



An ERIC since 2021

Three complementary facilities

➤ **ELI Beamlines, Czechia**
Femtosecond laser pulses

➤ **ELI ALPS, Hungary**
Attosecond laser pulses

Integrated into and operated by ELI ERIC as a unified organisation since 2024.

➤ **ELI NP, Romania**
High-power laser and gamma-beam systems

Nationally operated in Romania; Romania is a Founding Observer, preparing for future integration into ELI ERIC.

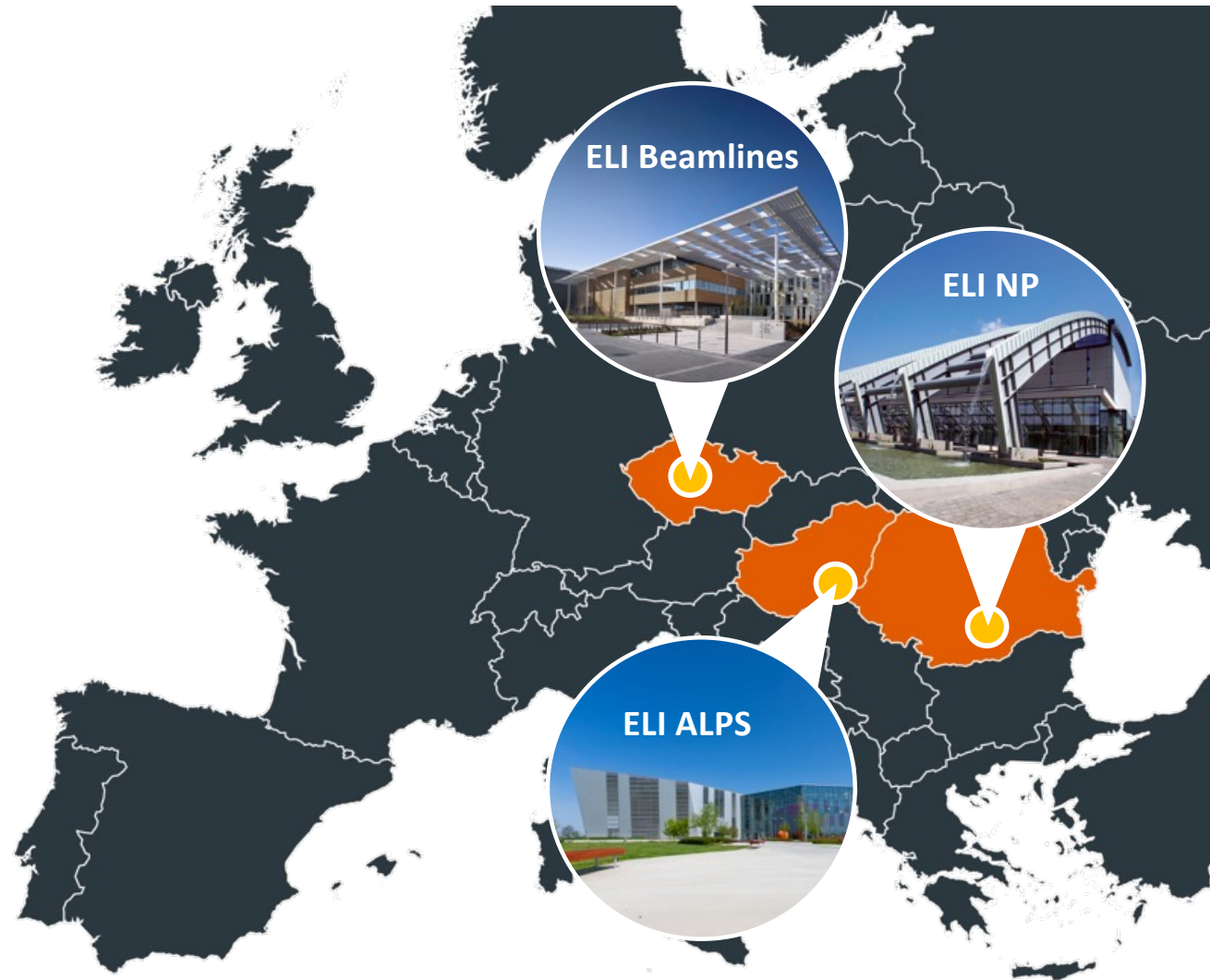
Member States

Czech Republic, Hungary, Italy, Lithuania, Bulgaria

Observers

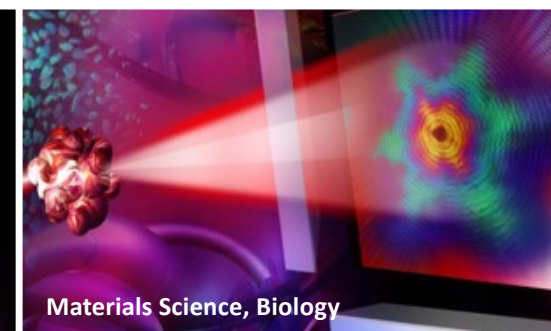
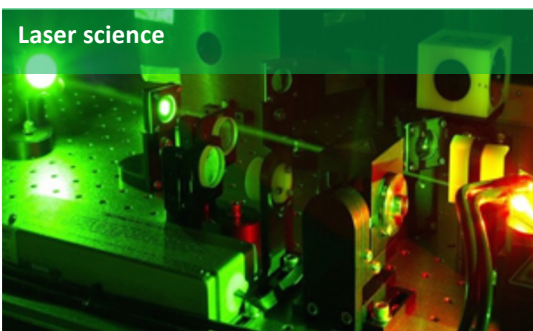
Romania, Germany, Montenegro, Slovakia, Poland

ELI ERIC at a glance

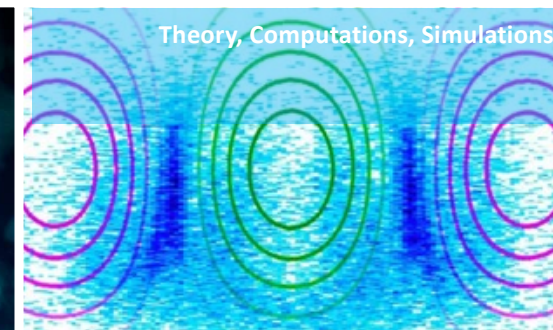
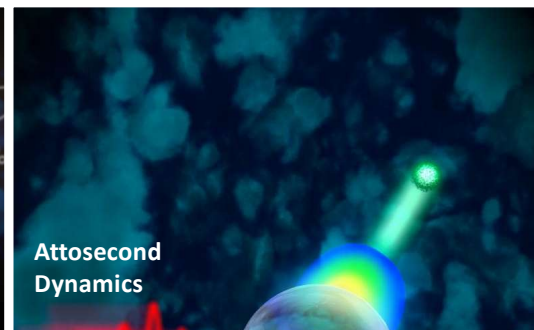
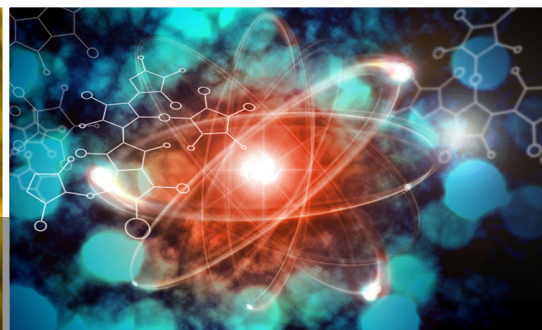




Why sustainability matters at ELI



*ELI's scientific mission relies on highly complex, energy-intensive infrastructure.
Responsible long-term operation therefore requires facilities that are
efficient, resilient and digitally enabled.*





Voluntary ESG implementation

a proportionate, ESRS-informed approach

ELI is not subject to statutory CSRD reporting; nevertheless, we are voluntarily implementing an ESG framework across ELI Beamlines and ELI ALPS in 2026–27.



Implementation must remain proportionate to ELI's multisite structure, data maturity and mission-critical operational requirements.



Operational pillars of ELI's green transition

ELI's green transition follows a practical sequence: Optimise demand → decarbonise supply → operate smart and flexibly.

