



# Environmental report 2021

 AVINOR OSLO AIRPORT

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# 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 crucial for Avinor's environmental goals to be achieved. The goals are in line with the UN's sustainability goals and support the EU's Green Deal, where significantly increased environmental and climate attention is expected.

Oslo Airport has also in 2021 been strongly affected by the Covid19 pandemic with a large loss in both the number of passengers and aircraft movements. Limited activity at the airport is reflected in our consumption and emission figures related to environment and climate. An important part of the environmental work is nevertheless linked to our discharge permits, framework conditions, certifications and ongoing projects that require continuous management, monitoring, follow-up and reporting both internally, externally and to the authorities regardless of the pandemic.

We are certified according to the environmental standard EN-NS ISO14001 which ensures good environmental management in our everyday lives. Oslo Airport is also accredited in the scheme Airport Carbon Accreditation (ACA), and which means that we have climate high on the agenda. New this year is the monitoring of groundwater in accordance with the requirements of the water regulations. We optimize energy consumption to the activity level and waste sorting can always be improved. For aircraft noise, there is still a focus on increasing the proportion of curved approaches. It is also gratifying that the authorities value our work in facilitating wild pollinating insects. We set environmental requirements in procurement, for ourselves and others who operate at the airport to improve the environmental achievement.

However, we see and experience a changing world and we must rig our airport operations for a new everyday life. We at Oslo Airport are embarking on a process of transition to a more circular economy. This means that we must incorporate circular-economic principles in planning, management, operation and development, and that each of us must both think and work somewhat differently in the coming years. This is going to be incredibly exciting!

To solve global challenges together, it becomes particularly important to work more broadly and participate in networks both nationally and internationally. As an example, Avinor and Oslo Airport will over a four-year period participate in an EU-funded project (TULIPS) where the goal is to contribute to the development of innovations that facilitate the transition to transport with low climate footprint and sustainable airports across European borders. It will be both interesting and educational.

Oslo Airport's environmental annual report for 2021 shows the status of the environmental aspects at the airport.

Gardermoen, May 2022

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 March 2014 according to EN-NS ISO14001: 2004 and is now 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 an important 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 the natural environment. Oslo Airport is also focusing on the environmental aspects of waste and emissions to air.

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. At the turn of the year 2020/2021, Oslo Airport's Facebook page had more than 183,000 followers.

Good dialogue with those who depend on Avinor's services or who are affected by our business in various ways is crucial for Avinor 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.

# 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). 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.

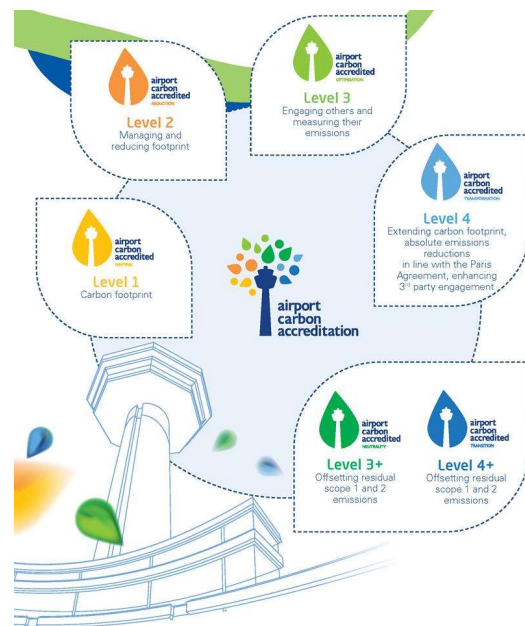
The major sources of emissions are the LTO cycle (i.e. emissions from aircraft below 3000 feet; approach, landing, taxiing, take-off and climb out) and the use of APUs and surface access (passenger's transport emissions when traveling to / from the airport). The remaining emissions are related to the 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, Avinor 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 (in relation 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. 382 airports are now certified in the ACA, of which 58 are

on level "Neutrality", 4 on level Transformation" and 10 on level "Transition" (January 2022).



