



2020-2021  
ANNUAL  
REPORT

Cerema's scientific excellence for the benefit of the French economy and its adaptation to the effects of climate change



# EDITORIALS

**"Cerema's strategic project makes Institut Carnot Clim'adapt pivotal to the development of the establishment's partnership research, intended to help regions adapt."**

French companies are the pillars of the country's economic life. Their capacity to successfully carry out the now obligatory ecological transition in conditions that reinforce their potential rather than undermining it is a prerequisite for the stability of our social model.

The challenges faced by economic players are, for the most part, unprecedented. Precisely formulating these challenges represents a field of research that is both stimulating and essential. Whether for reducing the environmental footprint of products, systems or services, developing ever more virtuous solutions, or helping companies to minimise their emissions or adapt to the increasingly critical effects of climate change, Cerema's researchers and experts are accessible and precious partners.

**Pascal Berteaud**

Director General of Cerema

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Climate change, brought about by human activity, is leading to increasingly significant and frequent events which, it is safe to say, challenge the very nature of humanity.

Whatever measures we take here and now to mitigate the causes of this change – first among them cutting back greenhouse gas emissions, **the earth's climate change in the coming decades is a foregone conclusion.**

Given the inertia of the interactions between the earth, ocean, atmosphere and cryosphere, phenomena such as global warming, changing precipitation patterns or rising sea levels will continue to pose an ever greater and longer-lasting threat to human societies and their activities.

**Adapting to the consequences of climate change is a major challenge alongside that – equally important – of attenuating these consequences.**

There is no universal solution for this adaptation (adapting is sometimes paraphrased as “how to deal with the inevitable”, attenuating as “how to avoid the unmanageable”) insofar as differences in terms of geography, topography and land use determine the breadth of climate change impacts, and affect the ranking of their severity.

### **“Research, a response to the challenges inherent in adapting to climate change”**

Furthermore, the conception of solutions cannot be limited to mere incremental supplements to whatever already exists, considering the degree to which the number of challenges, present and future, are unprecedented, both in terms of their nature and their scale. **Creating new knowledge, exploring uncharted fields and, accordingly, conducting research are therefore all-important.**

At the cutting edge of research, **received the “Institut Carnot” certification label in February 2020, with its Clim'adapt project.** This label follows an initial and successful period of integration within the system as “Tremplin Carnot Cerema Effi-sciences”. This is the first time that the Institut Carnot label has been awarded to a project focused on the issue of climate change.

Institut Carnot Clim'adapt helps businesses and regional authorities with their transition towards a low-resource, low-carbon economy that respects the environment. **Through bilateral contract research services, Cerema provides these economic stakeholders with the scientific excellence of its researchers and experts, in the establishment's six highly complementary fields.**

This complementarity serves to understand every facet of the issues submitted to us, their systemic nature, and to rigorously and impartially assess the pros and cons of the solutions developed, whether they be in the scope of adaptation or attenuation. In addition, thanks to the dense geographic mesh of its regional sites, Cerema can help companies and authorities go about their transitions and anticipations in accordance with local specificities.

The 2020-2021 period was marked by the shift towards the Carnot Institute status, and by the focus on the issue of climate change. This trend is illustrated in the following pages – we hope you enjoy reading them.

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**Thierry Braine-Bonnaire**  
Director of Institut Carnot Clim'adapt



# CEREMA'S INSTITUT CARNOT CLIM'ADAPT

## Cerema: public expertise for the ecological transition and regional cohesion



Institut Carnot Clim'adapt operates under the supervision of **Cerema**. Le Cerema (*Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement* - Centre for studies on risks, environment, mobility and urban planning) is a public institution dedicated to supporting public policies, under the dual supervision of the French Ministry for Ecological and Inclusive Transition and the Ministry for Regional Cohesion and Relations with Local Authorities.

Present in all French regions, Cerema benefits from its historical knowledge of local issues and contexts. This means it can **propose solutions tailored to regional players** and provide them with engaged and accessible contacts.

