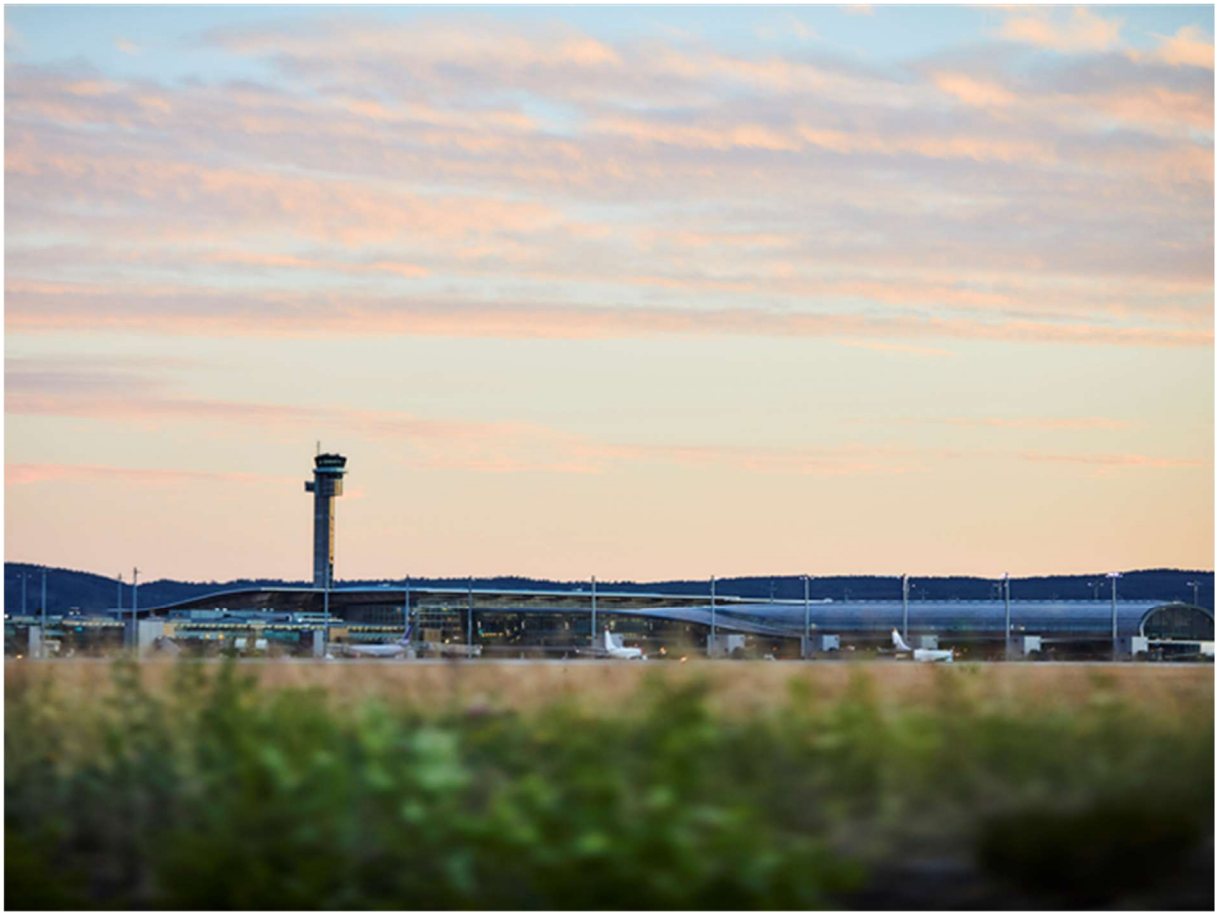

Environmental report 2019

AVINOR OSLO AIRPORT

CONTENTS

ENVIRONMENTAL STATUS

Oslo Airport is Norway's largest and most important traffic hub, as well as one of the country's largest workplaces. Avinor's environmental policy, strategy and goals form the framework for our environmental work. To be successful, it is crucial that environmental considerations are integrated both in day-to-day operations, in the procurement of products and services, and in the planning and implementation of construction projects.

We are certified according to the EN-NS ISO14001 environmental standard, which ensures good environmental management in our everyday lives. An important point on our strategy map is "Green Airport" and with that we want high environmental performance which in turn strengthens our reputation. While we conduct innovative work and are pioneers in many fields, all the work that is done every day through good routines and solid experience is crucial to being able to operate the airport with the least possible environmental impact.

The focus on the climate challenge has been central in 2019. We will facilitate further development and expected growth in air traffic and at the same time ensure that this does not conflict with national climate targets and international climate commitments. We do this through Avinor's climate program, which not only focuses on aviation electrification and phasing in jet biofuels, but also measures to reduce our emissions related to airport operations. As the largest airport, emissions reduction measures here at Oslo Airport are crucial to Avinor's climate goals.

Oslo Airport is accredited at the highest level in the European industry scheme Airport Carbon Accreditation (ACA). We are also at the top of the world in terms of public share for the customer service and have solid experience with curved approaches to limit both noise and greenhouse gas emissions.