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 2021, investments were made into the project "34 MW Wind Power Project" at Khanapur Sangli, Maharashtra, India (Project: Gold Standard ID 4707)





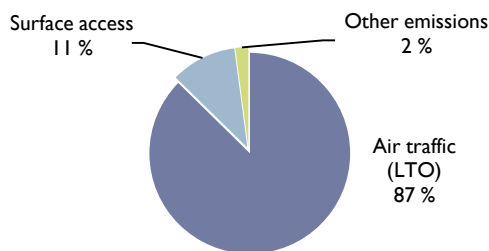
# Status, climate 2021

The greenhouse gas inventory for Oslo Airport

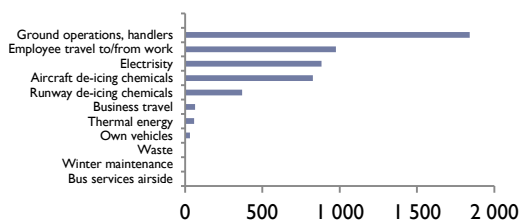
<b>Control</b> <i>Directly controlled by the airport operator</i>	<b>Guide/manage</b> <i>Carried out by a third party, but central to the operation of the airport</i>	<b>Influence</b> <i>Independently carried out by a third party</i>
Own vehicles (including airside bussing and hired winter maintenance) 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>1 411 tonnes</b>	<b>46 443 tonnes</b>	<b>93 159 tonnes</b>

In 2021, Oslo Airport's own, controllable greenhouse gas emissions from airport operations were 1 411 tonnes of CO<sub>2</sub>, which means that there has been a reduction in emissions of 16 percent compared with 2020 and 54 percent compared with 2019. The decrease is linked to reduced operations and activity due to the pandemic situation, but also the use of advanced biodiesel.

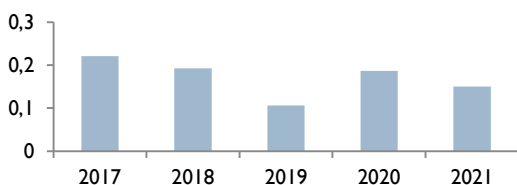
**Distribution of greenhouse gas emissions, tonnes CO<sub>2</sub>**



**Distribution of other emissions (2 %), tonnes CO<sub>2</sub>**



**Controlled greenhouse gas emissions pr pax (kg CO<sub>2</sub>)**



## 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 2021.

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 Avinor's greenhouse gas emissions related to its own vehicle fleet. 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. Fully electric sweepers, trucks and wheel loaders will come in larger classes in the years to come, and it should be possible to put in place test projects in some of these segments.

In 2021, eight new electric cars were purchased. Only one diesel van were purchased when a suitable electric alternative was not available. In addition, four other diesel / petrol cars were disposed of and not replaced. At the end of 2021, the vehicle fleet of administrative vehicles at Oslo Airport consisted of 32 zero-emission vehicles and the electric car park went a total of 81 395 km. Together with fueling biodiesel, this combined resulted in a reduction in greenhouse gas emissions of 1 841 tonnes of CO<sub>2</sub>.

Electric buses are now used 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 to cover an increasing need for charging of electric commercial vehicles.



*El-buses operating airside*

The new sweepers have a much wider clearing width than the old ones. It makes it possible to go from eight to six sweepers in the line of vehicles that clears a runway and from five to four sweepers when clearing taxiways. This means that the number of engines is reduced and thereby

also reduces the greenhouse gas emissions associated with the operation. If it eventually becomes possible to hybridize the unit and go down to one engine, then the potential for emission reduction is much bigger. With autonomous vehicles, higher precision is achieved in the operations and by driving the same fixed pattern every time, the number of km driven can be reduced and as a result less greenhouse gas emissions. More mechanical sweeping also reduces the need for runway de-icing fluid.



*Larger width of the plow provides environmental benefits*

## Surface access

By surface access is meant how our passengers get 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. For the surface access to be even greener, there will be, among other things, requirements for electrified shuttle buses in the parking business.