Both upstream of, and downstream from, the projects of its customers and partners, Cerema benefits from **multidisciplinary expertise to help meet the challenge of regional sustainable development**: support with public policies, innovation and research, dissemination of knowledge, standardisation.

Its expertise is deployed in six areas:



Cerema's work enlightens the choices of public decision-makers and supports them in the implementation of their projects with a view to regional development, cohesion and equilibrium.

**Cerema's objective: provide tailor-made solutions for local authorities, project owners, companies and public policy sponsors.**

### CEREMA, IN FIGURES:

**2,593**  
agents

**27**  
sites throughout  
mainland France and  
in French overseas  
territories

**€258m**  
budget

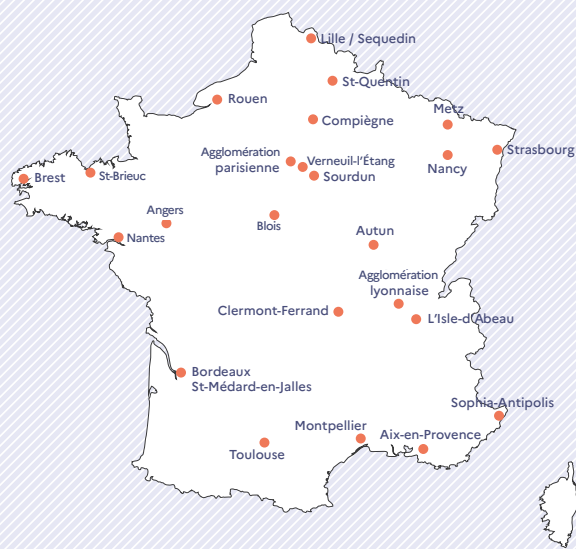
**€33m**  
own revenues

**11**  
research groups

**82**  
rank-A publications  
in 2020

**54**  
theses in progress

**8**  
theses submitted  
in 2020



Map of Cerema sites, certified "Institut Carnot Clim'adapt"

## EXPERT RESEARCH TO SUPPORT TRANSITIONING REGIONS

**Cerema supports innovation through dialogue with public and private research bodies.** Cerema thus provides a unique bridge between the academic world and the operational engineering world. This positioning is reflected by its state-of-the-art expertise.

**Developed by enthusiastic men and women who embody the excellence of public expertise, Cerema's applied research activity** involves 180 researchers, engineers and technicians. Many experts from Cerema provide their support to these research teams and to their academic or industrial partners.

**Cerema's research is underpinned by the actions of 11 teams** whose work, focused on concrete issues and needs on the ground, is carried out jointly with the establishment's experts.

**This research activity ensures the scientific resourcing of Cerema's expertise,** allowing it to offer state-of-the-art services in all its fields of activity. This resourcing is consolidated by the teams' close collaboration – either existing or under way – with top academic partners through the gradual implementation of partnerships with other research organisations (such as CNRS, INRIA, INRAE) and by Carnot's funding, part of which is reserved to Cerema research.

**Faced with the complex, diverse questions raised by the ecological transition,** Cerema's scientific community brings together highly diverse disciplines that cover engineering sciences, life sciences, and human and social sciences.

**Cerema helps create the conditions for the success of innovative projects developed in the regions.** The establishment seeks to strengthen this positioning at the core of research and innovation ecosystems, and to represent a gateway between the French academic and economic worlds, as the interface between public stakeholders and private companies. For this purpose, Cerema organises innovative experiments and demonstrators in France's regions. It is also involved in leading-edge European and international projects.

**Developed under the "Institut Carnot Clim'adapt" label, Cerema's partnership research reflects its focus on the need to adapt to climate change.**



Gaëlle Guyot, researcher in the BPE (Bâtiments Performants dans leur Environnement - Efficient buildings within their environment) research team

➔ See portraits of researchers at [www.cerema.fr](http://www.cerema.fr) / La recherche

# FROM TREMPLIN CARNOT CEREMA EFFI-SCIENCES TO INSTITUT CARNOT CLIM'ADAPT

Cerema received the "Institut Carnot" certification in February 2020 with its Clim'adapt project. This certification follows an initial and successful four-year period of integration within the system as Tremplin Carnot Cerema Effic-sciences.

