



Sustainable innovation and ecological transition in French industry

The industries in Europe and elsewhere in the world faces some urgent transitions in how the companies manufacture their products and use the ressources of the earth in order to preserve (or improve) the climatical and ecological conditions on our planet. Today the three main challenges to cope with are the transitions to new energy, digitalization, and ecology. In France the Carnot research institutions are supporting the companies in the industry to manage these transitions. This support was one of the main themes on the Carnot Rendez-Vous (RDV) conference 2025 in Lyon. The Carnot organization, which comprises 39 Carnot Institutes with excellent research labs and their respective research partners, is established of the French state with the main purpose to transfer technology from the public research to the industry.

Sustainable innovation is a central part of the transition to the new kind of energy such as wind- and solar-power, new generations of nuclear power, and geo-thermic energy etc. There are several tools available to implement sustainable innovation but so far they are used to a limited extent in the industry according to an investigation among 100 companies in France conducted by Maobi, specialized in durable strategy.

Decarbonization of the industry and the transition to the new energy sources repose on four pillars: renewable energy, storage and management of the energy, carbon-free industry, and intelligent energy systems, according to the ALLICE alliance. The purpose of the alliance is that the French companies can succeed with the energy transition.

Decarbonization is also one of the research projects at CEMEF, a research lab. of MINES ParisTech associated with CNRS, the French National Centre for Scientific Research. The challenge is the industrial sectors that are difficult to decarbonize (e.g. the cement industry), and one solution is to

embed the CO₂ in materials with long lifetime and/or recycle it. "Another research at CEMEF is to produce E-ethylene from captured CO₂, and we will develop and commercialize a rupture technology in order to produce green ethylene based on CO₂", said Franck Pigeonneau, research director, CEMEF. Ethylene is used as green chemical to manufacture everyday items such as electric cables, medical materials, toys, fabric, construction materials etc.

In sustainable innovation it is important to select and use the right materials and components. Bad choices of the materials may augment the total costs of the project by 30% and the number of product failures by 40%, likewise may bad choices cause more than 60% of the production delay. This according Total Materia A.G. that specializes in advising the companies to the right choices of materials. "The company has more than 160 models to describe about twenty properties of more than 300.000 materials", said Jérôme Cailleux, marketing manager, Total Materia.

The huge amount of data produced in the automatic manufacturing processes and at organizations has to be analysed properly in order to be useful in the transition efforts of the industry. "With approx. 180 Zeta Byte of data expected to be generated in 2025 globally the volume is enormous and impossible to analyse without automatic tools such as artificial intelligence (AI)", said Louis-Marc Perez, marketing director at Cikisi. The company market AI-based systems and advises the industry in using AI solutions based on tools like Mistral AI, Anthropic, OpenAI, Gemini, Copilot, and Meta.

Additive fabrication (AF) is a known technology that can be competitive on the market and useful to the environmental transition. The global market is growing and is expected to expand from 14Md euro in 2023 to 20Md euro in 2028, according to an investigation. However the costs to access the AF technology is still significant, especially for the SME companies. "It is about the costs to procure the materials and the machines, and also to integrate AF in the industrial production lines", said Hélène Determe, directrice adjointe, Carnot Cetim (centre technique des industries mécaniques).

Water in the town can be a problem and need innovative solutions to address challenges such as flooding, wastewater and storm-water treatment. "Innovation and management of the water will help to secure a durable city", said Stéphane Ruy, director, Carnot Eau & Environnement. Nexity Group takes on the challenge and help building a more resilient and sustainable future by supporting local authorities, and transforms the territories in delivering real and rapidly deployable solutions. Nexity Group is a leader in France in real estate development and services, and

serves local authorities, individuals, companies, investors and institutions.

The Odalie company proposes innovative solutions in order to manage water and waste water effectively in the buildings in relation to sanitary and environmental conditions.



Julia Bertret, Maobi, stratégie,

Several tools are available to implement sustainable innovation but so far only 24% in the industry are using them



Lucille Payet, ALLICE.

The purpose of the alliance is that the French companies can succeed with the energy transition



Salim Alami, développement et relations extérieures, ANRT. The industry should use the innovation tools more to be effective in the transition



Bruno Garcia, manager business dévelop, ifp énergies nouvelles. The main challenges are new energy, ecology and digitalization



Jérôme Cailleux, marketing manager, Total Materia.

We have more than 160 models to describe the different materials

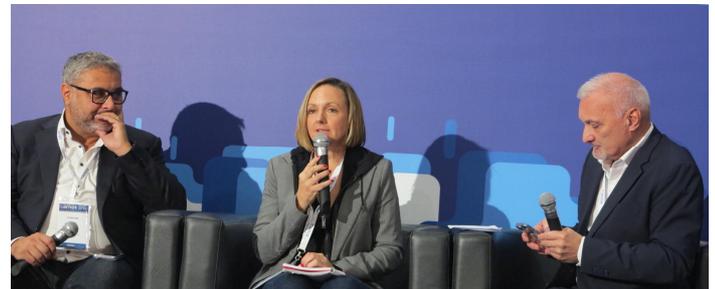


Pascal Giat, director, ANRT (association nationale recherche technologie). ANRT has expertise in doctorate education to research projects, and using our candidate is a win-win situation both for the technical doctors, the employment structure, and the research laboratories.



Louis-Marc Perez, marketing director, Cikisi.

To analyze the huge amount of data we need AI tools



Pascal Giat is here in talk with Stéphane Panin, President, Corroh, and Alexandra Bertron, directrice, INSA Toulouse



Franck Pigeonneau, research director, CEMEF. We will develop a rupture technologie to produce green ethylene based on CO₂



Thierry Braine-Bonnaire, Institut Carnot Clim'adapt. We transfer real solutions research to the industry and support the companies in their ecological and climatic transition



Franck Pigeonneau in talk with Damien Voiry, research director, Membrane Lab Institute European



Céline Vinot, directrice, Carnot MECD. We do innovation and research of building materials



Stéphane Ruy, directeur, Carnot Eau & Environnement. Innovation and management of the water will help to secure a durable city



Sandrine Lebois, general manager, AFCRT. CRT (centres de ressources technologiques) transfers technology from academic lab to the industry



Abdel Tazibt, directeur recherche et innovation, CRITT. We are doing modification of surfaces and shaping materials with cold projection



Hélène Determe, directrice adjointe, Carnot Cetim. The global market is growing and useful to the environmental transition



From left: Thierry Braine-Bonnaire, director, Carnot Clim'adapt, François Desgardin, director, Nexity, and Guillaume Germain, CEO, Odalie, are discussing solutions of the towns in transition to the climate changes



Nexity example how a town could be in a more resilient and sustainable future