



Environmental report 2015

 OSLO LUFTHAVN

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ENVIRONMENTAL STATUS

Oslo Airport Gardermoen (OSL) is the largest and most important traffic hub in Norway, as well as being one of the country's biggest workplaces. OSL must perform its role in society and support Avinor's ownership requirements; to facilitate safe, efficient, eco-friendly aviation. Hence we adopt an active approach when it comes to dealing with environmental challenges inherent in both the running and the development of the airport.

OSL's environmental management system has been certified according to EN-NS ISO14001 since March 2014. Our environmental policy forms a framework for our environmental work, and environmental targets and operations monitoring have been established for environmental aspects in order to manage the airport within the framework conditions.

The environmental annual report for 2015 indicates the status of the environmental aspects at the airport and describes some of the measures implemented in order to reduce the environmental impact of our activities.

OSL focuses strongly on reducing our greenhouse gas emissions, and we maintain the highest level in the European Airport Carbon Accreditation scheme (ACA). We have begun testing biofuel in larger vehicles in order to pave the way for alternatives to fossil fuel, and we are planning to be able to offer biofuel for aircraft. We also have a hydrogen station next to the airport, and we now offer a large number of charging points for electric cars. Moreover, the public transport percentage for shuttle services to the airport is at a record high.

We are also pioneers when it comes to the handling of water and soil. A pilot project involving injection of air for increasing the decomposition of de-icing chemicals is in progress, and an innovative treatment system for PFOS contamination has been commissioned.

On the energy side of things, heat exchange with sewage is fully operational and preparations are in progress for a snow cooling system whereby snow will be collected throughout the winter and used for heat exchange for cooling the terminal in summer. The new terminal building has also been awarded passive building grants by ENOVA.

Preparations have been in progress for new noise regulations in 2015, and the testing of curved approaches is particularly exciting; these are demonstrating good environmental effects in terms of both aircraft noise and greenhouse gas emissions.

Otherwise, the T2 project in particular has faced strict environmental requirements in terms of products and materials. The airport is well-organised when it comes to sorting waste, which makes the airport look clean and tidy. We are also taking responsibility for the natural environment around the airport, which includes a programme for combating blacklisted species. We also challenge our passengers not to buy items made from endangered species.

By placing "Green Airport" on the strategic map, we want people to have faith in us, knowing that environmental conditions are handled well in terms of both good environmental performance and a good environmental reputation.

Gardermoen, February 2016

Øivind Hasaas
Managing Director

ENVIRONMENTAL MANAGEMENT

Objective: OSL must obtain ISO14001 certification and ACA certification at level 3+, and achieve BREEAM status "excellent" within the T2 project before 2017.

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 – group 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 must operate in compliance with laws, regulations and regulatory requirements and will seek opportunities beyond these in certain environmental areas, where this is advantageous in terms of its reputation or business
- Avinor's management system must be compliant with ISO14001 and ensure that systems are in place for the coordination and follow-up of its environmental work
- Avinor must ensure there are high levels of environmental awareness and expertise throughout the entire group, clearly and unambiguously defining roles and responsibilities for strategic and operational environmental work centrally, within the air navigation service and out at the airports
- Avinor works to constantly improve its environmental performance
- 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 OSL's control and management system, which is certified according to the EN-NS ISO14001 standard. OSL 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 licence requirements relating to public transport share 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.

OSL's three-year audit programme focuses on environmental audits. An audit of its own unit was carried out in 2015, along with four audits relating to environmental aspects which were carried out among OSL's suppliers and contract parties.

OSL has mapped the airport's environmental impact and identified the following significant environmental aspects: greenhouse gas emissions, emissions to water and soil, aircraft noise, energy consumption, consumption products and materials, and waste. Impact on the landscape and the natural environment and emissions to air are other environmental aspects.

Ambitious environmental targets and operations monitoring have been established in order to manage the airport within the framework conditions. Environmental requirements are also stipulated in all contracts with stakeholders operating on the airport site.

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 OSL. The committee must also lay the foundation for communication with the airport's neighbours by holding meetings with a forum of neighbours and other surrounding municipalities.

Green Airport

"Green Airport" is a strategic objective for OSL. This involves improving performance and understanding the mechanisms that influence our environmental reputation. Among other things, a survey has been carried out into how our environmental reputation can be measured and reinforced further in order to underpin acceptance for further growth at the airport.



A live NRK Forbrukerinspektørene (consumer watchdog programme) broadcast from OSL on climate.

GREENHOUSE GAS EMISSIONS

Objective: OSL must have no fossil greenhouse gas emissions from directly controllable activities by 2020, and OSL must have a public transport share of 70 per cent.

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.

OSL 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. In this context, OSL includes both Oslo Airport AS and 50 per cent of Oslo Airport Tele og Data AS (OLTD). 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.

