



CIPEA

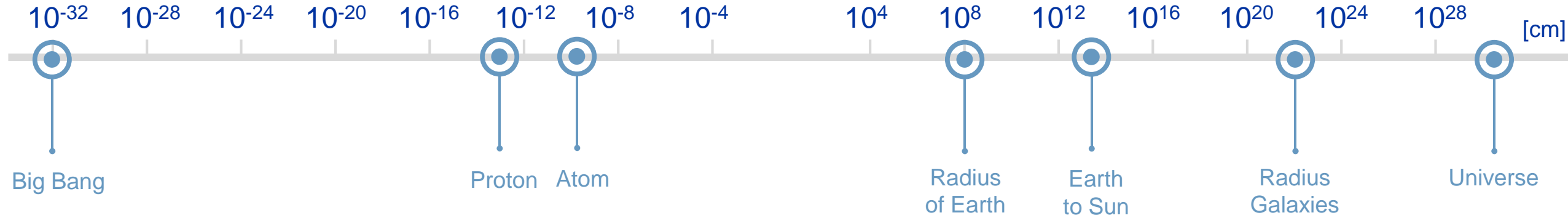
CERN Innovation Programme
on Environmental Applications

CIPEA Innovation Day Introduction

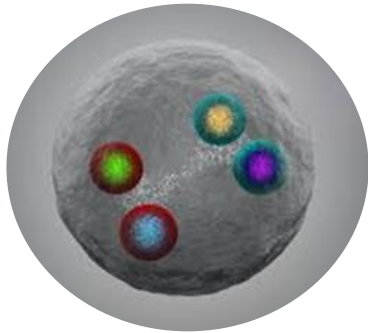
27/06/2022

Enrico Chesta
CIPEA Coordinator

The Question



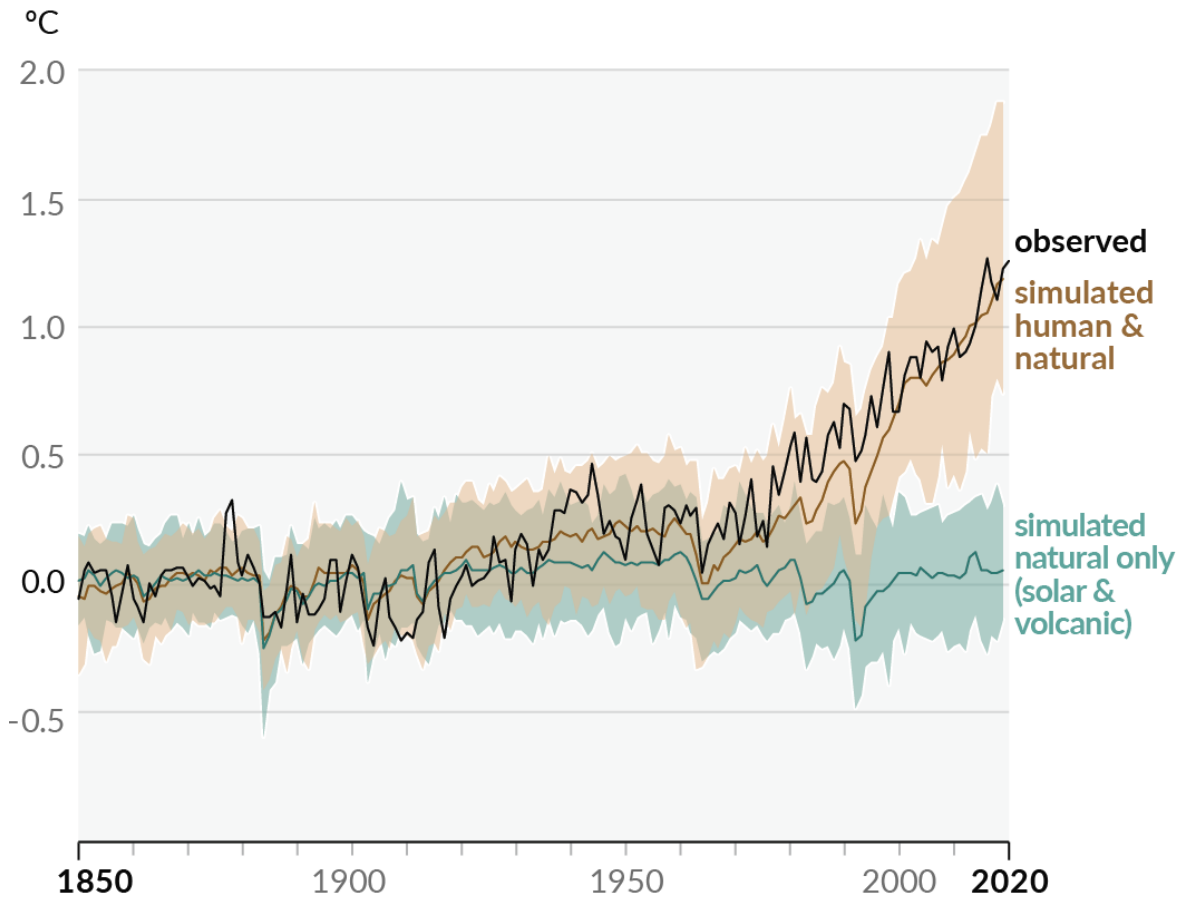
CERN can help to explore the secrets of matter



