

# Environmental report 2013



 OSLO LUFTHAVN





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## ENVIRONMENTAL STATUS

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Oslo Airport Gardermoen is Norway's biggest and most important traffic hub. It is also one of the country's largest workplaces. Oslo Airport (OSL) operates Norway's main airport according to plans aimed at making it Europe's best airport. Environmental considerations are crucial for the development of the organisation, and OSL is to be associated with environmental protection in a positive light.

OSL is very proud of the fact that during a phase of expansion and simultaneous operation, it appears that we have been able to handle the major environmental challenges of airport operations in a sound manner. OSL's environmental report for 2013 shows the status of the environmental aspects at the airport and describes some of the measures taken to reduce the environmental impact of our activities.

OSL's environmental policy provides the framework for our environmental work, and environmental goals and operational monitoring of environmental aspects have been established for managing the airport within the framework conditions. Extensive preparatory work has been done for the certification of OSL's environmental management system according to the NS-EN ISO 14001 standard, which will form the basis for continuous improvement of our environmental performance. (OSL was certified on 6 March 2014.)

OSL has been focused for years on reducing our greenhouse gas emissions and we prepare an annual greenhouse gas inventory that follows the ISO 14064 and Greenhouse Gas Protocol standards. Through our great commitment and a number of measures, OSL maintains the highest level of Airport Carbon Accreditation (ACA), a European industry scheme for certifying airport operators' efforts to manage and reduce greenhouse gas emissions within their direct control. OSL also works closely with other parties at the airport to reduce their emissions.

OSL conducts extensive operational monitoring of water and soil. An aeration project is currently under way to improve the decomposition conditions for de-icing chemicals in soil. OSL also has a strong focus on finding sound measures for cleaning up PFOS-contaminated sites. Through comprehensive mapping and environmental risk assessment at the airport, we now have a better overview of the activities that can cause acute pollution and we will take the necessary steps to reduce risk.

OSL conducts continuous noise and track monitoring, and tries to help limit the overall impact of aircraft noise on the population by steps that include adaptations of approach and take-off procedures.

OSL implements energy conservation measures to limit the increase of energy consumption despite the expansion projects and increased traffic. As a major consumer of products and materials, it is also becoming increasingly important to require suppliers to meet environmental standards. OSL also facilitates a high rate of source separation.

It is also important to OSL to protect the natural environment around the airport. Mapping of biological diversity at OSL shows that we have a considerable responsibility, and we will take action as required by the management advice that is given.

For its part, the T2 project has a large environmental responsibility that is being closely monitored throughout the expansion phase, and the project is on track with respect to certification of the new terminal building according to BREEAM International Bespoke 2010.

Gardermoen, April 2014  
Nic. Nilsen  
Managing Director



# ENVIRONMENTAL MANAGEMENT

Goal: OSL shall be certified according to ISO14001 in 2013, annually maintain its ACA certification at Level 3+ and achieve BREEAM "Excellent" status within the T2 project before 2017.

## Environmental policy

To create a clear, common direction in Avinor's environmental work, corporate management has adopted a Group-wide environmental policy and related targets. OSL has adopted its own environmental policy in line with this.

### OSL's environmental policy

Oslo Airport (OSL) operates Norway's main airport according to plans aimed at making it Europe's best airport.

Environmental considerations are crucial for the development of the organisation, and OSL is to be associated with environmental protection in a positive light.

### Principles for environmental work:

- OSL complies with statutes, regulations and regulatory requirements and will in some areas seek opportunities to exceed requirements.
- OSL utilises recognised environmental certificates. Our environmental management system ensures that we continuously improve our environmental performance in a systematic manner.
- OSL applies the "precautionary principle" and works in a risk-based manner to minimise pollution and avoid negative environmental impact.
- OSL conducts systematic environmental and practical training. OSL coordinates environmental measures and leads the way in an active environmental partnership with subcontractors and other parties operating at the airport.
- OSL emphasises and integrates environmental considerations early in planning, projects and procurement. Development projects are implemented with a strong environmental focus.
- OSL engages in open, constructive and proactive dialogue with partners, local communities, authorities, aviation organisations and other stakeholders.
- OSL collects and uses the best available knowledge, equipment and technology and constantly seeks to find innovative solutions to tomorrow's challenges. We collaborate with research and development communities both in and outside Norway.

### OSL is committed to:

- Monitoring, preventing and reducing the impact of airport noise.
- Monitoring and minimising the use and discharge of chemicals to ensure that water and soil are not contaminated.
- Limiting and compensating for the carbon footprint of our activities, and encouraging our partners to do the same.
- Making operations more energy efficient and facilitating increased use of renewable energy sources.
- Minimising waste and optimising the percentage of source-separated waste.
- Choosing products and materials with a view to minimising their environmental impact from a lifetime perspective.

## Managing environmental work

Environmental management is an integral part of OSL's overall management system, a system based on international standards such

as ISO 9001 and 14001, fulfilling all regulatory requirements for internal control. OSL methodically applies environmental management tools to ensure comprehensive supervision of the environmental work within the company as well as that of other parties at the airport.

Environmental management requires an overview of the company's environmental impact and all applicable environmental regulations. Particularly important framework conditions for airport operations consist of the licensing requirements regarding public transport share and aircraft noise, the water and soil discharge permits issued by the Norwegian Environment Agency and the noise-abatement regulations specified by the Civil Aviation Authority.

Risk assessments are an important tool in environmental management and are used to prevent potential incidents and mitigate their consequences. A major environmental risk analysis was conducted in 2012-2013 to obtain an updated overview of all risks related to the external environment at OSL. The analysis included a comprehensive survey of all situations and activities at the airport that may entail an acute pollution hazard to health and/or environmental damage inside OSL's area or beyond.

