



*my journey starts here*



# ISSUE 1

**SUSTAINABILITY  
REPORT**



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# OUR GOALS

## REDUCING OUR ENERGY CONSUMPTION



- Energy management strategy for existing buildings: checks, adjustments and optimization
- Investing in new technologies
- Improvement of the thermal envelope of buildings, renovation of heating systems

## REDUCING OUR CARBON FOOTPRINT



- Commitment to the Airport Carbon Accreditation program in order to become carbon neutral by 2021
- Lean & Green certification: achieve a 20 percent reduction in our carbon footprint by 2021
- E-mobility: car charging station installed, electric car rental, electric buses for airport car parks
- Promoting the use of renewable energy in all new

## WATER MANAGEMENT



- Continuous analysis of water pollution levels with five stations
- Treatment of polluted water and improvement of the treatment yield
- Further development of environmental emergency management procedures

## WASTE MANAGEMENT



- Continuous reduction of waste production at the source
- Increase of the recycling rate
- Information and awareness-raising actions on the topic of waste sorting targeted at the staff
- Promoting re-usable items – staff no longer use plastic cups

## SOIL CONSERVATION



- Establishment of an inventory of the risks in the different areas of the airport
- Analysis of potential pollution: facilitate what is necessary
- Restoration: old facilities
- Prevention: anti-pollution measures to be taken with a view to guaranteeing a healthy environment and preventing contamination

## BIODIVERSITY



- Improving the existing biodiversity through studies
- Promoting preservation by setting up projects (bee hives, ending the use of glyphosate, ...)

## NOISE

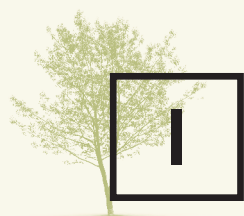


- Supporting all actions which contribute to noise reduction
- Analysis of the ground noise situation

# GREEN AIRPORT



## SUSTAINABLE GROWTH IN THE TRUEST SENSE



I am delighted to present to you the first sustainability report of lux-Airport. Sustainability has been on our agenda for a long time. With this report, we would like to give you an overview of our approaches and measures.

A crucial element of lux-Airport's environmental management is the assessment and reduction of our CO<sub>2</sub> emissions. The Airport Carbon Accreditation programme is the framework in which we document and analyze our progress – and we are pleased that we have recently achieved level 2 certification.

Our medium-term goal is complete CO<sub>2</sub> neutrality. To this end, all of Luxembourg Airport's activities are carried out under sustainability aspects.

As an airport, we are committed to sustainable growth in the truest sense of the word. I hope you will find this report both interesting and useful.

*René Steinhaus*

CEO, lux-Airport



## THE ENVIRONMENT IS AN INTEGRAL PART OF LUX-AIRPORT ACTIVITIES



Improving an airport's sustainability is a challenge. And yet, with the help of involved management, committed partners and motivated employees, opportunities become multifold. At lux-Airport, we base our environmental management on a variety of objectives: the reduction of our energy consumption and carbon footprint, the management of water, waste, soil and subsoil as well as the preservation of biodiversity.

Our goal is to use a structured environmental management system to guide our actions. We thereby create a solid foundation to motivate and involve all our stakeholders in the joint pursuit of preserving and improving the environment.

This report details our achievements and how we approach today's crucial question: how can we contribute to a more sustainable aviation industry? Thank you for joining us on this journey and for your interest.

*Sandrine Trapp*

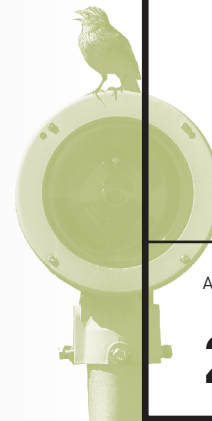
Environmental Officer, lux-Airport





# AIRPORT CARBON ACCREDITATION PROGRAM

*Reducing our carbon footprint*



ACCREDITED  
AIRPORTS

**296**

LUX-ARIPORT  
LEVEL

**2**

CARBON NEUTRAL  
AIRPORTS

**62**

*«At the beginning of the 1990s,  
I passed for a soft dreamer by  
announcing that we would halve CO<sub>2</sub>  
emissions. Today, this is the case.  
I come back to the same idea: the  
hardest thing is to choose to change  
course. After that, it's only a matter of  
deadlines and progress.»*

\*Former State Secretary for Sustainable  
Development and Infrastructure, Luxembourg

Camille Gira\*



Take action: lux-Airport is now certified in the Airport Carbon Accreditation Program, under the administration of WSP. Luxembourg Airport has earned accreditation level 2, «reduction», in recognition of the airport's actions to manage its CO<sub>2</sub> emissions. The certification program is part of the global airport industry's response to the challenge of climate change.

## ACCREDITATION PROCESS

Airport Carbon Accreditation is the global standard for carbon management in the airport industry. The aim of this program is to encourage and enable airports to implement best practices in carbon management, with the ultimate objective of becoming carbon neutral. It has been developed in line with international standards, including the Greenhouse Gas Protocol and ISO 14064, and is updated accordingly as these standards evolve.

The programme focuses on CO<sub>2</sub> emissions, as they represent the large majority of airport emissions. Independent verification ensures the program's credibility. Airports can become accredited at four progressively ambitious levels of accreditation.

### LEVEL 1 MAPPING

requires a policy commitment to emissions reduction endorsed by top management and the development of a carbon footprint for emissions under the airport's control (i.e., scope 1 & 2 emissions).

### LEVEL 2 REDUCTION

requires the fulfilment of all level 2 accreditation requirements, formulation of a carbon emissions reduction target, development of a carbon management plan to achieve the target and annual reduction of emissions under the airports's control (i.e., scope 1 & 2 emissions) versus the three-year rolling average.

### LEVEL 3 OPTIMIZATION

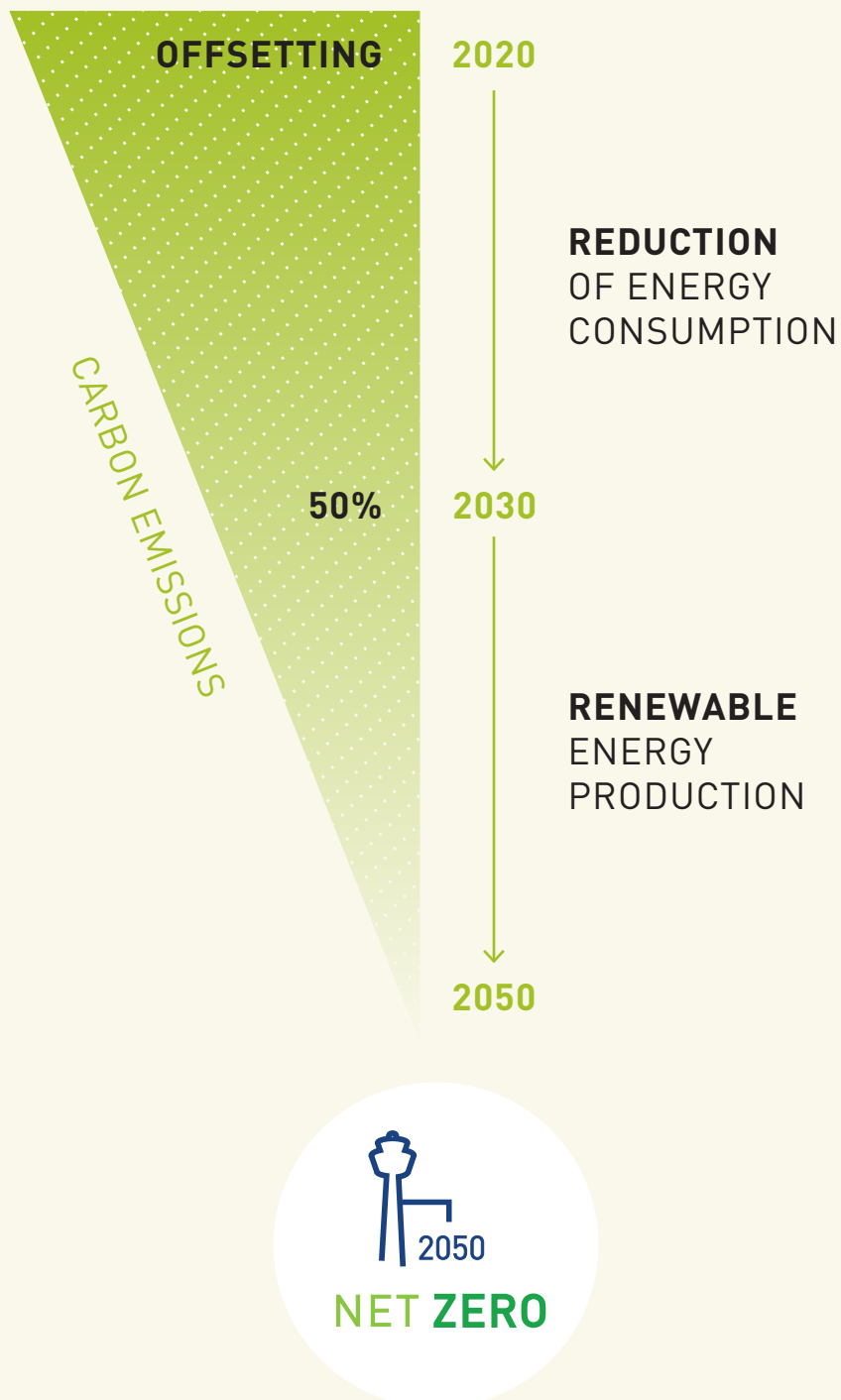
requires fulfilment of all level 2 accreditation requirements, development of a more extensive carbon footprint to include specific scope 3 emissions and the formulation of a stakeholder engagement plan to promote wider airport-based emissions' reductions.

### LEVEL 3+ NEUTRALITY

requires fulfilment of all level 3 accreditation requirements and offsetting of residual emissions under the airport's control that cannot be reduced.



## CARBON NEUTRALITY STRATEGY



## LEVEL 1 MAPPING

### THE REQUIREMENTS IN A NUTSHELL

**To achieve this level of accreditation, an airport has to:**

- Determine its «operational boundary» and the emissions sources within that boundary which are scope 1 and scope 2 sources, as defined by the Greenhouse Gas Protocol
- Collect data and calculate the annual carbon emissions for the previous year for those sources
- Compile a carbon footprint report
- Engage an independent third party to verify the report before submission, to ensure that the carbon footprint calculation is in accordance with ISO14064 and accreditation requirements.