OSL 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. 151 airports are now certified to ACA, of which 20 are at "Neutrality" level (February 2016).



The OSL Energy Central is subject to the regulations regarding GHG emissions allowance trading and OSL compensates for greenhouse gas emissions through trade in the European Emissions Trading System (EU ETS). To compensate for the remaining greenhouse gas emissions under OSL'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 2015, the highest level of accreditation (3+ neutrality) has been applied for. This involves reducing our 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 2015

The greenhouse gas inventory for Oslo Airport, 2015:

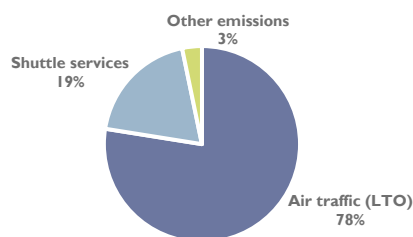
Control <i>Directly controlled by the airport operator</i>	Guide/manage <i>Carried out by a third party, but central to the operation of the airport</i>	Influence <i>Independently carried out by a third party</i>
Own vehicles (including airside bussing) Thermal energy Runway de-icing Fire drills Purchased 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
5 033 tonnes	93 894 tonnes	169 861 tonnes

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 OSL-owned vehicles, thermal energy and de-icing. OSL calculates electricity emissions even if the airport purchases electricity with the Guarantee of Origin.

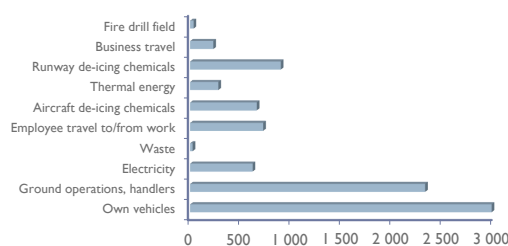
District heating supplied by Hafslund Fjernvarme AS (procured by Statkraft Varmer AS in September 2015) is not covered by the greenhouse gas inventory, in the same way as recovered heat from OSL's groundwater wells and heat recovery units. Nevertheless, these forms of energy help to limit the need for procured electricity.

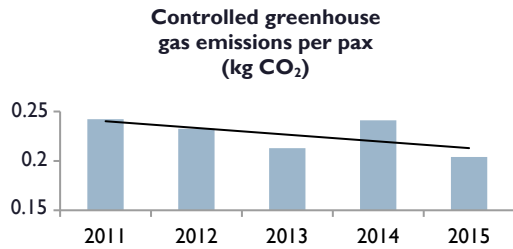
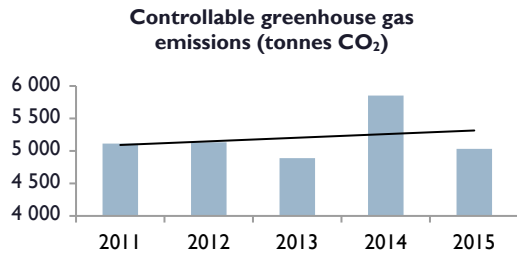
The figure shows the distribution of greenhouse gas emissions at the airport. The major sources of emissions at OSL are the LTO cycle (i.e. emissions from aircraft below 3 000 feet; approach, landing, taxiing, take-off and climbout) and surface access (passengers' emissions en route to the airport). The remaining emissions, which account for 3 per cent of total emissions, are specified in the columns in the figure at the bottom of the page.

Distribution of greenhouse gas emissions at OSL, tonnes CO₂



Distribution of other emissions (3%), tonnes CO₂





In May 2014, OSL's management decided that the airport should have no fossil greenhouse gas emissions from its own activities by 2020. To achieve this ambitious target, a Climate Programme was established in June 2014 which aims to identify short-term and long-term measures to reduce greenhouse gas emissions within each of the airport's emissions sources. This target is related only to own greenhouse gas emissions. However, the Climate Programme is operating far beyond that, and workgroups have been established to work with measures for reducing greenhouse gas emissions in the following areas: vehicles, energy, waste, LTO cycle (this work also includes measures beyond 3 000 feet), travel (including the surface access, employee travel to/from work and business travel), fire drills and handlers/other stakeholders.

To reduce greenhouse gas emissions, the transport sector must use alternative energy sources to fossil fuel to a greater extent. At OSL, we are paving the way for various energy sources to help reduce greenhouse gas emissions from the airport. From 2016, biofuel will be supplied for aircraft in a collective tank system for the entire airport. OSL is the first airport to be able to offer biofuel in this way. An agreement has been concluded regarding the purchase of a total of 1.25 million litres of bio-jet fuel in 2016. Thus Avinor will be able to offer biofuel to the airlines operating out of Oslo Airport as a normal part of its daily operations.