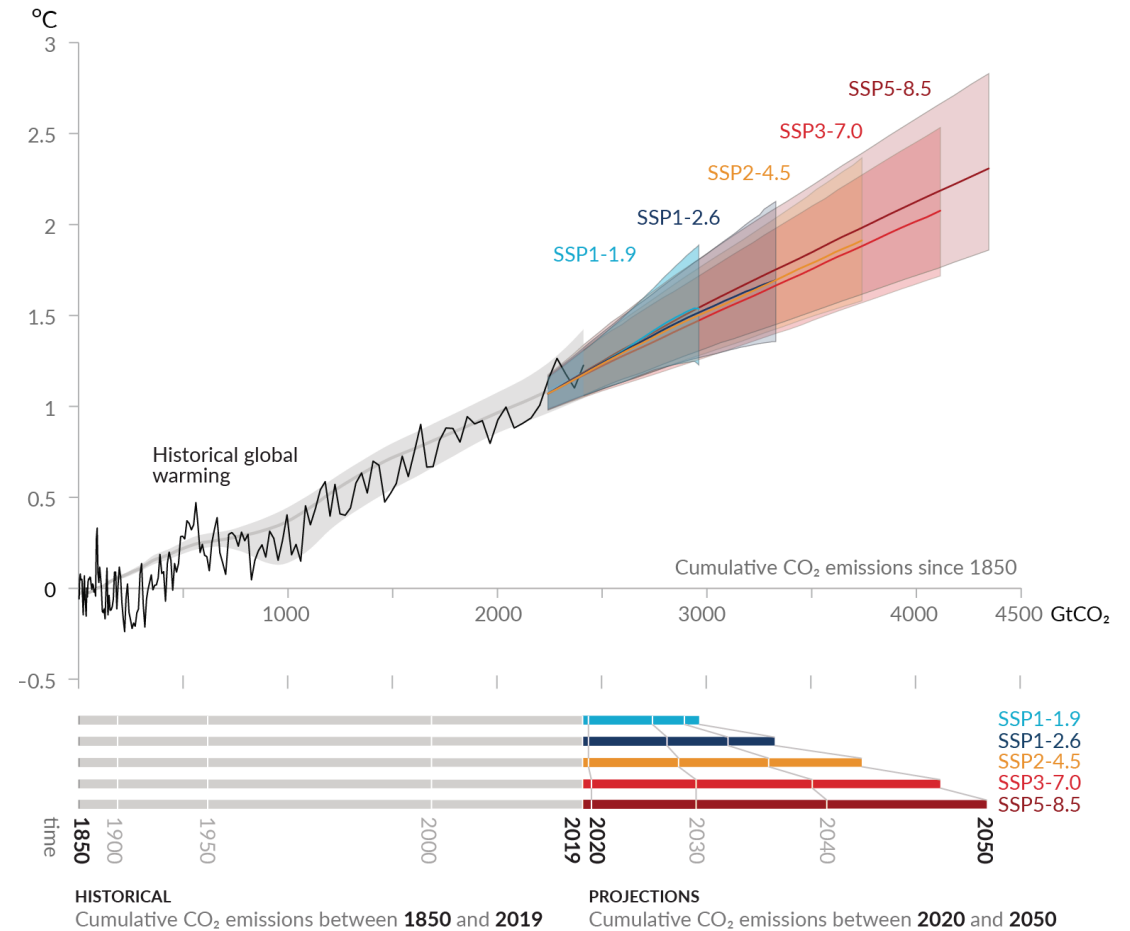
CERN can help to understand the mysteries of the universe

