Environmental report 2017

OSLO LUFTHAVN

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ENVIRONMENTAL STATUS

Oslo Airport is Norway's largest and most important traffic hub, as well as being one of the country's biggest workplaces. Environmental consideration is entirely fundamental to the operation and development of business, and we must be associated with the environment in a positive way.

While we conduct innovative projects and are pioneers in many fields, daily work through good routines and solid experience is crucial for operating the airport with the least environmental impact.

The T2 project is now complete. The new part of the terminal building is certified with the "excellent" degree in "design stage" and "as built" according to the BREEAM environmental classification system. The building has also achieved passive housing standards. Oslo Airport has been a pioneer in setting environmental requirements throughout the project period, and has received a number of awards for the building. Special recognition has been received for innovative energy solutions and conscious choice of materials.

Oslo Airport is certified according to EN-NS ISO14001 environmental standards and Avinor's environmental policy and strategy forms the framework for our environmental work. An important point on Oslo Airport's strategic map is "Green Airport". With this we wish to perform well in our environmental work and strengthen our reputation. We are part of an international benchmarking where we measure our environmental footprint against 25 similar airports, and very pleasingly Oslo Airport is ranked on top.

Oslo Airport is also on top in terms of public transport and we are certified at the highest level in the European Airport Carbon Accreditation (ACA) scheme. Additionally, Oslo Airport now has solid experience with curved approaches to limit both noise and greenhouse gas emissions.

Furthermore, it is exiting to follow and see results of major projects such as the aeration project to improve the degradation conditions for de-icing chemicals, the handling of PFOS pollution and the newly launched test project regarding the drilling of geothermal energy wells. A small, but interesting project, was mapping of bumblebees both inside and outside the fence at Oslo airport to facilitate pollinators.

Oslo Airport's environmental report for 2017 shows the status of the main focus areas climate, air pollution, water and land, and the other environmental aspects at the airport.

Gardermoen, June 2018

Øivind Hasaas
Managing Director

ENVIRONMENTAL MANAGEMENT

Oslo Airport must maintain ISO14001 certification and ACA level 3+ certification, and achieve BREEAM status "excellent" for "design stage" and "as built" within the T2 project

Environmental policy

Avinor has adopted a group-wide environmental and corporate social responsibility policy in order to create a clear, collective direction for Avinor's environmental work.

Environmental and corporate social responsibility –policy

This policy describes general principles for the environment at Avinor, with the following objectives:

Environment: Avinor must improve its own environmental performance and act as a driving force for environmental work in the aviation industry.

Principles:

- 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 on 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 in order 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. In March 2014, Oslo Airport was certified according to EN-NS ISO14001: 2004 and is now a part of a common Avinor certificate according to ISO 14001:2015.


CERTIFIKAT

ISO 14001

Avinor AS

Oslo Airport uses environmental management methodically in order to maintain a comprehensive approach to environmental work both internally within the company and among other stakeholders at the airports. 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 and noise, 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.

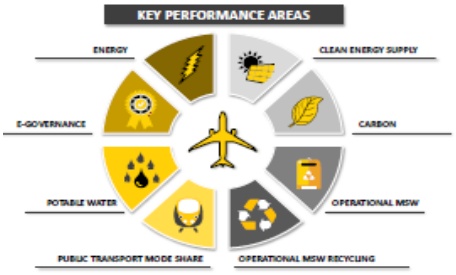
Risk assessments are an important tool in respect of environmental management and are used to prevent or mitigate potential unwanted events. Environmental risk analyses are carried out regularly in order to implement risk-reducing measures at the airport. Auditing is also an important tool and in 2017 an internal audit of Oslo Airport's environmental management was carried out in preparation for 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 OSL and Avinor. The purpose of this committee is to discuss challenges linked with noise and other environmental effects when expanding and running Oslo Airport. The committee must 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. Oslo Airport participates in an international benchmarking where Oslo Airport's environmental performance is assessed against 25 comparable airports around the world with respect to peak, latitude, altitude etc. The report shows that Oslo Airport is ranked as number 1.



Indicators included in the benchmarking

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 in order 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 of the company's own activities categorised as direct or indirect emissions, along with a selection of indirect emissions from other sources.

Oslo Airport has held accreditation to the European Airport Carbon Accreditation scheme (ACA) at the highest level since 2009. The ACA scheme operates using emissions categories linked with the degree of control the airport operator has over its activities. 210 airports in 47 countries are now certified to ACA, of which 36 are at "Neutrality" level (January 2018).