*Here will el-shuttlebus be coming*

Most instruments for increasing the public transport share are outside the airport's area of responsibility and require cooperation between several actors. The airport's most important contribution is to facilitate the infrastructure at the airport and provide good information about the services to travelers.

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 2021 (and 2020) 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 in the parking garages.



*Charging possibilities in the parking garages*

## Air traffic

Electrification of aviation can help to reduce the total greenhouse gas emissions from Norwegian aviation in the coming decades, and Avinor is still an important driving force in this work.

From 2020, a requirement of 0,5 percent biofuel was introduced as a share of all aviation fuel sold in Norway. Norway is the first country in the world with such a requirement. The biofuel must be advanced; that is, fuel that is made from waste and residues.

The most important emission reduction measures for air traffic are related to fleet replacement, streamlining of airspace, sustainable aviation fuel and the introduction of electric and hybrid electric aircraft. In addition, hydrogen as an energy carrier in aviation has become relevant.

Improved navigation technology allows for more accurate and flexible arrival and departure procedures. Through curved approaches, the aircraft can fly shorter distance and reduce fuel consumption and greenhouse gas emissions. There was a total of 11,5 percent curved approaches to Oslo Airport in 2021 and expanding the number of curved approach routes are in progress.

# 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 upconcentrated 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

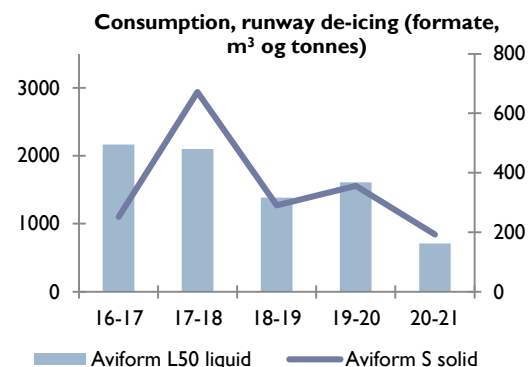
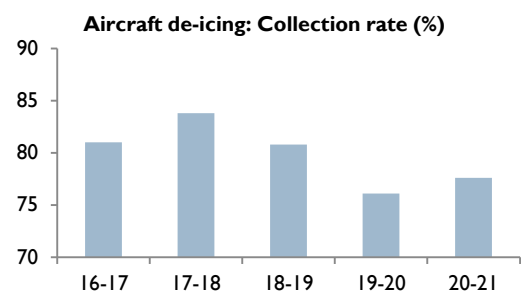
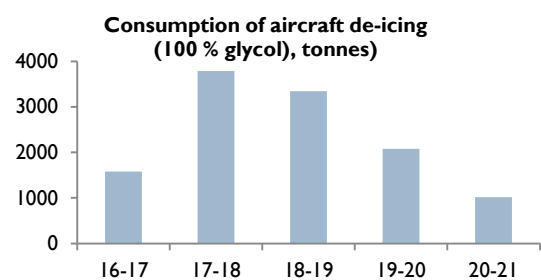
volumes of de-icing chemicals must be degraded in the soil above the groundwater. Contaminated soil from activities prior to the opening of the airport also presents challenges in local areas.

## Status water and soil (season 2020/21)

### 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

The collection rate for aircraft de-icing fluid was 77,6 percent in the 2020/2021 season.



Oslo Airport had a breach of its recipient-based discharge permit twice during 2021. Both 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. No breach of the limit



values for de-icing chemicals was detected at Oslo Airport in 2021. In 2021, a new monitoring program was initiated for monitoring of groundwater in accordance with the water regulations. The program will help to provide an assessment of the overall environmental impact on the groundwater reservoir.

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 training field, which is an annual average. The annual average for 202 was lower than this limit and it is therefore not a violation of the discharge agreements.



*Groundwater monitoring well*

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.



*Degradation of de-icing chemicals on the side areas*

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.

In 2019, Oslo Airport started a new project "Groundwater 2030" with the aim of improving the understanding of the long-term effects of the de-icing chemicals on ground and groundwater, and the processes behind it. The project also aims to assess and optimize existing measures, and to explore opportunities for developing new measures.