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

The Challenge



IPCC Sixth Assessment Report
Working Group 1: The Physical Science Basis



Observed and simulated change in global surface temperature as a function of time and cumulative CO₂ emissions (GtCO₂)

The Answer

- *Additional Sobriety*
- *Technology Improvement*
- *Innovative Disruption*

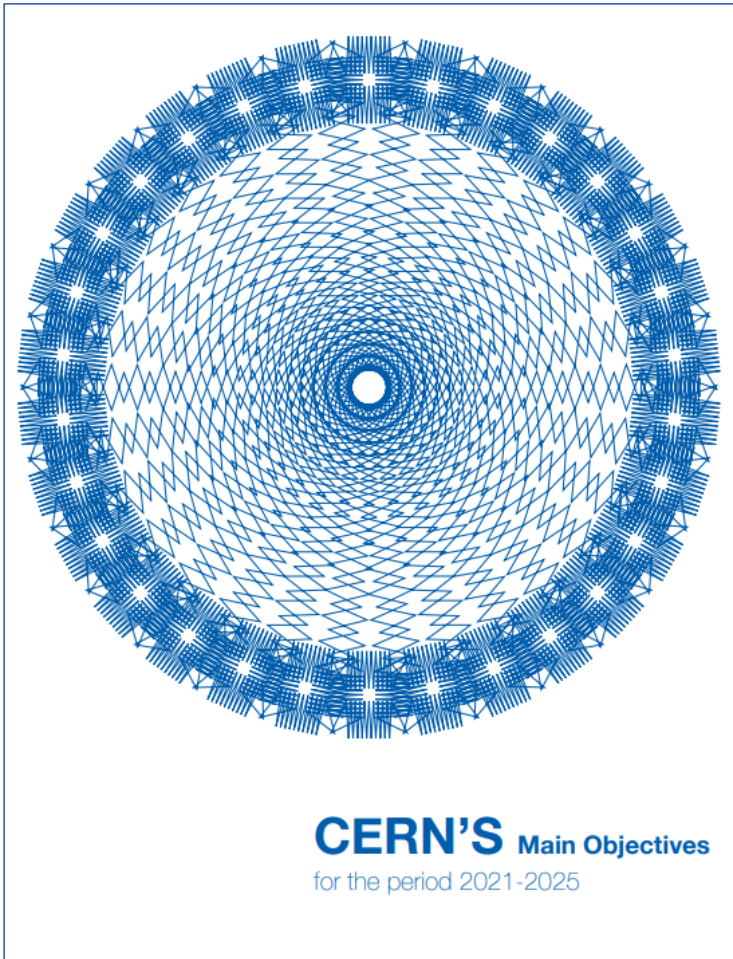


Harnessing CERN's unique skillset to help preserve the planet

- Initiative endorsed by the Director General and the Enlarged Directorate in January 2022
- Supported by HSE in the frame of CERN's Year of Environmental Awareness
- Coordinated by the Knowledge Transfer group to maximise positive impact on society

Entirely based on the ingenuity and expertise of CERN technical departments and community

Environment: a clear priority for CERN



Minimise the Laboratory's impact on the environment

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



Pursue actions and technologies aiming at energy saving

Environmental Applications: Key Areas for CERN

RENEWABLE AND LOW-CARBON ENERGY

Production
Transformation
Distribution
Storage



CLEAN TRANSPORTATION AND FUTURE MOBILITY

Aviation
Shipping
Rail
Automotive



CERN KNOWHOW

Superconductivity
High Field Magnets
High Vacuum
Cryogenics
Materials
Artificial Intelligence
Advanced Sensors
Rad-Tol Systems
Thermal Control
Radioprotection
...