## 2016-2020: A SUCCESSFUL TREMPLIN CARNOT CERTIFICATION PERIOD

During the Tremplin Carnot certification period, Cerema Effic-sciences:

- carried out in-depth work on **defining Cerema's partnership research strategy**, and its subsequent implementation;
- significantly increased its level of **eligible contractual revenues**, reaching the targets set at the time of the 2016 application;
- **consolidated Cerema's scientific resourcing** via the structuring of its research teams and the implementation of Carnot resourcing actions. Moreover, Cerema affirmed its position within the research ecosystem, particular through the development and consolidation of academic partnerships.



### 4 YEARS OF SCIENTIFIC RESOURCING, CULMINATING IN A NUMBER OF PROJECTS

#### GREEN ROOF TERRACES (SIGRI PROJECT)

Overview: Cerema has two life-size experimental green roof platforms at the Trappes and Nancy sites. These platforms are structured into several plots, each different from the other, to study each compartment (vegetation, substrate, drainage). They are equipped with a series of sensors to study the water and heat flows and balances. They have been the subject of five theses, three of which are under way, as well as several projects, including one ANR (French National Research Agency) project, called PROOF.

#### ELECTRIC DAM

Overview: The "electric dam" project is intended to develop a wave energy converter system based on the movement of a float subjected to the swell in front of a reverberating dam.

The converter will be tested in the wave flume at the University of Le Havre. The goal of the project is to perfect the conversion process and determine the system's yield with and without a dam.

#### RSF DRONE

Overview: In collaboration with Innovadrone, this Carnot project concerns the instrumental development of a drone-carried platform that will allow the use of a frequency-hopping radar for the sounding of vertical surfaces. This one-year project prompted the hire of an engineer on a fixed-term basis.

### USE OF FUNDING FOR TREMPLIN CARNOT CEREMA EFFI-SCIENCES (2016-2020):

- **diverse projects such as METHYDIS, INTHRIG, Ecopilote, Ophelia, AMDO+, Drone RSF, URBEOL, SANuM, COOLVEG, SAHARA:** acquisition of equipment, recruitment of 15 fixed-term contracts  
→ €1.4m
- **professional development and partnerships:** definition of the research strategy, training courses for agents to promote partnership research  
→ €260k
- **integration in the Carnot institute network**



Les Rendez-vous Carnot 2019

## 2019: ANOTHER **CARNOT APPLICATION** CROWNED WITH SUCCESS

This positive result encouraged Cerema to respond to the Carnot 2019 call for applications with its Institut Carnot Clim'adapt project, focused on adapting the French economy to the effects of climate change.

This decision was fully in line with the ambition to continue the development of Institut Carnot Clim'adapt through:

- a **differentiating offer**, driven by structured commercial teams to encourage companies' recourse to public R&D, and based on its recognised research capacities;
- **strong governance**, allowing the institute to implement areas of progress;
- **professional practice in terms of partnership relations**, demonstrated by the ISO 9001 certification of its departments;
- **an ambitious project for structuring ties with "upstream" research** via the structuring of research teams and the development of excellence-driven partnerships with the academic world;
- **the implementation of a wide-reaching internal and external communication plan.**

## 2020-2023: CEREMA RECEIVES THE **"INSTITUT CARNOT" CERTIFICATION** FOR CLIM'ADAPT

In February 2020, Cerema received the "Institut Carnot" certification for four years for its Clim'adapt project.



Awarded to research establishments, the Carnot certification serves to step up the transition from research to innovation by bringing together public research and socio-economic players.

**Improving living conditions, housing and mobility, protecting fragile environments and natural resources, renewing and maintaining infrastructures, developing a local circular economy approach for the use of resources...** These are some of the challenges to which Institut Carnot Clim'adapt seeks to provide concrete responses in order to meet the present and future needs of French regions, and to safeguard their transition towards a low-resource, low-carbon economy that respects the environment.