### MORE INFORMATION

An airport must understand how much carbon it emits every year and from which activities and operations in order to plan how to limit these emissions. Therefore, as a first step, an airport needs to measure its carbon emissions, also known as its carbon footprint.

An airport can measure its footprint itself, guided by accreditation bodies or get support from one of a number of specialist companies.

**The lux-Airport carbon footprint has been realized.**

The auditor passed end-December to verify the calculations and data and gave a positive opinion:

### Verification of the adequacy of the methodology used

«The quantization methodology is particularly suitable. The justification of Luxembourg Airport regarding its choice of scope, collecting data method and GHG emissions calculation is relevant. Based on the presented evidence and audits, the GHG emissions inventory is accurate and free of any significant deviation (>5 %).»

Wassim Daoud – Manager at D&D Intelligence

## LEVEL 2 REDUCTION

THE «REDUCTION» STEP OF AIRPORT CARBON ACCREDITATION REQUIRES CARBON MANAGEMENT AND PROGRESS TOWARDS A REDUCED CARBON FOOTPRINT.

To achieve this level of accreditation, an airport has to fulfill all the requirements of «mapping», provide evidence of effective carbon management procedures including target setting, and show that its carbon footprint has been reduced by analysing the carbon emissions data of consecutive years.

**Once an airport has measured its carbon footprint, it can work towards reducing its carbon emissions.**

This process is known as carbon management and involves a diverse range of measures. These include the airport demonstrating it has a low carbon/low energy policy and that a senior committee or body has responsibility for climate change/carbon/energy matters. It is also asked to provide information on how it communicates emissions performance to relevant stakeholders and to install procedures for preparing and checking an accurate carbon footprint. Both monitoring of the consumption of fuel & energy and the setting of carbon/energy reduction targets are required. The airport also has to implement programmes or control mechanisms to ensure operations minimise emissions and show that it considers the emissions impact of investments. Awareness training about emissions for staff has to be provided and a process of self assessment & auditing to monitor progress of improvement delivery has to be installed.

Most of this reduction is due to the fact that, according to our gradual demolition at lux-Airport of old energy-consuming buildings, we don't rent out old buildings after the current tenant leaves.

For the optimization of heating the old Cargo-center buildings, we study – case by case – the possibility to put the heating on frost protection only, turn on the boilers as late as possible and turn them off as soon as possible, and to modify the set value temperature point in function of the activity.

Lastly, beginning the optimization of Terminal A energy will also contribute to the reduction of carbon emissions.



Left to right: Olivier Jankovec – Director General ACI Europe, René Steinhaus – CEO lux-Airport, Sandrine Trapp – Environmental Officer lux-Airport, Filip Cornelis – Director for Aviation in European Commission (DG MOVE), Jost Lammers – President of ACI Europe / CEO Flughafen München GmbH

## OUR APPROACH TO OPTIMIZATION

We are already aware that most of our carbon footprint is concentrated in the heating of older buildings. We will therefore analyze the thermal envelope, heating processes and management systems of these buildings to identify areas with a potential to reduce consumption.

On the other hand, we are working on energy optimization of the terminal A which involve the revision of energy metering through the analysis of existing meters, their operation, their suitability and their replacement according to specific needs, as well as their integration into the GTC control system. Existing set values will be reviewed and adapted to optimize the different installations in terms of efficiency and energy saving potential.

We will also carry out a study of new concepts such as a progressive replacement of energy-intensive light sources with LED lighting.

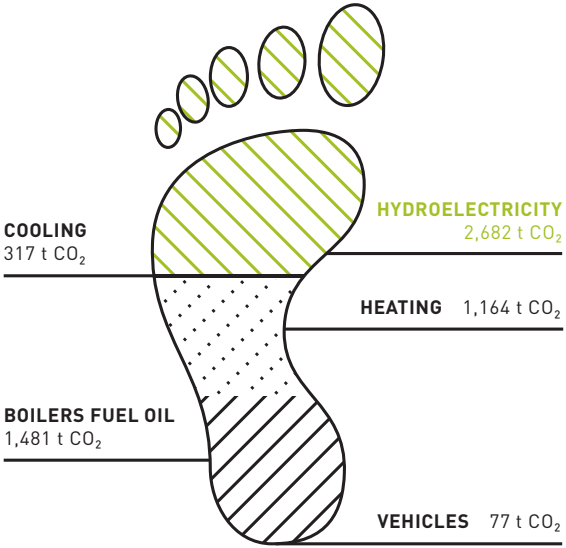


# CARBON FOOTPRINT LUX-AIRPORT

## 2016

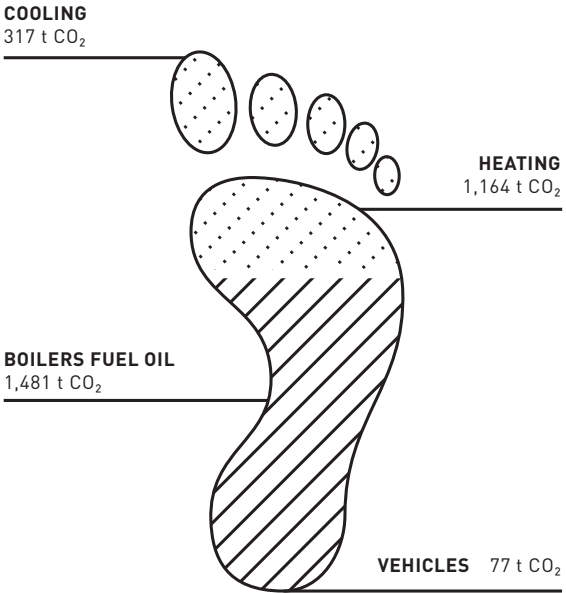
DISTRIBUTION OF CO<sub>2</sub> EMISSIONS BY

LOCATION BASED



4 %  
DECREASE OF  
EMISSIONS

MARKET BASED



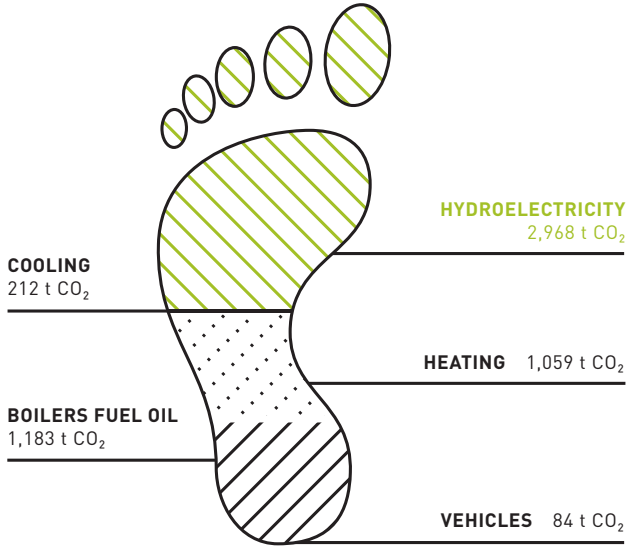
16 %  
DECREASE OF  
EMISSIONS

# CARBON FOOTPRINT LUX-AIRPORT

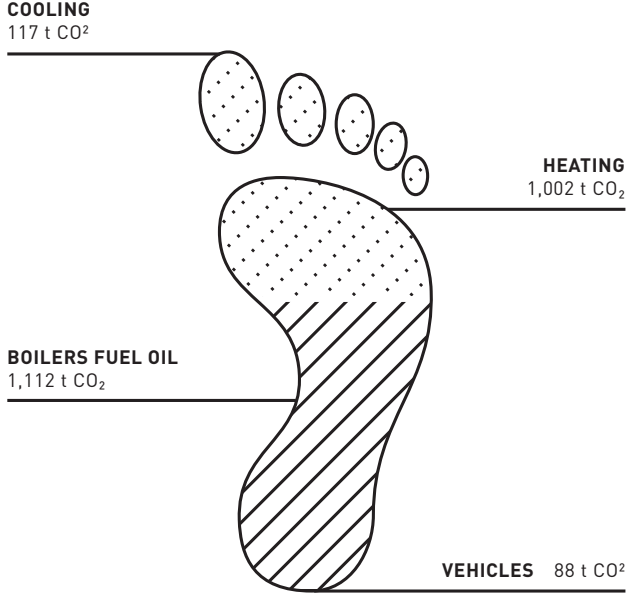
## 2019

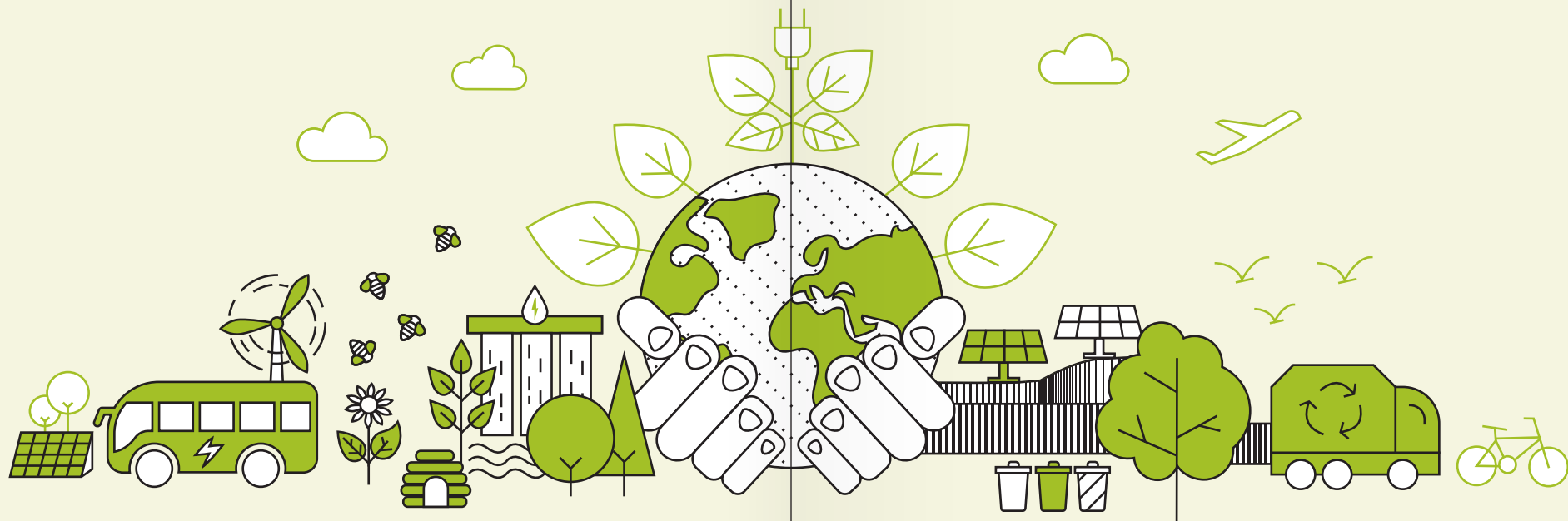
DISTRIBUTION OF CO<sub>2</sub> EMISSIONS BY

LOCATION BASED



MARKET BASED





## NO REASON TO REST

### LEVEL 3 : OPTIMIZATION

The «Optimization» step of Airport Carbon Accreditation requires third party engagement in carbon footprint reduction. Third parties include airlines and various service providers, for example, independent ground handlers, catering companies, air traffic control and others working on the airport site. It also involves engagement on surface access modes (road, rail) with authorities and users.