Apron Services using biodiesel this winter

Investment has been made in both electrification and biofuel over the past few years in order to reduce emissions from the vehicle fleet. 2015 saw the start of a test project for the use of biofuel for heavy snowploughs. A selection of vehicles will be arriving at the airport in the winter of 2015/2016 in order to test the synthetic fuel 2GPolar. This is a climate-neutral fuel which meets the EU's sustainability criteria and is an important means of

achieving our target of zero greenhouse gas emissions from our own activities by 2020.

The fleet of administrative vehicles at OSL included 15 per cent zero emissions vehicles at the end of 2015. If hybrid vehicles are also included, the administrative vehicle fleet includes up to 23 per cent green vehicles. Emissions from administrative vehicles have been reduced by 14.2 tonnes in 2015 as a consequence of the transition to zero emissions vehicles (18 electric vehicles and 1 hydrogen vehicle). In 2015, charging options for electric vehicles at OSL were expanded further and we had 265 charging points by the end of 2015.



Option for charging passengers' electric cars in multi-storey car park

A new taxi booking system is now making it possible to book zero emissions cars, and car hire companies receive a discount for hiring space for parking zero emissions cars. Optimisation of parking areas has resulted in shuttle buses having to drive shorter distances, thereby reducing their fuel consumption.

A pilot project, H2OSL, relating to the use of hydrogen at and adjacent to the main airport, was implemented in January 2014. This project is based on a previous study, feasibility study H2OSL, and the pilot project was financed by Akershus county municipality, ENOVA, OSL and the municipality of Ullensaker. The project was headed by Kunnskapsbyen Lillestrøm, and Hynor Lillestrøm, IFE, HYOP AS and OSL participated in the workgroup. The project was completed in 2015 and concluded with the opening of the hydrogen station at OSL by Erna Solberg. OSL bought its first hydrogen vehicle in 2014, and it is used by Airport Patrol on a daily basis.



Opening of the hydrogen station

Public transport share

OSL 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 in 2015 was 69 per cent.



OSL has the highest public transport share in Europe

EMISSIONS TO WATER AND SOIL

Objective: OSL 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

OSL 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 are the rivers Sogna and Vikka.

In general, surface water is handled locally at the airport. In the case of major run-offs, particularly during snow-melts, 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.



Water sampling

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 share 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 itself in differences in liquid consumption – 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 also result in variation in collection levels from year to year.

De-icing chemical residues degrades locally in the ground and soil along the runway systems.

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

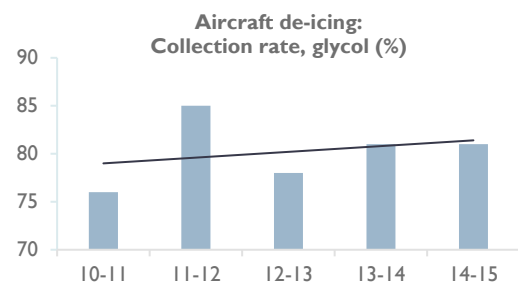
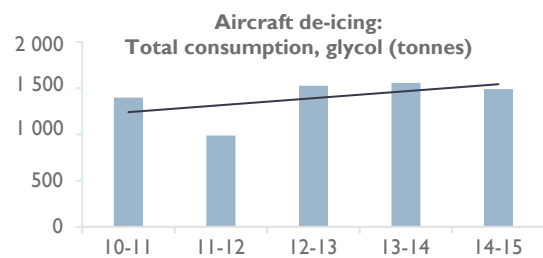
Status, water and soil (2014/15 season)

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 considerably higher than in the previous season. The collection rate for aircraft de-icing fluid was 81 per cent during the 2014-15 season.



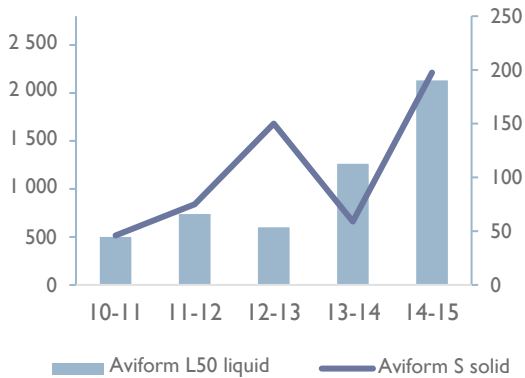
Aircraft de-icing





Spreading of runway de-icing chemicals

Consumption, runway de-icing (formate, m3 and tonnes)



A total of five minor violations of the emission permit for groundwater were detected in 2015. This involved indications of glycol and formate in groundwater wells. Measures such as pumping groundwater across to the municipal wastewater system, alternative pumping and re-infiltration and ongoing air injection at the south end of the west runway were implemented. These measures were also followed up with sampling.