A very important emission reduction measure in 2019 has been the phasing in of over a million liters of biodiesel into our vehicles. All energy for heating buildings is also now being prepared for the transition from fossil to bio-based fuel. Today, we have a high number of electric car charging stations at the airport and work has begun to meet the growing demand for charging opportunities for an ever-increasing number of electrified handler equipment. Furthermore, we are waiting in anticipation for eight electric buses that will run between the terminal and remote parked aircraft, and the necessary technical infrastructure for phasing them in is being established. In 2019, through both management measures and major investments, there has been extra focus on reducing energy consumption. With energy management and active energy monitoring, several simple but good measures have been found that show that there is a lot to save on energy use.

We always have the responsibility for reducing the consumption and emission of chemicals, as well as monitoring the impact of airport operations on the surrounding environment. In 2019, we started a new project, Groundwater 2030, with the aim of improving the understanding of the long-term effects of de-icing chemicals on ground and groundwater, both to assess and optimize existing measures, and to explore opportunities for developing new ones. Furthermore, it now appears that we have effective measures for the PFOS contamination we have at the airport after historic use of PFOS-containing fire foam; with established groundwater and stormwater treatment plants, as well as excavation of soil masses that are heavily PFOS contaminated.

For Oslo Airport, it is important to support various national and international initiatives. For example, we are following up the national strategy to ensure viable populations of wild bees and other pollinating insects by offering our small flying friends four areas with a total of 140 000 m^2 which we give special care to make them good habitats. Furthermore, we seek to comply with the requirements and intent of the EU Directive on lightweight plastic bags by introducing requirements in 2019 that all commercial operators in the terminal must now pay for plastic bags. Part of the profits goes to the The Norwegian Retailers' Environment Fund and the rest of the profit goes to Avinor's own Environmental Fund, which is earmarked for environmental initiatives under the auspices of Avinor with partners.

Oslo Airport's environmental report for 2019 shows the status of the focus areas climate, aircraft noise, water and soil, as well as the other environmental aspects at the airport.

Gardermoen, April 2020

Stine Ramstad Westby
Managing Director

ENVIRONMENTAL MANAGEMENT

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

Environmental policy

In order 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

his 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.


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AVINOR AS

Oslo Airport uses environmental management methodically to get an overall grasp 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 in 2019 received 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. Auditing is also an important tool and an internal audit of Oslo Airport's environmental management was conducted in 2019 in preparation for the ISO14001 audit.

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.

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.

Green Airport

"Green Airport" is a strategic objective for Oslo Airport. This involves improving performance and understanding the mechanisms that influence our environmental reputation. Through the change of infrastructure and processes, we will reduce our environmental impact through continuous improvement, innovative solutions and focusing on the most effective measures. Through open and active communication, Oslo Airport will strengthen our environmental reputation.

«Green Airport»

TRANSPORT AND CLIMATE

By 2020, 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.

Oslo Airport's proportion of public transport should be 70 percent by 2020 and 75 percent by 2030.

Greenhouse gas emissions in brief

The UN's climate panel has defined greenhouse gas emissions as the biggest challenge of our time. There is international agreement that the increase in the average global temperature must be limited to 2˚C compared to the pre-industrial era to avoid harmful climate changes.

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. 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.

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Oslo Airport has held accreditation to the Airport Carbon Accreditation scheme (ACA) at the highest level since 2009. 295 airports are now certified in the ACA, of which 62 are on "Neutrality" level (January 2020). The ACA scheme operates using emissions categories linked with the degree of control the airport operator has over its activities.

ACA comprises four accreditation levels: mapping, reduction, optimisation and neutrality. For 2019, Oslo Airport will still have the accreditation at the highest level (3+ neutrality). This requires Oslo Airport reducing its own 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.

ACA-levels

The Oslo Airport Energy Central is subject to the regulations regarding GHG emissions allowance trading and Oslo Airport compensates for greenhouse gas emissions through trade in the European Emissions Trading System (EU ETS). To compensate for the remaining greenhouse gas emissions under Oslo Airport's control, annual investment is made in emissions allowances through the UN's CDM, Clean Development Mechanism.

For 2019, it was invested in the project "Improved Cook Stoves Program for Malawi and cross-border regions of Mozambique". (Project: POA 9558)

Status, climate 2019

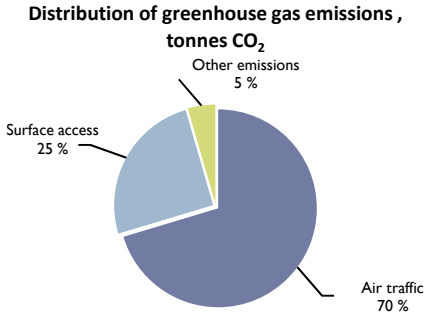
The greenhouse gas inventory for Oslo Airport, 2019:

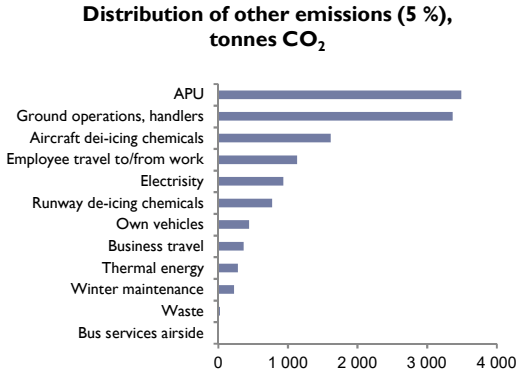
Control ***Directly controlled by the airport operator***	Guide/manage ***Carried out by a third party, but central to the operation of the airport***	Influence ***Independently carried out by a third party***
Own vehicles (including airside bussing) Thermal energy Runway de-icing Fire drills Purchased 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. 1000 m above airport level Surface access Employee commuting Not mapped: Business operations for tenants and lessees Transport of goods and services
3 036 tonnes	**79 2866 tonnes**	**209 484 tonnes**

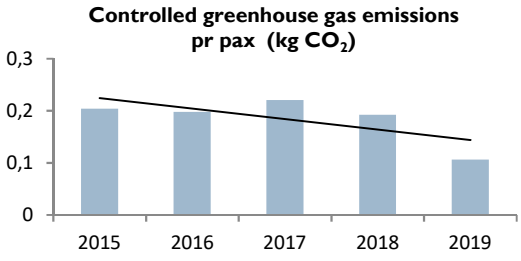
Several records in the greenhouse gas inventory are unpredictable and greatly dependent on winter conditions. This is primarily applicable to the areas of Oslo Airport-owned vehicles, thermal energy and de-icing. Remote heating from Statkraft Varme AS is not included in the carbon inventory, in the same way as 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.

The figure shows the distribution of greenhouse gas emissions at the airport. The major sources of emissions at Oslo Airport are the LTO cycle (i.e. emissions from aircraft below 3 000 feet; approach, landing, taxiing, take-off and climb out) and surface access (passengers' emissions on their way to the airport). The remaining emissions, which account for five percent of total emissions, are specified in the figure below



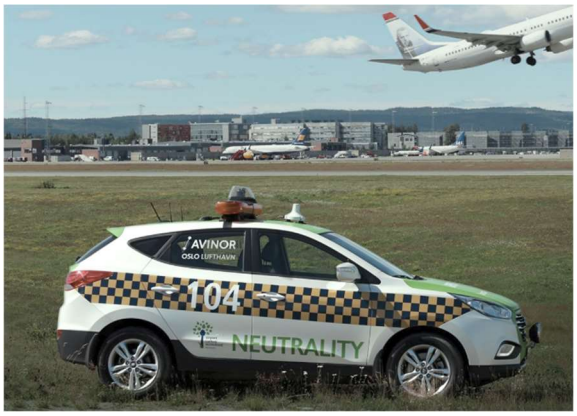




Vehicles

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. Bio-diesel used by Avinor does not contain palm oil or palm oil derivatives and conforms to EU sustainability criteria. A new framework agreement for the supply of advanced biodiesel was negotiated in 2019. Advanced biodiesel is used in vehicles that cannot be easily electrified, such as snow blowers and sweepers. Oslo Airport does not include emissions from biodiesel or bio heating-oil. In 2019 Avinor stepped up the phasing in of advanced biodiesel. The mixing ratio of biodiesel for Oslo Airport's entire fleet of machinery rose sharply from 20 percent in 2018 to 81 percent in 2019. This equates to around one million liters of advanced biodiesel. Furthermore, our partners at the airport have also fueled with biodiesel.

At the end of 2019, the vehicle fleet of administrative vehicles at Oslo Airport consisted of 19 zero-emission vehicles and the electric car park went a total of 46 843 km. Together with refueling biodiesel, this combined resulted in a reduction in greenhouse gas emissions of 2 742 tonnes of CO_2. Oslo Airport now has approximately 850 charging options for electric cars and a new charging infrastructure has been introduced in the parking garages.



Electric vehicles in daily operation

When procuring vehicles in Avinor, an assessment must always be made as to whether a vehicle with an internal combustion engine (ICE) can be replaced with an electric vehicle. A project at Oslo Airport saw the replacement of eight airside ICE buses with eight electric ones. The decision was made in June 2019 and the buses are scheduled to be delivered to the airport in the second quarter of 2020. The project is funded by Enova and involves the purchase of eight 18-metre buses from VDL and the associated charging infrastructure (Heliox). The buses will carry passengers between the terminal and aircraft parked at remote stands. It is expected that the transition from ICE buses to electric buses will save Oslo Airport around 170,000 liters of fuel per year. The agreement for electric airside buses, including infra-structure, is a framework agreement.

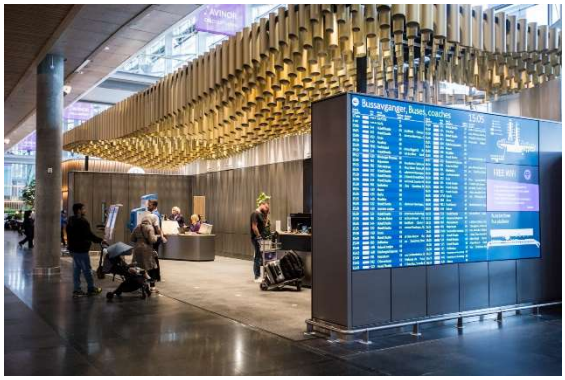
Oslo Airport's airside buses will look as shown in the picture above. Due to visibility requirements on the aircraft side, the buses are yellow.