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. Airport Carbon Accreditation (ACA) comprises four accreditation levels: mapping, reduction, optimisation and neutrality. For 2017, Oslo Airport has 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 in order to compensate for remaining emissions.

Status, climate 2017

The greenhouse gas inventory for Oslo Airport, 2017:

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	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
6 055 tonnes	**82 803 tonnes**	**198 538 tonnes**

Promoting Oslo Airport ACA certification in the airport terminal

……and on monitors at the gates

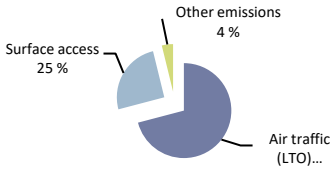
A number of the records in the greenhouse gas inventory are unpredictable and greatly dependent on winter conditions. This is primarily applicable to the areas of Oslo Airport-owned vehicles, thermal energy and de-icing.

Oslo Airport calculates electricity emissions even if the airport purchases electricity with the Guarantee of Origin.

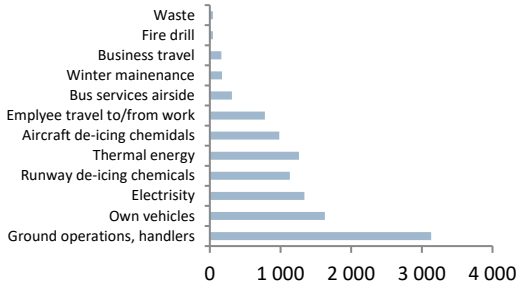
Remote heating from Statkraft Varme AS is not included in the carbon inventory, in the same way as recovered heat from Oslo Airport's groundwater wells and heat recovery units. Nevertheless, these forms of energy help limiting the need for procured electricity.

The 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 four per cent of total emissions, are specified in the columns in the figure below.

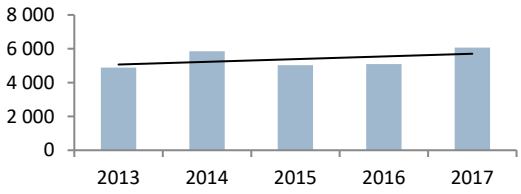
Distibution of greenhouse gas emissions at Oslo Airport, tonnes CO_2



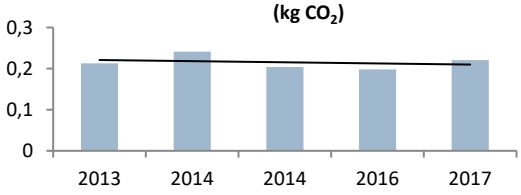
Distrbution of other emissions (4 %), tonn CO_2



Controllable greenhouse gas emissions (tonnes CO_2)



Controlled greenhous gas emissions per pax (kg CO_2)



To reduce greenhouse gas emissions, the transport sector must, increasingly, use alternative energy sources to fossil fuel. At Oslo Airport, we are paving the way for various energy sources to help reduce greenhouse gas emissions from the airport.

Norway's first flights using biofuel were done in November 2014. In January 2016, Oslo Airport, in collaboration with AirBP, SkyNRG, Lufthansa Group, KLM and SAS, became the first international airport with regular supplies of biofuel for all airlines refuelling at the airport. There was limited availability of jet biofuels on the market in 2017, and only 67 500 liters of jet biofuels were offered to Oslo Airport this year. The jet biofuel sold to the airlines in Norway is produced without palm oil or palm oil products.

In 2015 a test project for the use of biofuel for heavy snowploughs started, extended in 2016 for use on sweepers and wheel loaders. In the winter season 2016/2017, a snowblower was also successfully tested for 100 percent biodiesel. During the 2017 reporting year, the consumption of biodiesel accounted for about 20 percent of the total consumption of diesel in its own vehicle fleet. Avinor has a framework agreement for the purchase of second-generation biodiesel, a climate-neutral fuel that meets the EU's sustainability criteria and is also guaranteed without palm oil or palm oil products.

The fleet of administrative vehicles at Oslo Airport included 18 zero emissions vehicles at the end of 2017. The hydrogen car went 10 914 km in 2017 and the electric cars totalled 49 715 km. In addition, it was tanked 176 481 litres of biodiesel. This resulted in a reduction in greenhouse gas emissions of less than 500 tonnes of CO_2. As of 2017, Oslo Airport offered chargers for electric cars and the number will increase to over 800 in 2018. It is planned for a completely new charging infrastructure and procurement process has been initiated.