Extensive work has been carried out in connection with certification of the environmental management system according to ISO 14001 standard. During the year, OSL improved its systems for, e.g., mapping environmental aspects, conformity assessment, internal audit and tendency reviews. In the autumn of 2013, DNV Certification AS conducted a preaudit and main audit as part of the certification process before final certification in early 2014.

OSL has assessed the different aspects of its environmental impact, identifying the following as most significant:

- Greenhouse gas emissions
- Discharges to water and soil
- Aircraft noise
- Energy consumption
- Consumption of products and materials
- Waste

Other environmental aspects include impacting the landscape and natural environment, as well as emissions to air. Ambitious environmental goals and operational monitoring have been established for the environmental aspects of managing the airport within the framework. In addition, environmental requirements are imposed in all contracts with companies operating in the airport area.

An Environment and Noise Committee has been established as a continuation of the original Aircraft Noise Committee, consisting of the mayors of ØRU municipalities and a representative from OSL and Avinor. The Committee aims to discuss the problem related to noise and other environmental effects of the expansion and operation of OSL. The Committee will also facilitate dialogue with the airport's neighbours through meetings with a neighbours' forum and other surrounding municipalities.





# GREENHOUSE GAS EMISSIONS

Goal: OSL's controllable CO<sub>2</sub> emissions shall be reduced by 3% per year (grams of CO<sub>2</sub>/passenger) and OSL shall have a public transport share of 70% by 2020.

## Greenhouse gas inventory in brief

As is the case for aircraft, the impact of emissions from airport operations on the climate is both local and global. OSL takes this responsibility seriously and is committed by its environmental policy to limit - and compensate for - the impact of our operations on the climate and encourage our business partners to do the same.

Each year, OSL accounts for its climate impact in accordance with the Greenhouse Gas Protocol and the ISO 14064 series and prepares a greenhouse gas inventory verified by a third party. In this context, "OSL" includes Oslo Lufthavn AS, Oslo Lufthavn Eiendom AS (a wholly-owned subsidiary) and 50% of Oslo Lufthavn Tele og Data AS (OLTD). OSL's greenhouse gas inventory includes emissions from all of the company's own activities, classified either as direct or indirect emissions, as well as a selection of indirect emissions from other sources. OSL has been accredited since 2010 at the highest level by Airport Carbon Accreditation (ACA), a European industry-specific scheme. The ACA scheme operates with emission categories related to the degree of control airport operators have over their activities.

OSL's Energy Centre is subject to the regulations regarding GHG emissions allowance trading and OSL compensates for these CO<sub>2</sub> emissions mainly through the EU Emissions Trading Scheme (EU ETS). To compensate for the remaining GHG emissions under OSL's control, annual investments are made in emission allowances through the UN Clean Development Mechanism (CDM).

## Climate status 2013

The Airport Carbon Accreditation programme consists of four accreditation levels: Mapping, Reduction, Optimisation & Neutrality. For 2013, accreditation has been applied for at the highest level (neutrality), as in previous years. This requires an initiative to involve other parties at the airport in a joint effort to reduce the airport's combined greenhouse gas emissions. OSL has adopted an action plan with targets for GHG reductions in the period 2010-2016. Work groups have been appointed to coordinate the implementation of measures set out in the action plan in, for example, energy efficiency, improving the efficiency of the vehicle fleet, fire training field measures, etc.

In 2013, OSL purchased seven new electric cars, and more will be purchased in the years to come. Zero emissions vehicles are wrapped in eco colours featuring the ACA symbol and the inscription "NEUTRALITY".



In December 2013, OSL, like the rest of Avinor, launched a campaign to reduce idling at the airport. Signs that read: "Protect your health and the environment: avoid unnecessary idling" have been hung on all main gates to the airport, as well as in the sweeper hall. Furthermore, stickers with the same inscription have been affixed in all OSL vehicles, as well as our partners' vehicles.

## The 2013 greenhouse gas inventory for Oslo Airport Gardermoen

Control	Guide	Influence
Directly controlled by the airport operator	Carried out by a third party, but central to the operation of the airport	Independently carried out by third party
OSL-owned vehicles Thermal energy Runway de-icing Fire training Ground operations (bussing) Winter maintenance, airside Purchased electricity Business trips	Aircraft operations: taxiing Ground operations Aircraft de-icing Waste disposal: transport from airport to processing plant	Aircraft operations: approach, landing, take-off and climbout (<1,000 m above airport level) Passenger surface access Waste disposal: final processing Employee commuting Not included in inventory: Business activities of tenants Transport related to goods and services
4,889 tonnes	85,560 tonnes	180,651 tonnes

Several factors that contribute heavily to the greenhouse gas inventory are unpredictable and highly dependent on winter conditions. The emission factor for electricity varies considerably.

The new airside was opened in June 2013, increasing the area by approximately 30%. In 2013, less fuel than expected was consumed relating to the clearing of taxi and runways, due to favourable winter conditions. Fuel consumption is expected to increase in coming years. In 2013, bussing on the airport area is included in the emissions data (ground operations (bussing) in the table above). A larger selection of handlers are also included in "Ground Operations" (under Guide/manage in the table above). Data are recalculated and thus comparable for 2011, 2012 and 2013.

District heating from Hafslund Fjernvarme AS and groundwater energy are not included in the carbon inventory, although these energy sources contribute to reducing the need for purchased electricity.