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. Air injection to soil and groundwater works well, and there is no indication of de-icing chemicals in nearby groundwater wells. In 2015, a pilot project with three wells was expanded to include 70 ventilation wells. During the de-icing season, measures such as fertilisation and removal of snow as required are also assessed and implemented. These measures follow a separate operating plan for the areas under greatest stress.

One violation of the discharge permit was detected in the waterways during the 2014-2015 winter season. The source of the discharge was eliminated and follow-up samples showed no impact. 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 12 samples taken.

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 have

been no acute contamination event involving emissions to soil in 2015.

PFOS (perfluorooctane sulphonate) is a persistent organic pollutant. It used to be a legal component in firefighting foam. Groundwater treatment with the assistance of a separate treatment plant with active carbon has been ongoing since 2013 on account of a PFOS discharge at a hangar in 2010. Treatment of groundwater and wastewater began in the summer/autumn of 2015 in connection with PFOS contamination of OSL's fire drill area. The first analysis results are very positive, and a very important milestone has been reached by introducing measures for water contaminated with PFOS. An initial action plan with regard to what to do with soil contaminated with PFOS will be completed in February 2016. Soil, groundwater and waterways are undergoing parallel monitoring.



The groundwater treatment plant for PFOS at the OSL fire drill facility

Spillages

There are still too many incidents at the airport involving small spills, particularly from vehicles and equipment. Vehicle and equipment owners, manufacturers, types, model years, applications and annual reported incidents involving escapes or spills have been mapped. The aim of this is to provide data so that measures can be identified to prevent such incidents in the short and long term.



Spillages from equipment and vehicles

AIRCRAFT NOISE

Objective: The number of residents exposed to aircraft noise at outdoor levels in excess of L_{den} 60 dB and L_{night} 55 dB must not increase between 2012 and 2017.

Aircraft noise in brief

Aircraft noise affects the local areas around the airport. OSL 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.



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

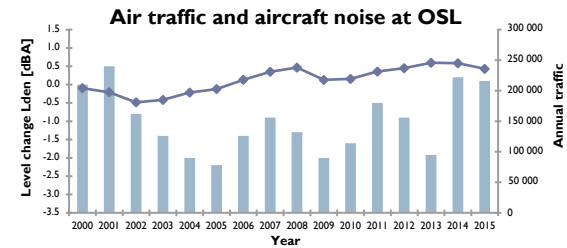
OSL's website for neighbours is designed to help the airport's neighbours find information on the regulations on traffic management and the airport's aircraft noise zone map, and contact OSL with regard to aircraft noise. OSL also has a separate contact phone line for enquiries relating to aircraft noise. 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.

Aircraft noise status 2015

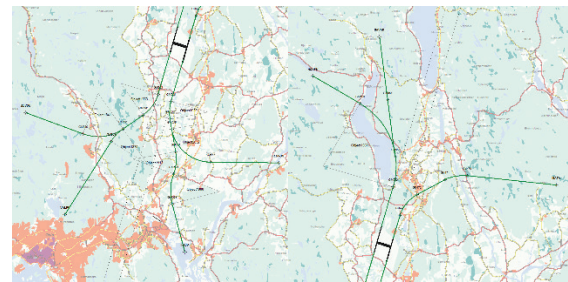
The figure shows the development of aircraft noise and air traffic volumes at OSL between 2000 and 2015. Total noise emissions (L_{den}) from all registered traffic are calculated for every year. According to this, there are changes in level calculated for every year from 2000, and these are plotted together with total traffic development. This representation provides a view of noise development independently of the geographical areas affected.

The combined aircraft noise impact around OSL was reduced by 0.1 dB between 2014 and 2015, while the number of aircraft movements fell by 3.9 per cent. This change in level is due to the fact that phasing out of the noisiest aircraft types is now complete. The MD80, a relatively noisy aircraft type, was phased out entirely for the biggest stakeholder at Oslo Airport in the autumn

of 2013. Flights using the aircraft type Boeing 737-300 are reduced considerably, while the percentage of newer aircraft of type B737 (models B737-600 to B737-900) increased further in 2015.



The noise level for 2015 was 0.1 dB above 2000, based on calculations for all traffic recorded. The traffic increase of 31 587 aircraft movements between 2000 and 2015 corresponds to a level increase of 0.62 dB above 2000 traffic levels. This means that modern new aircraft types have more than compensated for the increase in traffic. It looks as though the traffic percentage in the late evening and at night, which increased gradually between 2009 and 2011, has stabilised.



Curved approaches, from south and north respectively

On 17 December 2015, the Norwegian Civil Aviation Authority adopted revised noise regulations for Oslo Airport. The noise prevention regulations, as they are formally known, regulate runway use and the areas which can be overflowed in the vicinity of the airport. Thus this is a very important basic document for both Norway's main airport and the local environment around the airport.