Public transport share

Oslo Airport is working to increase the public transport share at the airport. Surface access – in other words, how our passengers get to and from the airport – is our second biggest source of greenhouse gas emissions. The public transport share was 70 per cent in 2017.

Oslo Airport has the highest public transport share in Europe

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.

Oslo Airport must see annual improvement in the degradation conditions in the soil and groundwater in areas under high stress along the runways.

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 in order 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.

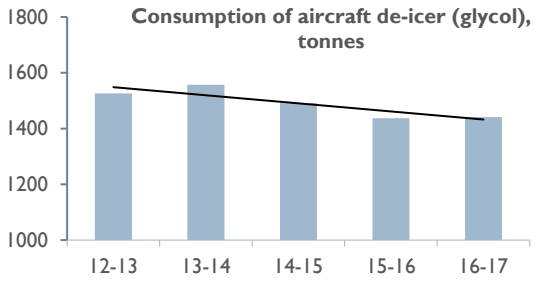
Climatic conditions vary considerably between the individual seasons: snow volume, days involving frost on aircraft, temperatures, wind, etc. This manifests in differences in the consumption of de-icing chemicals – in terms of quantity, mixing ratio and the use of different liquid types – and how this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

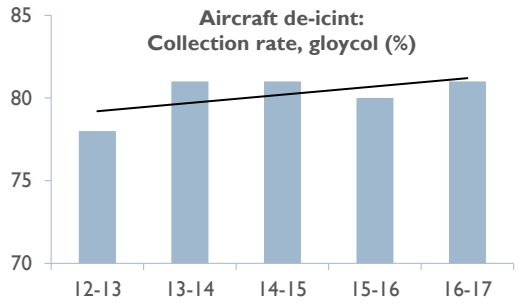
The biggest challenges in the area of water and soil are linked with increased traffic volumes in combination with a wilder, humid winter climate. This increases the consumption of de-icing chemicals, which in turn means that larger volumes of de-icing chemicals have to be degraded in the soil above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

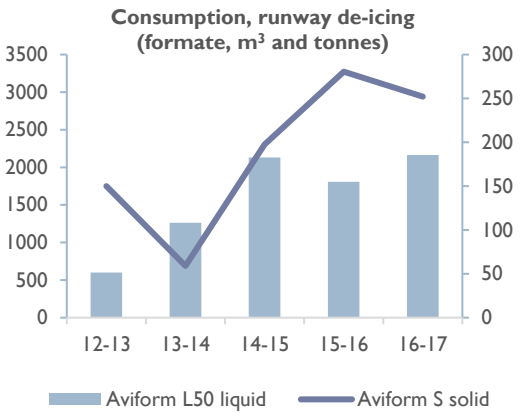
Status, water and soil (2016/17 season)

De-icing

Overall consumption of aircraft de-icing chemicals is slightly lower than in the previous season, while the consumption of runway de-icing chemicals is also slightly higher than in the previous season. The collection rate for aircraft de-icing fluid was 81 per cent during the 2016/17 season.







Aircraft de-icing

Runway de-icing

Seven minor violations of the emissions permit for groundwater were detected in 2017 (formate, glycol, acetate and oil). Measures such as pumping groundwater to the municipal wastewater system, alternative pumping and re-infiltration of the groundwater and ongoing air injection at the south end of the west runway – which is the area most heavily affected by de-icing chemicals – were implemented. These measures were also followed up with sampling so that the effects of the measures could be documented.

Three violations of the discharge permit were detected in the waterways during the 2016-2017 winter season. No exceeding of the limits for discharge of water containing oil from the fire drill site to the municipal wastewater network was recorded in the 16 samples taken.

Management of air injection

For a number of years, Oslo Airport has evaluated what long-term effects the de-icing chemicals used on runways and taxiways have on the soil and groundwater. One limiting factor for local decomposition in the most critical areas is access to oxygen. 2011 heralded the start of a pilot project where the objective was to see the effect of injecting air to the soil and groundwater. This pilot project showed good results and has demonstrated that it will help in the long term to re-establish natural conditions in the soil if sufficient oxygen-rich air is added to the ground. The next stage of the project commenced in spring 2016 by the drilling of 65 ventilation wells and connection to three air aggregates that ensure air is pumped out to the wells.

