CIPEA
CERN Innovation Programme
on Environmental Applications

CERN for Climate Action Event
Introduction – Update on CIPEA

28/10/2025

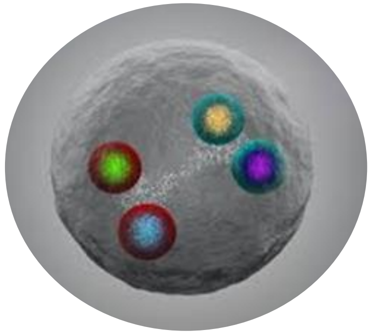
Enrico Chesta
CIPEA Coordinator

The Question (from CIPEA KO event in 2022)

10^{-32} 10^{-28} 10^{-24} 10^{-20} 10^{-16} 10^{-12} 10^{-8} 10^{-4} 10^{4} 10^{8} 10^{12} 10^{16} 10^{20} 10^{24} 10^{28} [cm]

Big Bang | Proton | Atom | Radius of Earth | Earth to Sun | Radius Galaxies | Universe

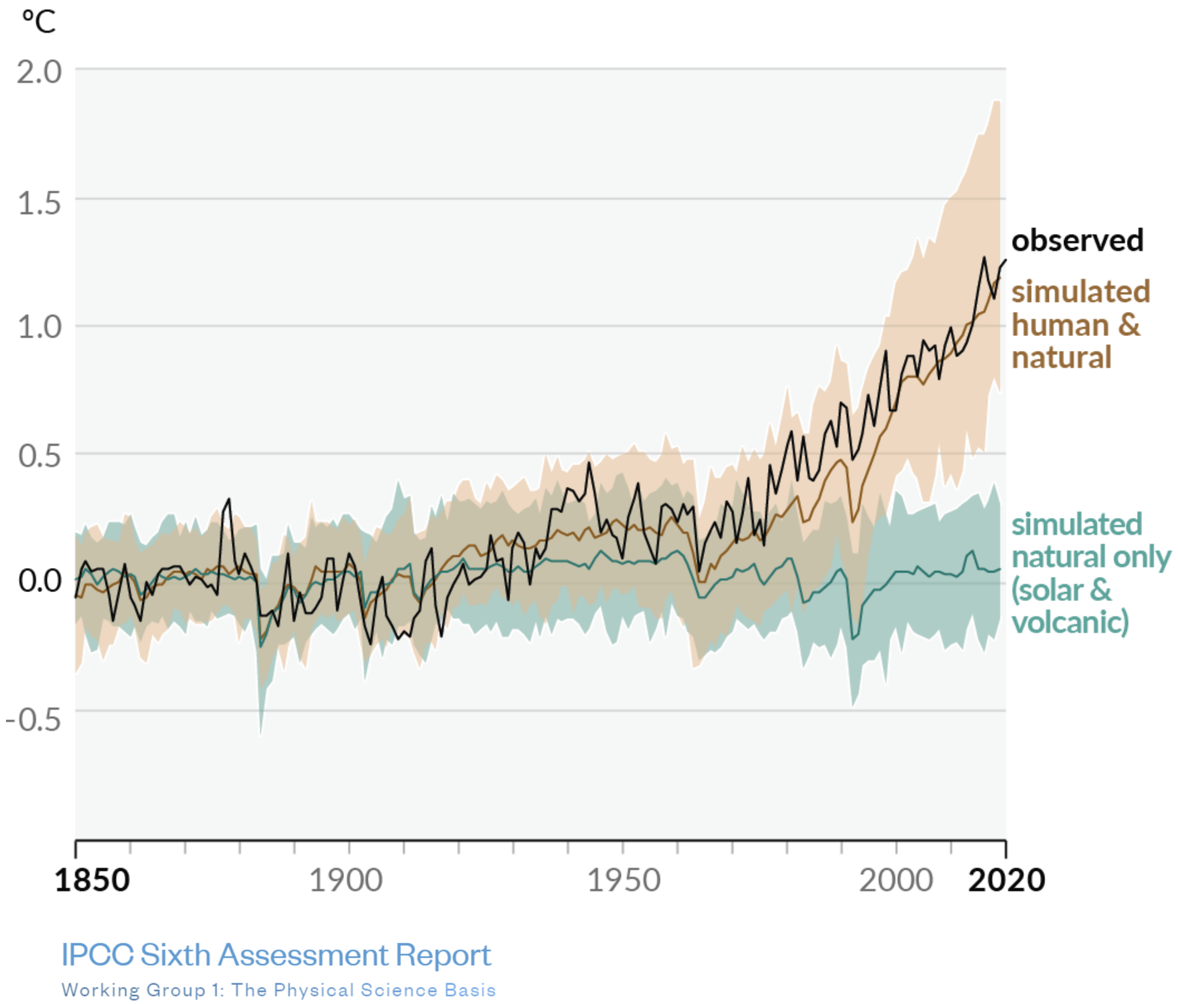
CERN can help to explore the secrets of matter