More than 4 300 tests of curved approaches had been completed by the end of the year. Tests show good environmental effects in terms of both aircraft noise and greenhouse gas emissions. Changes made to the revised noise regulations mean that curved approaches could become a permanent solution. Furthermore, a new departure corridor is being established north of the east runway. The purpose of these regulations is to avoid unnecessary noise loads in the areas around the airport, while also meeting requirements in terms of safety, operational conditions, capacity and other environmental conditions. The new noise regulations come into force on 26 May 2016.

OSL received aircraft noise enquiries from 264 people in 2015. The number of unique complaints peaked at 352 in 2011 in connection with the introduction of new airspace and new noise regulations. Residents of Ullensaker, Eidsvoll and Nannestad submit the highest number of complaints and include the highest number of complainers.

ENERGY CONSUMPTION

Objective: OSL must bring about a 75 per cent reduction in its use of fossil fuels for heating and use energy efficiency measures to reduce its energy consumption by at least 4 GWh in 2009-2016 using existing technical installations.

Energy in brief

The energy system that supplies OSL's buildings, tenants and road heating systems with energy for heating and cooling consists of a district heating plant, a district cooling plant, a groundwater plant and a waste heat exchanger system (sewage).

The district heating plant ensures that the buildings are kept sufficiently warm in winter. This plant uses water-based heating. OSL has its own district heating plant and also uses district heating from Statkraft Varme AS, which uses woodchips. The district cooling plant ensures that the buildings are kept sufficiently cool in summer. 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 stormwater provide the primary contribution to OSL's high percentage of renewable energy.

OSL's Energy central has a high capacity and is therefore subject to regulations regarding GHG emission allowance trading. OSL has a quota-regulated emission permit from the Norwegian Environment Agency for emissions subject to quotas, and compensates annually for CO₂ emissions in the EU's quota system. The oil-fired boilers have low priority and are used only for test operation and during periods when Statkraft Varme and the electrode boiler are unable to supply sufficient energy.

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

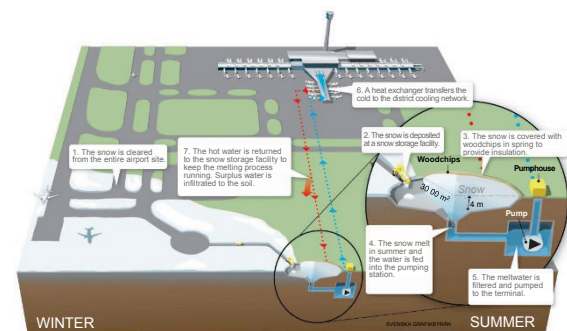
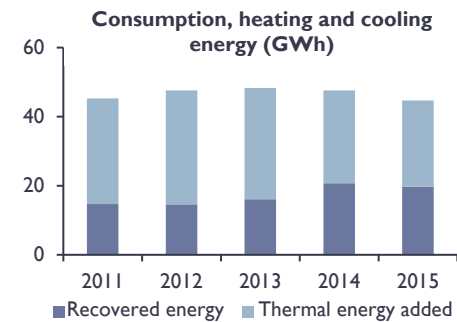
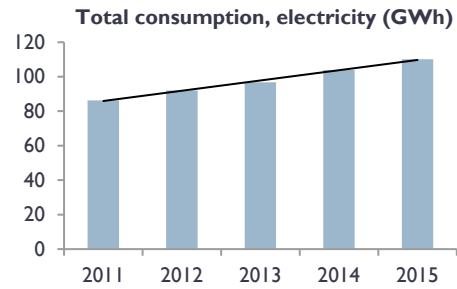
Status, energy 2015

Energy efficiency measures have been implemented, resulting in an overall reduction of 216 MWh per year. Further efforts to replace halogen runway lights with LED lights are the primary contributor to this reduction. Around 800 runway lights were replaced in total, reducing overall power consumption by 149 MWh. A ventilation unit has also been replaced with a free cooling unit, saving 67 MWh.

Heat exchange, with a free exchanger and low-temperature heat pump, and treated wastewater from the municipality of Ullensaker, has been fully operational this year. The treated wastewater acts as a heat source in winter and as a heat sink during cooling in summer.

A snow cooling system is also being prepared, which involves collecting snow in winter that is then used for cooling the terminal in summer.

An application for funding has been submitted to Enova for mapping energy measures in the old part of the terminal. The aim of this mapping is to find energy-saving measures providing a minimum 10 per cent reduction in relation to current structural consumption, i.e. measures resulting in savings of at least 4.5 GWh. This funding was granted, and the actual mapping work will begin in 2016.



Snow cooling principle



The snow storage facility is ready to receive the winter's snow

WASTE

Objective: OSL must increase its level of waste sorting to 63 per cent in 2014 and to 65 per cent in 2015.