Measures such as fertilisation of the relevant areas with sodium nitrate, providing bacteria with enough nutrition to break down the de-icing chemicals, were also assessed and implemented during the de-icing season. Snow containing chemicals from the stressed areas along the runway is removed, and pumping and irrigation are carried out if the presence of chemicals is detected in any one groundwater well.

Soil contamination

Locations with contaminated soil due to activities preceding the establishment of the main airport, and soil and groundwater contaminated later, are still undergoing follow-up. These are relatively small sites. There has been one contamination event involving emissions to soil in 2017, caused by a leak on a diesel aggregate. All contaminated soil was excavated and delivered to an approved waste treatment plant.

PFOS (perfluorooctane sulphonate) is a persistent organic pollutant, former used as a legal component in firefighting foam. Groundwater treatment with the assistance of a separate treatment plant with active carbon has been on-going since 2013 due to a PFOS discharge at a hangar in 2010. Treatment of groundwater and wastewater contaminated with PFOS from the fire drill area has showed good results. A separate treatment plant has been installed, consisting of three containers with treatment filters to ensure that no wastewater contaminated with PFOS is spread to the municipality treatment plant.During 2017, a test project was started with washing of mass from the unsaturated zone to flush out larger amounts of PFOS. The measure is followed closely to document the effect. Some contaminated soil with high concentration of PFOS have been excavated and delivered to an approved waste disposal.

Test project with the washing of PFOS-contaminated soil

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. This is why 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 in the vicinity of the airport. This data is assessed for compliance with the regulations for arrivals and departures in order to highlight any deviations from the regulations.

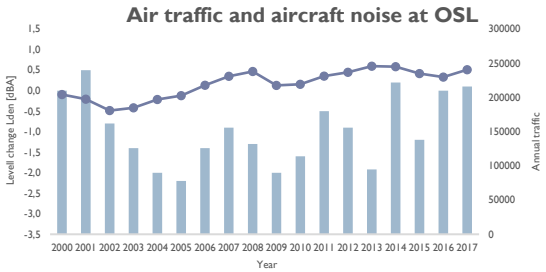
Oslo Airport's NTMS records the aircraft noise level continuously at 11 points around the airport

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 with regard to 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 2017

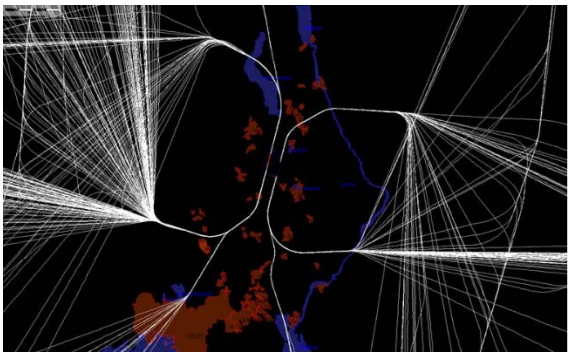
The figure shows the development of aircraft noise and air traffic volumes at Oslo Airport between 2000 and 2017. Total noise emissions (L_{den}) from all registered traffic are calculated for each year. According to this, there are changes in level calculated for every year from 2000, and these are 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 increased by 0.1 dB between 2016 and 2017, while the number of aircraft movements increased by 4.8 per cent. This change in level is due to factors such considerly reduced use of the aircraft type Boeing 737-300,, and increased use of newer aircraft type B737 (models B737-600 to B737-900) in 2017



The noise level for 2017 was 0.1 dB higher as in 2000, based on calculations for all traffic recorded. The traffic increase of 36 400 aircraft movements between 2000 and 2017 corresponds to a level increase of 0.71 dB above 2000 traffic levels. This means that modern new aircraft types have more than compensated for the increase in traffic.

On 26 May 2016, 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 per cent. 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

5 352 curved approaches had been completed by the end of the year. In total, over 19,000 curved approaches have now been completed. Oslo Airport received aircraft noise enquiries from 245 people in 2017. Residents of Ullensaker, Eidsvoll and Nannestad submit the highest number of complaints and include the highest number of complainers.

ENERGY

Avinor will reduce purchased energy by 25 per cent by 2020 compared with energy consumption in construction 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 waste water heat exchanger system (sewage) and.

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 also 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.

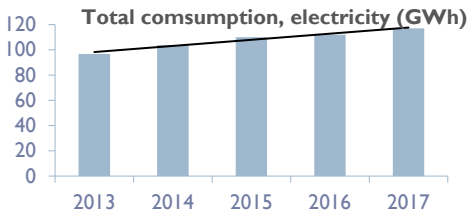
Oslo Airport's Energy central has a high capacity and is therefore subject to regulations regarding GHG emission allowance trading. Oslo Airport has a quota-regulated emission permit from the Norwegian Environment Agency for emissions subject to quotas, and compensates annually for CO_2 emissions in the EU's quota system. 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 sufficient energy.