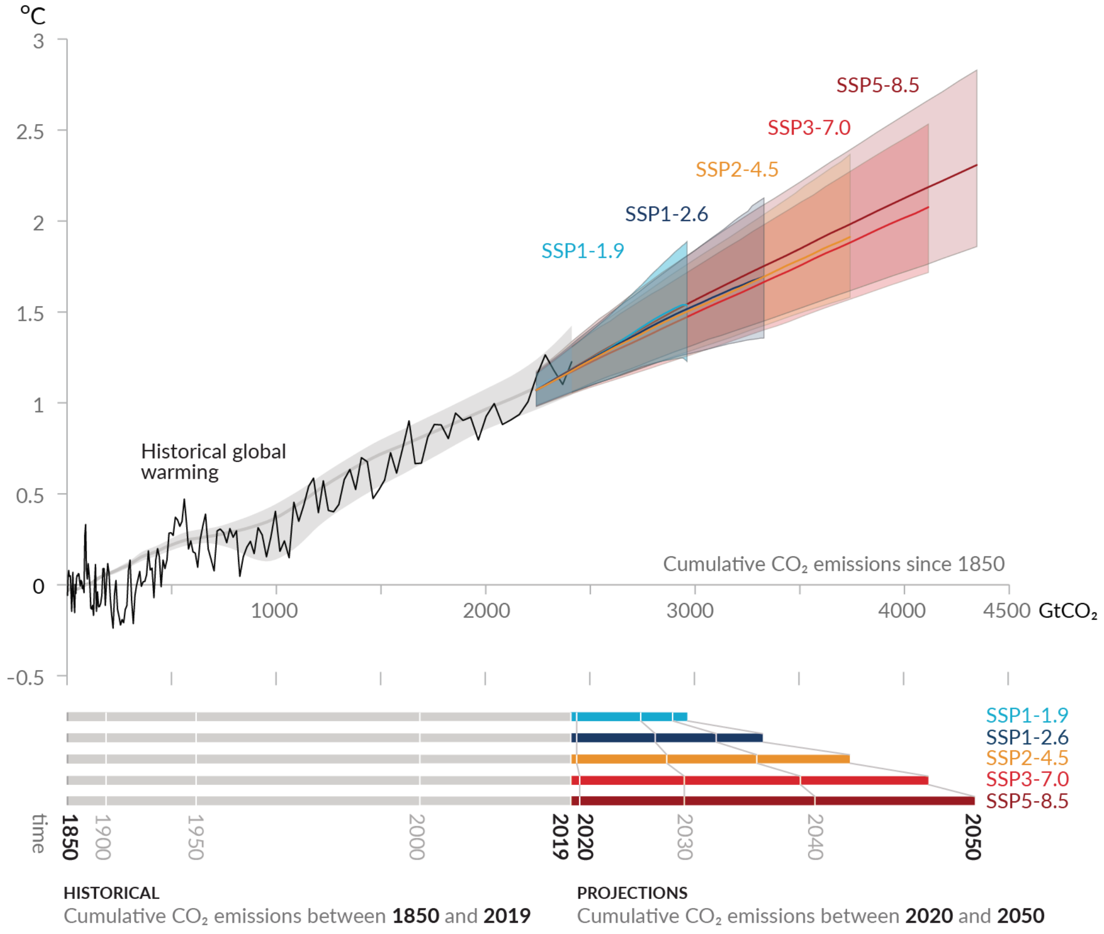


CERN can help to understand the mysteries of the universe

Can CERN help to tackle climate and environmental issues on a global scale?