In 2021, the first year of groundwater monitoring was carried out according to a program prepared in 2020 based on the requirements in the water regulations. The monitoring will help to set correct environmental targets for the groundwater reservoir under the airport. An assessment was also made of the sampling method for iron and manganese, a new groundwater level map was prepared, installation of two multi-level groundwater wells in the highest loaded area for de-icing chemicals along the western runway, monthly sampling of a series of wells to monitor groundwater development through an entire winter season, and the start of a master's thesis that will look at decomposition, and iron and manganese in the soil profile.

## 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 i 2021.

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 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.*

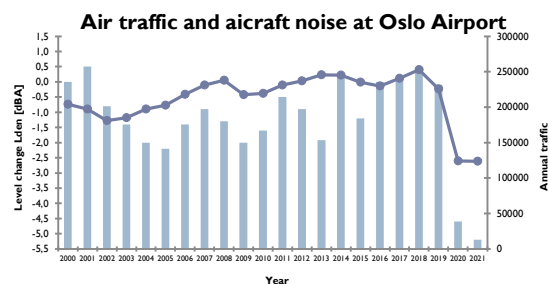
Oslo Airport's website for neighbours is designed to help the airport's neighbours find information on the regulations on traffic management and the airport's aircraft noise zone map and contact Oslo Airport about aircraft noise. Oslo Airport also has a separate phone number for enquiries relating to 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.

On 26 May 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 2021

The figure shows the development of aircraft noise and air traffic volumes at Oslo Airport between 2000 and 2021. 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 reduced by 0,6 dB from 2020 to 2021, while the number of aircraft movements was reduced by 0,7 percent. The level change is due to the phasing in of new, quieter Airbus Neo models in 2021.



The noise level for 2021 was 5,2 dB below the 2000 level, based on calculations for all registered traffic. The traffic decrease from 2000 to 2021 on 80 492 aircraft movements corresponds to a level increase of 2,18 dB over 2000 traffic. This means that new modern aircraft types have more than compensated for the increase in traffic

In 2021, 6 080 curved approaches were completed, i.e. 11,5 percent of all. In October 2021, several curved approach procedures were introduced. This led to a test period with restrictions on implementation. The new procedures will provide more opportunities for curved approaches from early 2022. The total number of curved approaches since 2012 is 48 004.

Oslo Airport had aircraft noise complaints from 68 people in 2021. The inhabitants of Ullensaker, Eidsvoll and Nannestad account for the largest share. The number is at the same level as in 2020, but a halving of the number of complaints compared with 2019. The reduction is probably due to the introduction of single-runway operations during the pandemic period. The traffic therefore went mainly on the western runway, so that the areas Mogreina, Sand and Jessheim had far fewer overflights.

Avinor has updated the knowledge base for assessing the future location of a possible third runway at Oslo Airport in 2020. Avinor maintains the recommendation for the eastern alternative as a location for a possible third runway, which was confirmed from a political point of view autumn 2021.

# 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

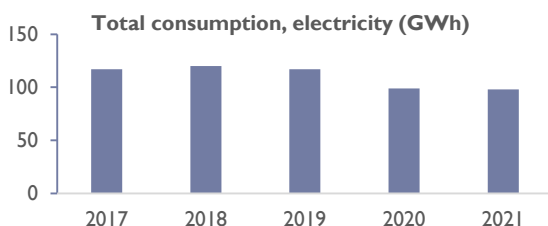
Oslo Airport has a high share of renewable energy. A separate district heating and district cooling system ensures that the buildings at Oslo Airport maintain the correct temperature throughout the year. The heat and cooling are mainly produced by heat pumps, which draw energy from several different 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.

