



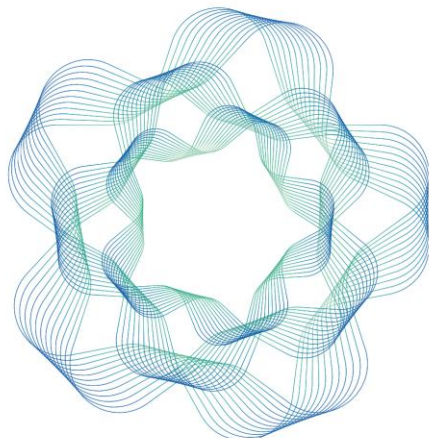
Zooming in on the CERN Environment report

A brief look back and a look ahead...

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3rd Environment report 2021-2022

Published Dec. 2023
Spanned end LS2 and
the start of Run 3



Environment
Report
2021-2022



ENERGY

1215 GWh

The Laboratory is committed to limiting rises in electricity consumption to 5% up to the end of Run 3 compared to the 2018 baseline year, which corresponds to a maximum target of 1314 GWh, while delivering significantly increased performance of its facilities. It is also committed to increasing energy reuse.

In 2021 and 2022, CERN consumed 991 GWh and 1215 GWh of electricity respectively.

In addition, the Organization consumed 67 GWh (240 TJ) and 51 GWh (184 TJ) of energy generated from fossil fuels in the two years respectively.

EMISSIONS

184 173 tCO₂e

CERN's objective is to reduce direct emissions by 28% by the end of Run 3 compared to the 2018 baseline year, which corresponds to a maximum target of 138 300 tCO₂e.

The scope 1 emissions in 2021 and 2022 were 123 174 and 184 173 tonnes of CO₂ equivalent (tCO₂e) respectively.

The total amount of scope 2 greenhouse gas emissions due to CERN's electricity consumption was 56 382 and 63 161 tCO₂e in 2021 and 2022 respectively.

Total scope 3 emissions arising from business travel, personnel commuting, catering, waste treatment and water purification amounted to 7813 and 8956 tCO₂e in 2021 and 2022 respectively.

Scope 3 emissions arising from procurement, which are reported for the first time, amounted to 98 030 tCO₂e and 104 974 tCO₂e in 2021 and 2022 respectively.

WATER AND EFFLUENTS

3234 ML

The Laboratory is committed to keeping the increase in its water consumption below 5% up to the end of Run 3 compared to the 2018 baseline year, which corresponds to a maximum target of 3651 ML, despite a growing demand for water cooling at the upgraded facilities.

In 2021 and 2022, CERN used 2661 and 3234 megalitres of water respectively.

IONISING RADIATION

< 0.01 mSv

The European annual dose limit for public exposure to artificial sources is 1 mSv. CERN is committed to keeping its contribution to no more than 0.3 mSv per year.

The actual dose received by any member of the public living near the Laboratory was less than 0.01 mSv in the reporting period, which is more than 100 times lower than the average annual dose received from medical exposure per person in Switzerland.

IN BRIEF 2021-2022

This reporting period saw the completion of the second long shutdown and the restart of the accelerator complex (Run 3) with a view to reaching the new collision energy of 13.6 TeV at the Large Hadron Collider (LHC). In some domains environmental indicators may be very different during shutdown years compared to operation years, so they are shown for both years to highlight this, where relevant. 2022 indicators are prominently shown for those domains where priority objectives have been defined, namely Energy, Emissions and Water and Effluents.

WASTE

69% recycled

CERN's aim has been to increase its recycling rate for non-hazardous waste. The recycling rate rose from 56% in 2018 to 69% in 2022.

In 2021 and 2022 respectively, CERN disposed of 5111 tonnes and 8812 tonnes of non-hazardous waste, and of 1544 tonnes and 1295 tonnes of hazardous waste, including 307 and 519 tonnes of radioactive waste.

NOISE

45 dBA at night

CERN is committed to restricting noise at its site perimeters to 70 dBA during the day and 60 dBA at night.