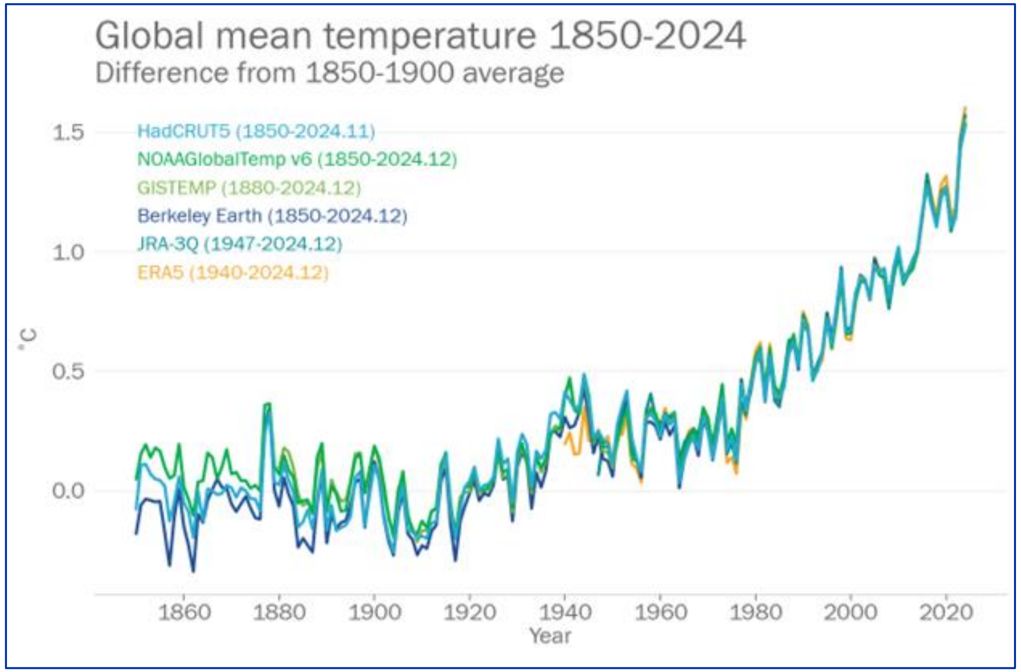
The Challenge in 2022

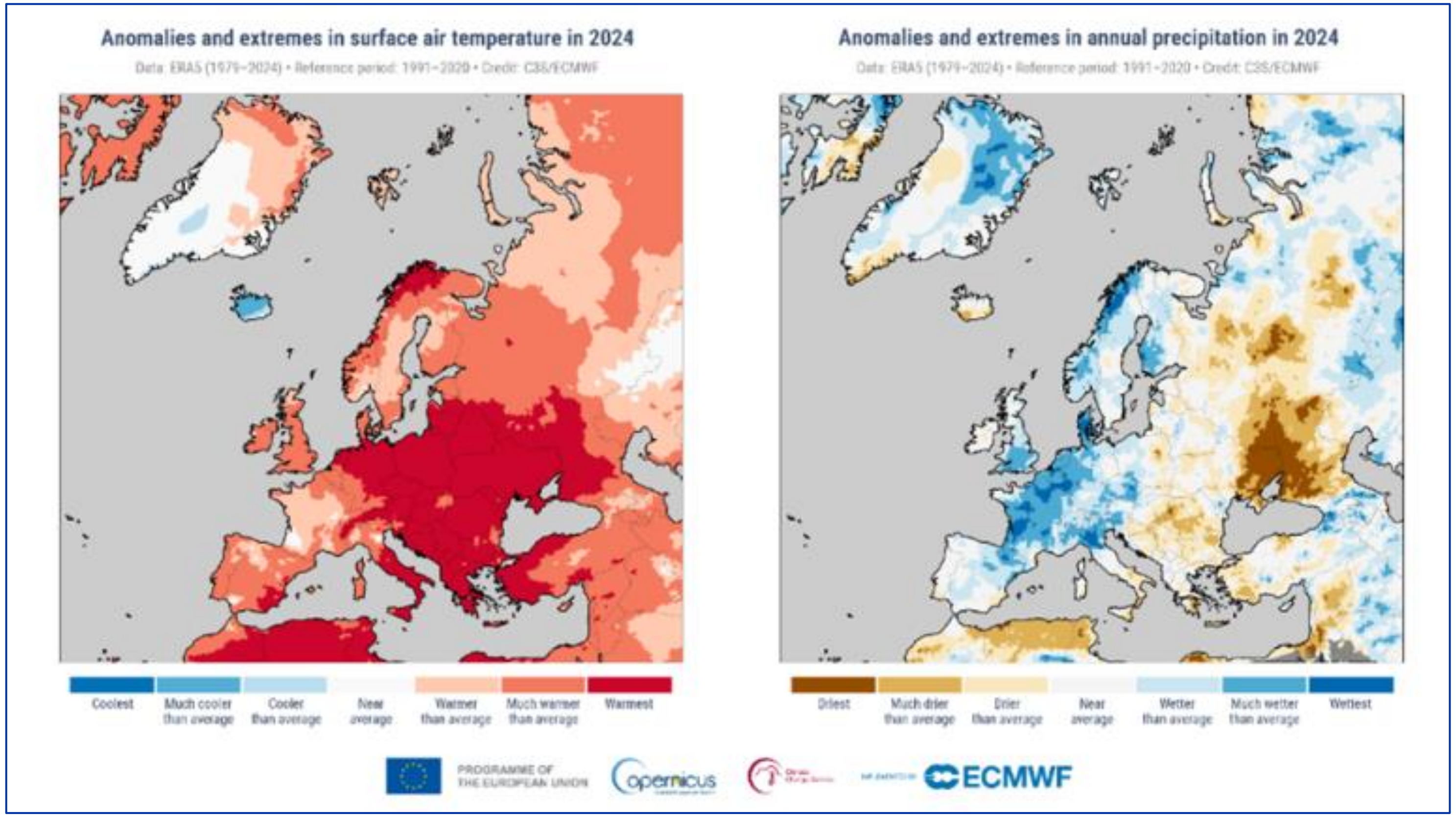




Observed and simulated change in global surface temperature as a function of time and cumulative CO_2 emissions ($GtCO_2$)

The Challenge in 2024-25





WORLD METEOROLOGICAL ORGANIZATION
Weather Climate Water

WMO confirms 2024 as warmest year on record at about 1.55°C above pre-industrial level

European State of the Climate: extreme events in warmest year on record

PRESS RELEASE

15 April 2025

Copernicus Climate Change Service and the World Meteorological Organization have issued their second joint annual report on the European State of the Climate.

Europe is the fastest-warming continent, and the impacts of climate change here are clear. 2024 was the warmest year on record for Europe, with record temperatures in central, eastern and southeastern regions.

Storms were often severe and flooding widespread, claiming at least 335 lives and affecting an estimated 413,000 people. During the year, there was a striking east-west contrast in climate conditions, with extremely dry and often record-warm conditions in the east, and warm but wet conditions in the west.