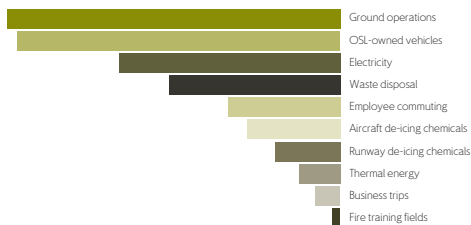
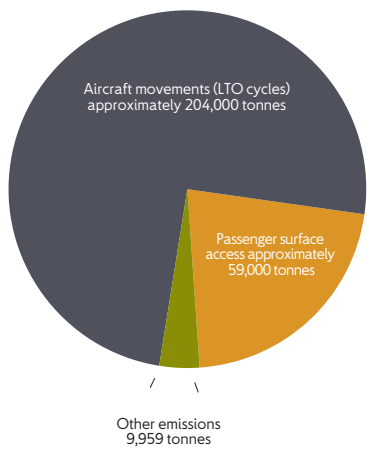


# GREENHOUSE GAS EMISSIONS

The figure below demonstrates GHG emissions at the airport. The major sources of emissions at the airport is the LTO cycle (i.e. emissions from aircraft below 3,000 feet: approach, landing, taxiing, take-off and climbout) and passenger service access (passenger emissions on the way to the airport). The remaining emissions are specified in the column below

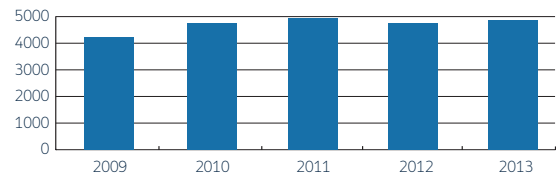
The overall reduction target is 3% per year per passenger for the controlled emissions in the period 2010-2016. Controlled emissions per passenger decreased by 8.5% from the base years 2009 to 2013. The ambition is to detach the development of greenhouse gas emissions from the expected traffic increase in the years ahead. The graphs below show the development in overall greenhouse gas emissions and the development of controlled greenhouse-gas emissions per passenger.

## CO<sub>2</sub> emissions at Oslo Airport 2013



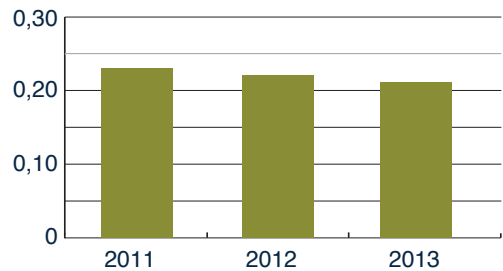
## Controlled greenhouse gas emissions

■ Tonnes CO<sub>2</sub>



## Controlled greenhouse gas emissions per passenger

■ Kg CO<sub>2</sub>





# DISCHARGES TO WATER AND SOIL

Goal: OSL must not violate discharge permits.

## Water and soil in brief

OSL extends over part of the Romerike aquifer and in the north, about half of the eastern runway overlies a potential future drinking water reservoir. The airport borders three protected landscape areas. The rivers Sogna and Vikka run through the ravines that characterise the landscape southwest of the airport.

Surface water is generally processed locally at the airport. In the event of large run-offs, especially during snowmelts, there will be some influx of unprocessed surface water from the western runway into the river Sogna. The first melt water, which has the highest chemical content, is collected for treatment.

Along the western runway and the railway line, the natural water table has been lowered to protect the infrastructure. The groundwater that is pumped out is released into the Sogna river or re-infiltrated into the groundwater reservoir. Wastewater and some of the collected de-icing chemicals (glycol and formate) are processed at the Gardermoen treatment plant. Approximately 80 per cent of the applied glycol is collected at the de-icing platforms. Surface water with the highest glycol concentrations is delivered to a local recycling plant where it is concentrated for re-use as industrial glycol. From one winter to the next, differences in weather conditions may lead to significant variations in total snowfall, in number of days with frost deposition, in temperatures, wind etc. These factors influence the applied volume of de-icing fluids, their required concentration and use of different fluids, the degree to which they run off the aircraft or are taken along by them, and the degree to which they are spread by the wind or remain on the de-icing platform. As a result, seasonal collection rates will also vary. The remainder of the de-icing chemicals decomposes in the ground along the runway systems.

The greatest environmental challenges in the area of soil and water relate to traffic increase which, with an unchanged winter climate, will result in higher consumption of de-icing chemicals. This means that larger amounts of the chemicals must be degraded in the soil above the aquifer. In addition, there are challenges related to local sites with soil contamination predating the opening of Oslo Airport at Gardermoen in 1998.

Surface water from OSL's fire training field contains fire-fighting agents (foam and powder) as well as jet fuel residuals. This water is collected and led through an oil/water separator to the municipal sewage network.

## Water and soil status 2013

The collection rate for aircraft de-icing fluid was 78% during the 2012-2013 season.

Seven groundwater discharge permit violations were detected during the 2012-2013 de-icing season. The detections were of glycol, formate and oil/THC in groundwater wells. Responses included pumping groundwater to the municipal sewer system, pumping and re-infiltration, and the start-up of air injection at the south end of the western runway to improve conditions for natural degradation in the unsaturated zone. In addition, samples were subsequently taken.

OSL has for a number of years evaluated the long-term effects of de-icing

chemicals that are applied on runways and taxiways. One limiting factor for local decomposition in the most critical areas is access to oxygen. A system for infusing oxygen into the soil and groundwater along the western runway has been tested and a smaller system is, as mentioned above, in operation as a mitigation measure. Measures such as fertilising and snow removal as needed are considered and implemented during de-icing seasons. One violation of the discharge permit for waterways was detected during the 2012-2013 winter season. Oil was detected once in the central culvert. The discharge source was located and removed and follow-up samples showed no impact.

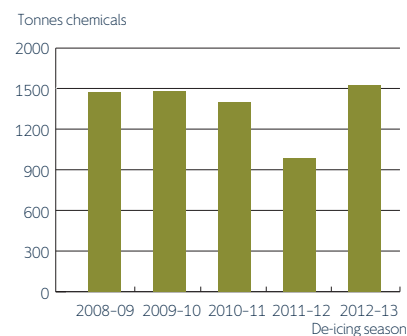
Follow-up continues of sites with soil contamination predating the opening of Oslo Airport at Gardermoen, as well as sites with subsequent soil contamination; all are relatively small sites. 2013 saw some minor discharge events and detections of contaminated soil where the response mainly involved removal of contaminated soil.