Surface access

The surface access share, i.e. how our passengers come to and from the airport, was 72 percent in 2019. In order to boost the range of services to passengers, reduce greenhouse gas emissions, and improve local air quality, Avinor wants to be a driving force behind enabling as many journeys as possible to and from the airports to be made by public transport.

A particularly challenging group are those who are driven to or picked up at the airport by private car. Oslo Airport is working with incentives to get these to use public transport. A vehicle sign recognition solution introduced in 2018 implies that the vehicles must pay for a stay beyond a given free time. This may help to encourage car users to switch to public transport.

Most measures for increasing the use of public transport fall outside of the airports areas of responsibility and require co-operation with several other stakeholders. The most important contribution is to provide infrastructure at its airports and useful information about services to passengers. Oslo Airport improved its public transport information considerably in 2019 with the opening of a new information center.



New information center in the Arrivals Hall

Information boards and vending machines, as well as service to assist passengers with ticket purchase and choice of transport.

Air traffic

The first flights using blended jet biofuel in Norway were conducted by SAS and Norwegian in November 2014. In January 2016, Oslo Airport – in collaboration with AirBP, Neste, SkyNRG, Lufthansa Group, KLM, and SAS – became the first international airport in the world to mix biofuel in the regular fuel supply system and to offer biofuel to all airlines fueling there.

Access to jet biofuels has been very limited, but in 2019 Avinor signed an agreement worth NOK 8 million for the advance purchase of fuel from the Norwegian company Quantafuel. The agreement with Avinor and funding from Enova will enable Quantafuel to establish biofuel production using biomass from Norwegian forestry.

Jet biofuel is an important measure

From 2020, a requirement of 0,5 percent biofuel has been introduced as a proportion of all aviation fuel sold in Norway (except for the Armed Forces). Norway is the first country in the world with such a requirement. The biofuels are required to be so-called advanced; i.e. fuel that is made of waste and residues.

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

Electrification of aviation

Improved navigation technology allows for more accurate and flexible entry and exit procedures. Through curved approaches, the aircraft can fly shorter and reduce fuel consumption and greenhouse gas emissions. The 6,1 percent curved approach to Oslo Airport in 2019 resulted in a reduction in emissions of approximately 600 tonnes of CO_2. 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 ground contamination or reduce the environmental status of the water environment.

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 that 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 meltwater contains a quantity of de-icing agent, and this is collected and treated. The natural groundwater level has been lowered along the west 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 concentrated before being transported and reused as industrial glycol. Wastewater and some of the collected de-icing chemicals (glycol and formate) are treated at the Gardermoen treatment plant.

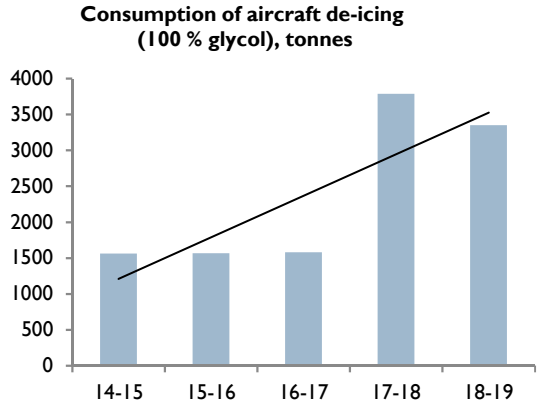
Climatic conditions vary considerably between the individual seasons: snow volume, days involving frost on aircraft, temperatures, wind, etc. This manifests in differences in the consumption of de-icing chemicals – in terms of quantity, mixing ratio and the use of different liquid types – and how this 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.

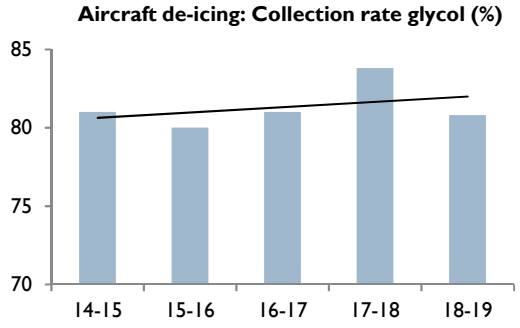
The biggest challenges in water and soil are linked with increased traffic volumes in combination with a wilder, humid winter climate. This increases the consumption of de-icing chemicals, which in turn means that larger volumes of de-icing chemicals must be degraded in the soil above the groundwater. Contaminated soil from activities prior to the opening of the airport also presents challenges in local areas.