CIPEA is part of the Answer

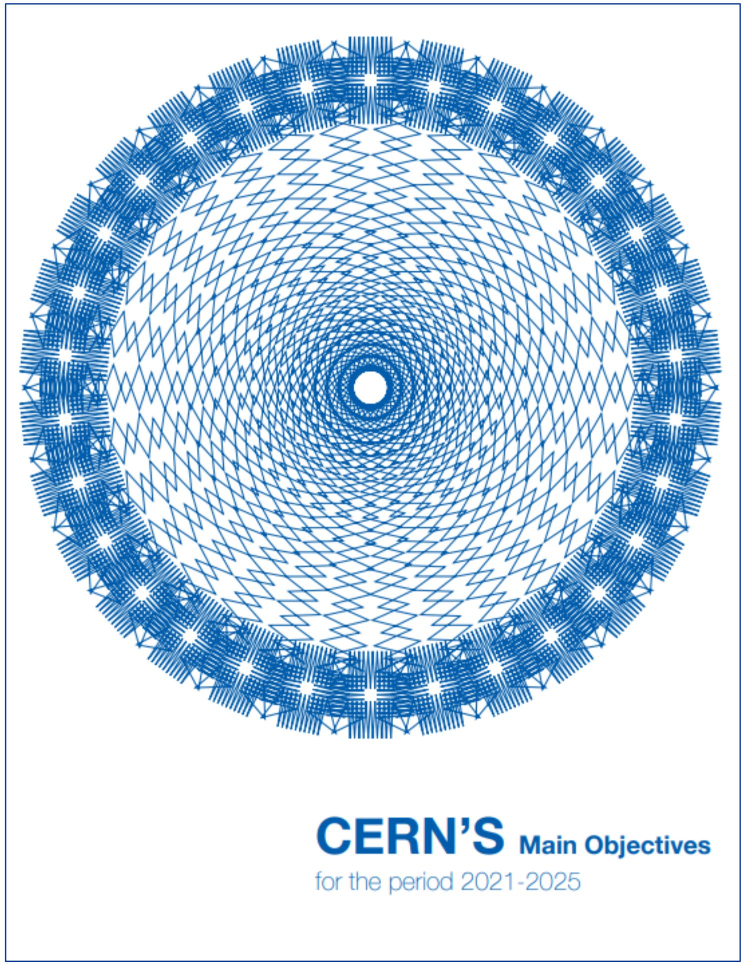
CIPEA CERN Innovation Programme on Environmental Applications

“It is better to take many small steps in the right direction than to make a great leap forward only to stumble backward”

Louis Sachar

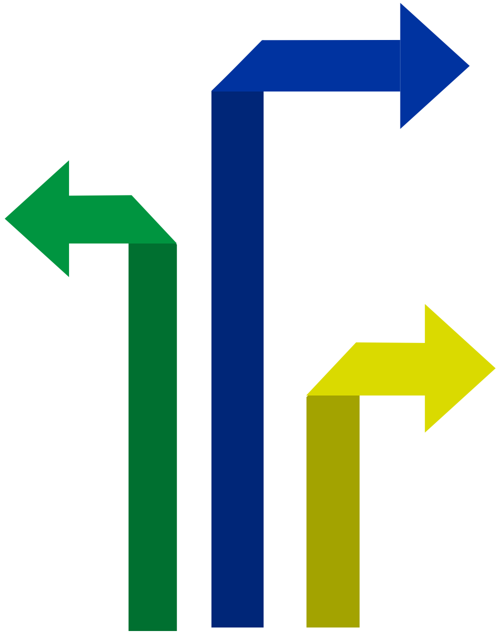
	Time scale	Impact level
Planned Sobriety	*Short*	*Small-Medium*
Technology Improvement	*Medium*	*Medium-Large*
Innovative Disruption	*Long*	*Large- Very large*