Energy demand optimisation

Targeting HVAC, cooling, cleanroom stability and critical utilities.

ELI Beamlines (2022–23):

- ~50% lower heat consumption
(~2,500 MWh; ~€300k/year saved)
- ~17% lower electricity consumption
(~2,100 MWh; ~€50k/year saved)

On-site energy decarbonisation

Reducing grid dependence through facility-specific energy generation.

ELI Beamlines:

- 630 kW_{th} / 530 kW_e combined heat and power unit
- 312.8 kW_p photovoltaic installation
(~2,600 tCO₂e indicative annual avoided emissions)

ELI ALPS:

- 6.26 MW_p photovoltaic installation
(~6,800 MWh/year generation; ~4,214 MWh/year estimated on-site self-consumption)

Energy flexibility & resilience

Using digital control and energy-flexibility planning to maintain scientific conditions efficiently.

- Open, configurable BMS at ELI Beamlines
(completed in 2025)
- IBM-supported AI/ML proof of concept: more stable temperatures and higher system efficiency





FlexRICAN

ELI's contribution to RI energy flexibility

FlexRICAN is a Horizon Europe project under **HORIZON-INFRA-2023-TECH-01-01**, developing and validating solutions that reduce the carbon footprint of energy-intensive research infrastructures while strengthening power-system flexibility.

ELI's operational challenge

High energy demand and strict climate-control requirements in laser and cleanroom environments.

ELI's role

Leading work on energy storage planning (WP4), intelligent building management and cleanroom-oriented optimisation (WP7).