In response to earlier discharges of PFOS by a hangar, groundwater is being purified with the infiltration reservoir using a special treatment plant with activated charcoal. Examinations have been performed in connection with water and soil contamination at the fire training field and monitoring of soil and groundwater as well as downstream in waterways is ongoing. Biota surveys are also performed. A study of the most suitable measures is in progress.

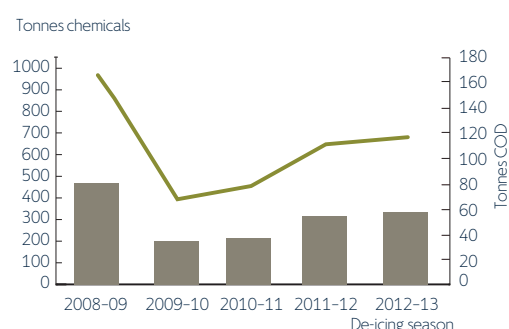
The limit value for discharges of oily water from the fire training field to the municipal sewer system was not exceeded in the ten samples that were taken.

Total consumption of aircraft de-icing chemicals was higher than in the previous season, while consumption of runway de-icing chemicals was approximately the same as last season.

## Consumption of aircraft de-icing fluid (glycol)



## Consumption of runway de-icing fluid (formate)





# AIRCRAFT NOISE

Goal: The number of residents exposed to aircraft noise with outdoor levels above  $L_{den}$  60 dB and  $55 \text{ dB } L_{night}$  must not increase during the period 2012-2017.

## Aircraft noise in brief

Aircraft noise affects the communities surrounding the airport. One of OSL's goals is that aircraft noise should be predictable for its neighbours. Monthly reports on aircraft movements and noise levels that are submitted to the Civil Aviation Authority and neighbouring municipalities are therefore made available to the public on our website. A Noise and Track Monitoring System (NTMS) operated by OSL continuously records aircraft movements and aircraft noise in the vicinity of the airport. Aircraft movements are subsequently assessed for compliance with the regulations applying to arriving and departing aircraft.

OSL's website has pages dedicated to noise issues. Here, neighbours can find regulations for arriving and departing aircraft, look up the airport's noise zone map or contact OSL regarding aircraft noise. OSL also has a dedicated telephone number for complaints or inquiries regarding aircraft noise. A summary of received noise complaints is included in the monthly report submitted to the Civil Aviation Authority. The report describes aircraft operations and aircraft noise levels measured in the vicinity of the airport based on data from the NTMS.

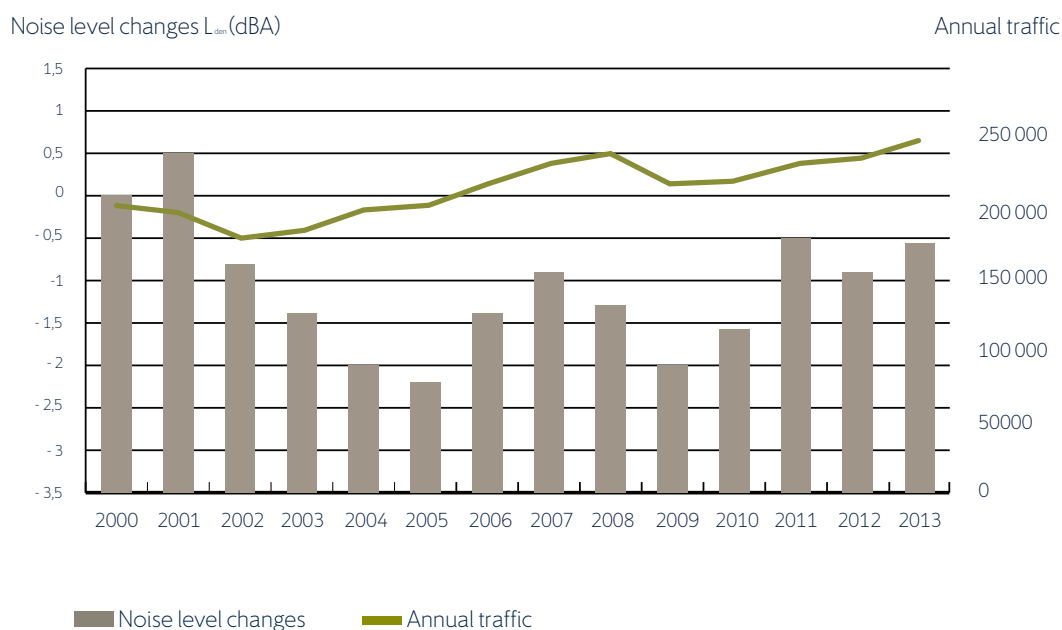
## Aircraft noise status 2013

The figure compares changes in aircraft noise and traffic volumes at OSL from 2000 to 2013. Total  $L_{den}$  is the spatially summed time-averaged noise impact from all registered air traffic for each year from 2000. This presentation reflects changes in noise impact independently of observation point.

The combined aircraft noise impact around OSL fell by 0.3 dB from 2012 to 2013, while traffic increased 3.8%. The decrease is attributed to the continued phasing out of the noisiest types of aircraft. MD80s, a relatively noisy type of aircraft, was completely phased out by the largest actor at Oslo Airport in the autumn of 2013. The percentage of newer and more modern B737s (models B737-600 through B737-900) continued to rise in 2013.