SUSTAINABILITY AND GREEN SCIENCE

Power Management
Heat Management
Industrial Processes

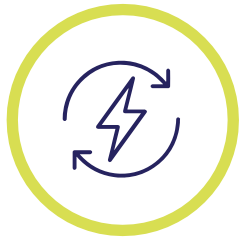


CLIMATE CHANGE AND POLLUTION CONTROL

Monitoring
Modelling
Mitigation



Examples of projects under implementation



RENEWABLE AND LOW-CARBON ENERGY

- Technologies for green hydrogen storage and transportation



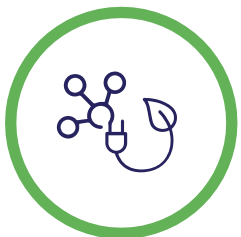
CLEAN TRANSPORTATION AND FUTURE MOBILITY

- Advanced power distribution systems for future electric/hybrid planes



CLIMATE CHANGE AND POLLUTION CONTROL

- Artificial Intelligence and big data expertise for Earth Observation

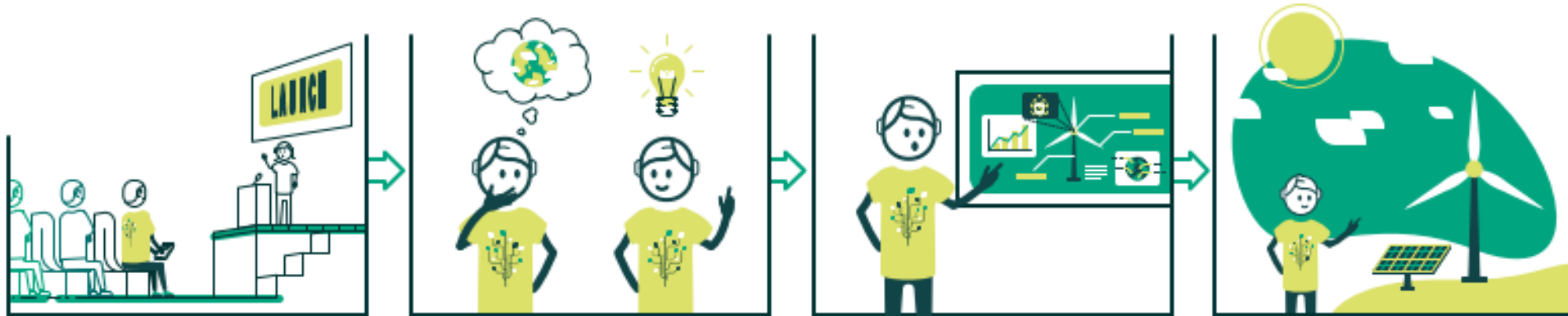


SUSTAINABILITY AND GREEN SCIENCE

- Infrastructure operation optimisation based on motor sensors



CIPEA: a very enriching ideation phase



LAUNCH

Find out how to take part

IDEATION