Over this reporting period, CERN implemented measures to improve its noise management, including the installation of an online real-time monitoring system at Point 2 of the LHC and Point 4 of the SPS. Average noise levels measured on the boundaries of CERN's sites are typically around 50 dBA during the day and 45 dBA at night.

BIODIVERSITY

18 species of orchids

Inventories of flora and fauna were conducted in 2022. A further two species of orchid were identified, bringing the total on the CERN sites to 18, as well as 62 species of Lepidoptera and 32 species of Orthoptera.

KNOWLEDGE TRANSFER

8 environmental projects

In 2022, CERN launched the Innovation Programme on Environmental Applications (CIPEA), which spans four focus areas where CERN's know-how can be of use, namely renewable and low-carbon energy; clean transportation and future mobility; climate change and pollution control; and sustainability and green science.

Eight projects were selected for implementation with the financial support of external partners or the CERN Knowledge Transfer fund.



CERN Environmental high priority objectives

Horizon: End Run 3



ENERGY

The laboratory is committed to limiting rises in electricity consumption to 5% up to the end of Run 3 (baseline 2018) – **Target max 1317 GWh/y**



EMISSIONS

CERN's objective is to reduce direct CO₂e emissions by 28% by the end of Run 3 (baseline 2018) – **Target max 138 300 tCO₂e**



WATER AND EFFLUENTS

The laboratory is committed to keeping the increase in its water consumption to 5% up to the end of Run 3 (baseline 2018) – **Target max 3651 ML**

No showstopper to achieving these objectives by the first year of LS3.

4th Environment report 2023-2024

An environmental management tool

CERN aspires to be a 'role model for environmentally responsible research'

Three main development directions:

1. **Minimise** the Laboratory's impact on the environment.
2. **Pursue** actions and technologies aiming at energy savings and reuse.
3. **Identify and develop** CERN's technologies that may contribute to mitigating the impact on the environment.

The report also serves as an important management tool:

- **Stimulating** progress and decision making in matters spanning the whole environmental spectrum.
- **Following** the GRI standards framework's guiding principles (transparency, verifiability, internationally renowned).
- **Preserving** CERN's reputation and contributing to safeguarding our future.



- Accuracy
- Balance
- Clarity
- Comparability
- Completeness
- Sustainability context
- Timeliness
- Verifiability

4th Environment report 2023-2024

Scope

The report covers update on progress made across all domains, and particularly towards end Run 3 objectives

- Priority domains: Energy, Emissions and Water.
- Progress across all other domains.

Collaborative report, implicating most of the CERN Departments.

IPT is a key partner for chapters ‘Procurement and Materials’ and ‘Emissions’.

New environmental objectives – Horizon 2030:

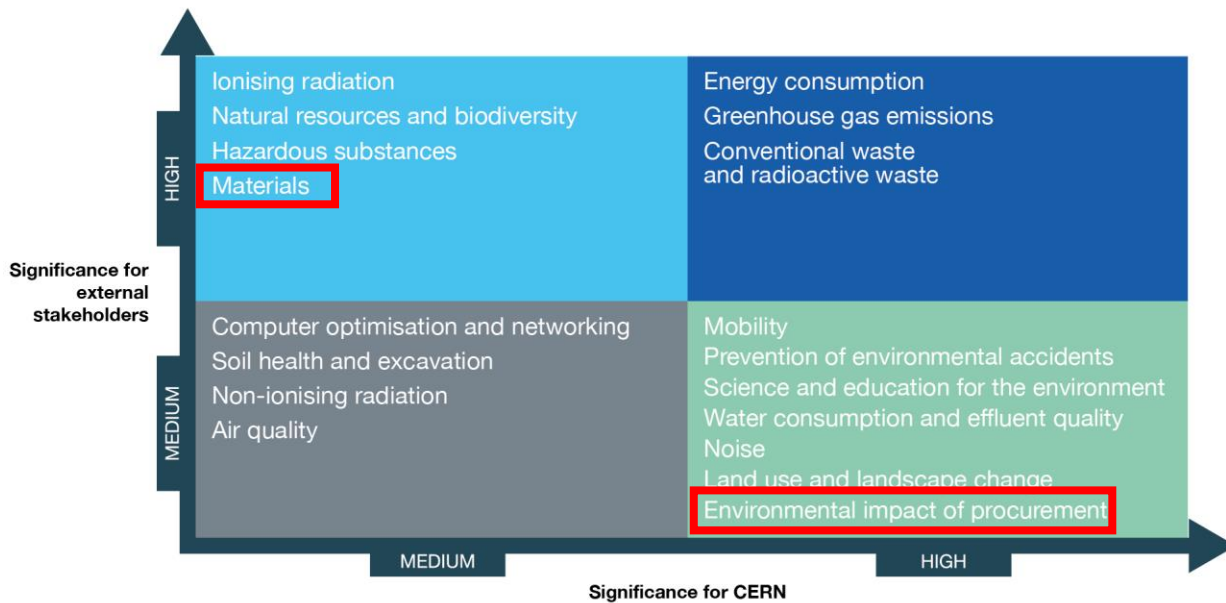
- Introducing 2030 (end Run 4) objectives for each priority domain and those applying to new domains.
- NB: procurement scope 3 emissions objective still TBD.