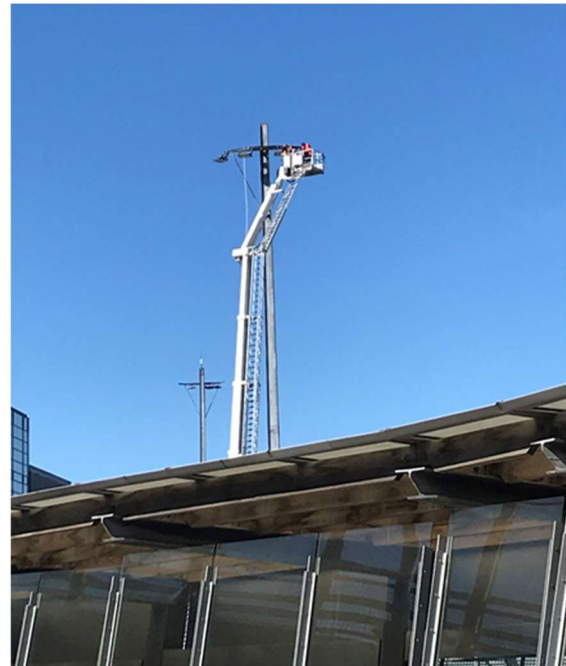
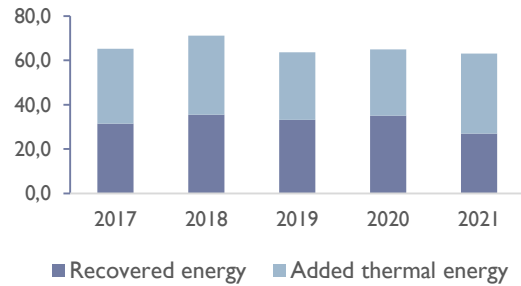
## Status, energy 2021

The year 2021 has, like 2020, been a different year, also when it comes to energy management. Due to less traffic and the consequences that come with this, there has been an increased focus on adapting and optimizing energy consumption to the activity level. This has given good results and purchased energy has been reduced by 15 percent in 2021, compared with -19.

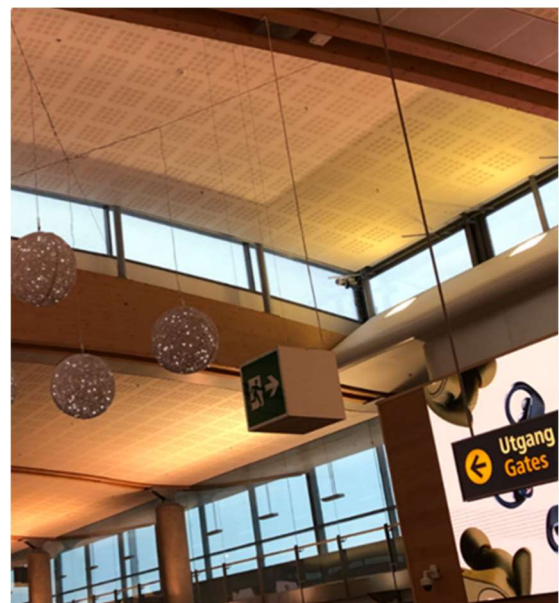
The energy follow-up system (Optima) is still being further developed by introducing more and new energy meters. Measures have included further replacement of LEDs, improvement of the energy wells in the geothermal plant, installation of free exchange in DA8, updating of monitoring systems (SRO) and changed routines for prioritizing the use of various energy sources.



Consumption, heating and cooling energy (GWh)



Replacement for LED in the floodlight outside the Terminal



Replacement for LED inside the Terminal



# 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.*

*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.

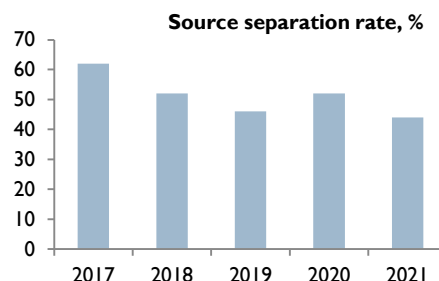
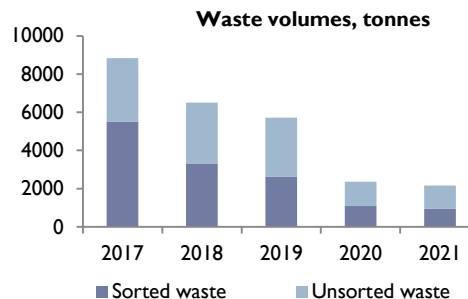
Oslo Airport is responsible for organising the waste management scheme at the airport and acts as a driving force, ensuring that the airport achieves good results in terms of waste. Waste from the building and construction project activities is reported separately.

