. For major building and construction projects, environmental follow-up plans are developed which take care of the external environment in all phases and ensure environmental considerations in the choice of materials and solutions.

Environmental documentation is required for products and services that have a significant environmental impact. Work is being done systematically with substitution and reduction of the number of chemical products. All products used must meet environmental requirements required by law.

## Status, consumption of products and materials 2022

Changing partners for the operation of commercial areas at the airport often entails some demolition and rebuilding activity. Requirements for material selection and reuse have therefore been important when entering into new agreements. Reuse mapping is also now done to a greater extent in own development projects. Digital registration with search capability and categorization of elements to be removed are fundamental for reuse, and the database PIMS is of great importance here. Limited space for intermediate storage, closure of area and time pressure in construction projects in the terminal are, however, a challenge to achieve reuse in practice. Another challenge is that there is currently a limited market for reuse.



*Reconstruction work in the Terminal*

When rebuilding large areas in the central building in the terminal, demolition material was transported to a temporary tent for post-sorting for the best possible preparation for reuse and material recycling.



*Post-sorting*



*HUB for intermediate storage of products and material for reuse*



# NATURAL ENVIRONMENT

## Biodiversity in brief

Oslo Airport has mapped the important areas for biodiversity, with descriptions of flora, vegetation, and bird life within the airport area, on Oslo Airport properties, leased area and influenced areas. The results of the surveys are publicly available, including in Naturbase. Management advice has also been prepared, which is being followed up.

The areas between the runways and the side areas within the airport site mainly have trivial grassland that is cut and fertilised regularly. Just outside, however, there are greater natural assets such as ravine forests, meadows, and calcareous lakes with several rare and endangered species that we wish to preserve.

Unfortunately, blacklisted species are also registered at the airport. These are unwanted as they suppress the natural Norwegian flora. Oslo Airport maintains an overview of the scope and potential for the spread of blacklisted species on and around the airport site. A maintenance plan for combating the four plant species Lupine, Giant hogweed, Canadian goldenrod and Japanese knotweed has been compiled based on an assessment of consequences and prioritisation of species and localities.

Both inside and outside the airport fence there are large areas with flowers suitable for a large selection of insects, especially plants in the pea flower family that are important for long-tongued, red-listed bumblebees, such as the critically endangered Clover Bumblebee who lives at the airport.

## Status, biodiversity 2022

Oslo Airport's operation, development and projects affect biological diversity in and around the airports in several ways. Development of areas, drainage, discharge of microplastics, use of chemicals and more are negative influences. However, several measures are being implemented to safeguard or improve biological diversity.



Canadian goldenrod is registered at the airport, - one of the unwanted species

Major efforts to combat the invasive plants began back in the summer of 2014, mainly involving several rounds of root cutting, weeding, and cutting down before the plants seeded, as well as a very limited amount of spraying with pesticides. Combating measures have continued since, with a focus on avoiding spreading into valuable natural areas. In 2022, registration of blacklisted species was made as an integrated part of an app which is used for other types of registration related to operation and maintenance at the airport. Courses were also held to recognize and register a selection of species. Training and registrations will continue in 2023.

Oslo Airport has dedicated four areas of a total of about 140 000 m<sup>2</sup> which are good habitats for pollinating insects. These have been followed up with special measures annually since 2019, including adjusted frequency for mowing, avoidance of pesticides, as well as cutting using grass trimmers of each individual invasive species. The work is supported by the County Governor and is discussed in the national Action Plan for wild pollinating insects 2021-2028. Oslo Airport also owns large areas in the Trandum area which house nationally important species of endangered pollinating insects, and which are particularly important to preserve. Oslo Airport has now therefore set strict requirements for the management and use when renting out these areas.



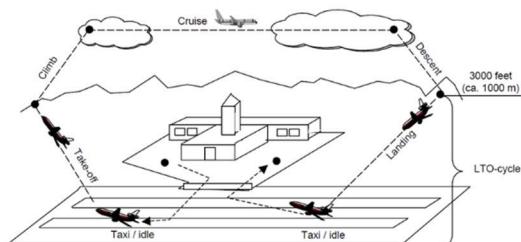
In the park outside the Terminal, a flower meadow has been established for our "little flying friends"

## CITES

The purchase and introduction of endangered species or endangered species products is illegal and regulated by CITES (Convention on International Trade of Endangered Species). For several years, Oslo Airport has provided guidelines to passengers during the holiday season, via various social media, preventing them to buy "endangered holiday souvenirs", which include objects made from ivory, turtle shells, hippo teeth, shark teeth, leopard skin, snake-skin, conches and corals and so on.

# LOCAL AIR QUALITY

Air quality in and around the airport area is affected by local and regional emissions, as well as by weather conditions and the local terrain. Emissions from airport operations have the greatest impact on ambient air quality locally at the airport, with aircraft and vehicles being the largest contributors. Off the airport site, road traffic is the most important source of emissions. Industrial emissions, emissions from heating and long-range contamination are other factors that affect air quality.



## Sources of emission

The municipalities are primary responsibility for assessment of air quality, but if there are reasons to suspect that limits have been exceeded, then owners of facilities that make significant contributions to these levels will be responsible for assisting to map the levels and assessing measures. Oslo Airport has operated a facility for monitoring air quality since the early 2000s. This was originally related to measurement of air quality close to the fire drill area. The historical data for previous years shows that concentrations of particulate matter and nitrogen dioxide at the selected measuring point were within both regulatory requirements and national targets, with few instances where the recommended air quality criteria were exceeded.