CERN HORIZON 2030 KEY ENVIRONMENTAL OBJECTIVES



4th Environment report 2023-2024

Materiality and IPT involvement



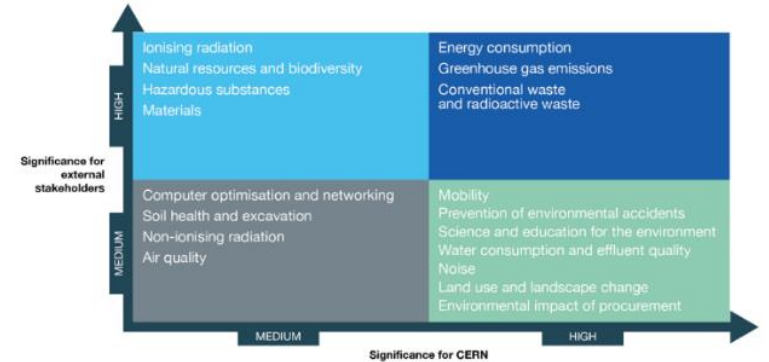
Domains of focus result from the ‘materiality exercise’ in 2022

Stakeholders identified Environmental impact of procurement and Materials as key domains

- Environmental impact of procurement first reported under ‘Emissions’ (Scope 3) in third report
- Materials to be presented for the first time in the fourth report in a combined ‘Procurement and Materials’ chapter

4th Environment report 2023-2024

New chapter on 'Materials'



Topic identified in the 2022 materiality assessment

- ✓ *This heading includes optimising the use of core materials (e.g., metals, helium, etc.) and favouring the use of recycled or secondary resources to minimise the environmental and human rights impacts caused throughout the materials' lifecycle.*
- ✓ *Given the complexity in tracing the material through its whole lifecycle, an in-depth analysis will be undertaken to establish a reliable way in which to report on this topic.*

Complex and challenging topic given the wide variety of materials sourced and used at CERN.

IPT is a key partner with SCE in developing this chapter.

- a. Total weight or volume of materials that are used to produce and package the organization's primary products and services during the reporting period, by:
 - i. non-renewable materials used;
 - ii. renewable materials used.

- **Must report on Materials used by weight or volume (we will start 'small').**
- **Challenge of the 'storytelling' around CERN' management of this topic.**
- **GRI requires focus on renewables vs non-renewables.**
- **So far, choosing to focus on Helium, metals and cables (TBC other domains for which we have tangible data)**
- **Unquestionably linked to CERN's supply chain for materials sourcing and procurement (also S&G aspects, conflict materials...)**
- **Challenge of data availability: will require setting up systematic data traceability.**
- **Integration in procurement process: lead by example and engage with suppliers for an integrated environmentally responsible approach.**

Collaboration has been key! Chapter draft is ready.

Submitted with all other chapters to the Head of HSE unit for review (DG review in July).

