Luxembourg, 23rd November 2015

Environmental and Social Data Sheet

Overview

Project Name:	CERN - HIGH LUMINOSITY LARGE HADRON COLIDER
Project Number:	2015-0246
Country:	France, Switzerland
Project Description:	The project concerns the financing of part of the promoter's investment activities towards the development and construction of the High Luminosity Large Hadron Collider accelerator system (HL-LHC), which represents a significant upgrade of the current LHC accelerator

EIA required: no

Project included in Carbon Footprint Exercise[1]: yes

(details for projects included are provided in section: "EIB Carbon Footprint Exercise")

Summary of Environmental and Social Assessment, including key issues and overall conclusion and recommendation

Research Infrastructures are not specifically mentioned in Annex II of the EIA directive 2011/92/EC, and the promoter has confirmed that an EIA will not be required. CERN has two agreements with its host states, France and Switzerland, regarding environmental protection ("Memorandum de Cooperation en matière d'environnement, 2007) and the protection against ionizing radiation (Accord relatif à la Protection contre les rayonnements ionisants et à la Sûreté des Installations de l'Organization Européenne pour la Recherche nucléaire, 2010). As the collision energy levels will not be higher than the ones in the original design, the upgrade will not require new operational authorisations. However, the project will include civil works for which normal construction permits will be required.
The project is considered acceptable with minor negative residual impacts in particular regarding ionizing radiation and energy consumption, which are inherent to its nature.

Environmental and Social Assessment

Environmental Assessment

The project concerns the financing of part of the promoter's investment activities towards the development and construction of the High Luminosity Large Hadron Collider accelerator system (HL-LHC), which represents a significant upgrade of the current LHC accelerator. The accelerator is installed in a tunnel 27 km in circumference, some 100 metres below ground, located between the Jura mountain range in France and Lake Geneva in Switzerland. The project activities will take place in sites in both countries.

The safety of the CERN installations is regulated by a tripartite convention between CERN, the French Nuclear Safety Authority (ASN) and the "Office Fédéral de la Santé Publique Suisse". The convention which was signed on 15 November 2010 covers safety and radiation protection for all CERN installations, both present and future

[1] Only projects that meet the scope of the Pilot Exercise, as defined in the EIB draft Carbon Footprint Methodologies, are included, provided estimated emissions exceed the methodology thresholds: above 100,000 tons CO2e/year absolute (gross) or 20,000 tons CO2e/year relative (net) – both increases and savings.

The 2010 tripartite agreement on radiation protection and radiation safety replaces earlier bilateral agreements governing the procedures applying on the French and Swiss parts of the site. From an operational point of view, the 2010 agreement simplifies matters by harmonising administrative processes while guaranteeing best practice in terms of radiation protection and radiation safety at CERN. Under the agreement, CERN has committed itself to document the safety related aspects of its installations, both old and new.
While CERN is not directly subject to national legislation and controls regarding its environmental impact, the Organization has an extensive environmental monitoring program. Two hundred on-line monitoring stations are spread over CERN's site and the surrounding region. Teams from CERNs occupational health and safety, and environmental safety unit (HSE unit) take samples of ambient air, soil, watercourses, groundwater, vegetation and agricultural products in the area and perform around 5,000 tests each year.

CERN regularly reports on its environmental, and specifically radiological, impact to the Swiss and French safety authorities (OFSP and ASN) in the framework of the above mentioned tripartite agreements.
Furthermore, the Swiss (OFSP) and French (ASN-IRSN) authorities carry out their own independent tests, which are published on a regular basis[2]. Both host states have closely followed the impact on the LHC over a number of years and will soon publish the LHC-point zero phase 2 report on the matter. When it is published, it will be a publicly available document.
These monitoring programs all confirm the insignificant impact of CERN on the environment, in particular regarding ionizing radiation. For example, in 2012, the last time CERN's installations were fully operational, people living closest to CERN's installations were exposed to a maximum annual dose of 5 microSv related to CERN activities. This corresponds to less than ~0.25% of the annual dose to which these people are exposed from other sources of ionizing radiation (cosmic rays, radon, medical examinations). For comparison, the dose received during a flight from Paris to New York is about 35 microSv.
Finally, HSE experts are closely involved at each stage of the life cycle of any major CERN project with a view to minimize the HSE impact of such projects. All projects are designed and operated in a way that allows CERN to stay within the limits set by the relevant legislations in the host states.

