A SUSTAINABLE RESEARCH ENVIRONMENT

Health, safety and environmental protection are of paramount importance to CERN. The Laboratory works to ensure the wellbeing of everyone using or visiting its facilities, while minimising its impact on the environment.

Bee-keepers maintaining their hives in a meadow at CERN. (CERN-PHOTO-201806-165-11)

PROTECTING HEALTH, SAFETY AND THE ENVIRONMENT

In 2018, the first recommendations of CERN's Environmental Protection Steering Board were put into practice, while the Energy Management Panel notched up a notable success in preparations for recycling CERN's waste heat. The Laboratory's mobility working group also saw its first recommendations implemented, and carried out a major survey of the daily commuting patterns of CERN personnel. Other notable highlights from 2018 include streamlining of the support provided to major projects and experiments in safety matters, and a new elimination pathway for low-level radioactive waste.

RETENTION BASINS TO PROTECT WATERCOURSES

In 2018, a significant amount of work was carried out to prevent water pollution from the CERN sites. On the main Meyrin site, several kilometres of rainwater and wastewater networks were inspected and repaired where necessary, and a comprehensive study was carried out to identify potential improvements to the sewer system. Meanwhile, a contract was awarded for the construction of a combined oil separator and water retention basin at Point 7 of the LHC ring in order to contain potential pollutants in the event of particularly heavy rain, a key recommendation of CERN's Environmental Protection Steering Board. Contracts for further retention basins at other CERN sites will be awarded in 2019.

WARMING HOMES WITH RECOVERED HEAT

Tower cranes are a common sight in the burgeoning Pays de Gex region of France, as new commercial and residential areas are constructed. One of these areas, in the town of Ferney-Voltaire, will soon be heated partly using heat recovered from the Large Hadron Collider. An agreement drawn up between CERN and the local authorities, due to be signed in 2019, provides for the construction of a heat converter at Point 8 of the LHC ring and a distribution system to carry the heat to a new residential area. The project will be financed jointly by the local authorities and CERN, with CERN recovering its investment over 15 years by selling the heat to the local authorities at an attractive price. Studies are under way for a similar project designed to heat offices on CERN's Meyrin site.

MANAGING WASTE

The operation of CERN's accelerators generates low-level radioactivity in accelerator components, which have to be stored at the end of their operational lifetime until they can be safely disposed of in the repositories of CERN's Host States. Until now, the waste-treatment process involved each item of waste being treated in CERN's radioactive-waste-treatment centre before being approved for release to a Host State repository. Much of this waste is in the form of magnets.

In 2018, a process that had begun three years earlier reached a successful conclusion, allowing waste magnets to be treated, characterised, packaged *in situ* and sent to the final repository without any intermediate further treatment or storage at CERN. This new procedure is the fruit of discussions with the French national agency for radioactive waste management, ANDRA, and a close and successful collaboration between CERN's Technology and Engineering departments and the Laboratory's Health, Safety and Environmental Protection unit (HSE). Following the conclusion of an agreement between CERN and ANDRA, the first magnets were prepared and shipped to an ANDRA storage facility in June 2018 for final disposal.

CERN also made some important advances in conventional waste management in 2018. The Laboratory already recycles over 50% of its waste, making it a leader in the Geneva region. Nevertheless, there is still room for improvement. In one significant development, the quantity of single-use plastic drinking cups was drastically reduced in the restaurants on CERN's Meyrin site. This measure promises to reduce CERN's plastic waste by 1.5 tonnes per year. All remaining single-use plastic cups will be replaced with recyclable cardboard cups in 2019.

IMPROVED SUPPORT IN SAFETY MATTERS

CERN has recently streamlined the way in which it provides the major projects and experiments with support in all matters of safety, with the exception of radioprotection, which has its own dedicated service. The Project and Experiment Safety Support (PESS) procedure was customised to provide project leaders and safety officers with a dedicated support structure to help them fulfil their roles and responsibilities in terms of safety. The procedure ensures that safety aspects are taken into account right at the beginning of projects and that HSE follows each project closely, while providing a tailored approach to each initiative. Each project leader has a single point of contact for all safety matters, and benefits from dedicated support throughout the lifecycle of the project. In 2018, PESS followed more than 130 projects.

The new insulation installed on the huge East Area building will reduce thermal losses by 90%. *(CERN-PHOTO-201805-130-3)*

GREENER MOBILITY AND BUILDINGS AT CERN

CERN's Mobility Working Group ran a two-part survey in 2018 designed to gather information about the commuting patterns and work-related travel habits of CERN personnel to help make CERN mobility greener. The survey was part of an initiative to develop a mobility plan that outlines measures, to be implemented by 2030, to facilitate movement in and around CERN and to encourage sustainable modes of transport. The survey provided the data that the working group needed to put forward a set of suggested measures. With many CERN personnel living in rural areas, the majority of commutes are by individual motorised vehicles, although car sharing and cycling account for around 8% and 13% respectively.