Imagine how your work can help the environment

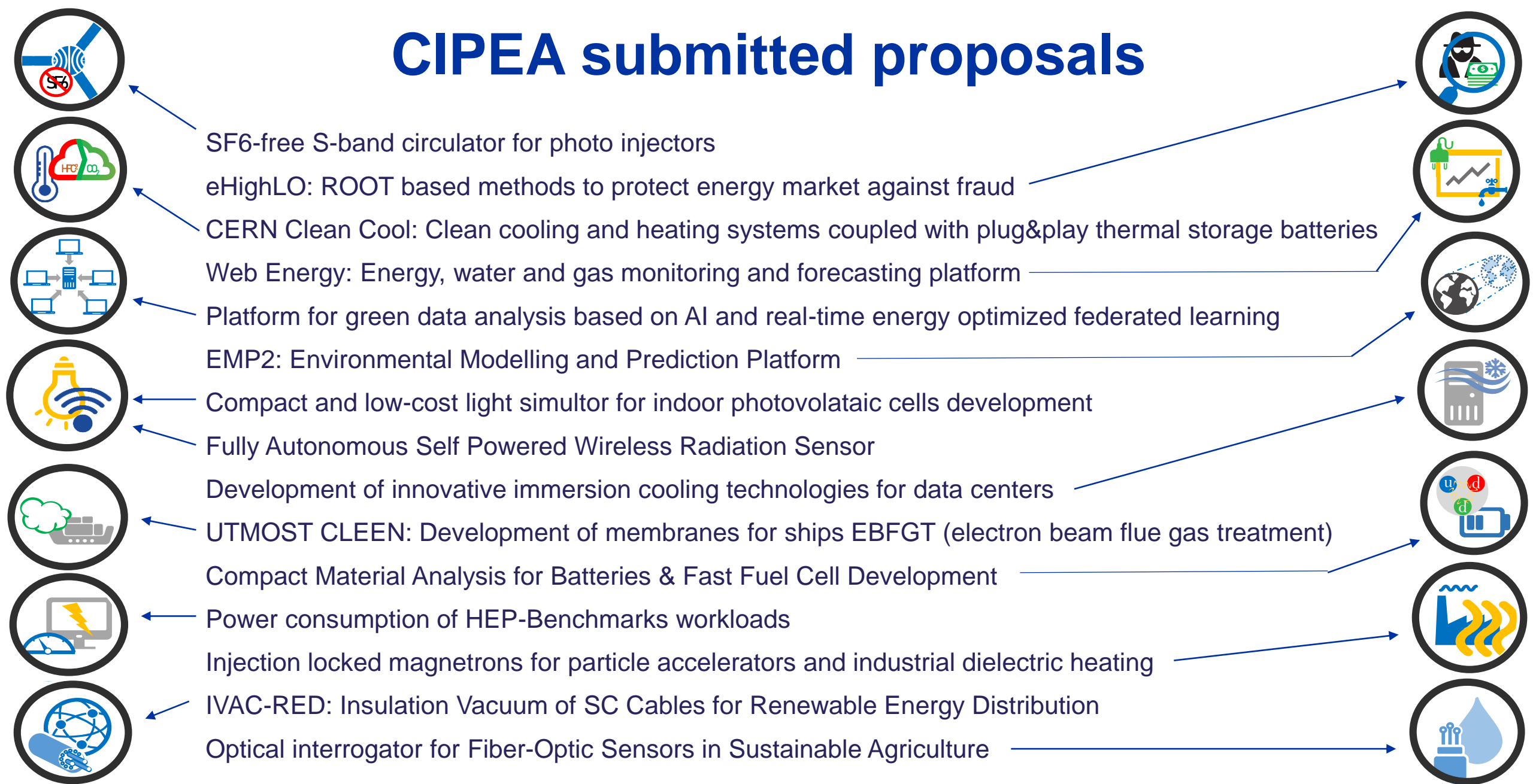
PITCHING

Present your idea to the CERN Management and experts in innovation

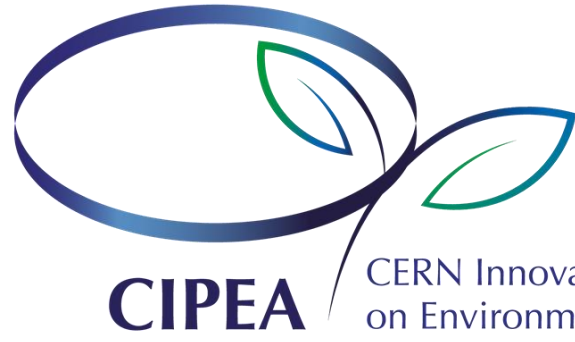
IMPLEMENTATION

Get support and build a project around your idea

CIPEA submitted proposals



CIPEA submitted proposals

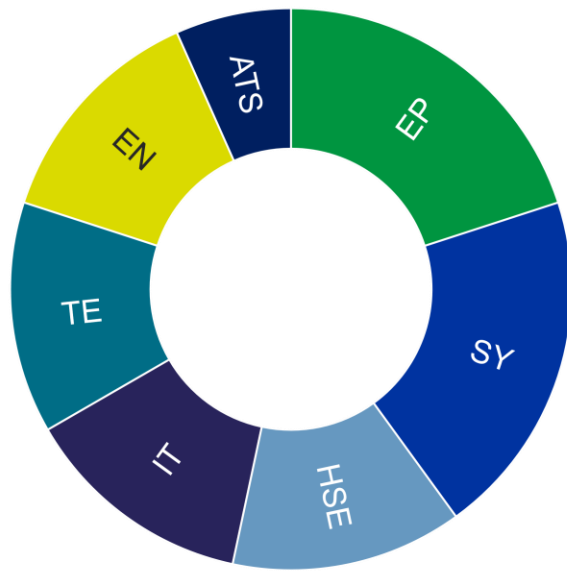


CIPEA CERN Innovation Programme
on Environmental Applications

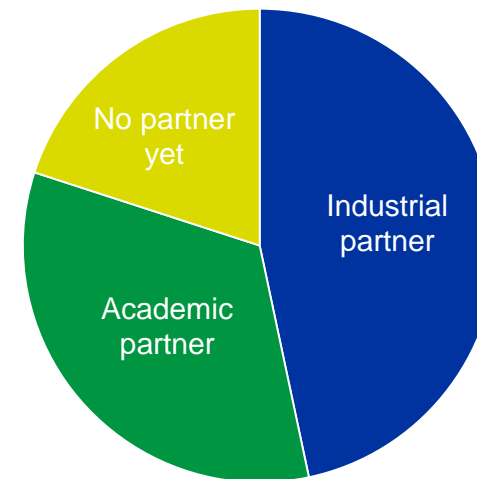
CIPEA ideation phase overview

- 15 high quality proposals submitted in the 4 target areas
- More than 30 ideas discussed (many postponed)
- Large variety in terms of origin / technologies / ambitions / needs
- Several external partners (industrial and academic) involved

Internal Distribution



External Partners



Bundling efforts to increase efficiency and visibility



Compact Fusion
Energy Systems

Accelerator Driven
Nuclear Systems

Technologies for
Hydrogen storage
and handling

Protection systems
for SC based
energy generators

Fast, low-power,
advanced ML/DL
based computing

Energy saving
techniques based
on digital twins

Platforms for
consumption and
emissions monitoring
and optimization

SC technologies for
on-board and long
distance energy
distribution

Technologies for
fuel cells, batteries
and PV efficiency
improvement

Efficient, low GHG
thermal control
systems

Detectors and
instruments for
environmental
monitoring

Fast, autonomous
long distance
transportation

Accelerator technologies
for on-board and industrial
pollution reduction

AI platforms for
environmental
modelling



CIPEA phases

IDEATION

March-May 2022

Identify new ideas
(done)

PITCHING

June 2022

Discuss and
celebrate
selected projects
(today)