Environment: a clear priority for CERN



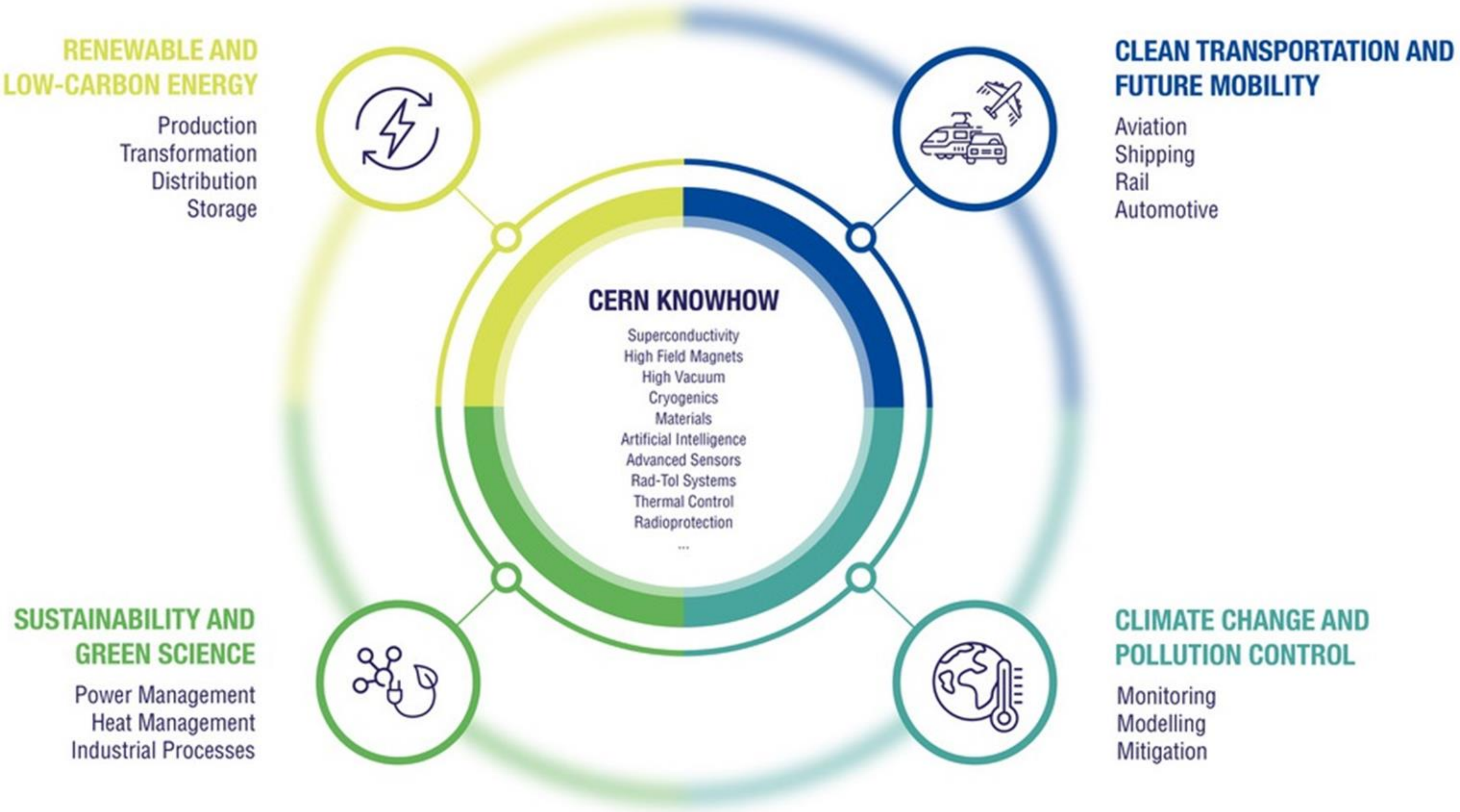
Identify and develop CERN's technologies that may contribute to mitigating the impact of society on the environment

Minimise the Laboratory's impact on the environment



Pursue actions and technologies aiming at energy saving

CIPEA Strategy – Main Pillars



CIPEA – Initial Call for Ideas (2022)

News › › News › Topic: At CERN

Promising start for future environmental applications of CERN technologies

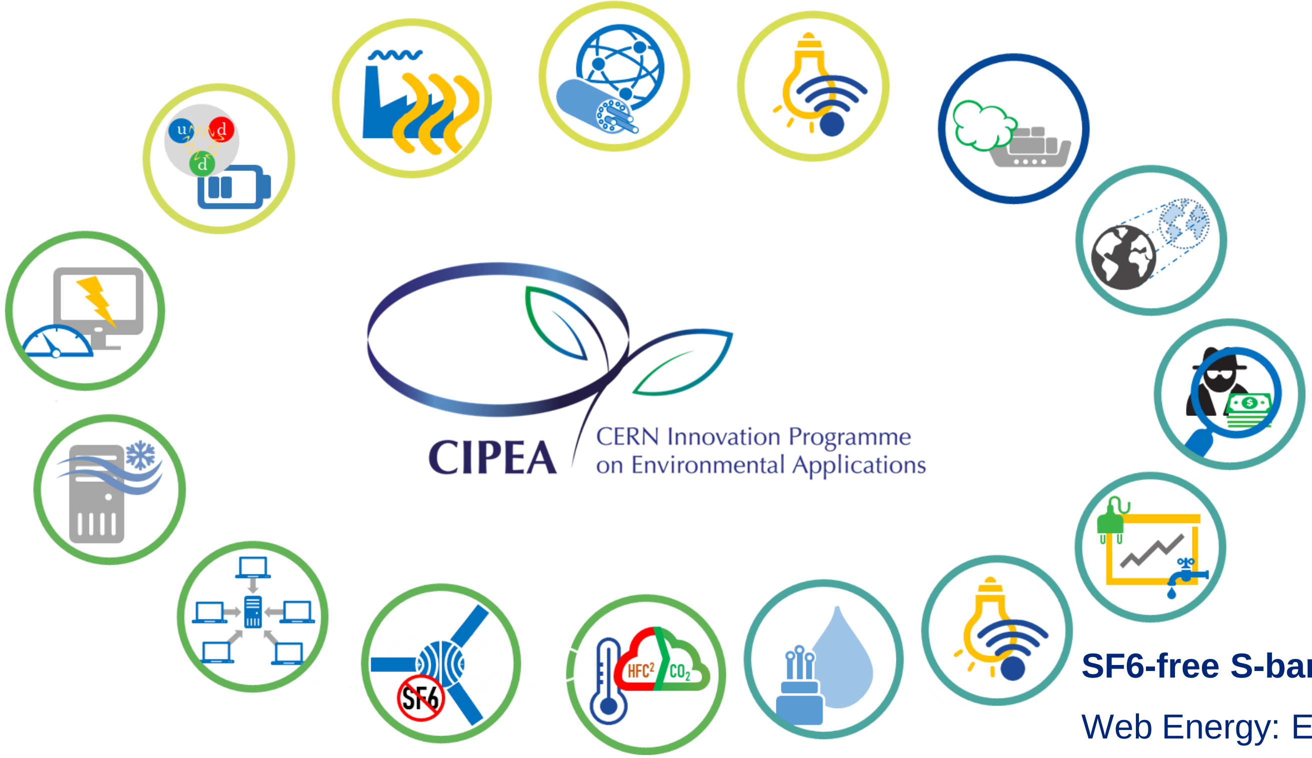
On 27 June, the CIPEA Innovation Day welcomed 15 innovative project proposals reflecting the CERN community's commitment to tackling environmental challenges

