



# GREEN & DECARBONATED ENERGY

## INCL. BIOPROCESSES & WASTE VALORIZATION

"Green energies", derived from sun, wind, geothermic, biomass... are produced in such a way as to minimize their negative impact on environment. As renewable and sustainable alternatives to fossil sources, they have a limited contribution to climate change. To tackle the increasing threat of global warming, the development of such clean sources of energy is one of the most fundamental technological challenges that our modern societies will have to face in the coming years.

Bioenergy, extracted from biomass and residues, is, so far, the first renewable energy source in Europe and in France. Concerning the biomass resource, microalgae namely represent a huge biomass potential for the production of food, renewable chemical inter-

mediates and biofuels.

The conversion of biomass and wastes generates carbon products, chemicals and gaseous/liquid fuels. Carbonated molecules either from biomass conversion or from direct CO<sub>2</sub> capture, contribute to closing the carbon cycle. In the "Bioressources and Power to X" approach, the recycled carbon molecules are hydrogenated through catalytic chemical conversion using a carbon-free H<sub>2</sub> to produce synthesis molecules of interest for energy and chemical industries, such as methane, methanol, fuels ...

Chemical selectivity, high conversion rates, overall energetic efficiency are the main scientific issues of this whole process.

### WHY A PHD RELATED TO GREEN & DECARBONATED ENERGY AT CEA TECH?



PhD students will take advantage of the very diverse and specific skills and means of CEA Tech teams.

Thanks to its technological platforms, CEA Tech is one of the major R&D French actors on microalgae. Indeed, the studies on bioprocesses for 3rd generation biomass production benefit from fourteen photobioreactors from laboratory to pilot scale. In that field, CEA Tech develops specific skills in pretreatment, fractionating and physicochemical analyses.

On the topic of mass and energy recovery from biomass and waste by thermochemical conversion, CEA Tech develops also expertise in pretreatment and thermochemical conversion of dry and wet feedstock. The key research areas, from laboratory to pilot scale are the feedstock characterisation, the understanding and modelling of the physical and chemical reactions occurring in the processes, and

the highlighting of the role of inorganic species in combustion or gasification technologies.

Concerning synthesis molecules production, the expertise includes the catalyst performance measurement and characterization, the optimization and the design of conversion reactors, as well as the optimization of the whole system energetic integration and its management, including technico-economic considerations.

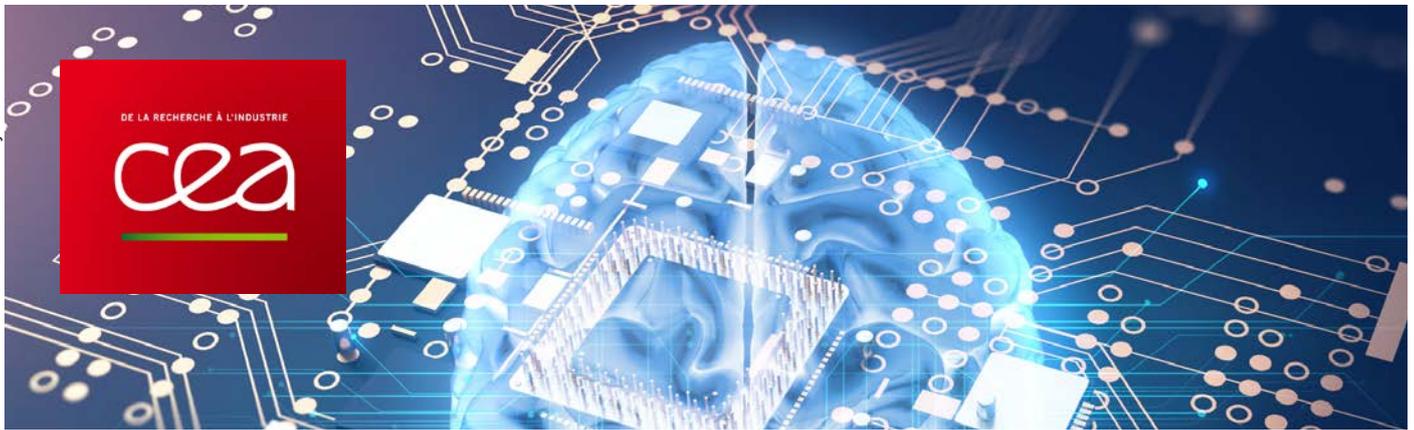
PhD students will be involved in the strong collaborations established by CEA Tech with fundamental research teams, international RTO and key industrial providers and end users.



CEA-Liten Institute in Grenoble Alpes or CEA Tech in Cadarache



10-15 ongoing PhD projects



# CEATECH SCIENTIFIC AND TECHNOLOGICAL CHALLENGES

CEA Tech tackles the three key and ongoing transitions of the 21st century: numeric, energy and medical ones. For each, CEA Tech research teams innovates within a vibrant network of academic and industrial partnerships, to develop the technologies of the future.

CEA Tech, one of the four CEA research divisions, relies on three large research Institutes, two in Grenoble, Leti and Liten and one in Saclay, List, and a network of technology transfer facilities in Bordeaux,

Nantes, Toulouse, Metz, Cadarache and Lille.

Close to 500 young researchers, prepare their PhD in CEA Tech Labs, with a major contribution to the research teams. They share the successes of the CEA, embodied in leading publications, patents, technology transfers to industry, business and start up creation. For years, Reuters ranks CEA as one of the top three most innovative research organizations in the world (1st, 2nd or 3rd).

## WHY A PHD AT CEA TECH?

Regardless of the field of research you are looking for, willing to explore prospective ideas or to further advanced technologie, you will likely find among CEA Tech doctoral positions the one that meets your expectations.

Then you can join either Leti (1800 p.) and focus on micro and nanotechnologies, embedded electronics, communications, components for the Internet of Things (IOT), cybersecurity, medical devices and healthcare outpatients (at Clinatéc) - or Liten (950 p.) to face the challenges of non-CO2 emitting energies (solar, batteries, hy-

drogen, biomass or smart grids) - or List (750 p.) to innovate in terms of data intelligence, cybersecurity and IOT software, manufacturing (4.0 industries), radiotherapy, health data processing - or a research team located in one of the technology transfer facilities (Bordeaux, Nantes, Toulouse, Metz, Cadarache and Lille).

Whatever the topic you select, whatever the career path you envision, joining CEA Tech for your PhD has a deep meaning. On the one hand, you will be dealing with one major societal challenge, deeply rooted in science

and technology. On the other hand, your PhD will be at the heart of highly innovative ecosystems, each offering unique opportunities in research and career paths.

Indeed, CEA Tech offers a highly efficient mix of digital and hardware skills, world-class facilities such as state-of-the-art 300 mm clean rooms, and integration facilities for hydrogen and battery technologies, and many others. CEA Tech's teams form active partnerships with other research organizations and universities, as well as active cooperation with more than 500 industrial partners in France, Europe, North America and Asia.

We will do our best to accompany your success.



CEA-List Institute in Paris Saclay or CEA-Leti Institute in Grenoble Alpes or CEA-Liten Institute in Grenoble Alpes



500 ongoing PhD projects