The accelerators collision energy levels will remain at 14 TeV (within the original design values) and therefore the upgrade will not require new operational authorisations. However, the project will include civil works that are expected to be carried out between 2019 and 2020 for which normal construction permits will be required, and which are expected to be obtained in due course.

EIB Carbon Footprint Exercise

CERN calculates, for internal purposes only, its carbon footprint based on: a) direct emissions, i.e. fuel used by CERN's car fleet, heating (natural gas), air conditioning (fluorinated gas), electrical isolation (fluorinated gas), detector cooling (fluorinated gas), use of experimental gases (fluorinated gases), and b) indirect emissions, i.e. electricity consumption.

Based on the above elements CERN's total carbon footprint corresponds to 200,000 t equivalent CO2 per annum. CERN does not distinguish between its facilities when calculating the footprint. However, the LHC clearly represents the most important of CERN's activities today (a purely indicative percentage would be around 80%), and therefore the project's baseline emissions are estimated at around 160,000 t equivalent CO2 per year.
The HL-LHC project is not expected to increase the footprint as electricity consumption in particular should stay more or less stable, and therefore the project's absolute emissions are estimated also at around 160,000 t CO2/year. The relative emissions are therefore estimated at 0.

[2] http://www.bag.admin.ch/themen/strahlung/00043/00065/02239/index.html?lang=fr and http://www.irsn.fr/FR/expertise/rapports_expertise/surveillance-environnement/Pages/environnement.aspx

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Other Environmental and Social Aspects

Environmental and safety impact are important elements in CERN's policy. To control the impact of its activities on the local environment, CERN carefully monitors the relevant parameters, which include everything from air and water quality to soil or agricultural products. This monitoring is administered by the Environmental Management System (EMS), developed and implemented with the basic aim to continuously improve CERN's environmental performance. EMS enables CERN to carry out and document its activities, conforming to environmental safety practices that are recognised worldwide.

During the activities of the second long shutdown, which involved the very high number of working hours (3.4 million) and personnel involved (1600) safety was the major focus before performance and schedule and the frequency and severity of accidents remained very low. Particular attention was paid to work in supervised and controlled radiation areas, and the long shutdown provided an opportunity to carry out exercises to re-evaluate some of the safety standards in the LHC tunnel. Safety exercises are regularly conducted across the facilities, and help to identify ways of improving the level of safety in these buildings and to raise awareness among the occupants. In addition training is a fundamental aspect of CERN's safety policy. In 2014, more than 5600 people took part in group training courses and 23 700 people took online courses. In order to formalize and improve the prevention of occupational hazards, a strategy known as ProSanTra (Promotion de la Santé au Travail — promoting health at work) was implemented placing particular emphasis on chemical hazards explaining measures to protect against and mitigate them.

Efforts to reduce the impact of CERN's activities on the environment continued. The shutdown of the accelerators provided an opportunity to replace many stations for monitoring air, water and new radiation-measuring stations, capable of detecting even lower levels of radiation, were also installed. All of the measurements demonstrated that the radiological impact of CERN's activities on the environment in 2014 was negligible. At the same time renovation work was carried out on several installations to reduce water consumption.

CERN's energy consumption is substantial. It uses 1.2 terawatt hours of electricity annually, and at peak consumption uses about 200 megawatts of power, which however would be 4 to 5 times as high if the laboratory was not using superconducting technology. The need therefore to innovate and improve energy efficiency is always in CERN's strategy. As an example in order to reduce the consumption of electricity, a new control system for the SPS accelerator's power supplies came into service. Previously, the magnet circuits had been powered without interruption from the moment the accelerator was ready to receive beam. The new system automatically adjusts the power supply to the magnets according to the intensity of the beam injected into the SPS, beam requests from users and the requirements of the accelerator operators. A similar renovation project to be carried out during the second long shutdown is being investigated for the power supplies for the North Area.

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