Waste in brief

Airlines, handling agents, catering companies, cargo handlers, tenants, passengers and OSL 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

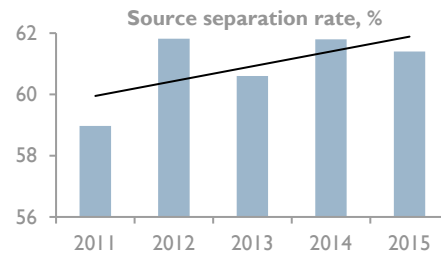
OSL is responsible for organising the waste management scheme at the airport and acts as a driving force, ensuring that the airport as a whole achieves good results in terms of waste. Therefore, waste volumes are reported for airport operations in their entirety, including OSL. That said, waste from the T2 project's building and construction activities is reported separately.

Status, waste 2015

The total waste volume for the whole airport in 2015 was 9 767 tonnes, compared with 10 361 tonnes in 2014; a reduction of no less than 5.7 per cent. There were 5 996 tonnes of sorted waste and 3 771 tonnes of mixed waste. Source separation rates stood at 61.4 per cent, slightly down on 2014. There is still special emphasis on increasing the sorting of waste from aircraft, and a new return point for aircraft waste is being constructed.

Collection of recyclable beverage containers made of steel, aluminium and PET (plastic) from aircraft has continued in 2015. SAS, Thomas Cook and Sodexo are all taking part in this scheme. A total of 33.4 tonnes of recyclable material has been received from this initiative, representing an increase of 8.7 tonnes compared with 2014. The airlines donate surplus revenues from deposits and aluminium returns to charity. OSL 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, OSL has collected boxes and bottles worth a total of more than NOK 1.5 million from aircraft and the public terminal, and the funds are being donated to humanitarian schemes.



Areas around the airport have been used by people as a dumping ground for waste in previous years. OSL has taken responsibility and cleared up a number of such unofficial dumping grounds. In consultation with the County Governor of Oslo and Akershus, OSL has just completed clearance of a large unofficial dumping ground in the Romerike landscape protection area. The waste has been removed, and the foundation has been laid for restoring the original landscape and vegetation. The area is undergoing further follow-up to ensure natural growth and avoid the establishment of blacklisted species. The entrance to the established nature trail to the conservation area has also been upgraded for the benefit of hikers.



Clearing up the unofficial dumping ground in the Romerike nature conservation area

CONSUMPTION OF PRODUCTS AND MATERIALS

Objective: OSL must emphasise the environment in its allocation criteria and define specific environmental requirements in all new framework agreements and procurement procedures.

Consumption of products and materials in brief

More and more attention is being paid to the consumption of products and materials, and this has considerable environmental impact during production and transportation. It also has an environmental impact when products and materials are discarded and become waste. Products of significance during the usage phase are those which consume energy or are used as materials in buildings, machines, etc. The term "products and materials" as used by OSL includes products and service provision, materials and chemical products.

The government has adopted an approach whereby the public sector must take the lead as a responsible consumer and request goods and services with low environmental impact. Therefore, the Government has outlined its own environmental policy for state purchases by means of an action plan with targets, priorities, instruments and measures. The Public Procurement Act also requires OSL to take into account life cycle costs and the environmental consequences of procurement procedures when planning individual procurements.

Environmental requirements in procurement procedures are an important element in the follow-up of OSL's environmental policy and targets, and help to reduce OSL's greenhouse gas emissions and provide financial benefits beyond protecting and preserving the environment. OSL's internal guidelines for environmental considerations when making purchases are based on the Ministry of Trade and Industry's directive "Environment and regulations for public procurement procedures" and DIFI's proposals for environmental requirements and criteria.

Status, consumption of products and materials 2015

OSL has focused on clarifying and simplifying requirements in annexes to construction contracts. Specific environmental requirements for materials with their own checklists are defined in connection with interior design work for the new terminal.



The materials selected have consequences for the entire service life of the building

LANDSCAPE AND NATURAL ENVIRONMENT

Objective: OSL must administer, manage and take care of its areas in order to promote natural diversity.

Biodiversity in brief

OSL has mapped and charted the important areas for biodiversity, with descriptions of flora, vegetation and bird life within the airport area, on OSL 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 2015

OSL 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 lupin, 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 in 2015. However, clearance is a long-term project and will require efforts for several years to come.



Japanese knotweed before and after removal measures

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 the second consecutive year, OSL has provided guidelines to passengers during the holiday season, via various social media, to tell people not 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.



OSL supported World Wildlife Day on 3 March, using our Facebook page to encourage passengers to practise responsible tourism. "Don't buy souvenirs made from endangered animals!"

EMISSIONS TO AIR

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.

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. OSL 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. This facility is now mobile and can be relocated if necessary.