The noise level at OSL in 2013 was 0.6 dB below the 2000 figure, based on estimates for all recorded traffic. The increase in traffic of 41,537 aircraft movements from 2000 to 2013 corresponds to a level increase of 0.80 dB above 2000 traffic. This means that new modern aircraft have more than compensated for the increase in traffic. It appears that the percentage of late evening and night traffic that increased gradually from 2009 to 2011 has stabilised.

## Air traffic and noise at OSL







# ENERGY CONSUMPTION

Goal: OSL will reduce its use of fossil fuels for heating by 75% and will by using energy conservation measures reduce energy consumption in existing technical installations by at least 4 GWh in 2009 to 2016.

## Energy in brief

The Energy Centre at OSL – which provides heating and cooling energy for OSL’s buildings, OSL’s tenants and its pavement heating installations – consists of a district heating plant, a district cooling plant and a groundwater heat exchange system. The district heating plant provides heating for buildings in winter while the district cooling plant provides cooling for buildings in summer. The groundwater heat exchange system extracts heat from OSL’s buildings in summer and stores it for use in winter. The process takes place by means of heat exchangers and heat pumps. Heat energy from treated wastewater from Ullensaker municipality’s treatment plant is also utilised for heating and cooling in our energy system.

The Energy Centre at OSL has equipment for producing heat from three other sources as well: one electric boiler, four oil-fuelled boilers and four heat exchangers that are provided with biomass-fuelled heat (wood chippings and bark) from Hafslund District Heating. Due to their high capacity, the four oil-fuelled boilers at OSL’s Energy Centre are subject to regulations regarding GHG emission allowance trading. OSL has quota-regulated emission permits from the Norwegian Environment Agency and annually compensates for CO2 emissions from the oil-fuelled boilers through trade in the European Union Emission Trading Scheme (EU ETS). The oil-fuelled boilers are a last resort and are only used for test runs and in periods of insufficient energy supply from the electric boiler and Hafslund District Heating.

## Energy status 2013

OSL has maintained an active focus on energy conservation measures for several years. In 2013, measures were implemented in the international arrivals hall, and conversion of the remaining 100 uplights was completed. This represents a decrease in consumption of 40%, reducing energy consumption by 213 MWh per year. 280 uplights are being converted in Pier East and Pier West. Approxima-

tely 70% were put into operation in 2013, resulting in a reduction in consumption of approximately 50 MWh per year. Fluorescent light fixtures were replaced in the administration building, reducing consumption by 25 MWh per year. Electricity consumption in the Central Building and Pier West has stabilised over the past three years and in 2013 it decreased by 1% (300 MWh) compared to the peak year of 2010.

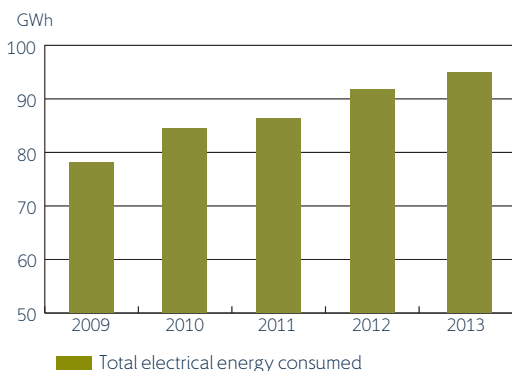
OSL has undergone considerable expansion in recent years. Relative to 2012, the electrical consumption for electricity-specific installations has grown by 4.7 GWh. Further increases in energy consumption are expected in the years ahead as a result of additional expansions at OSL. Consumption for thermal energy production, district heating and electricity reflects the addition of new buildings and weather conditions in 2013, and rose by approximately 1.5% compared with 2012.

As a result of OSL’s policy of reducing GHG emissions, fuel oil is used sparingly for thermal energy production. OSL’s fuel consumption in 2013 was 30% of consumption in 2012 and 13.2% of the average consumption over the last 8 years.

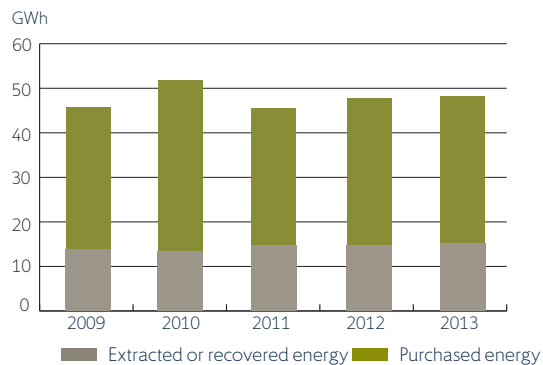
Electric heat production by electric boiler in 2013 was 8.5% higher than the average consumption in the period 2001-2013. This is 5.2% lower than consumption in 2012. The consumption of district heating in 2013 was 6.9% higher than the average level for the period 2001-2013 and 8.5% lower than in 2012. Hafslund’s production of district heating is temperature dependent and the surplus delivered to OSL varies with the number and size of wood chip boilers that are deployed. Total consumption of thermal energy was 15.9% higher than the 2001-2013 average and 1.5% higher than in 2012.

The recovery rate for thermal energy from the heat exchangers was 16.1 GWh in 2013. This is 36.7% higher than average compared with 2001 and 10.3% higher than in 2012.

## Total consumption of electrical energy



## Consumption of heating and cooling energy





## CONSUMPTION OF PRODUCTS AND MATERIALS

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*Goal: OSL will weight environmental protection in award criteria and set specific environmental requirements in all new framework agreements and procurement.*

### **Consumption of products and materials in brief**

Consumption of products and materials is gaining more attention and has a significant environmental impact where they are produced and in the transport chain. The environment is also impacted when products and materials become waste. Products and materials have a significant environmental impact in the use phase, especially energy consuming products and materials required for maintenance. The term products and materials as used by OSL includes products and deliveries of services, materials and chemical products.