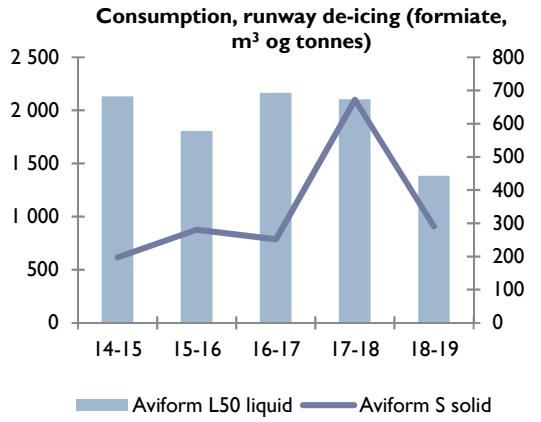
Status, water and soil (2018/19 season)

De-icing

Total consumption of aircraft de-icing chemicals during the 2018/2019 season was at the same level as last season. The weather conditions were similar the previous year and did not result in a noticeable change in total consumption. The collection rate for aircraft de-icing chemicals was 80,8 percent in the 2018/2019 season. For liquid runway de-icing chemicals, consumption was lower than last year, and consumption of the solid chemical was below half of last year's level.







Aircraft de-icing

Runway de-icing

Groundwater discharge violations were detected in nine groundwater wells during 2019 (formate and glycol). Several of these wells are located west of the western runway. Higher values were detected in only one of the wells over a long period of time compared to the remaining wells. Sampling was conducted in all these wells until de-icing chemicals were no longer detected in the samples.

In Sogna, one violation of the discharge permit was detected during the winter season 2018/2019 (oxygen). This was due to relatively high temperatures in the transition between winter and the summer season, which affected measured oxygen content.

According to the permit from Nannestad municipality, no more than 20 mg/l of oil per day should be discharged, which is an annual average. The annual average for 2019 was lower than this limit.

Management of air injection

. 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.

During the de-icing season, other measures are also considered and implemented. One of these is the fertilization of the relevant areas with sodium nitrate. 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 of measures.

Soil ontamination

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 2019.

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 plants that purifies PFOS from groundwater and stormwater with good results. In 2019, the Norwegian Environment Agency has granted permission for excavation of parts of the area that are heavily PFOS contaminated (areas with an average concentration above 1000 µg/kg). Lots of analysis has been done and detailed plans are established for the excavation to be initiated in 2020. At the PFOS-contaminated site by the hangar, the pumping action to stop the PFOS spread has, with permission from the Norwegian Environment Agency, ended. The measure has been followed up with regular sampling to monitor possible spread from the area to groundwater and downstream recipients.

Use of fire-fighting foam has led to the large concentrations of PFOS in ground and groundwater at Oslo Airport.

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.

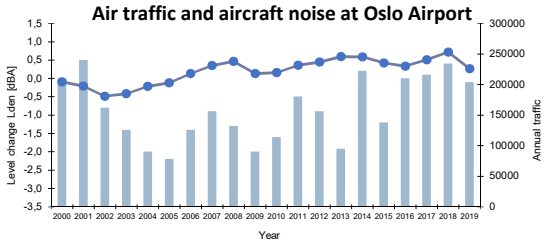
Oslo Airport's NTMS records the aircraft noise level continuously at 11 points around the airport

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.

Status, aircraft noise 2019

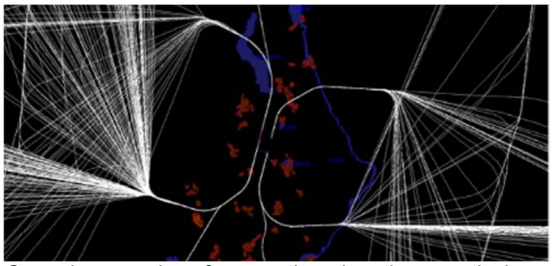
The figure shows the development of aircraft noise and air traffic volumes at Oslo Airport between 2000 and 2019. Total noise emissions (L_{den}) from all registered traffic are calculated for each year. According to this, there are changes in level calculated for every year from 2000, and these are 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 0,5 dB from 2018 to 2019, while the number of aircraft movements was reduced by 10,8 percent. The change in the level is partly due to the phasing out of the aircraft type Boeing 737-600, while the proportion of newer aircraft of the aircraft type B737-800 and Airbus Neo increased further in 2019.



The noise level for 2019 was 0,1 dB below the 2000 level, based on calculations for all registered traffic. The traffic increase from 2000 to 2019 on 21 300 aircraft movements corresponds to a level increase of 0,43 dB over 2000 traffic. This means that new modern aircraft types have more than compensated for the increase in traffic.

On 26 May 2016, a revised noise regulation issued by the Civil Aviation Authority took effect 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.



Curved approaches, from south and north respectively

In 2019, 7 046 curved approaches were completed, i.e. 6,1 percent of all. Re-paving of the eastern runway in the summer, as well as many do not have approval to fly it in the IMC, were the reasons why the proportion was not greater. The total number of curved approaches since 2012 is 32 836.

Oslo Airport had aircraft noise complaints from 183 people. The inhabitants of Ullensaker, Eidsvoll and Nannestad account for the largest proportion. The increased number from last year is probably because the eastern runway was closed during the summer for re-paving.

An operational concept and updated noise mapping for a third runway, western alternative has also been carried out.

ENERGY

Avinor will reduce purchased energy by 25 percent by 2020 compared with energy consumption in buildings and constructions in 2012.

