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News

IFPEN

**The renewal of the framework agreement between CNRS and IFP Energies nouvelles on 11 July 2024 testifies to the determination of the two institutions to continue their collaboration on the energies of the future.**

On 11 July 2024, Antoine Petit, President and CEO of CNRS (French National Center for Scientific Research), and Pierre-Franck Chevet, Chairman of IFP Energies nouvelles (IFPEN), formally renewed the framework agreement between the two research organizations for a further five years.

The main focus of the agreement is on the energies of the future. Indeed, renewable energies – particularly offshore wind power, biomass, geothermal energy and hydrogen – are one of IFPEN's four strategic priorities, alongside climate, the environment and the circular economy, sustainable mobility and responsible hydrocarbons.

## Uncovering the energies of the future

As Pascal Breuilles, CNRS Chimie's Deputy Scientific Director in charge of industrial and international partnerships, explains: “The CNRS/IFPEN framework agreement enables the two institutions to tackle a number of complex issues related to the energy transition, such as reducing CO2 emissions, developing renewable energies and improving energy efficiency.” In fact, these research topics account for the majority of the two institutions' co-publications. Although the 621 co-publications between CNRS and IFPEN between 2014 and 2021 – almost 45% of IFPEN's scientific publications during this period – involve almost all ten CNRS institutes, there is a predominance of three: CNRS

Chimie (40% of publications), CNRS Ingénierie (19%) and CNRS Terre & Univers (18%). While joint publications for the 2014-2020 period will focus on reducing CO2 emissions from the use of hydrocarbons ($CO_2$ capture and storage), renewable energies (biomass in particular) and mobility, other themes are emerging at the crossroads of each organization's expertise.

Such is the case for the study of the underground environment, part of the PEPR Underground common good program, as Laurent Jammes, Director of Industrial Relations at CNRS Terre & Univers, explains: “This framework agreement will strengthen collaboration between CNRS and IFPEN on topics relating to the exploitation of underground resources and uses, particularly in the field of modeling and simulation, as well as on the societal issues associated with these activities.”

For her part, Olga Vizika-Kavvadias, IFPEN's Scientific Director, underlines “The complementary nature of our expertise, particularly in physics and analysis, chemistry, catalysis and processes, geosciences and digital technology,” citing as examples the Road4Cat chair[1], which aims to improve the eco-efficiency of catalytic processes and reduce the number of metal atoms in catalysis, the Carma chair on carbon dynamics in ecosystems, joint initiatives on hydrogen from underground, which, unlike other sources of hydrogen production, would have a low or even neutral carbon impact, or the joint research laboratory “Characterization of materials for new energies”[2]. The latter “addresses the multi-scale characterization of porous materials (catalyst supports, adsorbents, reservoir and source rocks, native biomass, battery electrodes, etc.) of great interest in the field of energy transition,” says an enthusiastic Pascal Breuilles.

## Inventing the energies of the future

This variety of collaboration patterns bears witness to the consolidation of scientific interactions between CNRS and IFPEN. These are now largely based on the PEPR system, in particular the PEPR Spleen. With a budget of €70 million over six years, this program co-piloted by CNRS and IFPEN aims to develop and test processes to support the reduction of greenhouse gas emissions and the overall decarbonization of industry, a sector responsible for 32% of $CO_2$ emissions and 37% of energy consumption worldwide. In addition to Spleen, IFPEN is co-pilot of two other acceleration PEPRs - “Biosourced Products - Sustainable Fuels” with Inrae and “Digitization and Decarbonization of Mobilities” with Gustave-Eiffel University - and contributes to five exploratory PEPRs - Underground common good, OneWater, FairCarbon, Diadem and NumPEX.

This low-TRL research (1 to 4) will form the basis of future innovations[3]. IFPEN's Scientific Director has observed in the joint structures and actions between the two organizations a ”shared ambition to lead research and innovation projects, from low-TRL research, often carried out as part of theses, chairs and ANR and PEPR projects, to involvement in innovation platforms (Axel'One4) and support for start-ups, particularly in the fields of decarbonizing energy and mobility, and the circular economy.” In addition to research excellence, CNRS and IFPEN share a strong propensity for technological innovation. IFPEN and CNRS rank second and third respectively on the podium of European research institutes for hydrogen technologies, and are also well placed among the world's leading patent filers for low-carbon technologies – IFPEN in fourth place and CNRS in seventh. In the words of Olga Vizika-Kavvadias, these are “common foundations for stepping up our collaboration in the interests of energy, ecology and digital transition.”

[1] The Chair's scientific strategy proposes an innovative research approach based on computational chemistry at the quantum level, applied to the efficient design of heterogeneous catalysts and a

detailed understanding (at the atomic scale) of the mechanisms at work, from their preparation (genesis of active phases) to their operation (key properties) under reaction conditions.

[2] The CNRS, ENS de Lyon, IFPEN, Sorbonne Université, Université Claude Bernard Lyon 1 and Université de Strasbourg have created this joint research laboratory in 2019, for a period of five years, in the field of characterization of materials for new energies.
The aim is to enhance knowledge of molecular and/or colloidal transport in porous substrates and develop fine analysis methodologies to support innovations for the energy transition.

[3] The TRL (Technology Readiness Level) scale assesses the level of maturity of a technology up to its integration into a complete system and its industrialization.

[4] Axel'One is a collaborative chemistry-environment innovation platform dedicated to clean processes and innovative materials.

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