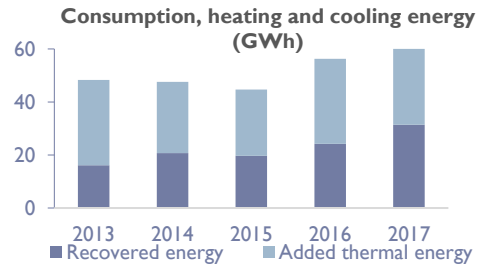
Oslo Airport has been working actively with energy efficiency measures over the past few years, and its percentage of renewable energy excess 90 per cent annually. There has been considerable expansion at Oslo Airport over the past few years, and energy consumption is expected to increase in years to come, even when energy efficiency measures are phased in. Oslo Airport's objective is to use only renewable energy by 2020. This objective can be achieved by choosing energy efficient solutions when modernising and replacing equipment and when switching from fossil energy to bioenergy.

Status, energy 2017

In 2017, ENØK measures were implemented and resulted in a total reduction of 2 398 MWh / year. One of the contributions to this reduction has been the replacement of halogen lights to LED lights. In total, 1100 lane lights were replaced, which resulted in a reduction of power consumption of about 198 MWh. Some replacements were also made to LED lighting in the terminal, which contributed a reduction of 250 MWh. The largest saving, however, was the replacement of the lighting system in the parking lot P-11. Here, the entire lighting system of 1250 luminaires was switched to more efficient LED lighting. Each luminaire is equipped with a motion sensor in order to dim down if there is no nearby activityIn total, this project has resulted in an estimated total of 1 950 MWh.

In 2017, Oslo Airport continued the successful survey of the terminal from 2016 by mapping the remaining buildings at the airport. This project also aimed at finding measures that gave a minimum 10 percent reduction. Overall, we ended up with measures with a potential reduction of 20 percent. Mainly, these measures were related to lighting, ventilation, water purification and gates.





Drilling for thermal rock energy

In collaboration with the company Rock Energy AS, a pilot project has been launched to establish two 1500 meters deep geothermal 6.5 " energy wells which will supply the ground heating system at the aircraft engine test area. It is estimated that each of the wells can deliver between 80 and 100 kW and will save a power consumption of around 300,000 kWh / year. The project has two parts, a research part funded by Rock Energy, and a plant part funded by Avinor. Innovation Norway supports both the research part and the plant part of the project. The wells are expected to be completed during May 2018.

WASTE

The volume of unsorted waste (waste code 99- in accordance with NS 9431) must not exceed 3500 tonnes per year.

Waste in brief

Airlines, handling agents, catering companies, cargo handlers, tenants, passengers and Oslo Airport itself all produce waste at the airport.

All companies at the airport participate in a joint waste management scheme whereby all waste is handled by the same waste disposal company. The waste management scheme is flexible, and waste fractions, container sizes and collection rates are adapted according to requirements. Waste is separated at source and dropped off at fixed 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 disposal company deals with the waste and delivers it to approved final processing and recycling plants. The waste disposal company reports on the monthly source separation rates and tonnages for all collection points.

Source separation at 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 as a whole achieves good results in terms of waste. Waste from the building and construction project activities is reported separately.

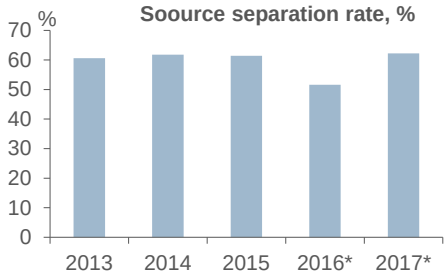
Status, waste 2017

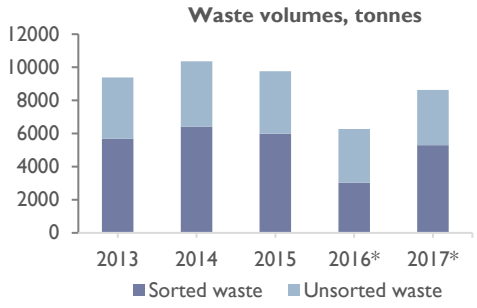
The total waste volume for the whole airport in 2017 was 12 397 tonnes. From 2016, Oslo Airport has opted to define targets for and report only the waste invoiced via Oslo Airport. The total waste volume in this case was 8 833 tonnes. There were 5 301 tonnes of sorted waste and 3 335 tonnes of unsorted waste. Source separation rates stood at 62.2 per cent.