To achieve this level of accreditation, an airport has to fulfill all the requirements of «mapping» and «reduction». GHG Protocol Scope 3 emissions to be measured include landing and take-off cycle emissions, surface access to the airport for passengers and staff business travel emissions. It also has to present evidence of engagement with third-party operators to reduce wider airport-base carbon emissions.

Airports rely on cooperation with airlines and service providers on the airport site, such as ground handling and catering companies. However, these services also emit carbon, making engagement with the providers essential for an overall reduction in carbon footprint.



**By having obtained level 2 accreditation, we can work towards optimization our carbon emissions.**



## GOODBYE PLASTIC CUPS

*Welcome sustainable  
alternatives*

**500**

YEARS ARE NEEDED TO  
DEGRADE PLASTIC CUPS

**70,000**

PLASTIC CUPS  
SAVED PER YEAR

We all know that the production of plastic cups is a big problem for the environment, but their disposal also presents a major environmental threat.

The European Commission is discussing a series of measures to reduce the number of plastics found on beaches and in the sea:

«Plastic waste is increasingly polluting the oceans and according to one estimation, by 2050 the oceans could contain more plastic than fish by weight.»

European Parliament

### But what if we decided to act?

What's easier than simply removing the plastic cups? It was one of our security staff who came up with this great idea. At lux-Airport, every year staff consume 70,000 plastic cups at water fountains alone. Plastic cups are generally not recyclable due to the poor quality of plastic used in their production. Instead, they are incinerated or dumped in a landfill where they take 500 years to degrade.

Surprisingly, cardboard cups are no more environmentally friendly. Their manufacture from wood requires 13 times more water and twice as much electricity than plastic cups.

When all processes are considered, the manufacture of a plastic cup requires the equivalent of 3.2 grams oil compared to 4.1 for the cardboard version.

Worse still, the thin layer of plastic that covers the inside of a cardboard cup makes it almost impossible to recycle and very complex to compost.

**At lux-Airport, replacing disposable cups with reusable bottles means that every year we reduce:**

- Waste by **2 tons**
- Equivalent CO<sub>2</sub> emissions for production by **200 kilogram**
- Equivalent CO<sub>2</sub> emissions for disposal by **2 tons**

In our quest to find reusable alternatives, we finally settled on «Gobi» because in addition to the long-term advantages of a reusable container, it is Eco-designed with all of its environmental impact reduced.

It only takes 30 uses to repay the environmental impact of the Gobi bottle. After that, it begins to have

a net benefit for the environment compared to single-use plastic cups.

We know that when it comes to the environment, even small gestures can make a big difference, especially when they are multiplied many times. Making the bottle available to our staff is a contribution to the objective of minimizing our environmental impact.

## GET YOUR OWN MUG!

Gobi has a new friend – the new personalized isotherm mug for our staff! It is another step in our ecological journey we encourage.

To take a coffee in our shop or in the canteens, this mug will be used instead of plastic or cardboard cups.







## BEES AT LUX-AIRPORT

*Biodiversity*

HIVES AT  
THE AIRPORT

**2**

NEW FLYING  
EMPLOYEES

**100,000**

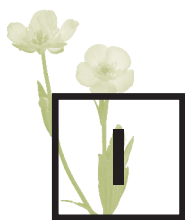
HONEY FROM  
ONE HIVE (KG)

**150**

«Bees do have a smell,  
you know, and if they  
don't, they should, for  
their feet are dusted with  
spices from a million  
flowers.»

Ray Bradbury





In July, the airport of Luxembourg welcomed some 100,000 new «flying employees». If their arrival escaped your notice, it is because they are really tiny and pretty busy. Their work, however, is most important as they are indirectly responsible for the production of one third of the food we consume. Indeed, they are among the most effective pollinating insects. Yes, you guessed correctly: they are honey bees.

## HONEY IS ONLY PART OF THE STORY

We have implemented several eco-friendly programs at lux-Airport as part of our efforts to improve the local environment and reduce our carbon footprint. One is our partnership with the Administration de la Navigation Aérienne (ANA) to implement the «Bees at Luxembourg Airport» project.

In recent years, bees around the world have experienced a phenomenon called «bee colony collapse syndrome» which sees deserted hives at the end of winter and an estimated loss of 30 percent of bees on average.

Environmental factors such as pesticides, disease or habitat loss have been blamed for this massive die-off. In addition to environmental concerns, this problem threatens to have significant economic consequences because 84 percent of plant species cultivated in Europe depend directly on pollinators like the honey bee.

But is it a good idea to have bees at airports? At first glance, our bees seem to have little concern for noise and enjoy themselves very well in their new environment which combines very few agricultural pesticides with the great diversity of plants found on the late-mowed meadows of the airport enclosure. And there are more good news for our busy friends: the airport has stopped using glyphosate. Together with the constant care of the ANA beekeepers, this makes for seemingly happy bee colonies.



But honey is only part of the story. Bees do a lot more at lux-Airport: they also help monitor the air quality.

Because bees cover a large area, honey samples are considered to be perfectly representative of local environmental conditions. As a result, the honey produced by our bees will be analyzed by a certified body and used as biomarkers of pollution.

Our initiative aims at promoting the preservation of biodiversity by introducing the best pollinator insect while at the same time contributing to the ongoing testing of air quality by the competent authorities.

Our bees are now perfectly at home in two hives and ideally placed under tall pines in a protected area with easy access to the meadows along the runway. We are looking forward to some 50 kilograms or more of honey in mid-2018, which will be distributed to partners and customers.



Left to right: Laurent Schank – ANA Beekeeper, Tessy Eiffener – ANA Internal / External Communication Manager, Yves Becker – ANA Environmental Manager, Claudio Clori – Director of the ANA, Meho Dzinic – ANA Beekeeper, René Steinhaus – CEO lux-Airport, Sandrine Trapp – Environmental officer lux-Airport, Christophe Thill – Legal counselor lux-Airport, Rebecca Pecnik-Welsch – Marketing & Communications Manager lux-Airport

## BEES AND PLANES ... A SECURITY PROBLEM?

There is little operational concern about bees interacting with aircraft: if bee and jet meet, the bee will lose. But there have been recent swarming incidents – a natural occurrence when a second queen leaves the hive in search of a new home and around half the hive's bees follow.

In one incident, a whole swarm of bees chose to nestle in an airplane engine in South Africa. Their arrival paralyzed airport operations, and experts had to be called to safely remove the swarm from the engine. But here in Luxembourg, the risk of this happening is minimal because there are only bee farms in the immediate vicinity and our beekeepers control the swarming of their hives.

## THE WORK OF THE BEEKEEPER

A new occupational area at lux-Airport: the beekeeper works from March to September. When he goes to check the swarms and their broods, he calms the bees with wood smoke. After opening the hive, he delicately removes the frames and, with a trained eye, identifies whether everything is fine or if the hive needs some help.

A beekeeper's material consists of a suitable outfit to prevent the curious bee from entering sleeves or pockets and becoming trapped, which can often result in a sting. A bee smoker to calm them is also required to open the hive and leave the frames in peace. The reward for his careful watch and care: sweet golden honey.

# FORAGING

RADIUS OF A BEE



## BEE FACTS

### THE LIFE OF THE HIVE

There is only one queen per hive. She can live between three and five years. In summer, the hive comprises 50,000 to 60,000 bees that live on average 35 days. In winter, the population is reduced to 5,000 to 8,000 bees that then live nine months.

### THE FLIGHT

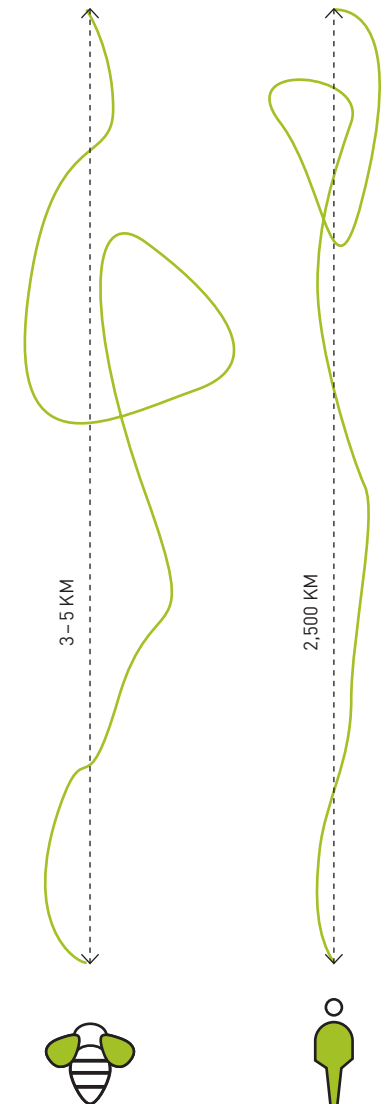
A bee operates in a radius of three to five kilometers around the hive. It uses visual elements of the environment that guide it to and from the hive. A bee can travel up to 8,000 kilometers in the 35 days of its life.