Status, emissions to air 2015

Measurements in 2015 have taken place on a housing estate just outside the airport fencing, west of the south end of the west runway. The mobile measurement facility was relocated in December 2015 and positioned 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.



OSL's mobile air monitoring facility

OSL's voluntary metering programme includes continuous measurements of the density of particulate matter (PM₁₀) and the concentration of nitrogen oxides (NO_x). The data for 2015 is rather incomplete due to technical problems. However, 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 the airport. Calculations were performed and measurements were taken at various locations around the airport. NILU's report concluded that air quality at and around the airport was much better than in urban areas. We have now decided to update the NILU report, and work on this assignment is in full swing. We are awaiting a new, updated report that should be available at some point in 2016.

Avinor has participated in the project entitled "Assesment of exposure to diesel exhaust particles in the Norwegian labour market, using elementary carbon (EC) as a marker". This is a partnership project between the Federation of Norwegian Industries and the National Institute of Occupational Health (STAMI). Measurements were carried out at OSL in summer and winter in order to identify any seasonal variations. Four businesses with employees at OSL took part in the survey. In 2009, the Norwegian Directorate for Civil Protection sent out the consultation draft: Date of establishment of an administrative norm for diesel particles. This includes a proposal for an administrative norm of 0.5 mg/m³ for diesel particles. The measurement results show that our average values for ultrafine particles (UFP) are a great deal lower than for similar measurements carried out at other places of work abroad. STAMI concludes its report with the following: "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/m³) that occur in central urban areas".

THE T2 PROJECT

Oslo Airport is being expanded so that it can serve 28 million passengers each year when phase 1 is completed in 2017. This expansion is designated "the T2 project" and includes: 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.

OSL's high environmental ambitions for the T2 project are defined in the project's Environmental Programme, which focuses on all phases of the project, from planning and design to construction and operation. A decision has made to acquire environmental certification of the new parts of the terminal building via the internationally renowned certification scheme BREEAM International Bespoke 2010. The project was awarded a "Design stage" certificate at "Excellent" level in 2014, and its objective is to achieve the same level for the "Post construction" stage as well.

For the T2 project, environmental management is an integral part of OSL's management system. The management system covers all regulatory and internal requirements and is based on relevant requirement elements in international standards such as ISO 14001. The T2 project uses environmental management methodically in order to maintain a comprehensive approach to environmental work management within its own organisation and among planners and executing contractors. Inspection plans are being prepared for the external environment for all contracts. Nobody is permitted to access the construction site until they have completed a course on the external environment.

1 663 safety inspections have been carried out in total, focusing on the external environment. Separate environmental inspections are also carried out at regular intervals with executing contractors. 100 unwanted environmental incidents were reported in 2015, but none of these has led to lasting environmental harm to the soil, groundwater or waterways. Some smaller, local spills have occurred, particularly minor oil leaks from construction activities. These were cleared up as they occurred, in line with applicable procedures. Contractors fill in daily checklists for machine inspection, and also indicate that they have absorbents available in the event of accidents/leaks. All contractors must compile emergency response plans which include procedures for notification and handling of unwanted environmental incidents.

All contractors must implement measures to limit waste volumes, and targets of a minimum of 80 per cent sorting of construction waste, excluding concrete, asphalt and contaminated soil, have been established. At the end of 2015, accumulated figures indicate a source separation rate of 87.9 per cent for the T2 project. The T2 project has produced a total of 10 405 tonnes of construction waste. Central Building West and Pier North have generated 48.6 kg construction waste per m².

During excavation work, the T2 project has discovered contaminated soil from previous activity at the airport. Contaminated soil is being dealt with in accordance with applicable requirements in permits from the Norwegian Environment Agency and delivered to an approved receiving station.

Strict environmental requirements are defined for executing contractors to ensure that the T2 project does

not involve contaminated emissions to soil, groundwater or waterways, and that the natural water balance is maintained. This includes requirements for handling bilge water, securing tank areas, carrying out repairs and cleaning equipment, and requirements for machine fleets.

The new terminal building must be developed as an energy-efficient building where the energy requirement is half that of the existing terminal building; it has been designed as a passive building. The new terminal has been awarded grants by ENOVA due to its passive building status, and a separate checklist for passive buildings has been prepared. A procedure has also been implemented with regard to how holes through outer walls and outer roofs are to be sealed once cables, pipes and similar have been passed through the holes, so as to avoid air leaks and heat loss.

A greenhouse gas inventory has been prepared for the terminal building as an integral part of the design and construction process. These include emissions linked with energy consumption and operational transport, as well as the production of the materials included in the building. The solutions selected will ensure significant reductions in greenhouse gas emissions compared with similar buildings using standard solutions. Construction activity as part of the T2 project has resulted in the consumption of 1 601 782 litres of fuel in 2015.