The Government has decided that the public sector should take the lead as a responsible consumer and demand goods and services with low environmental impact. The Government has therefore submitted an environmental policy for government procurement through an action plan with goals, priorities, policies and measures. The Public Procurement Act also requires OSL to consider life-cycle costs and environmental impact of the procurement during the planning of each procurement.

Environmental requirements in procurement are an important part of following up OSL's environmental policy and goals, help reduce OSL's greenhouse gas emissions and provide financial benefits beyond protecting and preserving the environment.

### **Status consumption of products and materials 2013**

In 2013, OSL has developed internal guidelines for environmental considerations in procurement, based on the Ministry of Trade and Industry's guide to "Green Public Procurement Regulations". For procurements in OSL, reference is made to proposed environmental requirements and criteria for environmentally important public procurements from the Agency for Public Management and eGovernment (Difi).

Environmental requirements in procurement received more attention in OSL in 2013 and work on this will continue as a priority subject in the coming years.



# WASTE

Goal: OSL shall increase its source separation rate to 62% by 2013 and to 65% by 2015.

## Waste in brief

Sources of solid waste at the airport are the airlines, handling companies, catering companies, cargo handlers, tenants, passengers and OSL itself.

All companies operating at the airport participate in a joint waste management scheme in which all waste is handled by the same waste disposal company. Waste is separated at the source, brought to fixed waste collection points at the airport and subsequently collected by the waste disposal company. The waste management scheme is flexible, allowing waste fractions, container sizes and collection rates to be adjusted when necessary.

Waste generated in the public areas of the terminal is transported by a suction system to a central waste collection point for removal by the waste disposal company. The airport administration building and the Flyporten Business Centre are also linked to this disposal system. The waste is weighed by the waste disposal company and delivered to approved waste management plants for final processing and recycling. The waste disposal company provides monthly statistics on separation rates and tonnage at all collection points.

## Waste status 2013

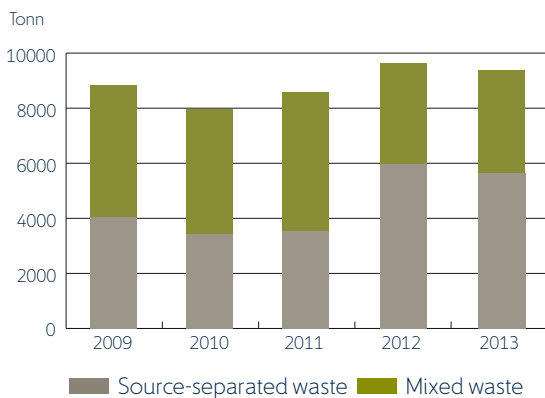
OSL is responsible for organising the waste management scheme at the airport and is a driving force in ensuring that the airport as a whole achieves high performance scores on waste management. Waste statistics are therefore reported here for the entire airport, including OSL. However, waste from construction work in the T2 terminal expansion project is reported separately.

Waste tonnage for the airport as a whole in 2013 was 9,381 tonnes compared with 9,625 tonnes in 2012, representing a reduction of 2.6%. Source-separated waste accounted for 5,688 tonnes and mixed waste 3,696 tonnes. The 60.6% separation rate represented a minor decrease compared with 2012. The replacement of the waste disposal company during the year, accompanied by adaptations of new procedures and reporting, may be the reason the separation rate was not as high as expected. The termination of the old waste disposal contract and initial phase with the new contracting party has, however, been successful in terms of logistics and daily operations at the airport.

There is still a strong focus on sorting waste from aircraft, and the work of building a new collection point for aircraft waste commenced in the autumn of 2013 and will be completed in the summer of 2014.

The collection of recyclable beverage containers in steel, aluminium and PET (plastic) from aircraft continued in 2013 with participation from SAS, Norwegian, Thomas Cook and Sodexo. This resulted in the delivery of 31.5 tonnes of recyclable material, an increase of 3.2 tonnes from 2012. The airlines donate the profits from deposit refunds and recycled aluminium to humanitarian causes. In addition, OSL has an agreement with the Norwegian Red Cross for handling beverage containers collected from passenger areas in the terminal building. The work has been delegated to the local chapter in Ullensaker. The Red Cross is responsible for receiving, sorting and returning the containers in an efficient manner and may freely use the profits from the recycling refunds. Thanks to the combined efforts of employees and the public in collecting bottles and cans from aircraft and the terminal area, NOK 2.87 million was collected at OSL to support humanitarian causes.

## Waste tonnage for the airport as a whole



## Source separation rates for the airport as a whole







## OTHER ENVIRONMENTAL ASPECTS

*Goal: OSL shall manage, operate and take care of its land to promote biodiversity.*

### IMPACT ON NATURE AND ENVIRONMENT

A biodiversity survey was conducted at OSL in 2011-2013. The survey resulted in a report that describes and maps the important biodiversity areas, and also describes management advice. The report also provides a detailed description of the flora, vegetation and bird life within the airport area, OSL properties, leased area and influence areas.

Large parts of the areas between the runways and lateral areas within the airport area have mostly trivial grassland that is cut and fertilised regularly. The airport area in the south, north and east is surrounded by protected areas. The Elstad and Aurmoen protected landscape areas comprise more than 20 pothole and kettle lakes. The southernmost pothole lakes are calcareous lakes that are selected habitat types under the Nature Diversity Act. Ten habitat sites are mapped on OSL properties north and east of the airport. Of these, three are very important, three are important and four are locally important. Some of these have been identified as wildlife areas, mainly as breeding areas for birds. Management measures have been proposed for the habitat sites. A very important habitat site with older stands of grey alder-bird cherry forest partially located on OSL's property and within Romerike's protected landscape area has been mapped south of the airport.