### HONEY

One hive can produce 150 kilograms of honey. To produce one kilogram, it takes 350 to 400 bees. Two thirds of the production is used for the hive: 40 percent of that is used to provide energy that maintains the temperature in the hive thanks to air currents created by the flapping of the bees' wings. In this way, in summer, the temperature is maintained at or below 35°C and in winter the hive is kept between 10 and 15°C.

### HARVESTS

Only one third of the honey production is harvested for human consumption. It is possible to harvest 20 to 50 kilograms per year per hive. Between the end of May (spring honey) and the end of July (summer honey) we hope to get 40 to 100 kilograms for the year 2019.



SCALED UP TO THE HUMAN LEVEL, A PERSON WOULD HAVE TO TRAVEL A RADIUS OF 2,500 KM TO REPRODUCE THE FOOD GATHERING ABILITIES OF THE BEE.



## HONEY ANALYSIS

The appreciation of the quality of honey by the consumer is mainly achieved by the aroma. However, there are some measurable evaluation criteria for the honey's quality:

### THE HMF CONCENTRATION



**lux-Airport & ANA Honey**  
spring & summer: 1 mg / kg

HMF is a very good indicator of the degradation of honey.

HMF is a chemical compound resulting from the breakdown of fructose (sugar). Starting from zero, its concentration will increase over time and with temperature. The HMF content therefore reflects the age and thermal history of honey. Natural honey, harvested without particular heating, contains no more than 5 mg of HMF per kg. During storage of honey (at room temperature), the HMF concentration can increase by approximately 5 to 10 mg/kg per year.

Honey must not have an HMF content greater than 80 mg/kg. This high figure is explained by the need to take into account all of the honeys

produced worldwide (very high HMF contents for tropical honeys). In the European Union, the maximum level of HMF has been set at 40 mg / kg. However, these high rates are almost exclusively encountered in honeys coming from large packaging circuits. Honeys sold directly by beekeepers rarely exceed 10 mg / kg and almost never exceed 20 mg / kg.

### SACCHARASE INDEX OR AMYLASE / DIASTASE



**lux-Airport & ANA Honey**  
spring: 51 DZ  
summer: 19.7 DZ

Honey contains enzymes. Their quantities vary depending on the botanical origin of the honey and the intensity of the honey. The enzymes found in honey include sucrase (or invertase) and diastase (or amylase). They are very sensitive to heat and aging. They provide more precise information than the HMF on the thermal shocks the honey was exposed to. Diastase is more resistant to temperature than sucrase. These data provide information on the proper processing of honey and its freshness.

# 2019 HARVEST

SHARED BETWEEN ANA AND LUX-AIRPORT

## SPRING HONEY



## SUMMER HONEY



### MOISTURE



**lux-Airport & ANA Honey**  
spring: 16,9 %  
summer: 16,5 %

The water content of honey comes mainly from nectar but can be influenced by many factors, including harvest time, closure rate of the rays, storage conditions (before filling in jars), weather conditions and during of the harvest.

Humidity is one of the most important characteristics of honey, because it plays a key role in its quality and preservation. It is involved in the viscosity, crystallization, flavor and fermentation of honey.

Legal standards allow honey up to 20 percent, but only honeys with a moisture content below 18 percent keep well. Too dry (less than 16.5 percent), honey no longer releases its aromas optimally. It sticks in the mouth and dries all your saliva.

### SUGARS



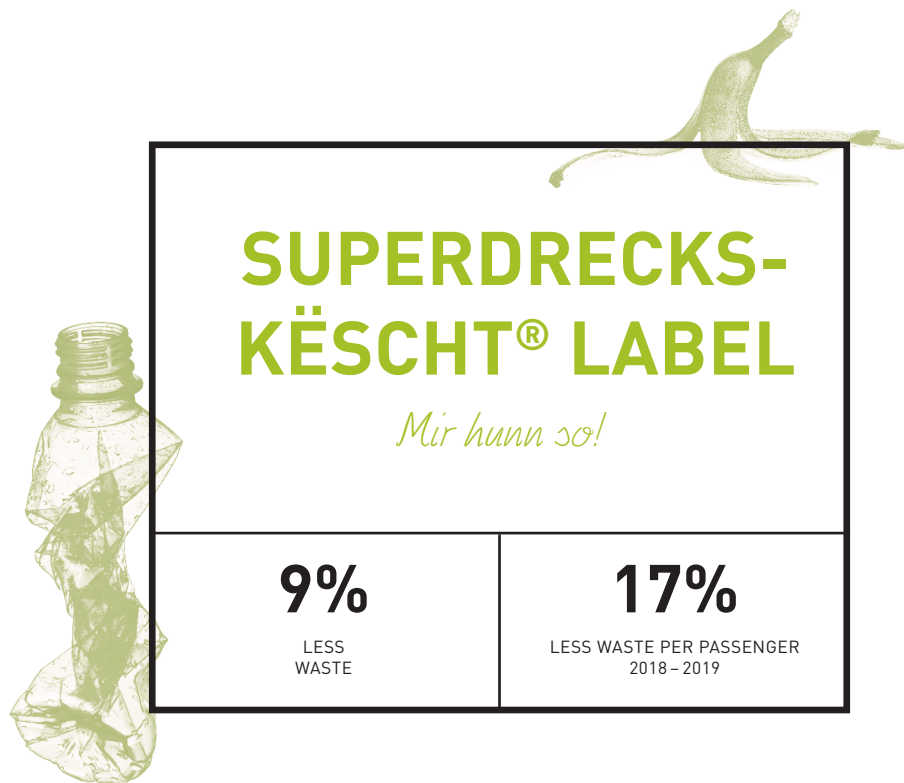
**lux-Airport & ANA Honey**  
spring & summer: 1,1  
fructose / glucose index

Fructose and glucose. Sugar analysis is important to confirm that honey has not been «adulterated» with cooking sugar (sucrose) – it can only contain tiny traces. Indeed, nectar or honeydew contains large amounts of sucrose. Bees should be given time to develop honey to transform it into fructose and glucose.

The fructose-glucose ratio makes it possible to evaluate the rate of crystallization. An F/G index below 1.05 will cause honey to crystallize often in less than a month. Between 1.06 and 1.45, it crystallize place between 2 and 12 months. An F/G index greater than 1.45 means that the honey will remain liquid for at least one year.

As part of the analysis, the sample complies with the legal provisions of the current version of the honey ordinance for table honey. In addition to these «normal» honey quality analyses, we decided to also analyze the presence of heavy metals in honey. No measurable trace was detected.





In its desire to ensure sustainable development and reduce the environmental impact of its activities, lux-Airport aims to improve the management of its waste. In order to control the effectiveness of the measures implemented, we have signed up to the SuperDrecksKëscht® waste management scheme. Since the last inspection visit, the official label has been granted to lux-Airport in recognition of our adherence to this principle of sustainable management, ensuring high quality as well as ecological and economic sustainability.

## MAKE THE WORLD CLEAN AGAIN

The SuperDrecksKëscht® label is a distinction for establishments that actively contribute to the protection of the environment through modern waste management according to the SuperDrecksKëscht® fir Betriber concept.

This quality label rewards 2,000 companies for their responsible approach and commitment to the environment. It is certified according to the ISO 14024: 2000 international standard. As a result, the waste management policies of labeled companies also fully meet the requirements of ISO 14024.

The main criteria for receiving the SuperDrecksKëscht® label are the implementation of preventive measures, the selective collection of all waste, the environmentally friendly storage of waste and the treatment of waste products through approved companies. This guarantees the protection of the environment and the quality and transparency of recycling and waste disposal.

Compliance with the label criteria is checked once a year. If the company meets the criteria for five successive years, it is awarded a diploma and is audited every two years. This quality label thus contributes to maintaining the foundations of sustainable development through the rational management of natural resources.

With more than 40 different types of waste sorted but only 29 percent recycled, our efforts at lux-Airport must continue, even if the quantities of waste and the level of sorting strongly depend on the behavior of the passengers.

### OUR GOALS FOR THE COMING YEARS ARE THEREFORE MULTIPLE

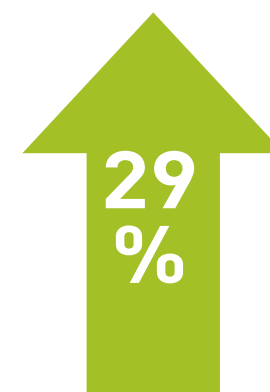
- Reduction of waste production at the source
- Increasing the recycling rate
- Training and awareness of staff and also passengers
- Encouraging reusable packaging



### HOUSEHOLD WASTE DEVELOPMENT PER PASSENGER (PAX)



**NUMBER OF DIFFERENT TYPES OF WASTE SORTED**



**2019 RECYCLING RATE**



# ZÉRO MÉGO!

*Depollution Protocol*

<b>REDUCE</b> FIRE RISK	<b>DECREASE</b> LITTERING	<b>AVOID</b> WATER POLLUTION
----------------------------	------------------------------	---------------------------------

Worldwide, 137,000 cigarette butts are thrown away every second. And almost half of them would end up thrown to the ground – a gesture that has become almost banal. The cigarette butt is ranked 1st in the «Top 10 waste picked up on beaches» by the Surfrider Foundation Europe association.

## THE BUTT – SMALL WASTE, BUT A BIG PROBLEM!

Luxembourg Airport tries to keep the entrance to its buildings, its parking and its green spaces clean. Sometimes, cleaning can be done by sweepers, but other times only manually. In this case, the collection of cigarette butts is particularly long and tedious. But if the butts pass by the hatch, their way towards the sewers or watercourse begins.

The content of the filters is harmful to the environment: it consists of a cellulose acetate filter, which is a form of plastic treated with toxic substances to give it its shape (titanium dioxide, triacetin, etc.), tobacco residue and paper surrounding the filter. It contains more than 2,500 chemical components (mercury, arsenic, tar, pesticide residues and other heavy metals, etc.). These are all substances found in nature, where the degradation of this small waste can take up to 15 years. Beyond visual pollution, each cigarette butt not picked up is swept away by natural phenomena (water, wind, etc.) and continues on down the drain, but also in the water tables, rivers, seas and oceans.

Thus, a small cigarette butt alone pollutes the equivalent of 500 liters of water and, in the mountains, one cubic meter of snow! Lux-Airport therefore decided to be the first international airport to take up this issue and joined forces with Shime and MÉGO! to collect and recycle this waste.