Low resource loads, the absence of substances that are harmful to health and the environment, low emissions to the indoor environment and low greenhouse gas emissions during production of materials are key considerations when selecting materials for building and construction. High levels of recycled metals, green concrete and European oak on the roof of Pier North are examples of eco-friendly materials. Systematic environmental assessment of materials and chemicals is undertaken. Low-emitting materials are selected for the new terminal buildings.

The T2 project will generate some construction noise at times, but no instances have been recorded whereby the noise limits for the T2 project have been exceeded. Noise-reducing measures will be implemented if the noise exceeds applicable limits indoors. People who work at the airport every day will be protected in this way.

Contractors must also plan their activities so that the spread of dust is prevented, thereby ensuring that air traffic is not affected by dust. A clean, dry building regime was introduced in 2014 for the new terminal buildings. This is under construction to ensure that the ventilation system is not subject to dust accumulation during testing, which began in 2015. Maintaining a clean, tidy construction site is also of major significance as regards safety, fire safety and efficiency for the expansion works.



Pier North takes shape

KEY FIGURES

		2011	2012	2013	2014	2015
Air traffic						
passengers	number	21 103 199	22 080 433	23 159 093	24 269 361	24 678 195
Domestic	number	10 042 229	10 387 621	10 583 935	10 907 550	10 917 495
International	number	11 189 841	11 897 173	12 575 158	13 361 811	13 760 700
Aircraft movements	number	221 086	227 114	231 460	237 595	234 974
Passengers per aircraft movement (scheduled / charter)	number	99	101	104	106	109
Public transport share						
Public transport share for surface access	%	62	64	65	68	69
Noise						
Change in total noise impact relative to reference year 2000	dBA	-0.5	-0.9	-0.6	0.2	0.1
Inquiries, aircraft noise (persons)	number	352	144	192	142	264
Energy						
Total consumption of electricity	GWh	86.3	92.0	96.8	103.9	109.8
Electricity for electricity-specific installations	GWh	74.3	80.4	83.7	95.9	99.0
Purchased heating and cooling energy	GWh	30.6	33.0	32.2	26.9	25.0
Electricity for electrode boiler	GWh	4.6	5.1	4.8	8.1	11.1
Electricity for compressors, pumps, etc.	GWh	7.4	6.5	8.3	9.4	8.7
Hafslund Fjernvarme AS	GWh	17.8	20.7	18.9	8.8	4.9
Heating oil (Energy central)	GWh	0.7	0.7	0.2	0.6	0.3
Recovered energy	GWh	14.7	14.6	16.1	20.7	19.7
Consumed heating and cooling energy	GWh	45.2	47.6	48.3	47.6	44.7
Non-renewable resources						
Jet fuel	m ³	500 000	540 000	598 790	639 600	613 500
Heating oil/diesel*	m ³	180	205	110	135	103
Bio heating oil	m ³				6.1	11.4
Fuel for OSL vehicles**	m ³	843	829	668	902	820
Biofuel for OSL vehicles	m ³					9.3
Fuel for fire drills (paraffin)	m ³	35.9	34.4	21 076	12.9	14.8
Fuel for fire drills (propane)	tonnes	0.7	0.7	0.6	0.3	0.4
Waste						
Sorted waste	tonnes	5 065	5 950	5 688	6 405	5 996
Residual waste	tonnes	3 524	3 675	3 694	3 956	3 771
Total amount of waste	tonnes	8 589	9 625	9 382	10 361	9 767
Source separation rate	%	59.0	61.8	60.6	61.8	61.4
Hazardous waste	tonnes	111	55	90	368	298
Greenhouse gas emissions						
Control – OSL emissions	tonnes CO	4 923	4 855	4 889	5 852	5 031
Control – OSL emissions, kg per passenger	kg CO ₂ /passenger	0.233	0.220	0.213	0.241	0.204
Guide – third-party emissions -	tonnes CO	83 448	85 740	87 560	96 942	93 922
Impact –third party emissions	tonnes CO	171 508	179 966	180 654	182 031	169 861
Water supply and sewage						
Water consumption, OSL	m ³	201 000	201 000	215 000	207 000	215 000
Wastewater volume, airport	m ³	265 000	278 000	289 000	265 000	283 000
Drainage water volumes	m ³	1 711 000	1 937 722	1 498 000	1 955 000	2 205 000
De-icing chemicals (per season)		2010/11	2011/12	2012/13	2013/14	2014/15
Aircraft de-icing						
Total consumption, glycol	tonnes	1 398	988	1 526	1 557	1 491
Specific consumption, glycol	kg/aircraft	130	130	139	139	146
Collection rate for glycol	%	76	85	78	81	81
Runway de-icing						
Aviform L50	m ³		739	600	1263	2132
Aviform S	tonnes		75	150	59	198
* Total heating oil						
** This figure does not include airside bus services and winter maintenance carried out by Veidekke						