Oslo Airport wants to be part of the transition to a circular economy for the best possible use of resources and reduced extraction of raw materials. This also means prevention of waste and a vision of zero waste, only resources in the cycle. The resources must be used far more efficiently, so that we reduce the need to extract new resources, the products last as long as possible, are repaired, upgraded and reused. When the products cannot be reused in their original form, they must be recycled and used as raw materials in new production. By reusing products and waste, the same resources are utilized several times and as little as possible is lost.

## Status, waste 2021

The total amount of waste for the entire airport in 2021 was 5 073 tonnes. The amount of waste invoiced via Oslo Airport was 2 157 tonnes. Sorted waste amounted to 949

tonnes and unsorted waste 1 208 tonnes, which gave a sorting rate of 44 percent. Low waste volume is mainly due to less activity, fewer passengers and many closed shops and restaurants due to the pandemic. 24 percent were recycled, 0,3 percent biologically treated, 67 percent energy recovered and 9 percent sent to landfill.



Collection of recyclable beverage packaging in aluminium and PET (plastic) from the aircraft has continued in 2021. The parties participating in this scheme are SAS and Sodexo, and they distribute profits from the income from mortgages and aluminium returns to charitable causes. With the efforts of employees and the public, boxes 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 receives help from local school classes, different teams and 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 beverage packaging is then picked up and taken to a recycling facility by Infinitem.



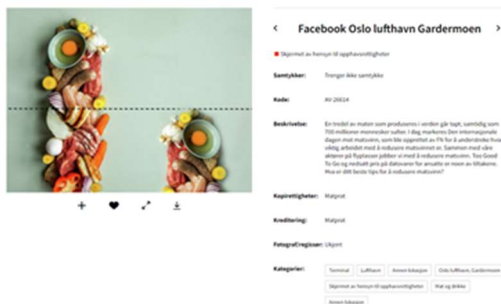
*Incomes from bottles and cans that are left behind before the security check goes to charity*

To reduce consumption, Avinor's carrier bags are charged. This was introduced in 2019 and led to a decrease in the consumption of bags. Part of the profit from bag sales goes to the Trade's environmental fund, which supports projects that reduce plastic waste, increase plastic recycling and reduce consumption of plastic carrier bags. Avinor is a member of the Trade's Environmental Fund, and as a contract partner with the commercial businesses at the airports, they participate through the agreement with us. The rest of the profit goes into Avinor's environmental fund and is earmarked for environmental measures under the direction of Avinor and partners. Large shopping bags are now produced in Sweden with 80 percent recycled plastic, and the small bags will also be produced in this way when existing stock is used.



Merchants are encouraged to limit the use of plastic bags

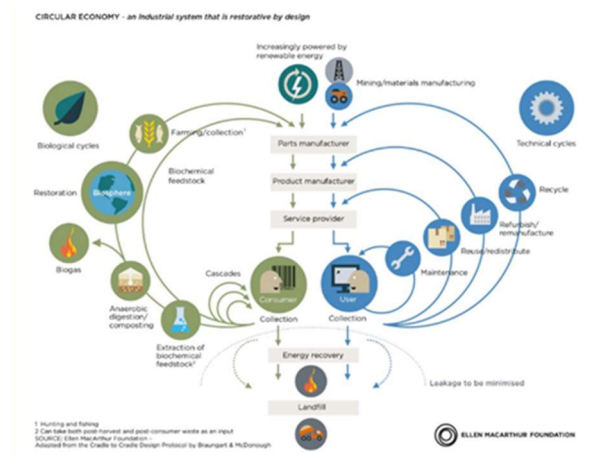
Together with our players at airports, we work to reduce food waste. At restaurants and kiosks at the airport, the app "Too Good To Go" has been tested, where food that would otherwise have been thrown away is sold at a reduced price. However, this was put on hold due to the closure of several restaurants through the pandemic.