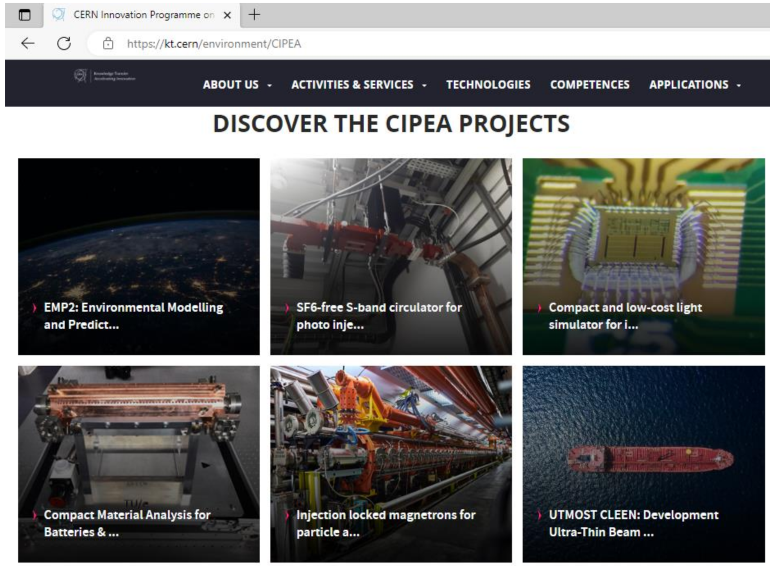
12 JULY, 2022 | By Antoine Le Gall

The CIPEA Innovation Day brought together experts from all CERN technical departments. (Image: CERN)

- \>30 Ideas discussed
- 15 Proposals submitted
- 8 Projects selected for implementation
- 7 Projects supported with KT Fund

CIPEA – Initial Call for Ideas (2022)





SF6-free S-band circulator for photo injectors

Web Energy: Energy, water and gas monitoring and forecasting platform

EMP2: Environmental Modelling and Prediction Platform

Compact and low-cost light simultor for indoor photovolataic cells development

UTMOST CLEEN: Development of membranes for ships EBFGT

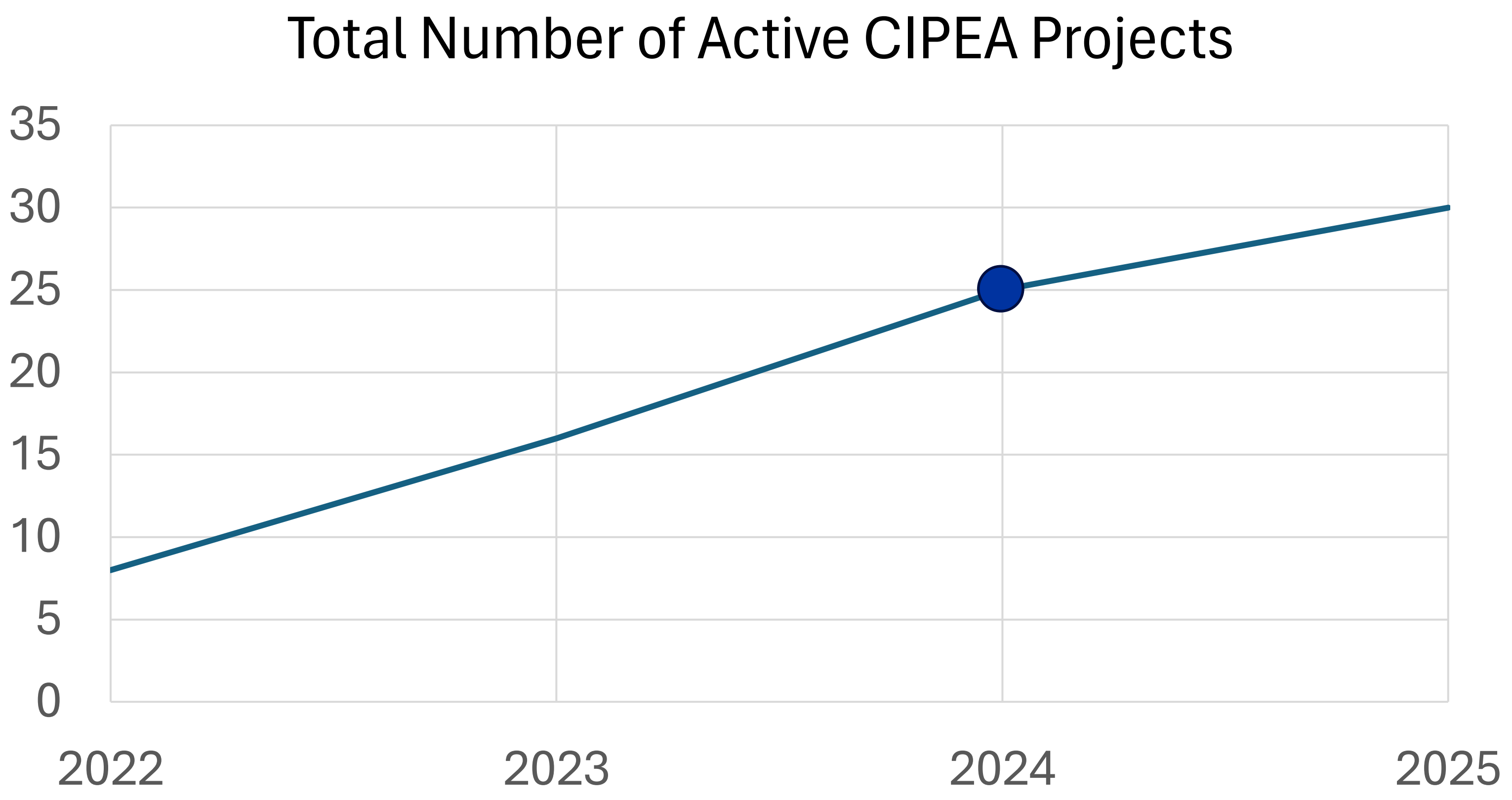
Compact Material Analysis for Batteries & Fast Fuel Cell Development