Shime's task is to provide ashtrays, collect the waste and transport it to the recycling industry. We could stop at collecting and sorting since we already avoid polluting water, so why go further? The recycling process is expensive, it is worth the effort. The butts are sent to a recycling company in France which has developed an innovative and patented process for cleaning and reusing the material.



### MÉGO! DEPOLLUTION PROTOCOL AND RECYCLING PROCESS: ONLY ONE IN EUROPE

At the start of this process, cigarette butts are sorted using an air suction and filtration system ensuring absolute safety. The filter depollution solution does not use any chemical and/or toxic product. The main solvent is water, in a closed circuit. The water is purified with clays as well as the latest water filtration technologies. The water becomes clear and decontaminated again, wash after wash. The same water has been used since the foundation of the company (2.5 m3).

The finished product contains hardly any pollutants (only traces of nicotine are left). The seats of the street furniture are made of PlastiGO! Cellulose acetate blades, which are returnable and recyclable at the end of their life. To produce the material, new filters supplied by the tobacco industry are used as these are production scrap intended for waste.

**ONE BUTT  
POLLUTES**



**WATER**

**ONE BUTT  
TAKES**



**TO DEGRADE**



**BUTTS  
END UP IN  
NATURE**

**2/3**



**VISUAL AND  
ENVIRONMENTAL  
POLLUTION**

**WE RECYCLE  
YOUR CIGARETTE  
BUTTS:**



**Grinding**



**Depollution**



**Drying**



**Thermo-  
compression**



**Plastic**



**Furniture**





## SKYPARK BUSINESS CENTER

*made from wood*

**30,700 SQM**

WOOD SUPERSTRUCTURE

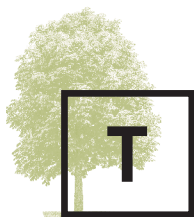
**7**

FLOORS

*«Sustainability can't be  
like some sort of a moral  
sacrifice or political dilemma  
or a philanthropical  
cause. It has to be a design  
challenge.»*

Bjarke Ingels – Founder of BIG





The Copenhagen-based architects from the Bjarke Ingels Group (BIG) have designed a sustainable superstructure for the airport building. The structure communicates transparency and opens up to its surroundings. It consists of lightweight wood columns, beams and slabs, making room for a total area of 30,700 m<sup>2</sup> in Phase 1.

The wood elements are both a sustainable choice and very fast to build with. The philosophy of the design is inspired by the ideas of the circular economy where materials are easy to adapt and recycle if needed. Four floors of underground car parking made of reinforced concrete add to the necessary infrastructure.

The building will house an extremely efficient and flexible office layout. The final design is an office building with three different levels of roof terraces, providing users with abundant opportunities to enjoy unique views whilst surrounded by lush greenery. On the east end, the building is connected to Terminal A, allowing visitors to enjoy a coffee or lunch on the generous plaza.

## THE IMPORTANCE OF SUSTAINABLE MATERIALS

What is it made of? A building's sustainability is not only measured by its energy consumption during operation. The embodied energy of the construction materials makes a significant contribution to the overall carbon footprint of a building.



For the Skypark Business Center, **cross laminated timber (CLT)** is used as a main construction element for levels zero to six. CLT has a significantly lower embodied energy than concrete or steel since it is a renewable material.



**Photo-voltaic panels** are installed on the upper roof to generate renewable electricity on site for self-consumption and to supply to the local electricity grid. Thereby, a significant part of the building's energy demand can be compensated on site.



**Roofs will be greened** to reduce the heat island effect, to temporarily store rainwater and to reduce the upper floor summer cooling demand by evaporation of rain water on the roof areas.



Levels one to six show a **double façade: an outer façade layer in zig-zag**, with an opaque and a transparent element that protect from noise and wind, and a second inner façade layer with triple glazing that insulates from noise and heat.





## PLANTING FOR THE FUTURE

Throughout the building, on all terraces and in the drop-off areas, trees, bushes, shrubs and grasses will create a lush and welcoming biotope to walk out into and to look on from the different building floors.

Our green roof will feature a variety of grasses, perennials and small shrubs. The aesthetic and recreational value of a green roof and green terraces is obvious. But they contribute so much more to urban environments: they also enhance biodiversity, providing plants and animals with new habitats.

The retentive properties of a green roof allow for a better water management: rainwater is absorbed, evaporated and delayed, taking the pressure from the channeling systems. Also, the microclimate improves as the increase in water vapor balances extremes of temperature locally. The planted surfaces filter fine dust and heavy metals out of the air.

## ADVANTAGES OF A GREEN ROOF



NOISE REDUCTION



FILTERS WIND



AESTHETIC VALUE



AIR PURIFICATION



LONGER LIFESPAN



BIODIVERSITY



INSULATION



FIRE PROTECTION



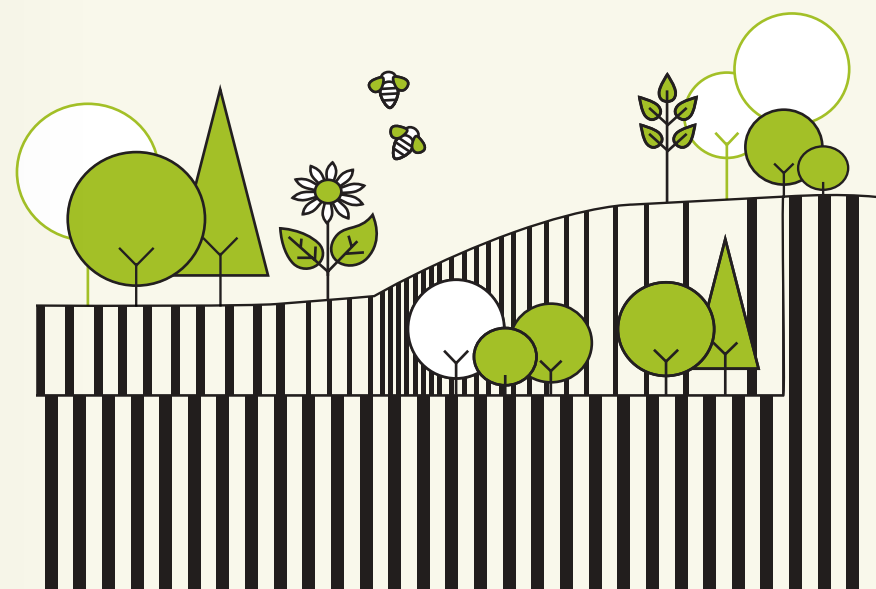
RECREATIONAL  
VALUE



STORM WATER  
RETENTION



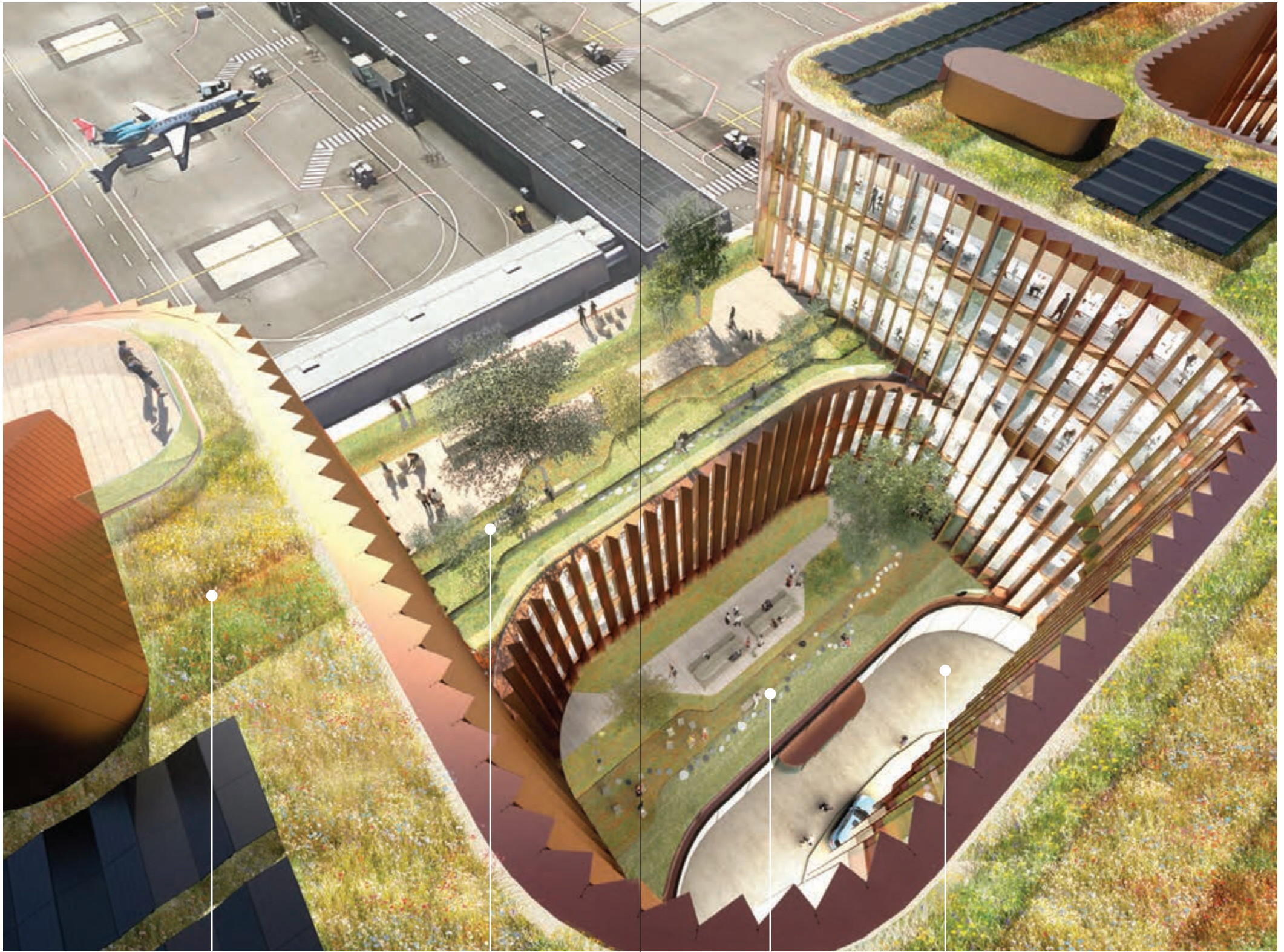
REDUCES HEAT  
ISLAND EFFECT



## OTHER QUALITIES

- The growth layer has an insulating effect in terms of temperatures and noise reduction
- The lifespan of the roof membrane is longer since it is not exposed to sunlight and temperature changes
- The vegetation filters the wind and provides shelter
- Green roofs provide a high fire resistance due to the water content of the soil and vegetation