In 2001, NILU, the Norwegian Institute for Air Research, carried out a major survey of local air quality on behalf of Oslo Airport. Calculations were performed, and measurements were taken at various locations around the airport. This report was updated in 2016. NILU's report concluded that air quality at and around the airport was much better than in urban areas.

NILU has further concluded that the smell of aviation fuel that may occasionally occur in the airport area is present in such low concentrations that there is no reason to believe that it could cause health problems. Furthermore, there is no indication that the blackening of residential buildings around Oslo Airport is due to soot drop from airplanes but is mainly due to black moulds growth.

Oslo Airport has participated in the project entitled "Assessment of exposure to diesel exhaust particles in the Norwegian labour market, using elementary carbon (EC) as a marker". The National Institute of Occupational Health (STAMI) concludes in its report that "Operators at the airport who are exposed to diesel exhaust fumes and exhaust fumes from stationary, parked aircraft are exposed to air concentrations ( $= 2.7 \mu\text{g}/\text{m}^3$ ) that occur in central urban areas".

## Status, emissions to air 2022

In 2022, Oslo Airport did not carry out measurements of air quality. Previous years' measurements show values well below regulatory requirements and national targets.



# KEY FIGURES

		2018	2019	2020	2021	2022
<b>Air traffic</b>						
Passengers	number in thousands	28 510	28 572	9 022	9 398	22 468
Aircraft movements	number in thousands	249	244	117	125	207
Passengers per aircraft movement	number	114	117	77	75	109
<b>Public transport share</b>						
Public transport share for surface access	%	71	72	**	**	66
<b>Noise</b>						
Change in total noise impact relative to reference year 2006	dBA	0,4	-0,1	-2,9	-5,2	-2,7
Inquiries, aircraft noise (persons)	number	150	183	72	68	123
<b>Energy</b>						
Total consumption of electricity	GWh	120	117	99	98	100
Electricity for electricity-specific installations	GWh	112	113	96	95	99
Purchased heating and cooling energy	GWh	36	31	30	36	31
Electricity for electrode boiler	GWh	8	4	3	4	1
Electricity for compressors, pups, etc.	GWh	11	11	10	9	8
Statkraft Varme AS	GWh	15	17	16	23	22
Heating oil (Energy central)	GWh	2	1	1	1	0
Recovered energy	GWh	36	33	35	27	29
Consumed heating and cooling energy	GWh	71	64	65	64	60
<b>Non-renewable resources / biofuel</b>						
Jet fuel	m <sup>3</sup>	700 000	693 600	288 000	280 963	521 031
Heating oil/diesel	m <sup>3</sup>	220	104	26	22	26
Bio heating oil	m <sup>3</sup>	64	63	80	134	108
Fuel for Oslo Airport vehicles*	m <sup>3</sup>	1 011	254	53	15	15
Biofuel for Oslo Airport vehicles*	m <sup>3</sup>	250	1 009	528	598	701
Fuel for fire drills (paraffin/Jet A1)	m <sup>3</sup>	13	0	0	0	0
Fuel for fire drills (propane)	tonnes	0,9	0,0	0	0,2	0,2
<b>Waste</b>						
Sorted waste	tonnes	3 323	2 620	1 091	949	1 935
Residual waste	tonnes	3 175	3 096	1 280	1 208	2 765
Total amount of waste	tonnes	6 498	5 716	2 370	2 157	4 700
Source separation rate	%	51	46	52	44	41
Hazardous waste	tonnes	111	151	274	152	165
<b>Greenhouse gas emissions</b>						
Control - Oslo Airport emissions	tonnes CO <sub>2</sub>	5 491	3 036	1 687	1 411	2 012
Control - Oslo Airport emissions , kg per passenger	kg CO <sub>2</sub> /passenger	0,193	0,106	0,187	0,150	0,090
Guide- third party emissions	tonnes CO <sub>2</sub>	88 806	79 286	3163**	46 443	75 187
Impact - third party emissions	tonnes CO <sub>2</sub>	203 278	200 484	0**	93 159	160 301
<b>Water supply and sewage</b>						
Water consumption	m <sup>3</sup>	271 000	246 000	131 700	132 500	222 000
Wastewater volume	m <sup>3</sup>	341 000	336 000	159 000	163 500	287 000
Drainage water volumes	m <sup>3</sup>	1 411 000	1 660 000	2 185 650	2 161 000	1 293 573
<b>De-icing chemicals (per season)</b>						
		2017/18	2018/19	2019/2020	2020/2021	2021/2022
<b>Aircraft de-icing</b>						
Total consumption, glycol	tonnes	3 785	3 340	2 080	1 816	1 780
Specific consumption, glycol	kg/aircraft	210	211	186	248	196
Collection rate for glycol	%	84	81	76	78	77
<b>Runway de-icing</b>						
Aviform L50	m <sup>3</sup>	2102	1383	1609	708	1 302
Aviform S	tonnes	672	290	356	193	185
* The figure includes airside bus services and winter maintenance						
** Figures are not complete						