European value

Converting facility-level experience into open, transferable solutions for other research infrastructures.



*8 consortium partners + 2 affiliated entities
3 ESFRI research infrastructures + 2 energy-industry partners*

March 2024 -February 2027





ELI's contribution to FlexRICAN

Turning facility-level challenges into three reusable tools for European research infrastructures.

⚙️ TOOL 1

Energy-chain & storage planning Tool

Planning storage for flexibility and self-consumption.

Tool for energy-chain optimisation and battery-storage planning

Assesses how energy storage can improve self-consumption, flexibility and resilience.

⚙️ TOOL 2

Open BMS programme blocks Tool

Transferring proven building-management logic across RIs.

Open repository of reusable building-management-system programme blocks

Makes configurable, reusable BMS logic available for adaptation by other RI facilities.

⚙️ TOOL 3

Cleanroom optimisation Tool

Balancing cleanroom stability with energy-efficient operation.

Cleanroom-oriented technological-chain optimisation tool

Supports optimisation of strict indoor-climate requirements and related energy use.

Co-developed with FlexRICAN partners, combining RI operational data, predictive methods and academic and industry expertise, designed for open-access use, not limited to European research infrastructures.

[Tools | Energy Decision Support](#)



Project Context

Select your planning horizon and facility location. This determines the climate models (Copernicus) used for calculation.

Technology preferences



Project Start Year

2026

Project End Year (Max 2055)

2055



Digital foundations for efficient and resilient operation

Digitalisation supports both precision facility control and a shared scientific operating environment.

Open & configurable BMS

Replacing rigid legacy control with an adaptable operational platform.

- Major BMS modernisation completed at ELI Beamlines in 2025
- In-house configurability and stronger control of cleanroom temperature and humidity conditions
- **Next step:** reusable BMS programme blocks will be made available through an open-access repository for adaptation by other RIs (FlexRICAN)

AI/ML-enabled control

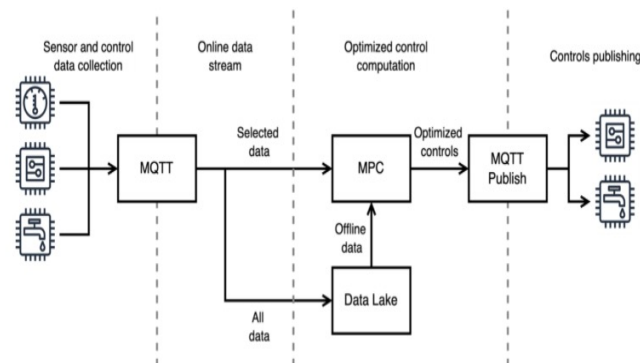
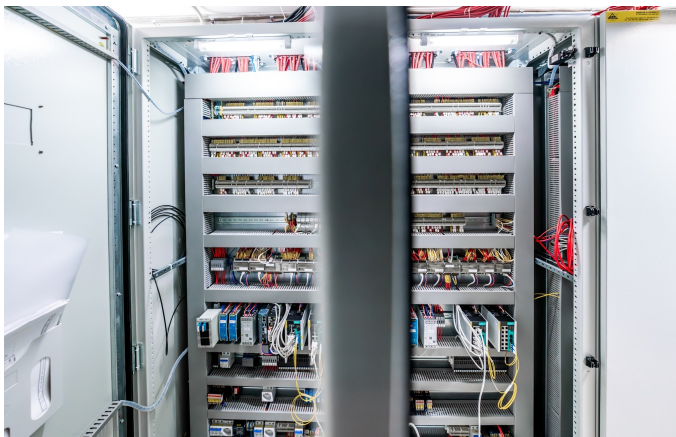
Testing data-driven control of complex facility environments.

- IBM-supported proof of concept tested on a defined facility area
- Demonstrated more stable experimental-hall temperatures and higher system efficiency
- **Next step:** scaling across ELI and other RIs is the subject of a submitted Horizon Europe 2026 proposal

Cloud-enabled collaboration

Creating a secure, centrally governed digital environment across ELI.

- Shared domain environments for data analysis, computing and scientific collaboration through ELI facilities
- Centralised identity and access management across ELI systems
- Strengthening cybersecurity and common services





Next steps: scaling ELI solutions through RI collaboration

Moving from facility-level measures to shared, interoperable solutions for sustainable and resilient research infrastructures.

Scaling at ELI

- Complete ESG baseline: double materiality assessment and harmonised carbon-footprint methodology
- Embed ESG into policies, governance and operational processes
- Scale digital solutions integrations and enhancement

Building shared RI capability

- Test, adapt and use FlexRICAN tools across research infrastructures
- Develop shared carbon-footprint and life-cycle-data approaches
- Build follow-up Horizon Europe collaboration on integrated ESG, data-driven and energy-flexibility solutions





Any questions?

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