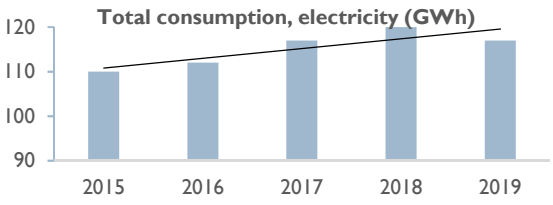
Energy in brief

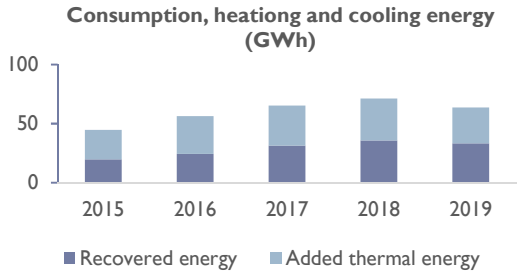
The energy system that supplies Oslo Airport's buildings, tenants and road heating systems with energy for heating and cooling consists of a remote heating plant, a remote cooling plant, a snow cooling plant, a groundwater plant and a wastewater heat exchanger system (sewage).

The remote heating plant ensures that the buildings are kept sufficiently warm in winter. This plant uses water-based heating. Oslo Airport has its own remote heating plant and uses remote heating from Statkraft Varme AS, which uses woodchips. The remote cooling plant ensures that the buildings are kept sufficiently cool in summer. Snow which is stored during the winter season in a large basin, and the melting water is used for cooling the terminal on days in the summer with extra cooling needs. The groundwater plant provides interim storage for surplus energy. Large heat pumps, groundwater wells, heat exchangers to sewers (from the municipality of Ullensaker's treatment plant) and surface water provide the primary contribution to Oslo Airport's high percentage of renewable energy. The fossil fuel boilers have low priority and are used only for test operation and during periods when Statkraft Varme and the electric boiler are unable to supply enough energy.

Status, energy 2019

In 2019, large investments and active energy management was implemented to achieve the energy target. Several measures resulted in a total saving of 1,4 GWh/year.





New LED lighting has been installed in both Sweeper halls and parts of PMZ. A contract has also been signed for the replacement of all flood lighting around the terminal with new LED lighting. The measure will improve safety, save electricity, and reduce power consumption. The switching is coordinated with the development of the non-Schengen east, so the actual replacement has not started.

Scheduled for switching to LED lighting.

Three new energy-efficient rotor recyclers in the terminal are installed and a new heat exchanger will help to recover further 3-4 GWh of heat energy from the treatment plant in Ullensaker

Several management measures have been detected and implemented through the energy management working group. For example, blanking pedestals on existing lights in Hangar 8, motion sensors and night lowering in Pir Syd, night lowering of lighting in Pir Nord and SBV, as well as automatic control of ground heating systems at the apron. In total, the management measures have yielded savings of around 2 GWh. Several of the measures were detected via night surveys, which were carried out on two occasions in 2019, in January and in June.

During 2019, all fossil heating oil was phased out and replaced with bio heating oil. Even the tanks supplying the oil boilers in the energy center are prepared to only use the biofuel HVO from 1 January 2020. Only the reserve power units still run on fossil diesel.

The Energy Center at Oslo Airport.

The energy monitoring system (Optima) was further developed and new energy meters has been installed. Power meters at Central Building West and Pir Nord are now included in Optima. In addition, some structural changes have been made to the system that make it easier to find buildings / meters and retrieve relevant consumption data.

In 2019, Oslo Airport applied for an Enova-supported concept study for thermal energy. The project was planned to be a collaboration project with both Statkraft Varme and Oslo Airport City, where good interconnection solutions for thermal energy supply between the various companies would be considered. Unfortunately, the application was rejected because the concept study was not linked to a specific building project.

WASTE

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.

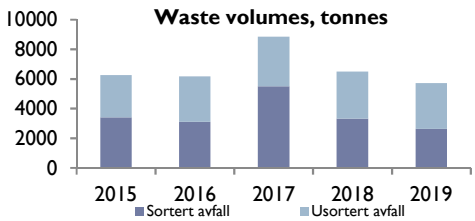
All companies at the airport participate in a joint waste management scheme whereby all waste is handled by the same waste handling company. The waste management scheme is flexible, and waste fractions, container sizes and collection rates are adapted according to set requirements. Waste is separated at source and dropped off at waste collection points. Waste generated in the public areas of the terminal is transported to a central waste collection point by means of a waste extraction system. The administration building and Flyporten are also connected to this disposal system. 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.

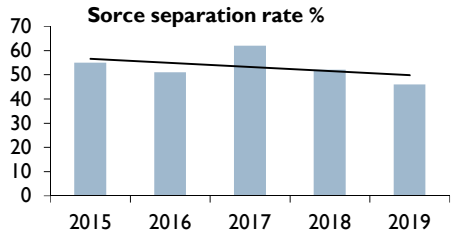
Source sorting of waste in the terminal.

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 2019

The total amount of waste for the entire airport in 2019 was 9 672 tonnes. The amount of waste invoiced via Oslo Airport was 5 716 tonnes. Sorted waste amounted to 2 620 tonnes and unsorted waste 3 096 tonnes, which gave a sorting rate of 46 percent.