**GREEN**  
ROOF

**GREEN**  
LEVEL 4,  
TERRACES

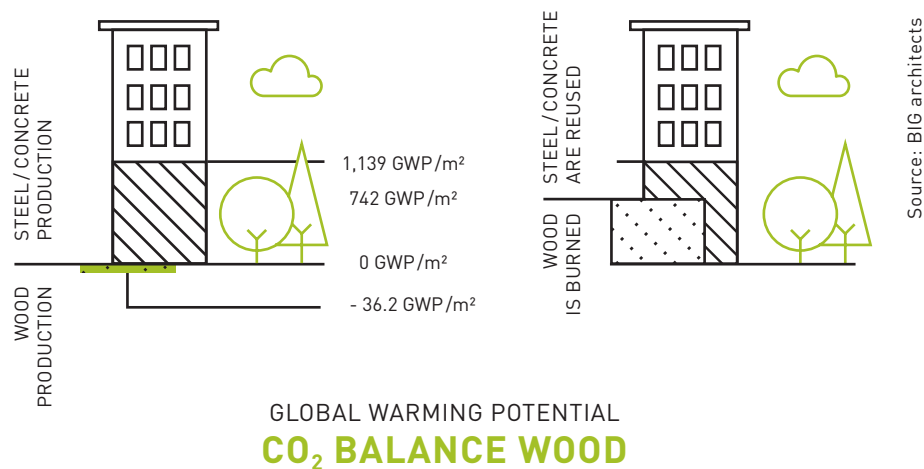
**GREEN**  
LEVEL 1,  
TERRACES

**GREEN**  
GROUND FLOOR,  
TERRACES AND  
DROP-OFF AREA

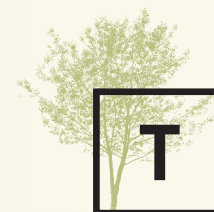


## WOOD STRUCTURE: A MULTI-TALENT

CO<sub>2</sub> IS REMOVED FROM THE ATMOSPHERE  
THROUGHOUT THE LIFETIME OF THE BUILDING.



## WE EMBRACE OUR ECOLOGICAL AND SOCIAL RESPONSIBILITY



he airport is the first point of contact for many international guests, an essential factor for mobility in the national economy and a place of work and residence for numerous companies and their employees.

Therefore, one can rightly expect responsible and exemplary conduct from lux-Airport. We are happy to accept this responsibility.

With the Skypark Business Center, we are implementing a benchmark project for sustainable and eco-conscious construction, a «green building» in the literal sense of the word: it offers urban green spaces on several levels that are accessible and available to both occupants and visitors. For us, green urban development means much more than just concentrating on ecological concerns. We also place great emphasis on practical aspects. For employees, business partners and visitors alike, we want to realize an attractive project with an extremely high quality of experience and a diverse range of services that will be exemplary for the future of the Airport City development.

*Alexander Flassak*

CFO & Head of Real Estate Development, lux-Airport





**JAKOB SAND**

Lead Architect, BIG

### What makes the Skypark Business Center building special?

**Jakob Sand** The SBC building is a very ambitious sustainable building on multiple levels. It looks different because it performs differently. It creates optimal conditions for employees and visitors. The overall shape of the meandering volumes provides an exciting indoor as well as outdoor environment.

### What are the advantages of the SBC building for the employees?

**Jakob Sand** The employees have access to green outdoor gardens with various programs. Research shows that happiness and productivity increase if the employees have access to qualitative green outdoor space during the workday. The noise from the airfield is reduced through the vertical façade panels. Blinds are controlled individually by the employee, are integrated in the cavity of the façade.

### What makes the building an ambitious sustainable building?

**Jakob Sand** The indoor comfort is optimized through an innovative double layered façade. Adjustable windows in the façade allow for natural ventilation of the office spaces.

The ventilation air will be naturally preheated in the cavity of the façade before entering the building.

The depth of the building is only 18 meters and the floor to ceiling height is very generous, due to the absence of false ceilings. This creates optimal daylight conditions for all work zones at most times. Additional artificial light will be provided by low energy LED fixtures.

The structure of the building is almost entirely made of timber and will be one of the largest wooden structures in Europe. The timber elements can be prefabricated in factory workshops and easily assembled on site. It creates good working conditions for the construction workers. The elements are also easy to modify and reuse if anything needs to be changed. The presence of all the untreated wood inside the building creates a pleasant atmosphere, but also reduces the need for paint and other claddings.

The wooden construction stands on a 4 story parking structure which is naturally ventilated through the lamellas in the façade.

Solar panels are integrated on the green roof and will cover some of the electricity consumption of the building. Rainwater running off the building is also collected and will be used to water the gardens.

### Thank you for the interview.

**Jakob Sand** Thank you. We are very proud that the building will be a future sustainable icon in the new masterplan of the airport and we profoundly thank lux-Airport for having such high ambitions on behalf of our shared environment.



«Sustainability focuses on meeting the needs of the present without compromising the ability of future generations to meet their needs. Skypark Business Center is aiming beyond this principle with the desire of becoming a reference for environmentally friendly and sustainable building.»

Olivier Lamaignere, BIG

## THE ARCHITECTS REFLECT

«Designing the largest timber structure in Europe is a truly inspiring task.

By benchmarking new quality and safety standards with international wood experts, we are actively shaping the future of our industry. It is incredibly rewarding to be working with such an ambitious and international design team and of course with a client, who is actively supporting new ideas to make the Skypark Business Center the unique project it is.»

Nick Beissengroll, BIG





# STOP GLYPHOSATE

*Thermal weeder*

Weeds need to be kept in check on the airport.  
The hunt for an alternative to conventional weed  
killers led to a simple solution: heat.

## WE ACT NOW

The principle of the thermal weeder is to create a thermal  
shock of 1,400°C for a fraction of a second on the aerial  
surface of the plant. The aim is not to burn the weed per  
se, but to give it a momentary blast of heat such that,  
within 2 days, the plant dries out and dies.

**This is a practical and ecological solution because  
no chemicals are used during weeding.**

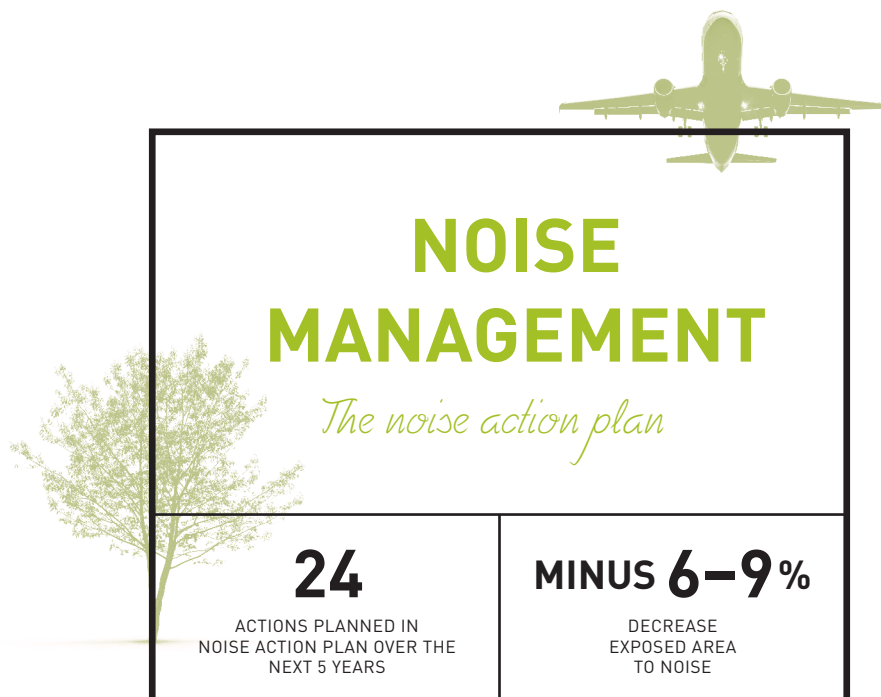
In 2016 Ripagreen® won the Grand Prize for innovation  
in the «sustainable development» category at Salon Vert,  
the largest exhibition in France for green spaces and  
landscapes. The Ripagreen kit and its unique heat diffuser  
system were held in high regard by the jury.

This method consumes less energy, is faster and more  
effective. To be perfectly effective however, it requires a  
great knowledge of weed varieties, their resistance and  
their life cycle.

« We just have to inform that Ponts&Chaussées already  
don't use glyphosate for the green areas and runway »

Sandrine Trapp – Environmental Officer, lux-Airport





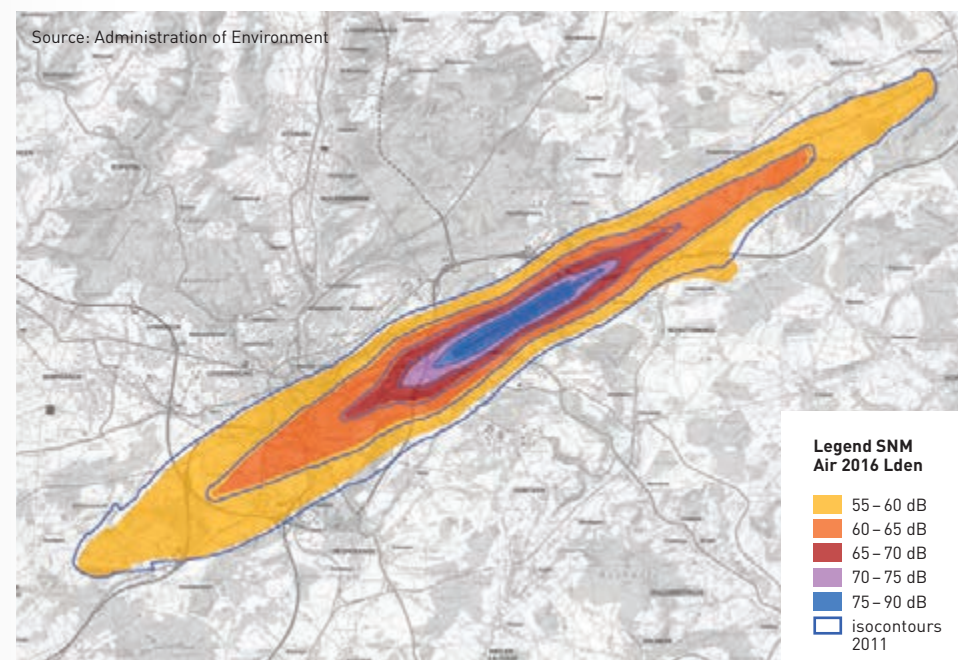
The noise action plan set out the national strategy for prevention and remediation of noise pollution in our environment based on strategic noise maps. It is elaborated by the Ministry of Environment and implemented by the different actors. Following noise mapping in the Grand Duchy of Luxembourg, action plans have been developed for areas particularly affected by noise pollution.