IMPLEMENTATION

Starts in July 2022

Define support strategies

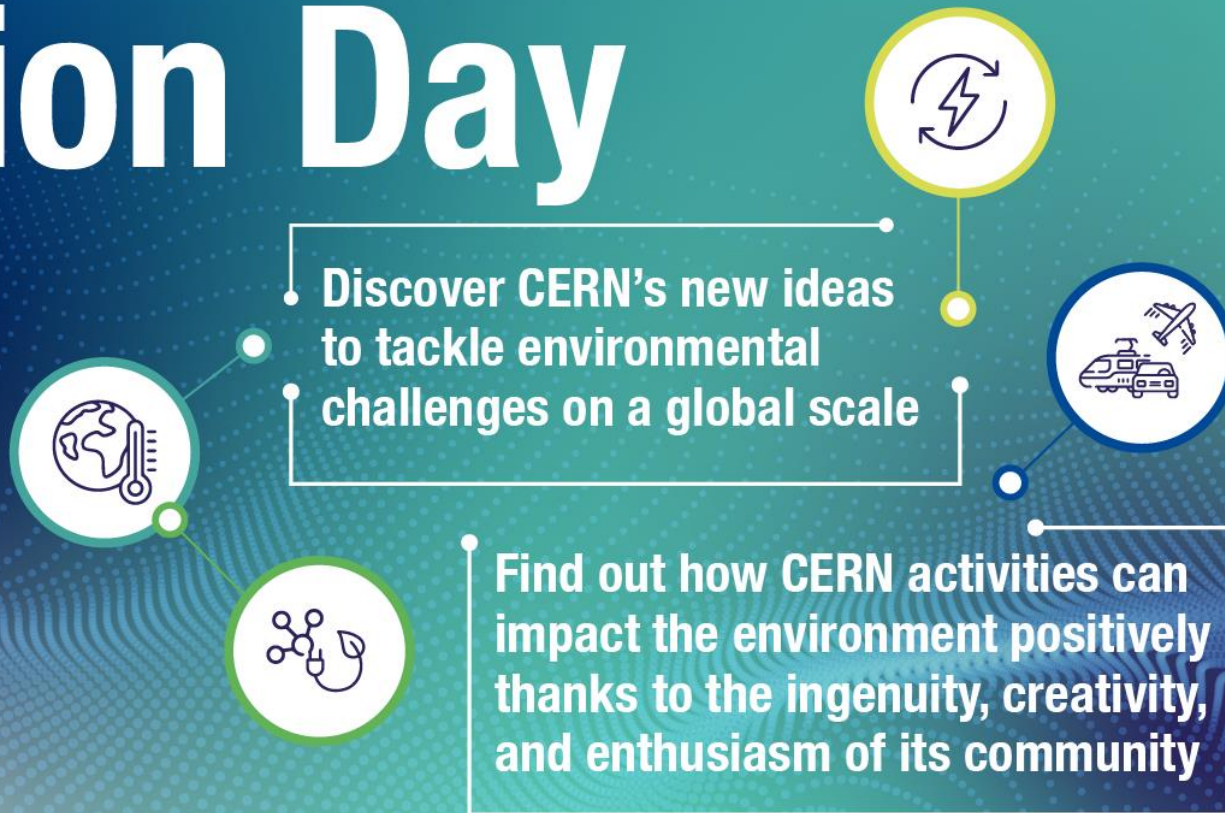
CIPEA Innovation Day

27 June

09h00 - Main Auditorium

14h00 - IdeaSquare

<https://indico.cern.ch/e/cipeainnovday>



CERN Innovation Programme
on Environmental Applications



Main Auditorium
IdeaSquare

CIPEA Innovation Day Agenda

| | | |
|-------|---|---------------------------------------|
| 09:00 | CIPEA Innovation Day management opening 500/1-001 - Main Auditorium, CERN | <i>Raphaël Bello</i> 09:00 - 09:10 |
| | CIPEA Coordinator Introduction 500/1-001 - Main Auditorium, CERN | <i>Enrico Chesta</i> 09:10 - 09:30 |
| 10:00 | Session 1 - New Ideas in areas 1 and 2 (Renewable Energy and Clean Transportation) 500/1-001 - Main Auditorium, CERN | 09:30 - 10:30 |
| | Coffee Break 500/1-001 - Main Auditorium, CERN | 10:30 - 11:00 |
| 11:00 | Session 2 - Examples and first new ideas in areas 3 (Climate Change and Pollution Control) and 4 (Sustainability and Green Science) 500/1-001 - Main Auditorium, CERN | 11:00 - 12:00 |
| 12:00 | Morning Session Closing 500/1-001 - Main Auditorium, CERN | <i>Enrico Chesta</i> 12:00 - 12:05 |

Main Auditorium

| | | |
|-------|--|---|
| 14:00 | Afternoon Session Opening 3179, CERN | <i>Benoit Delille</i> 14:00 - 14:10 |
| | Welcome to IdeaSquare 3179 | <i>Markus Nordberg</i> 14:10 - 14:15 |
| | Afternoon session Introduction 3179, CERN | <i>Enrico Chesta</i> 14:15 - 14:20 |
| 15:00 | Session 3: new ideas in area 3 (Climate Change and Pollution Control) 3179, CERN | 14:20 - 15:30 |
| | Break 3179, CERN | 15:30 - 15:55 |
| 16:00 | Session 4: new ideas in area 4 (Sustainability and Green Science) 3179, CERN | 16:55 - 16:55 |
| | CIPEA Innovation Day wrap-up and conclusions 3179, CERN | <i>Enrico Chesta</i> 16:55 - 17:00 |
| 17:00 | Innovation Day Closing 3179, CERN | <i>Giovanni Anelli</i> 17:00 - 17:05 |