Both increased waste volume and source separation rate are mainly due to the delivery of large quantities of contaminated soil from remediation at the fire and rescue training field, and that the amount of cardboard and food waste has increased in line with increasing number of shops and eateries in the terminal. There has also been a lot of reconstruction work during the period.

With increased activity in the terminal, the amount of waste also increases

Collection of recyclable beverage containers made of steel, aluminium and PET (plastic) from aircraft has continued in 2017. SAS, Thomas Cook and Sodexo are all taking part in this scheme. A total of 2.1 tonnes of recyclable material has been 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. With efforts from employees and the public, Oslo Airport has collected boxes and bottles worth a total of more than NOK 1.7 million from public areas in the terminal building, and the funds are being donated to humanitarian schemes.





** Only waste invoiced via Oslo Airport and new definition of unsorted waste from 2016*

PURCHASING, BUILDING AND CONSTRUCTION PROJECTS

Consumption of products and materials in brief

Oslo Airport undertakes procurement procedures for services, products and materials by means of purchases linked with regular operation, or via construction projects. Oslo Airport has its own processes which ensure that all purchases are made in accordance with public procurement regulations. Purchasing in connection with operation must take place using framework agreements as far as possible, while purchases linked with construction projects will take place via agreements with contractors.

Environmental requirements are specified in both framework agreements and agreements with contractors in order to ensure procurement sustainability and selection of the most eco-friendly products and materials. Requirements are specified as quality requirements (mandatory requirements) or as allocation criteria where suppliers compete to provide the most eco-friendly solutions, products, materials and services.

Environmental requirements in procurement processes are an important element in following up Oslo Airport's environmental policy and help to reduce Oslo Airport's greenhouse gas emissions. They also provide financial benefits beyond safeguarding and preserving the environment.

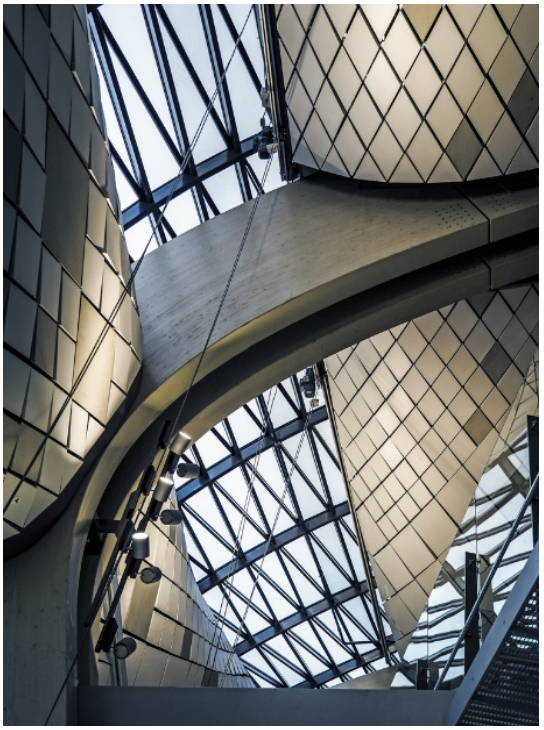
Status, consumption of products and materials 2017

As a basis, Oslo Airport specifies requirements for environmental management systems or equivalent in the qualification documents, where relevant. Product suppliers are also required to have membership of the packaging return scheme (Grønt Punkt, Green Dot). For example, there are specific environmental requirements for procurement of runway de-icing chemicals and waste management, as well as requirements for cleaning services to be "Svanemerket" (Nordic Ecolabel).

To ensure that environmental considerations are taken into account throughout the entire procurement process, the purchasing function has assistance from environmental advisors on specific procurement procedures, for formulation of qualification requirements, requirement specifications and weighting of the environment in respect of allocation. For example, there are specific environmental requirements for the acquisition of runway de-icing chemicals and waste management, as well as requirements for Nordic Ecolabel to the cleaning services in the terminal.

Oslo Airport specifies requirements in a separate annex to construction contracts to ensure that environmental targets and strategy are taken into account in building and construction projects. Strict environmental requirements are defined for materials, particularly in connection with interior design work at the new terminal. Environmental requirements are also stipulated in all contracts with stakeholders operating on the airside.