The collection of recyclable beverage containers made of aluminum and PET (plastic) from the aircraft continued in 2019. SAS, Thomas Cook and Sodexo are all taking part in this scheme. A total of 28,7 tonnes of recyclable material was received from this initiative. The airlines donate surplus revenues from deposits and aluminium returns to charity. Oslo Airport also works with the Norwegian Red Cross to handle beverage containers collected from public areas in the terminal building. This assignment has been delegated to the local Red Cross division in Ullensaker. The Red Cross is responsible for receiving, sorting and returning bottles efficiently and can spend the profit from deposits as it pleases.

Water refilling stations reduce waste

In April 2019, Avinor introduced payment for plastic bags at all airports. Part of the profits goes to the Trade Environment Fund and the rest of the profits go to Avinor's own Environmental Fund to support measures with the ambition to reduce climate and environmental footprints in connection with commercial activity at airport. After payment was introduced, Avinor sees a 20 percent reduction in bags in 2019 compared to 2018. New shopping bags with less plastic per bag and a proportion of recycled plastic have also been designed. This new bag will be phased in by 2020.

Food waste

In order to minimize food wastage from restaurants and kiosks at the airport, several has started a pilot project with the app "TooGoodToGo" where food, which would otherwise had been ended as waste, was sold at a strong reduced price.

PURCHASING, BUILDING AND CONSTRUCTION PROJECTS

Consumption of products and materials in brief

Oslo Airport, through Avinor's centralized purchasing function, undertakes procurement for services, products and materials by means of purchases linked with regular operation or via construction projects for significant sums. The processes ensure that all purchases are made in accordance with public procurement regulations.

Environmental requirements in procurement processes are an important element in the environmental policy and help to reduce Oslo Airport's environmental footprint. They also provide financial benefits beyond safeguarding and preserving the environment. Through the acquisitions we can influence suppliers in several sectors in a more environmentally friendly direction.

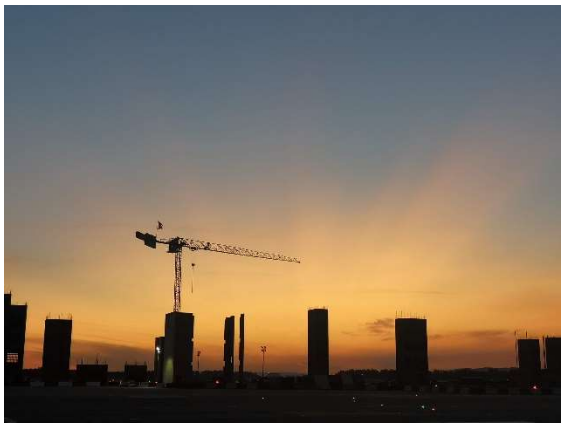
Oslo Airport has ambitions and sets requirements in areas such as reducing greenhouse gas emissions, waste management and minimisation, soil handling, the use of environmentally friendly products and chemicals, noise, and the conservation of the natural environment.

Environmental certification requirements or equivalent qualifications are required where applicable, quality requirements are set as well as award criteria where suppliers compete to deliver the most environmentally friendly solutions, products, materials and services.

Status, consumption of products and materials 2019

Environmental requirements are set in all contracts with actors operating at the airport and in all our construction projects, and continuous efforts are being made to further develop the environmental requirements in line with the industry's development.

Oslo Airport focuses on the environment throughout the life cycle of the projects, including 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 external environment at all stages and ensure environmental considerations in the choice of materials and solutions.



Development of the non-Schengen east (UNSØ project).

For products and services that have significant environmental impact, environmental documentation is required. Systematic work is done on substitution and reduction of the number of chemical products. All products used must meet environmental requirements from local and central authorities.

Environment is given high priority to acquisitions that are considered to be of great importance for the environment. For example, specific environmental requirements have been set for the procurement of buses operating on the airside, and in the framework agreement for biodiesel and for fire fighting foam.

Strict environmental requirements for biodiesel used on the sweepers.

NATURAL ENVIRONMENT

Biodiversity in brief

Oslo Airport has mapped and charted 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, black-listed 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.

Status, biodiversity 2019

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. Major efforts to combat these 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 dispersal into valuable natural areas. However, clearance is a long-term project and will require efforts for several years to come.

Area with custom care for pollinating insects.