# INSTITUT CARNOT CLIM'ADAPT IN 2020-2021

## INSTITUT CARNOT CLIM'ADAPT: OFFER AND MISSIONS

Cerema received the "Institut Carnot" certification in February 2020 with its Clim'adapt project. **This is the first time that the Institut Carnot certification has been awarded to a project focused on climate change.**



### DID YOU KNOW?

**Institut Carnot Clim'adapt develops partnership research**, i.e. research work carried out by public laboratories in partnership with socio-economic players, companies of all sizes, and local authorities, in response to their needs.

**Institut Carnot Clim'adapt helps businesses and regional authorities with their transition** towards a low-resource, low-carbon economy that respects the environment. Through bilateral contract research services, Cerema provides these economic stakeholders with the scientific excellence of its researchers and experts, in the establishment's six fields of activity:

**Expertise  
& territorial  
engineering**

**Building**

**Mobility**

**Transport  
infrastructure**

**Environment  
& risk**

**Sea  
& coast**

Thanks to this multi-disciplinary expertise, **Clim'adapt develops an approach in line with the new life styles engendered by digital transition and adaptation to climate change.** For the benefit of innovation, it provides them with Cerema's R&D results, skills and technological resources in the fields of observation, instrumentation, measurement, analysis and modelling to understand and anticipate how new products or services – focused on adapting to the effects of climate change – work, and to gauge their impact.

Institut Carnot Clim'adapt plays a key role as the **interface between companies and regional authorities** on the scientific and technical issues relating to economic development and land use management.

This represents a real opportunity to **deploy and test innovative solutions.**





### Thierry Braine-Bonnaire

Director of Institut Carnot Clim'adapt

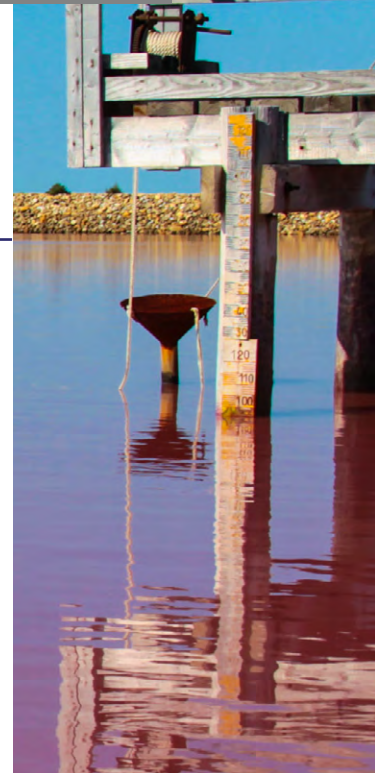
*"The challenges faced by companies and regional authorities often represent highly stimulating research topics. These are important opportunities for Cerema's researchers to show their talents. Collectively, Clim'adapt and the other 38 Carnot institutes carry out around 10,000 bilateral research contracts for an amount in the region of €530m. They produce 26,000 rank-A publications and file 1,100 patents each year."*



LOCAL AUTHORITIES



BUSINESSES



#### In this context, Clim'adapt has a threefold mission:

- **transfer Cerema's R&D to companies** to support them with their ecological transition and, in particular, their adaptation to climate change;
- **help companies to develop innovative, adapted solutions, characterise them in controlled conditions, and try them out in the field;**
- **support local authorities** to identify and implement solutions that match their needs **via partnership research.**



#### Events: Clim'adapt present at the Rendez-vous Carnot 2020 and Occitanie Innov 2021 events

On 18 and 19 November 2020, the team from Institut Carnot Clim'adapt and several of Cerema's development directors took an active part in the **Rendez-vous Carnot** event, which, given the health crisis, was held in digital format.

On 4 February 2021, the Clim'adapt team, along with development directors and several members of Cerema's new Occitania delegation attended the **Occitanie Innov** digital event, i.e. encounters for innovation in Occitania.