Thirty-six red-listed species have been registered within OSL's properties, including 20 species categorised as "near threatened" (NT), 13 as "vulnerable" (VU), two as "endangered" (EN) and one species, the ortolan bunting, categorised as "critically endangered" (CR). Blacklisted species, including lupine, giant hogweed and Japanese knotweed, have also been registered. These species can have negative effects on ecosystems, native species, genotypes or can be vectors for other species (parasites, diseases) that can harm indigenous biological diversity.

### 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. Outside the airport, the most significant source of emissions is road traffic. Other factors that may affect

local air quality include industrial emissions, emissions from domestic oil furnaces or wood-stove heating and long-range pollution.

The municipality has primary responsibility for assessing air quality, but where there is reason to fear exceeding the limit values, owners of facilities that contribute significantly to the excess will be responsible for assisting with mapping and assessing measures. When the main airport was established at Gardermoen concerns were expressed about air quality as a result of the activities at the fire training field. OSL therefore established a mobile system for monitoring air quality. The measurements showed that there was no cause for concern for the fire drills' impact on air quality. As a voluntary action, OSL nevertheless decided keep the measurement system and continue measurements in a residential area just outside the airport fence, west of the southern end of the western runway.

OSL's voluntary measurement programme includes continuous measurements of the density of particulate matter (PM10) and the concentration of nitrogen oxides. Due to technical problems, the data for 2013 are incomplete. Previous years' history shows that concentrations of particulate matter and nitrogen dioxide in the selected sampling site have been within both regulatory requirements and national targets, and with few exceedances of the recommended air quality criteria.

Avinor has been a participant in the project "Assessment of exposure to diesel exhaust particles in Norwegian working life through the use of elemental carbon (EC) as a marker." The project is a collaboration between the Federation of Norwegian Industries and the National Institute of Occupational Health (STAMI). Measurements were taken at Oslo Airport in the summer and winter to look for any seasonal variations. Four companies with employees at OSL participated in the survey. Measurement results show that our average values for ultrafine particles (UFP) are considerably lower than similar measurements made at other workplaces abroad. While STAMI cannot disclose the average values of other organisations that have been involved in the project, they will likely say more about this when the final report is ready.



## PROJECTS

### THE T2 PROJECT

Oslo Airport Gardermoen is being expanded to serve 28 million passengers annually after phase 1 is completed in 2017. The terminal expansion is called "the T2 project" and comprises:

- Expansion and modification of the existing terminal building
- Expansions and modifications airside
- Modifications of ground operations areas and technical installations
- New remote aprons
- A temporary pier south of the terminal building

OSL has set ambitious environmental goals for the T2 project. These are specified in the project's Environmental Programme, which deals with all phases of the project, from planning and design to construction and operations. Also, the decision has been made to environmentally certify the new part of the terminal building through the internationally recognised BREEAM International Bespoke 2010 certification scheme. The goal of the T2 project is certification at the "Excellent" level. Work on documentation for certification of the design phase, Design Stage, was being concluded at the end of 2013.

Environmental management of the T2 project is also an integral part of OSL's governance and management system. The management system covers all regulatory and internal requirements and is based on relevant requirements in international standards such as ISO 14001. Environmental management is applied methodically to achieve comprehensive control not only of the T2 project's own environmental work, but also that of the contractors involved in planning as well as construction. External environment control plans are being prepared for all contracts. Anyone entering the construction area must have completed an external environment course. All contractors must prepare an emergency plan that includes plans for notification and management of undesirable environmental incidents. OSL's Operations Centre must be notified without delay in the event of any acute emission or discharge of pollutants. The fire and rescue service at OSL will advise and, if necessary, direct any required clean-up.

In 2013, 248 safety inspections were conducted in which environmental issues were also addressed. All parties are actively encouraged to report all incidents that may pose a threat to the environment. Ninety-eight such incidents were reported. None of the incidents caused permanent, irreversible environmental damage. For its own part, OSL's Operations Centre recorded 38 T2 project-related incidents with consequences for the external environment. None had a high degree of severity. A few minor, local discharges occurred; most involved minor oil leaks from construction activities and glycol from pipe systems. The leaks were cleaned up as they occurred in line with applicable procedures. A total of 2,993 machinery inspection checklists were filled out. Eighteen repairs of machinery were carried out at workshops and 75 in the field.

All contractors must implement measures for limiting waste volumes. For source separation, the minimum target has been set at 80 per cent for construction waste excluding concrete, asphalt and contaminated soil. At the end of 2013, the accumulated source separation rate was 85.8% for the T2 project. Construction waste from the T2 project totalled 3,200 tonnes.

Excavation work during the T2 project uncovered soil contamination from activities predating the airport. Contaminated excavated earth was handled as required by applicable permits from the Norwegian Environment Agency. All contaminated soil excavated in 2013 was delivered to an approved facility. Contractors must meet strict environmental standards to ensure that the T2 project does not

cause polluting emissions to soil, groundwater or waterways and that the natural water balance is maintained. This includes requirements for handling bilge water, protection of tank sites, execution of repairs, cleaning of equipment and machinery requirements. Designed as a passive energy building, the energy requirement of the new terminal will be roughly half that of the current terminal building.

The new terminal has received commitments for passive energy building grants from Enova. A greenhouse gas inventory for the new terminal building has been prepared as an integrated part of the planning and building process. The inventory includes emissions associated with energy use in operations, transport in operations and production of the materials used in the building. The inventory shows that the chosen solutions will provide substantial reductions in greenhouse gas emissions compared with similar buildings using standard solutions. Fuel consumption in connection with T2 project construction activities totalled 934,716 litres, equivalent to 2,493 tonnes of CO<sub>2</sub> emissions.