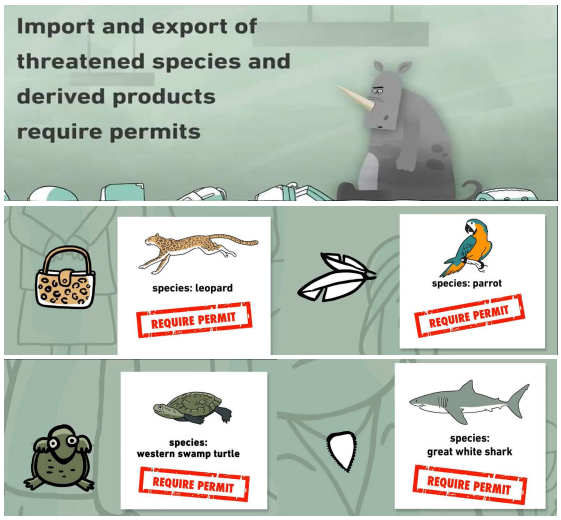
Both inside and outside the airport fence, areas with lots of flowers are good habitats for a wide variety of insects. Especially plants in the pea flower family are important for long-tounge, red-listed bumblebees, such as the critically endangered “Kløverhumle” that lives at the airport. In 2018, the government presented a national pollinator strategy to secure viable populations of wild bees and other pollinating insects. Oslo Airport follows the strategy and has defined four areas with a total of 140 000 m^2 which are good habitats for pollinating insects. These have been followed up with special measures in 2019, including adjusted frequency for mowing, avoidance of pesticides, and cutting each individual blacklisted species using grass trimmer.

Park outside the terminal where selected flower seeds are sown to create good insect habitat.

Vibrant insect life in the 52 flowerpots on the bars in front of the terminal.

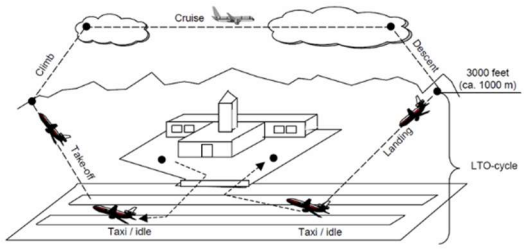
CITES

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, snakeskin, 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 bear 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^3) that occur in central urban areas".

Status, emissions to air 2019

In 2019, Oslo Airport did not carry out measurements of air quality. 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

		2015	2016	2017	2018	2019
Air traffic						
Passengers	number in thousands	24 657	25 766	27 458	28 510	28 572
Domestic	number in thousands	10 916	11 221	11 629	12 008	11 852
International	number in thousands	13 741	14 546	15 828	16 494	16 720
Aircraft movements	number in thousands	235	238	243	249	244
Passengers per aircraft movement	number	105	108	113	114	117
Public transport share						
Public transport share for surface access	%	69	70	70	71	72
Noise						
Change in total noise impact relative to reference year 200	dBA	-1,2	0	0,1	0,4	-0,1
Inquiries, aircraft nose (persons)	number	264	285	245	150	183
Energy						
Total comsumption of electricity	GWh	110	112	117	120	117
Electricity for electricity-specific installations	GWh	99	105	111	112	113
Purchased heating and cooling energy	GWh	25	32	34	36	31
Electricity for electrode boiler	GWh	11	7	6	8	4
Electricity for compressors, pups, etc.	GWh	9	9	9	11	11
Statkraft Varme AS	GWh	5	15	16	15	17
Heating oil (Energy central)	GWh	0	1	4	2	1
Recovered energy	GWh	20	24	31	36	33
Consumed heating and cooling energy	GWh	45	56	65	71	64
Non-renewable resources / biofuel						
Jet fuel	m^3	613 500	618 192	672 000	700 000	693 600
Heating oil/diesel	m^3	103	182	465	220	104
Bio heating oil	m^3	13	21	60	64	63
Fuel for Oslo Airport vehicles*	m^3	881	911	783	1 011	254
Biofuel for Oslo Airport vehicles*	m^3	9	83	178	250	1 009
Fuel for fire drills (paraffin/Jet A1)	m^3	15	18	17	13	0
Fuel for fire drills (propane)	tonnes	0,4	0,3	0,3	0,9	0
Waste						
Sorted waste	tonnes	3 410	3 111	5 498	3 323	2 620
Residual waste	tonnes	2 843	3 044	3 342	3 175	3 096
Total amount of waste	tonnes	6 254	6 155	8 840	6 498	5 716
Source separation rate	%	55	51	62	51	46
Hazardous waste	tonnes	59	62	178	111	151
Greenhouse gas emissions						
Control - Oslo Airport emissions	tonnes CO_2	5 031	5 093	6 055	5 491	3 036
Control - Oslo Airport emissions , kg per passenger	kg CO_2 /passenger	0,204	0,198	0,221	0,193	0,106
Guide- third party emissions	tonnes CO_2	93 922	96 570	82 803	88 806	79 286
Impact - third party emissions	tonnes CO_2	169 861	188 939	198 538	203 278	200 484
Water supply and sewage						
Water consumption	m^3	215 000	221 000	277 000	271 000	246 000
Wastewater volume	m^3	283 000	297 000	337 000	341 000	336 000
Drainage water volumes	m^3	2 205 000	1 870 000	1 444 000	1 411 000	1 660 000
De-icing chemicals (per season)		**2014/15**	**2015/16**	**2016/17**	**2017/18**	**2018/19**
Aircraft de-icing						
Total consumption, glycol	tonnes	1 491	1 437	1 441	3 785	3 348
Specific comsumption, glycol	kg/aircraft	146	142	136	211	212
Collection rate for glycol	%	81	80	81	84	81
Runway de-icing						
Aviform L50	m^3	2132	1806	2164	2102	1383
Aviform S	tonnes	198	281	252	682	290
* The figure includes airside bus sevices and winter maintanance carried out by Veidekke						