IdeaSquare

Session 1

New Ideas in Area 1 «Renewable and Low-Carbon Energy» and 2 «Clean Transportation and Future Mobility»

Compact material analysis for batteries and fuel cell development

Steinar Stapnes

500/1-001 - Main Auditorium, CERN

09:30 - 09:45

Injection locked magnetrons for particle accelerators and industrial dielectric heating

Eric Montesinos et al.

500/1-001 - Main Auditorium, CERN

09:45 - 10:00

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

Emiliano Frulloni et al.

500/1-001 - Main Auditorium, CERN

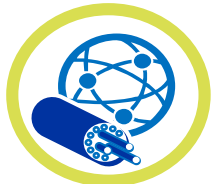
10:00 - 10:15

UTMOST CLEEN: Development of membranes for ships EBFGT

Muhammed Sameed

500/1-001 - Main Auditorium, CERN

10:15 - 10:30



Session 2

Examples and new ideas in Area 3 «Climate Change and Pollution Control» and 4 «Sustainability and Green Science»

EMP2: Environmental Modelling and Prediction Platform

Anna Ferrari

500/1-001 - Main Auditorium, CERN

11:00 - 11:15

Example: QUAI4EO project in collaboration with ESA

Dr Sofia Vallecorsa

500/1-001 - Main Auditorium, CERN

11:15 - 11:30

Example: MotorSense project in collaboration with ABB

Nauman Latif

500/1-001 - Main Auditorium, CERN

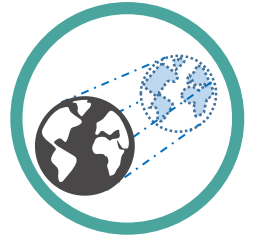
11:30 - 11:45

CERN Clean Cool: Clean cooling and heating systems coupled with thermal storage batteries

Mr Pierre Barroca et al.

500/1-001 - Main Auditorium, CERN

11:45 - 12:00



Session 3

New Ideas in Area 3 «Climate Change and Pollution Control»

eHighLO: ROOT based methods to protect energy market against fraud

Axel Naumann

3179, CERN

14:20 - 14:35

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

Anargyros Kiourkos

3179, CERN

14:35 - 14:50

Compact low-cost indoor light simulator for photovoltaic cells development (Lightbox)

Hamza Boukabache et al.

3179, CERN

14:50 - 15:00

Fully Autonomous Self Powered Wireless Radiation Sensor

Hamza Boukabache et al.

3179, CERN

15:00 - 15:15

Optical Interrogator for Fiber-Optic Sensors in Sustainable Agriculture

Haitham Zaraket et al.

3179, CERN

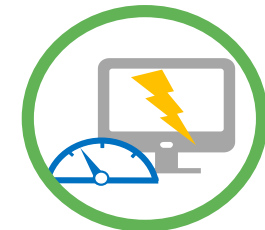
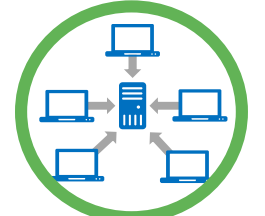
15:15 - 15:30



Session 4

New Ideas in Area 4 «Sustainability and Green Science»

| | |
|--|--|
| SF6-free S-band circulator for photo injectors 3179, CERN | Steffen Doebert 15:55 - 16:10 |
| Platform for green data analysis based on AI and real-time energy optimized federated learning 3179, CERN | Luigi Serio 16:10 - 16:25 |
| Development of Innovative Immersion cooling technologies for data centers 3179, CERN | Niko Neufeld 16:25 - 16:40 |
| Power consumption of HEP-Benchmarks workloads 3179, CERN | Andrea Valassi et al. 16:40 - 16:55 |





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Thank you!

<https://kt.cern/environment/CIPEA>