The selection of building and construction materials has been guided by the following criteria: low resource burden, avoidance of substances detrimental to health and the environment, low emissions to the indoor environment and a low initial carbon footprint. Examples of environmentally friendly materials include a high percentage of recycled metals, environmentally friendly concrete and a wooden roof on the North Pier. Materials and chemicals are subject to systematic environmental assessment. The ChemXchange tool has been used to check the environmental properties of chemicals, based on safety data sheets. Safety data sheets are obtained for all chemicals used at the facility.

Work on the T2 project will periodically generate some construction noise. Noise reduction measures will be implemented if indoor noise levels exceed limit values, in order to protect airport employees. Work on the T2 project did not result in any recorded exceedances of applicable noise limit values.

### THE HOPE PROJECT

The HOPE (Harmonisation (of) OSL Procedures & (the) Environment) project, the main objective of which was to improve compliance with "Noise abatement regulations for Oslo Airport, Gardermoen", reduce the overall noise impact and help curb the increase in greenhouse gas emissions - was implemented in March 2013.

Further improvement measures require changes in current regulations and further work on this will be implemented in cooperation with the Civil Aviation Authority and the consultation process related to the regulation.

Development in navigation technology allows for more accurate and flexible approach and take-off procedures and proposed measures are initially aimed at introducing curved approaches adapted to the settlement pattern in the airport's vicinity and the desire for shorter approach routes. The solutions that have been developed are considered to satisfy the neighbouring municipalities' need for predictability in connection with land use planning. Good predictability is achieved with fixed tracks, preferably over unpopulated or sparsely populated areas. In 2012, a new noise survey was carried out in collaboration with SINTEF based on the traffic situation after the reorganisation in April 2011 and forecasts up to 2030. The calculation confirmed significant noise-related benefits by introducing curved approaches. The procedures also provide significant reductions in emissions.

The Civil Aviation Authority granted OSL's application for a regulation exemption to test the concept and in 2012 approximately 1,100 curved approaches were executed across areas with few homes and buildings.



## KEY FIGURES

		2009	2010	2011	2012	2013
<b>Air traffic</b>						
Passengers	number	18 087 722	19 091 113	21 103 199	22 080 433	22 956 540
Domestic	number	8 627 881	8 964 169	9 990 102	10 283 786	10 484 645
International	number	9 459 841	10 126 944	11 113 097	11 796 647	12 471 895
Aircraft movements	number	211 039	212 244	223 565	230 361	234 524
Passengers per aircraft movement (scheduled/charter)	number	90	94	98	100	102
<b>Public transport share, ground transport</b>	%	63	-	61	63	65
<b>Aircraft noise</b>						
Change in total noise impact relative to reference year, 2000 dBA		-2	-1.6	-0.5	-0.9	-0.6
<b>Energy</b>						
Total consumption of electricity	GWh	78,1	84,5	86,3	92,0	96,8
Electricity for electricity-specific installations	GWh	68,3	72,3	74,3	80,4	83,7
Purchased heating and cooling energy	GWh	31,9	38,5	30,6	33,0	32,2
Electricity for boiler	GWh	3,8	5,7	4,6	5,1	4,8
Electricity for compressors, pumps, etc.	GWh	6,0	6,4	7,4	6,5	8,3
Hafslund Fjernvarme AS	GWh	21,2	24,9	17,8	20,7	18,9
Heating oil	GWh	0,9	1,5	0,7	0,7	0,2
Extracted or recovered energy	GWh	13,7	13,4	14,7	14,6	16,1
Consumed heating and cooling energy	GWh	45,5	51,9	45,2	47,6	48,3
<b>Fossil fuels</b>						
Aviation fuel	m <sup>3</sup>	442 821	475 497	500 000	540 000	598 790
Heating oil	m <sup>3</sup>	214	283	166	187	110
Fuel for OSL's vehicles	m <sup>3</sup>	895	774	843	829	668
Fuel for fire training (paraffin)	m <sup>3</sup>	45,2	31,4	35,9	34,4	21,1
Fuel for fire training (propane)	m <sup>3</sup>	1,3	1,9	0,7	0,7	0,6
<b>Waste</b>						
Source-separated waste	tonnes	4 822	4 509	5 065	5 950	5 688
Mixed waste	tonnes	4 014	3 431	3 524	3 675	3 694
Total amount of waste	tonnes	8 836	7 940	8 589	9 625	9 382
Source separation rate	%	54,6	56,8	59	61,8	60,6
Hazardous waste	tonnes	320	233	111	55	90
<b>Greenhouse gas emissions</b>						
Control - OSL emissions	tonnes CO <sub>2</sub> *		4 899	5 113	5 133	4 889
Control - OSL emissions	kg CO <sub>2</sub> /passenger		0,257	0,242	0,232	0,213
Guide - third party emissions	tonnes CO <sub>2</sub>			83 696	86 201	87 560
Influence - third party emissions	tonnes CO <sub>2</sub>			171 508	179 955	180 651
<b>Water supply and sewage</b>						
Water consumption OSL	m <sup>3</sup>	237 000	185 000	201 000	201 000	215 000
Wastewater volume, airport	m <sup>3</sup>	245 000	243 000	265 000	278 000	289 000
Drainage water volume	m <sup>3</sup>	1 621 500	1 562 000	1 711 000	1 937 722	1 498 000
<b>De-icing chemicals (per season)</b>		2008/09	2009/10	2010/11	2011/12	2012/13
<b>Aircraft de-icing</b>						
Total consumption of glycol	tonnes	1 470	1 481	1 398	988	1 526
Specific consumption of glycol	kg/fly	139	137	130	130	139
Collection rate for glycol	%	79	80	76	85	78
<b>Runway de-icing</b>						
Total consumption of runway de-icing chemicals	tonnes	469	200	213	315	321
Environmental burden given as COD *	tonnes COD	164	70	77	110	116

\* COD = chemical oxygen demand