



Organisme de recherche

CEA

CEA, the Atomic Energy and Alternative Energies Commission, is a French public research organization. We conduct research in low carbon energies (nuclear and renewable energies), defense and global security, information technologies, and health technologies. In each of these four fields, CEA's work relies on first-class fundamental research. The Commission also participates in the design and operation of very large international research facilities such as the LHC, ITER, and the ESRF. Through our strong relationships with university and industry partners, we support industrial companies, the set-up of innovative technology start-up companies, and exports of French nuclear technologies.

Securing competitive, safe and CO2-free energy to maintain France's energy independence and fight global warming.

Research on nuclear energy at CEA is carried out by the Nuclear Energy Division and focuses on 7 areas of expertise:

- the design of future nuclear systems—referred to as Generation IV nuclear systems—and the associated reactors and fuel cycle. They aim at optimizing the use of uranium resources and reducing waste production. CEA plays a key role in the Generation IV International Forum,
- the optimization of current French nuclear reactors and the related fuel cycle,
- the development and operation of large simulation and experimental tools,
- research on radioactive waste management and control of the impact of nuclear activities,
- the cleanup and dismantling of nuclear facilities,
- safety and security,
- and nuclear materials & mechanics.

As a nuclear operator, the Nuclear Energy Division is also in charge of managing and enhancing CEA's nuclear facilities. It carries out construction, renovation, decommissioning, and dismantling programs. Our outstanding research equipment features some unique facilities. **Training**

Academic education and vocational training

Academic education (from Bachelor's degrees to Master's degrees) and vocational training at CEA are managed by INSTN (see p. 62). Research training is managed by labs themselves together with our Office for Research Training & Career Development.

Research training

PhD students at CEA join research teams and complete their doctoral research under the guidance of the lab supervisor and/or an academic supervisor. They also receive professional training in different settings inasmuch as they are encouraged to do internships in academia, government organizations, and industry. Together with INSTN, the Office for Research Training & Career Development also organizes seminars and workshops to help PhD students manage their studies, enlarge their knowledge of the business world, and prepare their careers. These include but are not limited to:

- conducting your thesis and determining your career project
- managing a scientific project
- technology transfer and innovation in the industry
- supervising a PhD student, for lab supervisors.

Unequaled research facilities, tools and equipment

We have cutting-edge nuclear research facilities, some of which are unique in the world. They are constantly updated and enhanced so as to maintain their exceptional experimental capabilities. Our PhD students have access to our 27 Equipex (Facilities of Excellence) and 33 Labex (Laboratories of Excellence), as well as to all our other facilities:

- research reactors (ORPHEE, JHR in construction—start of operation scheduled in 2017) and critical models (EOLE, MINERVE),
- hot laboratories to carry out studies on radioactive substances (ATALANTE, LECI),
- experimental platforms for thermal-hydraulic, earthquake, severe accident, and corrosion studies.

They also have access to the biggest library resource of doctoral and post-doctoral level in France dedicated to nuclear science and technology, with over 1,000,000 books, magazine collections, technical reports, and dissertations.



Key figures

9

research centers

20,572

technicians, engineers, researchers and support staff

670

priority patents filed

216

spin-offs since 1972 in the innovative technologies sector

€5 B

overall resources

1,233

PhD students

176

postdoctoral fellows

700

labs

5,130

publications in peer-reviewed journals

64

frameworks agreements with universities and graduate schools

International school in nuclear engineering

INSTN and the Nuclear Energy Division organize each year an international school in nuclear engineering for PhD students, post-docs, young professionals, and established engineers. The school consists of 6 one-week courses:

- thermal hydraulics and safety,
- materials for nuclear reactor, fuel and structures,
- reactor core physics: deterministic and Monte Carlo methods,
- nuclear fuels for LWRs and FRs,
- nuclear fuel cycle and reprocessing,
- nuclear waste management.

International course on generation IV nuclear reactors

ENEN, INSTN, and CEA have set up an annual international course on future nuclear reactor systems. It is meant for professionals, researchers, and students, and taught entirely in English by international experts in the field. It includes lectures and tutorials on SFRs, HTRs and VHTRs, GFRs, LFRs, SCWRs, MSR, and the fuel cycle.

Support to newcomer and expanding countries

We are a founding member of I2EN. Together with INSTN and other industry partners, we often take part in I2EN's missions abroad to help newcomer and expanding countries develop their HCB plans.

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