

## 7 AFFORDABLE AND CLEAN ENERGY



# ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL

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The CNRS supporting the 2030 Agenda – a few examples:

**Access to energy is a necessity for human activities, from cooking food to transport. One person in five in the world does not have access to electricity and the share of clean energies in the global energy mix is far from enough to cover the ever-increasing demand. The research conducted at the CNRS focuses on clean energies and alternatives to fossil fuels, on the efficiency and sobriety of systems, and on issues of use and access. This research brings together disciplines ranging from the physical sciences to sociology, economics, systems engineering, biochemistry and material sciences. The inevitable reduction in fossil fuel consumption by 2030, offset by an increase in renewable energies, requires the removal of some major scientific obstacles in a very short time in the sectors of power generation (solar, wind, hydropower, biomass) and storage (batteries, super-capacitors, etc.), as well as the multi-scale optimisation and flexibility of the source-network-user triangle. The potential that the energy transition brings will need support and must be seen in a territorial context while taking on-board changing uses and practices in an overall approach and with a concern for social justice.**



### A MOVE TOWARDS IMPROVED WOOD/ENERGY SYSTEMS OFFERING MULTIPLE BENEFITS

Wood is one of the oldest sources of fuel used for energy and, when sustainable practices and efficient processes are followed, it can be very efficient and offer multiple benefits.

To determine the sustainability of wood energy, scientists contrasted ecological forestry methods (climate, soils and ecosystem dynamics), land issues (land use and management), studies of the business sectors related to biomass and energy supply, with some value-added processes.

After the growth, use and conversion of biomass have been modelled and the life cycle of the sectors and their improvement analysed, disruptive sectors can be created, with carbon sequestration and the production of a renewable resource. This can be achieved while promoting the good ecological state of an environment and a business activity, especially in rural or mountainous regions.

The FORÈVER project brings together AgroParisTech, INRA and CIRAD, in the 'Reactions and Chemical Engineering Laboratory (LRGP)'.

### UNDERSTANDING ENERGY TRANSITIONS IN SOCIETY

The energy transition is manifold, occurring through social development processes and through the deployment of new technologies.

To understand this multifaceted transformation process, researchers are studying seven new energy technologies: solar, onshore wind, offshore wind, smart grids, CO2 capture and sequestration, wood energy and efficient buildings.

They use social science methods and concepts to analyse the socio-technical groupings that are leading these transformations.

The new socio-energy landscape sees the emergence of transnational coalitions of stakeholders and processes, the development of climate/energy policies and the emergence of sustainable energy communities. Visions of the future and organisational patterns are thus taking shape.

The Collener project is supported by the Agence Nationale de la Recherche and coordinated by a researcher from the CIRED laboratory.

Find out more: [www.forever-biomass.com](http://www.forever-biomass.com)

## MULTIPLYING THE POTENTIAL OF ORGANIC PHOTOVOLTAICS

Organic photovoltaics, a rapidly growing renewable energy source with a small ecological footprint, does not require rare earths.

Researchers from the MOLTECH-Anjou Laboratory and the Rennes Institute of Chemical Sciences have succeeded in significantly increasing the performance of organic photovoltaic cells by changing the arrangement of certain molecules. Improving our understanding of the active layer that converts light into electricity, and more specifically the layout of the elements it comprises, is key to improving the performance of these cells. The layout studied by the researchers has led to a significant increase – up to six-fold – in photovoltaic performance. This contribution opens fundamental new perspectives for the design of original and efficient active materials for photovoltaic conversion.

**Find out more:** [inc.cnrs.fr/fr/cnrsinfo/la-photoconversion-boostee-par-un-melange-enantiopur](http://inc.cnrs.fr/fr/cnrsinfo/la-photoconversion-boostee-par-un-melange-enantiopur)

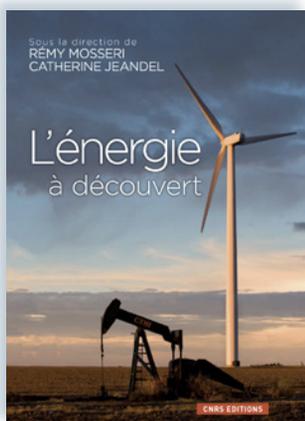
## MYRTE & PAGLIA ORBA: WHEN RESEARCH GENERATES AND STORES ELECTRICITY

The MYRTE and PAGLIA ORBA platforms are among the few facilities in the world capable of studying the renewable energy and storage combination in real conditions. Connected to the EDF grid, they cover the equivalent of the electricity consumption of 200 households.

The research carried out on the MYRTE platform, backed by the University of Corsica, CNRS, AREVA Stockage d'Énergie and French Alternative Energies and Atomic Energy Commission (CEA), is dedicated to the production and storage of energy from solar radiation and hydrogen. The aim is to redistribute this energy in the electricity grid during periods of high daily consumption or to compensate for sudden variations in the power supplied by the photovoltaic plant.

These research activities have enabled development of a control and command system that can be used to operate all the production facilities optimally based on algorithms devised by the researchers.

**Find out more:** [www.universita.corsica/fr/recherche/plateforme-energetique-myрте](http://www.universita.corsica/fr/recherche/plateforme-energetique-myрте)



## CLEAN ENERGY STORAGE START-UP WINS GLOBAL INNOVATION AWARD

Founded in 2014 after discoveries made in the Rennes Institute of Chemical Sciences laboratory, the start-up KE-MIWATT was a prize-winner in the 2018 Global Innovation Competition. Focused on energy storage with its circulating electrolyte batteries, its 'Infini' project aims to store large quantities of energy with a battery that uses organic, biodegradable and recyclable molecules.

**Find out more:** [www.cnrs.fr/cnrsinnovation-lalettre/actus.php?numero=557](http://www.cnrs.fr/cnrsinnovation-lalettre/actus.php?numero=557)

## An Energy Unit at the CNRS

A special Energy Unit coordinates the CNRS's work and initiatives in this field, involving ten of the organisation's institutes, represented by as many working groups. It covers the key areas overseen by the National Alliance for the Coordination of Energy Research (ANCRE) such as biomass and bioenergy, fossil energies and geo-resources, nuclear energies, renewable energies, energy efficiency in transport, buildings and cities, processes and industries, socio-economic dimensions and so on [www.celluleenergie.cnrs.fr](http://www.celluleenergie.cnrs.fr)

## UNDERSTANDING HOUSEHOLD ENERGY CONSUMPTION

The 'EnergieHab' project, led by a LATTs researcher, comes at a time when improving the thermal performance of buildings in France has emerged as a priority for 2020. The project is based on the finding that most of the models put forward on energy consumption overlook the impact of domestic uses. The objective is therefore to devise reliable indicators that can be used for an observatory of household energy consumption, looking at spatial practices alongside the technical performance of buildings.

**Find out more:** [hal.archives-ouvertes.fr/hal-01744946/document](http://hal.archives-ouvertes.fr/hal-01744946/document)

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