The survey has already allowed concrete actions to be taken. More pavements and dedicated cycle paths are being built on the CERN site. The frequency of shuttles on and between the sites has been increased, as has the size of CERN's fleet of bicycles. And for those who have no alternative but to drive, the flow of traffic through the entrances to the CERN sites at peak times has been improved. As a result of discussions involving CERN, the local authorities and Geneva's public-transport provider, improved public-transport solutions are being deployed on the French side of the border close to CERN.

A key message emerging from the 2018 surveys is that the CERN population has a green outlook on travel. Where green options exist, people use them, and the survey's results are allowing more green options to be deployed.

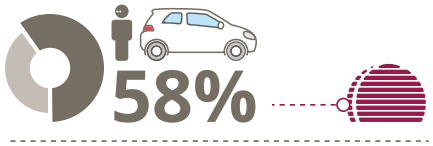
Infrastructure and building renovation projects continued in 2018. One of the largest concerns the East Area, a huge 100 000 m^3 building housing four PS beamlines and several experiment installations. The first phase of work began with the restoration of the building to reduce energy losses. New insulation will reduce thermal losses by 90%. The second phase, which will begin in 2019, consists of renovating the beamlines, in particular by replacing the magnets and their power supplies with a much more energy-efficient system.

R&D FOR BETTER SAFETY

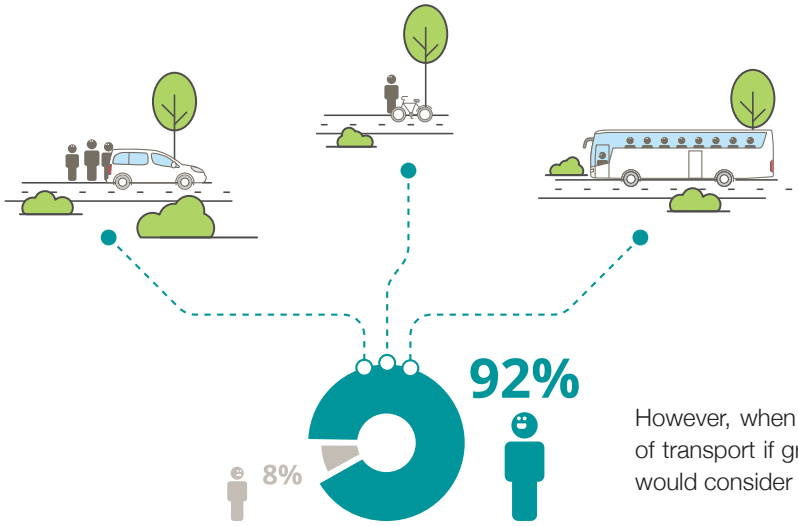
CERN's research is not confined to unravelling some of the deepest mysteries of the universe, but also covers more down-to-earth domains. The CERN radiation-monitoring electronics project, CROME, is a case in point. CROME develops high-performance, high-reliability cost-effective and low-maintenance radiation monitors for CERN, with the potential for applications beyond the field of scientific research. CROME-equipped monitors installed in and around the CERN sites will provide continuous real-time measurements, including of very low-level dose rates, and permanent, reliable data logging.

In 2018, CROME R&D for the next generation of electronics continued apace, with a prototype being produced and tested. Series production of CROME equipment, such as alarm units, uninterruptible power supplies and a first batch of monitors, began in 2018 and will ramp up in 2019 in accordance with the schedule for the installation of new monitoring equipment during the second long shutdown of CERN's accelerator complex.

THE CERN POPULATION HAS A GREEN OUTLOOK ON TRAVEL. WHERE ALTERNATIVES EXIST, PEOPLE USE THEM.



Of the 4300 people who responded to CERN's mobility survey, 58% come to work by car with a single occupant.



However, when asked whether they would change their mode of transport if greener alternatives were on offer, 92% said they would consider doing so.

CERN's safety-training operations received an important boost in 2018 with the inauguration of a new building at the Laboratory's safety-training centre in November. The new building allows all of the safety-training team to be located in the same place and to offer a better service to the CERN community. This will be particularly important as the second long shutdown progresses, as teams of users and contractors will be coming to the Laboratory to carry out work in a wide range of disciplines, all with their own specific safety requirements. The centre now boasts six classrooms, as well as hands-on facilities such as a fire simulator and a mock-up of the LHC tunnel. In 2018, some 6100 people received safety classroom training, and, in a typical week, around 16 separate course sessions were run.

(CERN-PHOTO-201904-081-2)