Environmental documentation requirements are specified for products and services with significant environmental impact. Systematic efforts are being made to substitute and reduce the number of chemical products. All products used must meet environmental requirements from local and central authorities.



Materials are also selected on the basis of environmental considerations

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. 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 a number of 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.

Status, biodiversity 2017

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 varieties lupine, giant hogweed, Canadian goldenrod and Japanese knotweed has been compiled on the basis of 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. These measures were successful, and this work has continued since. However, clearance is a long-term project and will require efforts for several years to come.

In the summer of 2017 a survey of humblebees and a number of other insects and plants was carried out both inside and outside the fence at Oslo Airport. 12 species of humblebees were found within the fence and 11 outside the fence. “Kløverhumle” (red listed as highly threatened) was found both inside and outside the fence. “Grashumle” (red listed as close to threatened) was found within the fence. Both inside and outside the fence, flowers are suitable for a wide variety of insects, especially plants in the “erteblomst”- family that are important for long-tonged, red-listed humblebees.

Lots of «rødkløver» in flower

All findings are registered in the Norwegian Biodiversity Information Centre. The areas outside the fence have the basic nature, location and extent that make them important to many insects and proper care is important to facilitate pollinators.

“Kløverhumle”(Bombus distinuendus)

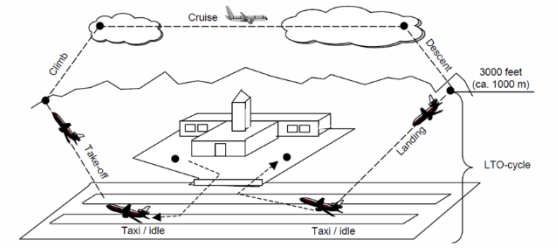
Yellow striped “bjørneblomsterflue” (Arctophila bombiformis) som looks like a bumblebee, but is actually a fly

CITES

The purchase and introduction of endangered species or products of endangered species are illegal and regulated in accordance with 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. This campaign has been run in partnership with Norwegian Customs and the Norwegian Environment Agency. Oslo Airport also supported the World Wildlife Day on 3 March, using our Facebook page to encourage passengers to practice responsible tourism. “Don’t buy souvenirs made from endangered animals.

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



Source of emissions

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.

Avinor 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".

OSL's mobile air quality monitoring system outside the departures hall

Status, emissions to air 2017

In 2017, emissions have been measured directly outside the arrivals hall at the terminal. We have received enquiries linked with unpleasant odours in this area. This relates to the smell of perfume emerging from the ventilation system, the smell of paraffin from aviation fuel and exhaust fumes from buses and taxis collecting passengers. These measurements PM_{10} limits were exceeded 4 times. This was within the regulatory requirements, where exceeding the limit is restricted to 30 for PM10. The concentration of contamination in outdoor air must not exceed the limits more than the permitted number of times.

NGI has, on behalf of Oslo Airport, investigated whether aircraft emissions or the use of surfactants or other chemicals at the airport affect and change surface tension in nearby small lakes (Aurtjern and Danielsetertjern). Measurements show no significant difference between the lakes and the control sample (running water). There was also no formate, glycol or acetate in the lakes detected.

THE T2-PROJECT

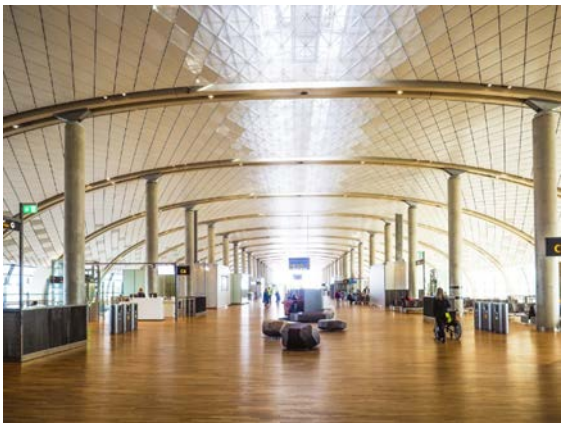
April 27 2018, Oslo Airport completed the expansion project so that it can serve 28 million passengers each year. The T2 project has included: Expansion and modification of the existing terminal building and of airside facilities, alterations to the operational areas and technical installations, new remote aprons, a temporary pier south of the existing terminal and upgrading of the railway station

With comprehensive environmental requirements and all together approx. 150 enterprises, the T2 project has been groundbreaking on the development of an efficient and environmentally-managed project management model. It has also been crucial with clear environmental requirements for all deliveries.