## TAKING ACTION

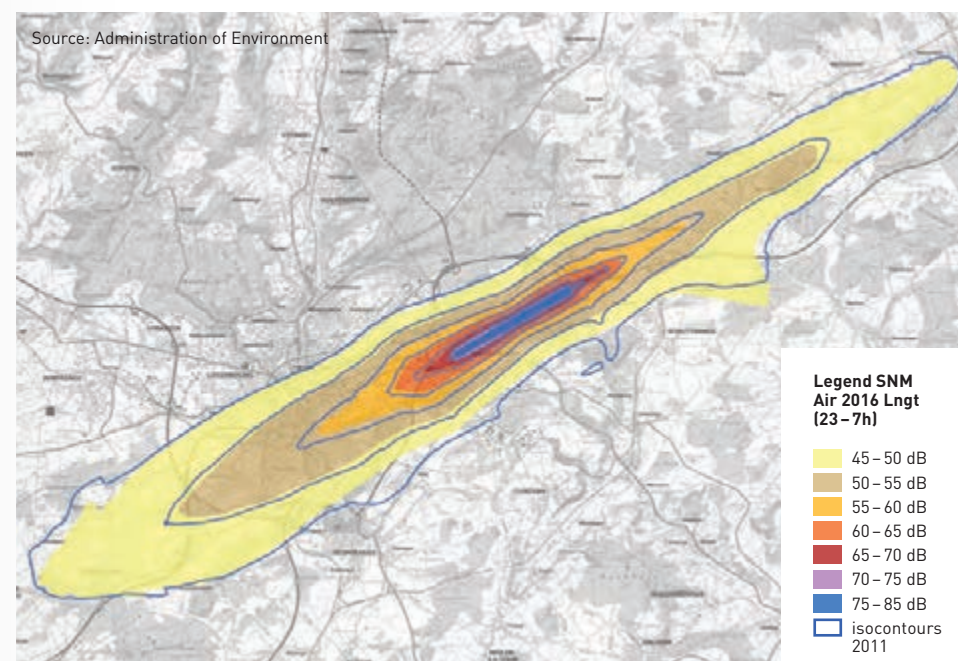
The noise maps were calculated with two indices according to the calculation methods of the regulation (the Grand-Ducal Regulation of 2 August 2006 implementing Directive 2002/49 / EC of the European Parliament and of the Council of 25 June 2002 on the management of environmental noise and the law of 2 August 2006 modifying the modified law of June 21, 1976 relating to the fight against noise):

**LDEN:** average noise index for an average day of 24 hours evaluated over a year (night penalized by 5 dB [A] in the evening and 10 dB [A] at night)

**LNIGHT:** average noise index for an average night of 8 hours evaluated over a year



Noise map 2016 – 2011 | Daytime

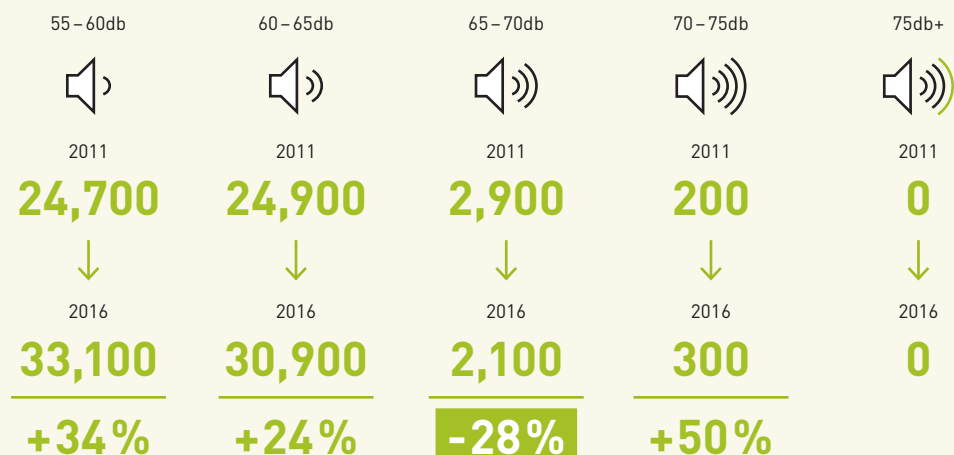


Noise map 2016 – 2011 | Nighttime



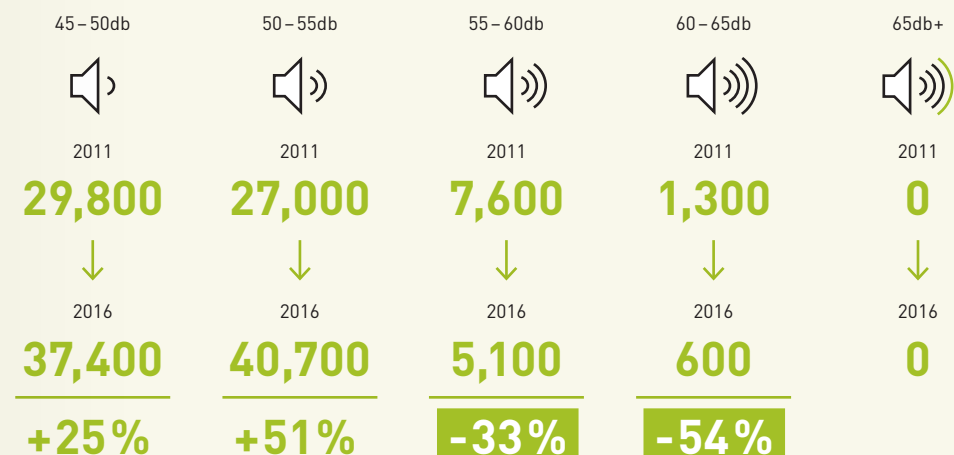
# PEOPLE AFFECTED BY AIRPORT NOISE\*

## DAYTIME



\* number of people exposed rounded to the nearest hundred

## NIGHTTIME



## HOW THE COMMITTEE TACKLES NOISE POLLUTION

**Preventive measures** include, first and foremost, action at the spatial planning level (e.g. general development plan, special development plan, land use plan, model building regulations), and municipal planning (sectoral plans). These measures are part of an approach to preserve quiet areas on the urban plan.

**Measures for remediation of existing noise problems** include focusing on priority areas of noise management, i.e. areas with high noise levels and a large number of people affected. Action plans focus on noise reduction measures at the source, i.e. where the noise is created, which has the advantage of having an immediate impact on the external sound environment and are generally more favorable in terms of cost-effectiveness.

Where noise reduction at source is insufficient, protective infrastructures (e.g. screens and noise barriers) may be considered, provided that their integration into the environment or urban landscape is respected.

**Compared to 2011, 2016 noise mapping results showed a reduction of isocontours, and therefore impacted surfaces in km<sup>2</sup>, by 6 to 9 percent.**

We have achieved a reduction in the number of people impacted by the highest level of noise at night from 8,900 to 5,700 and a reduction in the number of people impacted by medium levels from 3,100 to 2,400. It was also taken into account that the total number of people exposed increases as a result of population growth around the airport.

The complete noise action plan is available on the website of the Administration of the Environment:

[www.environnement.public.lu](http://www.environnement.public.lu)



# AIR QUALITY ASSESSMENT CAMPAIGN

*around the airport*

In collaboration with the Luxembourg Institute of Science and Technology (LIST), the Environment Administration carried out a measurement campaign around the airport in 2018 – 2019 to determine the impact of airport activities on the region.

## A CLEAR VIEW OF THE AIR

### **The purpose of this campaign was**

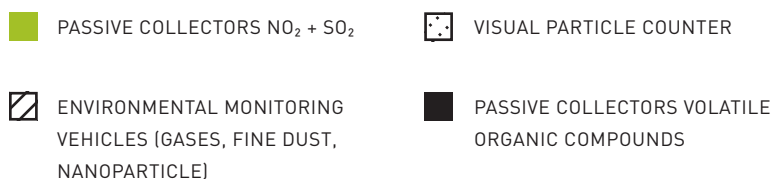
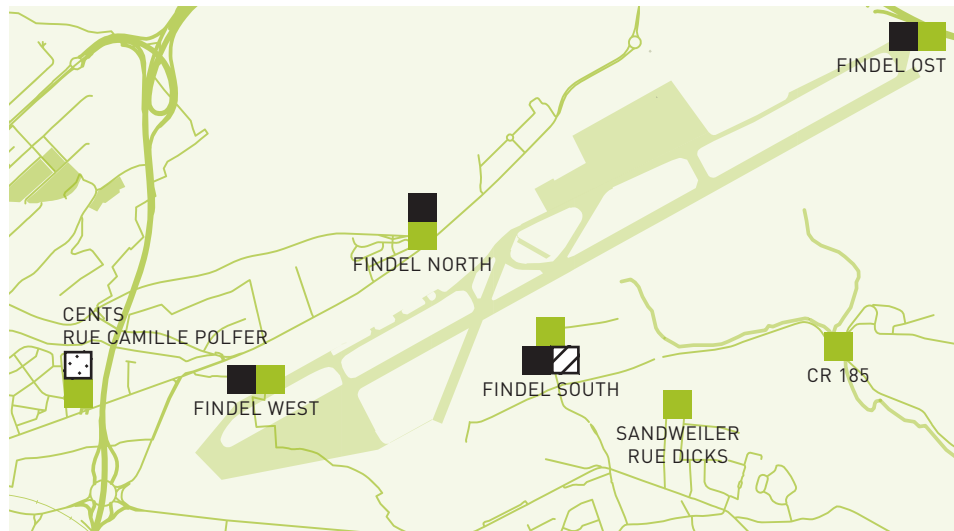
- to assess the overall air quality around the airport
- to assess the influence of airport activities on the air
- to make an inventory of the air quality in the vicinity of the airport

The measurements carried out focused on dust (PM10, PM2.5 and ultrafine), nitrogen oxides and organic compounds. Ultrafine particles were particularly interesting, since a large number of scientific publications relate them to airport activities, even if limit values such as uniform measurement methods are still missing.