The International Day Against Food Waste September 29, 2021 was marked on Oslo Airport's Facebook page with a call for tips to reduce food waste

## Circular economy

Oslo Airport has started a process and planned for a stepwise transition to a more circular airport.



The "Butterfly Diagram" as an illustration of circular economy (ref. Ellen MacArthur Foundation)

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 buildings, among other things.



Logo for the TULIPS project

Oslo Airport also participates in Romerike Circular Economic Network, which is a newly established professional corporate network within circular economy for public and private actors in the Romerike region with the aim of identifying future circular value chains that can create new jobs. Here we look at material/waste flows to find opportunities for where and how to industrialize, what to invest in, and where there may be new value chains and new business ideas.



# 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 an important element in environmental policy and contribute to reducing Oslo Airport's environmental impact. Opportunities for waste reduction, reuse and material recycling are often already decided upon when procuring products and services for the airport. They also provide economic benefits beyond protecting and preserving the environment. Through the procurement process, we can influence suppliers in several sectors in a more environmentally friendly direction.

Oslo Airport has ambitions and sets requirements within, among other things, reduction of greenhouse gas emissions, waste management and minimization, use of environmentally friendly products and chemicals, noise and protection of the natural environment.

Requirements are set for environmental certification or equivalent in a qualification basis when relevant, furthermore quality requirements are set and award criteria where the suppliers compete to deliver the most environmentally friendly solutions, products, materials and services.

Further environmental requirements are set in all contracts with players operating in the airport area and in all our building and construction projects, and continuous work is being done to further develop the environmental requirements in line with the industry's development.

Oslo Airport focuses on the environment through the projects' life cycle, through early identification of environmental challenges and possible environmental ambitions for the project. Environment is part of the project management system as a separate process. For major building and construction projects, environmental follow-up plans are prepared that consider the environment in all phases and ensure environmental considerations in the choice of materials and solutions.

We work systematically with substitution and reduction of the number of chemical products. All products used must

satisfy environmental requirements from local and central authorities.

## Status, consumption of products and materials 2021

In 2021, specific environmental/climate requirements have been set for procurement of vehicles, contractor service and requirements for both operation, product selection and interior design in new agreements in the food & beverage category.



*Pop-up in tax-free with a sustainability focus on sales products and interior design*

Oslo Airport is almost 25 years old and several systems are nearing the end of their service life and must therefore be replaced or modernized. In 2021, the oldest luggage facility at Oslo Airport will be disconnected, dismantled and demolished. The project has good resource utilization as a main strategy. Some of the old facility is given new life through reuse at other Avinor airports. Other parts are given to technical schools in the area that will be used in practical learning. Once recyclable parts have been removed, virtually all of the remaining materials are sorted for material recycling.



*Gentle demolition for reuse options*



*Lot of tonnes of metals for material recycling*

# 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 that lives at the airport.

## Status, biodiversity 2021

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 certain amount of spraying with pesticides. Combating measures have continued since, with a focus on avoiding spreading into valuable natural areas.

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



*Bustling insect life also in the park where pollinator-friendly flowers are seeded*



*Sign in the park with information for visitors about pollinators and Oslo Airport's actions*



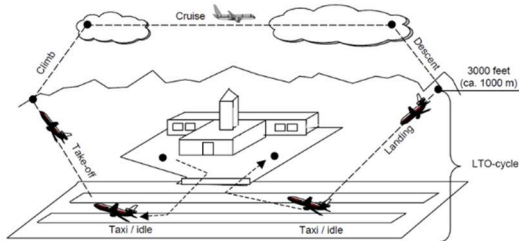
*The area around Trandum is one of the few core areas for red-buttoned sand bees (critically endangered) in Norway. The species is completely dependent on red button flower as a source for pollen*

## 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 µg/m<sup>3</sup>) that occur in central urban areas".

## Status, emissions to air 2021

In 2021, Oslo Airport did not carry out measurements of air quality, but we plan for new measurements in 2022/23. Previous years' measurements show values well below regulatory requirements and national targets.