Injection locked magnetrons for particle accelerators and industrial dielectric heating

IVAC-RED: Insulation Vacuum of SC Cables for Renewable Energy Distribution

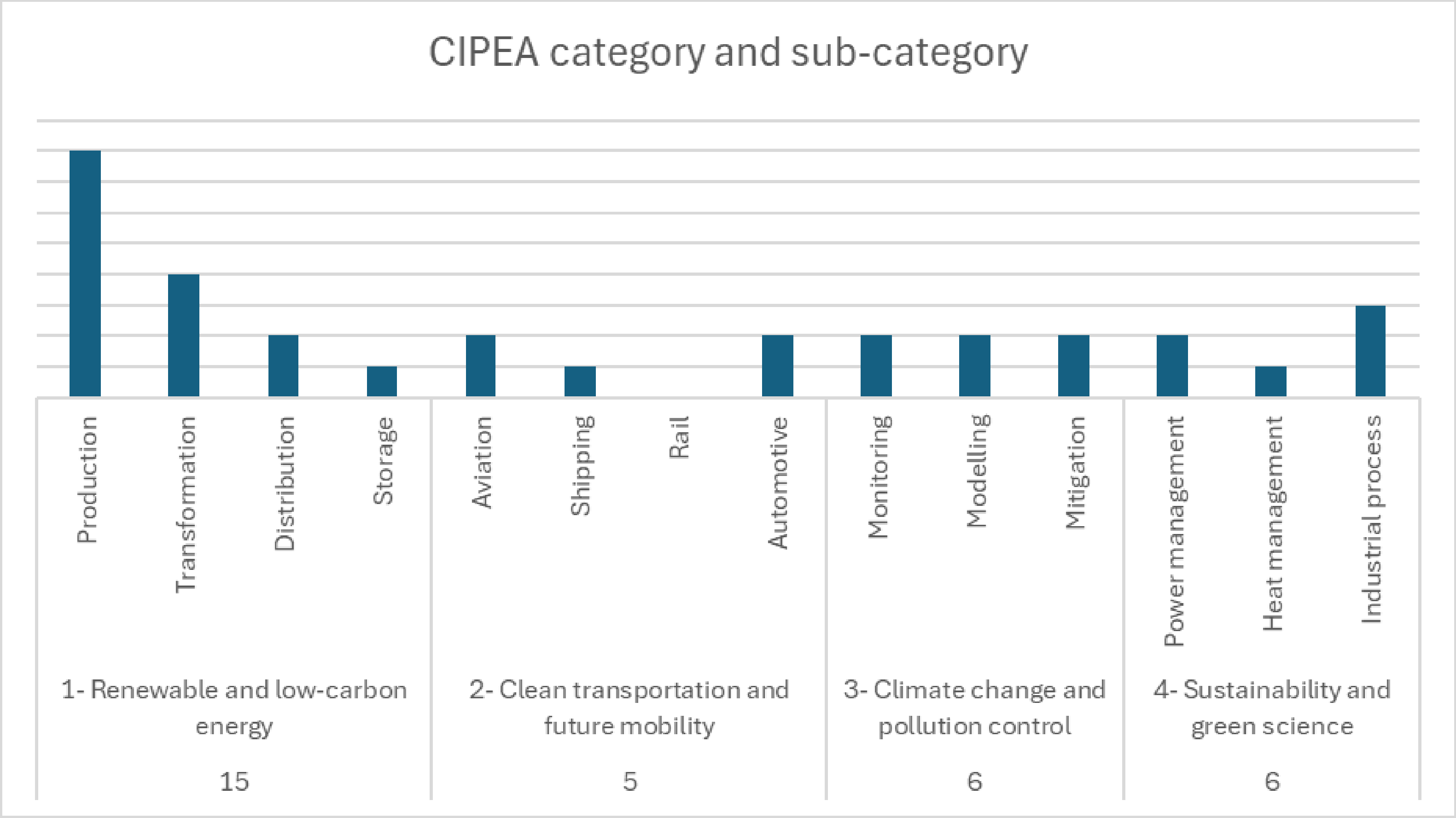
https://kt.cern/environment/CIPEA

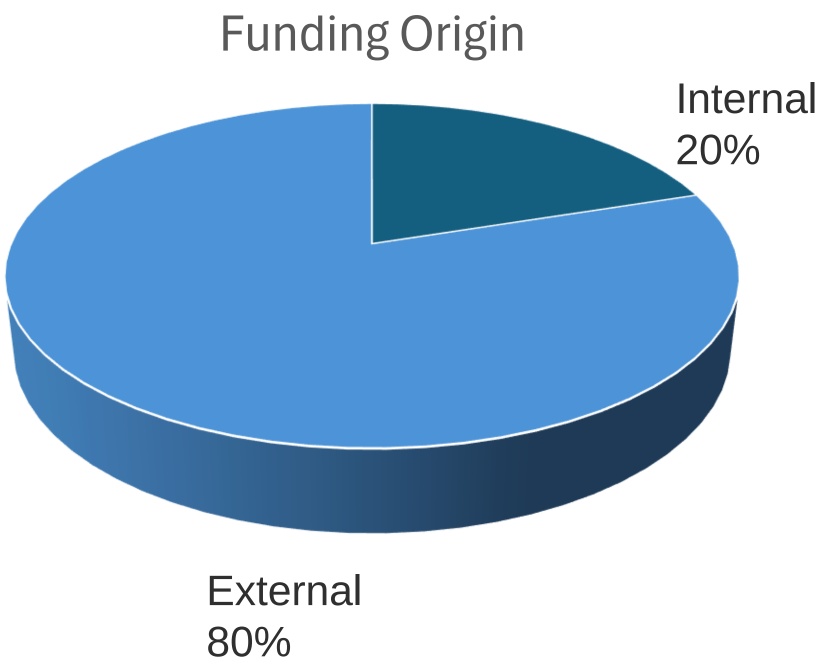
CIPEA – Programme expansion 2022-2025



New CIPEA projects KT Funded:	7 in 2022, 3 in 2023, 0 in 2024, 2 in 2025
New CIPEA projects with External Partners:	1 in 2022, 5 in 2023, 9 in 2024, tbc in 2025
End 2024: ●	25 active CIPEA projects in total

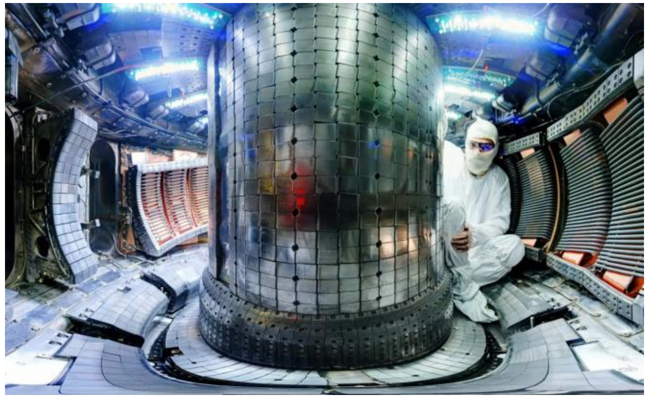
CIPEA programme – statistics end 2024





CERN-70 Ceremony - Inspiring the Future 01/10/24

It is such an honour to celebrate with you the 70th anniversary of CERN …
We are in the midst of a global race for the technologies that will shape the world of tomorrow, from clean tech to quantum, from AI to fusion. …
Your core mission at CERN has always been fundamental research. But all along your history, you have produced countless positive spillovers for our society and economy. …
You are constantly working with European industries, to build low-emission airplanes, or to create new solutions to transport liquid hydrogen. …
We need more of these partnerships between research and business; more ideas that go from the laboratory to the factory.