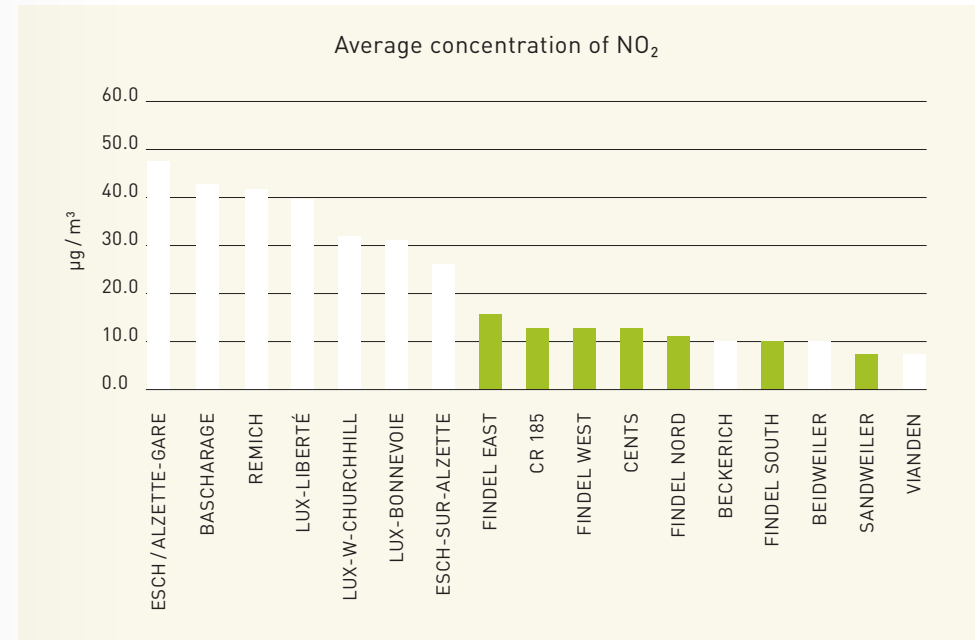
Thus, the evaluation of the results of this study is based on values deduced from similar studies. The measurement locations were chosen in the immediate vicinity of the airport to exclude, as far as possible, other sources, thus allowing a better appreciation of the significance of the airport's impact. In addition, metering locations were also chosen in the nearest residential areas, such as Findel, Cents and Sandweiler, in an attempt to quantify the impact of the airport and possible adverse effects in these areas.

For PM<sub>2.5</sub>, for example, the results show almost the same concentrations (i.e. approximately the same concentrations) that were observed during the same period at the Beidweiler station, serving as a rural background measurement. A particular influence of a source of emission is not directly observable. On the other hand, peak concentrations at the Luxembourg-Cents station are observed during December 2018 and January 2019. This phenomenon could be linked to the spreading of salt on roads in the Cents district during this period.

#### Position of the air quality test points around lux-Airport



**For nitrogen oxides, another interesting pollutant for quantifying the impact of airport activities on the region, the following concentrations are observed:**



The graph above compares the average concentrations measured between June 2018 and May 2019 near the airport (in green) with the annual averages in 2019 of the NO<sub>2</sub> continuous measurement stations of the air quality monitoring network (in white). We can deduce that the concentrations around the airport are lower than the concentrations of stations assessing the impact of traffic. The concentrations observed correspond more to a peri-urban, even rural, situation.

**In general, the results of the campaign led to the conclusion that the airport does not have a worrying impact on these surroundings.** Its geographical location allows rapid dilution and distribution of the emissions produced by airport activities. Notwithstanding, this does not exclude an occasional and local negative impact following unfavorable weather conditions and wind directions, in particular by bad odors. **For pollutants for which an hourly, daily or annual limit value is prescribed (NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, Ar, Cd, Pb, B (a) P, C<sub>6</sub>H<sub>6</sub>), it was not possible to observe the values exceeding the hourly or daily limit values, or a trend towards potentially exceeding the annual limit values during the measurement period.**

Source:  
environnement.  
public.lu/fr/loft/air/  
mesures/campag-  
nes-speciales/eva-  
luation-air-aeroport.  
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schlussbericht-Flug-  
hafen-Findel.pdf





## IN BRIEF

### *Environmental initiatives*

#### 1 | SOIL AND SUBSOIL MANAGEMENT

##### QUALITY SURVEY

We continue the job of identifying potentially polluted sites. Using knowledge of the airport's history, specific sites are being visited and an inventory taken. With the use of a grid layout of the airport, we are moving zone by zone to identify and treat possible pollution.

##### REMEDIATION

Depollution is in progress for the zone of the Luxembourg Air Rescue extension, which includes:

- Cleaning up the area prior to building the extension of Luxembourg Air Ambulance
- Decommissioning of the old underground tank at the Nennig shed
- Removal of 4 old underground tanks

#### 2 | WATER MANAGEMENT

##### ANALYSIS OF WATER POTENTIALLY POLLUTED BY DE-ICING PRODUCTS

In close cooperation with the Administration des Ponts & Chaussées, we share our pollution analyses and meet regularly with Sidest, who manages the Ubersyren wastewater treatment plant to refine detection and downstream processing.

##### DRINKING WATER PROTECTION

The airport is located on three drinking water protection zones of the City of Luxembourg. New regulations encourage us to take action in relation to the protection of these groundwaters.

We are working to improve the management of environmental emergencies, including the implementation of an emergency management plan that, upon detection of an incident likely to pollute the water, allows fire fighters to call the management network to ensure the closure of valves to retain polluted water in the pipes for suitable treatment.

##### PIEZOMETERS

A number of piezometers have been installed to monitor the quality of the groundwater:

- on the site of the current fuel farm
- in the southern part of the runway
- at the site of an old diesel distribution
- in the course of new projects like Skypark Business Center

We work closely with all stakeholders and the administration to enable the most effective monitoring possible.

#### 3 | E-MOBILITY



New charging stations for electric vehicles have been installed in the underground car park at the terminal. We encourage the use of electrical vehicles airside.

A contract with a company renting only electric cars has been negotiated.

##### SAVINGS ON BUSES

Diesel bus = 110 t CO<sub>2</sub> / year  
Electrical bus = 1 t CO<sub>2</sub> / year  
**Savings = 109 t CO<sub>2</sub> / year**

#### 4 | CERTIFICATION



We are engaged with the Lean & Green program. With this certification, we are committed to reducing our carbon footprint by 20 percent within 5 years. This certification is complementary to our efforts undertaken as part of the Airport Carbon Accreditation certification.

#### 5 | RENEWABLE ENERGY

The size and position of the roof of the terminal A building is suitable for the installation of photovoltaic panels of more than 500 kW. We are conducting this study in parallel with a study of the building's statics to ensure that the additional load is recovered.

#### 6 | WASTE SEPARATION



We have introduced selective sorting of waste at the different security checkpoints of the airport site. The containers have been designed to fit the available space and the waste is then brought to the centralized waste sorting center at terminal A.

#### 7 | ALWAYS UP-TO-DATE

You will soon find the latest information on the environment and sustainability at lux-Airport on our website under: [www.lux-airport.lu/sustainability](http://www.lux-airport.lu/sustainability)



**NO**  
CHEMICALS

WEEDING BY  
**THERMAL GAS  
SHOCK**

**100**  
%

RENEWABLE  
ELECTRICITY



HYDRO-  
ELECTRICITY

WE SAVE  
**109t CO<sub>2</sub>**  
PER YEAR



ON **ELECTRIC BUSES** TO SERVE  
AIRPORT CAR PARKS



WE USE  
**PERSONALIZED  
WATER BOTTLES  
AND MUGS**  
INSTEAD OF  
PLASTIC CUPS



RECYCLING

**40**  
TYPES  
OF SORTED  
WASTE

## ENVIRONMENTAL GOAL

REDUCING OUR CARBON FOOTPRINT



# NET ZERO

CARBON EMISSIONS BY  
**2050**



# PUBLISHING DETAILS

*Responsible for the content*

## **PUBLISHER**

**SOCIÉTÉ DE L'AÉROPORT  
DE LUXEMBOURG S.A.**

## **DESIGN & IMPLEMENTATION**

Lekkerwerken GmbH

## **LECTURER / PROOFREADING**

Koch & Konsorten GbR / Christine Tennie, M.A.

## **PRINTING HOUSE / BOOKBINDING**

Vereinte Druckwerke Frankfurt UG /  
Buchbinderei Schaumann GmbH

## **PAPER**

Cover: Gmund Urban powder cement  
(FSC® certified, 20% pre-consumer recycled material)  
Inner sides: RecyStar Polar (100% recycling paper,  
FSC® certified, Blauer Engel, EU Ecolabel,  
nordic swan ecolabel)

## **PHOTO CREDITS**

lux-Airport: page 4, 5, 6, 13, 18, 20, 22, 25, 26,  
28, 32, 34, 45, 48, 59 / Luc Willems: page 2, 62  
BIG: page 36, 38, 39, 40, 44, 46, 47 /  
Adobe Stock: Cover, flap, page 4, 5, 7, 8, 16, 17,  
18, 23, 24, 30, 33, 37, 38, 45, 49, 50, 55, 58 /  
iStock: page 60 / shutterstock: page 54

## **PUBLICATION DATE**

July 2020





**LUX-AIRPORT**

**SOCIÉTÉ DE L'AÉROPORT  
DE LUXEMBOURG S.A.**

B.P. 635 L-2019  
LUXEMBOURG-FINDEL

[www.lux-airport.lu](http://www.lux-airport.lu)