The BREEAM-certificate

The T2 project appears both as a national and international model project for the environment. The building is BREEAM certified at level Excellent for both the "Design stage" and "Post construction stage".


Nice outside….


…..and nice inside

KEY FIGURES

		2013	2014	2015	2016	2017
Air traffic						
Passengers	number	23 159 093	24 269 361	24 678 195	25 787 391	27 482 315
Domestic	number	10 583 935	10 907 550	10 917 495	11 220 648	11 630 750
International	number	12 575 158	13 361 811	13 760 700	14 543 699	15 851 565
Aircraft movements	number	231 460	237 595	234 974	247 560	242 555
Passengers per aircraft movement (scheduled(charter)	number	104	106	109	104	113
Public transport share						
Public transport share for surface access	%	65	68	69	70	70
Noise						
Change in total noise impact relative to reference year 200	dBA	-0,6	0,2	0,1	0	0,1
Inquiries, aircraft nose (persons)	number	192	142	264	285	245
Energy						
Total comsumption of electricity	GWh	96,8	103,9	109,8	112	117
Electricity for electricity-specific installations	GWh	83,7	95,9	99,0	104,8	111,2
Purchased heating and cooling energy	GWh	32,2	26,9	25,0	32,1	33,9
Electricity for electrode boiler	GWh	4,8	8,1	11,1	7,2	5,7
Electricity for compressors, pups, etc.	GWh	8,3	9,4	8,7	9,3	8,6
Statkraft Varme AS	GWh	18,9	8,8	4,9	14,7	15,3
Heating oil (Energy central)	GWh	0,2	0,6	0,3	0,8	3,6
Recovered energy	GWh	16,1	20,7	19,7	24,2	31,4
Consumed heating and cooling energy	GWh	48,3	47,6	44,7	55,9	64,6
Non-renewable resources						
Jet fuel	m^3	598 790	639 600	613 500	618 192	672 000
Heating oil/diesel*	m^3	110	135	103	182	465
Bio heating oil	m^3	0	6,1	13	21	60
Fuel for Oslo Airport vehicles**	m^3	668	902	820	632	604
Biofuel for Oslo Airport vehicles	m^3	0	0	9,3	81,0	176,5
Fuel for fire drills (Paraffin/Jet A1)	m^3	21,1	12,9	14,8	17,8	17,4
Fuel for fire drills (propane)	tonnes	0,6	0,3	0,4	0,3	0,3
Waste					***	***
Sorted waste	tonnes	5 688	6 405	5 996	3 238	5 301
Residual waste	tonnes	3 694	3 956	3 771	3 033	3 335
Total amaount of waste	tonnes	9 382	10 361	9 767	6 272	8 833
Source separation rate	%	60,6	61,8	61,4	51,6	62,2
Hazardous waste	tonnes	90	368	298	213	197
Greenhouse gas emissions	^{2}					
Control - Oslo Airport emissions	tonnes CO	4 889	5 852	5 031	5 093	6 055
Control - Oslo Airport emissions , kg per passenger	kg CO_2 /passenger	0,213	0,241	0,204	0,198	0,220
Guide- third party emissions	tonnes CO^2	87 560	96 942	93 922	96 570	82 803
Impact - third party emissions	tonnes CO	180 654	182 031	169 861	188 939	198 538
Water supply and sewage						
Water consumption, Oslo Airport	m^3	215 000	207 000	215 000	221 000	277 000
Wastewater volume, airport	m^3	289 000	265 000	283 000	297 000	337 000
Drainage water volumes	m^3	1 498 000	1 955 000	2 205 000	1 870 000	1 444 000
De-icing chemicals (per season)		**2012/13**	**2013/14**	**2014/15**	**2015/16**	**2016/17**
Aircraft de-icing						
Total consumption, glycol	tonnes	1 526	1 557	1 491	1 437	1 441
Specific comsumption, glycol	kg/aircraft	139	139	146	142	136
Collection rate for glycol	%	78	81	81	80	81
Runway de-icing						
Aviform L50	m^3	600	1263	2132	1806	2164
Aviform S	tonnes	150	59	198	281	252
* Total heating oil						
** The figure does not include airside bus sevices and winter maintanance carried out by Veidekke						
*** New methodology from 2016. Oslo Airport's waste only. All code 99- according with NS9431 count as unsorted.						