CIPEA CERN Innovation Programme on Environmental Applications

CIPEA Strategy – Key Poles of Competence

Compact Magnetic Confinement Fusion Energy Systems	**SC Lines for On-board and Grid Power Distribution**
Accelerator Driven and Advanced Nuclear Reactors	Liquid Hydrogen Storage and Handling Systems
Engineering Systems and Tools for Low Emissions and Energy Efficiency	**Technologies and Facilities for Remote and In-situ Environmental Monitoring**
Fast, Low-power Computing Techniques based on AI	**AI Platforms for Global Phenomena Modelling and Climate Simulations**

CERN for Climate Action Day

CIPEA 2025 Event

October 28 @CERN

https://indico.cern.ch/e/CIPEA-2025

CIPEA
CERN Innovation Programme on Environmental Applications

- 15 projects presented (=> ~50% of CIPEA portfolio)
- Mix of KT Funded proposals, external partnerships, CVC projects and EU projects
- All projects in preliminary or advanced implementation phase

Enjoy the event!

RENEWABLE AND LOW-CARBON ENERGY

CLEAN TRANSPORTATION AND FUTURE MOBILITY

SUSTAINABILITY AND GREEN SCIENCE

CLIMATE CHANGE AND POLLUTION CONTROL

CERN | Knowledge Transfer
Accelerating Innovation

Thank you for your attention!
Any questions?

https://kt.cern/environment/CIPEA