*Aircrafts and vehicles are the most important sources of emissions locally at the airport.*



# KEY FIGURES

		2017	2018	2019	2020	2021
<b>Air traffic</b>						
Passengers	number in thousands	27 458	28 510	28 572	9 022	9 398
Aircraft movements	number in thousands	243	249	244	117	125
Passengers per aircraft movement	number	113	114	117	77	75
<b>Public transport share</b>						
Public transport share for surface access	%	70	71	72		
<b>Noise</b>						
Change in total noise impact relative to reference year 2000	dBA	0,1	0,4	-0,1	-2,9	-5,2
Inquiries, aircraft noise (persons)	number	245	150	183	72	68
<b>Energy</b>						
Total consumption of electricity	GWh	117	120	117	99	98
Electricity for electricity-specific installations	GWh	111	112	113	96	95
Purchased heating and cooling energy	GWh	34	36	31	30	36
Electricity for electrode boiler	GWh	6	8	4	3	4
Electricity for compressors, pumps, etc.	GWh	9	11	11	10	9
Statkraft Varme AS	GWh	16	15	17	16	23
Heating oil (Energy central)	GWh	4	2	1	1	1
Recovered energy	GWh	31	36	33	35	27
Consumed heating and cooling energy	GWh	65	71	64	65	64
<b>Non-renewable resources / biofuel</b>						
Jet fuel	m <sup>3</sup>	672 000	700 000	693 600	288 000	280 963
Heating oil/diesel	m <sup>3</sup>	465	220	104	26	22
Bio heating oil	m <sup>3</sup>	60	64	63	80	134
Fuel for Oslo Airport vehicles*	m <sup>3</sup>	783	1 011	254	53	15
Biofuel for Oslo Airport vehicles*	m <sup>3</sup>	178	250	1 009	528	598
Fuel for fire drills (paraffin/Jet A1)	m <sup>3</sup>	17	13	0	0	0
Fuel for fire drills (propane)	tonnes	0,3	0,9	0,0	0	0,2
<b>Waste</b>						
Sorted waste	tonnes	5 498	3 323	2 620	1 091	949
Residual waste	tonnes	3 342	3 175	3 096	1 280	1 208
Total amount of waste	tonnes	8 840	6 498	5 716	2 370	2 157
Source separation rate	%	62	51	46	52	44
Hazardous waste	tonnes	178	111	151	274	152
<b>Greenhouse gas emissions</b>						
Control - Oslo Airport emissions	tonnes CO <sub>2</sub>	6 055	5 491	3 036	1 687	1 411
Control - Oslo Airport emissions , kg per passenger	kg CO <sub>2</sub> /passenger	0,221	0,193	0,106	0,187	0,150
Guide- third party emissions	tonnes CO <sub>2</sub>	82 803	88 806	79 286	3163**	46 443
Impact - third party emissions	tonnes CO <sub>2</sub>	198 538	203 278	200 484	0**	93 159
<b>Water supply and sewage</b>						
Water consumption	m <sup>3</sup>	277 000	271 000	246 000	131 700	132 500
Wastewater volume	m <sup>3</sup>	337 000	341 000	336 000	159 000	163 500
Drainage water volumes	m <sup>3</sup>	1 444 000	1 411 000	1 660 000	2 185 650	2 161 000
<b>De-icing chemicals (per season)</b>						
		2016/17	2017/18	2018/19	2019/2020	2020/2021
<b>Aircraft de-icing</b>						
Total consumption, glycol	tonnes	1 579	3 785	3 340	2 080	1 816
Specific consumption, glycol	kg/aircraft	147	210	211	186	248
Collection rate for glycol	%	81	84	81	76	78
<b>Runway de-icing</b>						
Aviform L50	m <sup>3</sup>	2164	2102	1383	1609	708
Aviform S	tonnes	252	672	290	356	193
* The figure includes airside bus services and winter maintenance						
** Emission figures are not complete						