These prominent events represent excellent opportunities for presenting Cerema's offer in terms of R&D, introducing CeremaLab to companies, and organising high-quality business appointments.

DES RENDEZ-VOUS D'AFFAIRES  
100% ONLINE

LES RENDEZ-VOUS **CARNOT 2020** 18 > 19 NOVEMBRE  
LE RENDEZ-VOUS DE LA R&D POUR LES ENTREPRISES ÉDITION 2020 100% ONLINE



## A NEW TEAM TO HELP WITH THE DEVELOPMENT OF INSTITUT CARNOT CLIM'ADAPT



**Thierry Braine-Bonnaire**  
Director

**Thierry Braine-Bonnaire joined Cerema as Director of Institut Carnot Clim'adapt in July 2020.** Thierry Braine-Bonnaire is a French engineer (École Polytechnique) and a doctor of physics (Laboratoire de Météorologie Dynamique). He has held a number of managerial positions in various companies and centres for research and expertise.

He plays a decisive role in defining Clim'adapt's strategy, stepping up its integration in the network of Carnot institutes, and developing the corporate market.

**Fanny Tomaszek**

Marketing and Communication Officer



Having acquired ten years' experience firstly with Lagardère Group, then with industrial startup BOOSTHEAT, **Fanny Tomaszek was hired in September 2020 as Marketing and Communication Officer** to define and deploy an internal/external communication plan in line with the strategy and objectives of Institut Carnot Clim'adapt.

She is tasked with ensuring the coordination and production of marketing and communication materials, defining and implementing the editorial strategy, and helping to organise internal and external events.



**Sonia Chauvin**  
Project Manager to the Director

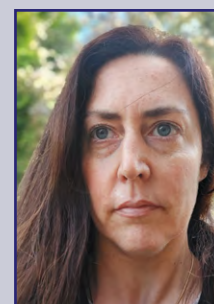
**Sonia Chauvin joined the Institut Carnot Clim'adapt team on 1 April 2021, as Project Manager to the Director.** She oversees the follow-up of Carnot contracts and tracks the institute's budget. Her job involves working alongside the development directors and the French National Research Agency (ANR). On standby, she reports to the French Ministry of Agriculture, where she previously held a position as manager of an agricultural college.



### DID YOU KNOW?

The Institut Carnot Clim'adapt team is part of Cerema's **Department of Research, Innovation and International activity (DRII)**, under the responsibility of **Céline Bonhomme**.

During a webinar organised on 16 December 2020 for the Cerema Research Day, Céline Bonhomme reminded the institute's agents that *"in 2020, Cerema had the great honour of being certified 'Institut Carnot' with Clim'adapt, which is decisive for partnership research."*



## CLOSE-UP ON SEVERAL CARNOT CONTRACTS IN 2020-2021

Over this period, Carnot signed a great many contracts for R&D services aimed at businesses and regional authorities. In fact, all those responsible for urban development or who design, build and manage infrastructures are the natural partners of Institut Carnot Clim'adapt.

Here, in brief, are a few examples of **successful partnerships**.



PARTNERSHIP WITH  
ENGIE GREEN

### Development of a process for automatically estimating noise levels emitted by a wind farm

Outline: The partnership involves developing a process for automatically estimating the noise levels of a wind farm based on measurements taken on site and an artificial intelligence algorithm. The underlying objective of this process is to allow significant gains in wind farm productivity while complying with acoustic regulations.

Environment  
& risk



PARTNERSHIP WITH THE ÎLE-DE-FRANCE REGIONAL AUTHORITY

### Optimisation of energy-plus buildings: the Maison d'Île-de-France at the Cité Universitaire de Paris

Outline: The Région Île-de-France regional authority ordered the building of the Maison d'Île-de-France, a university residence at the Cité Internationale Universitaire de Paris. This building is designed to produce more energy than it actually uses, thanks to a system never before installed on this scale in France. Cerema was tasked with ensuring this exploit by evaluating the building's actual performance and striving to further optimise it.

Building



PARTNERSHIP WITH  
TRANSDEV

### Delivery of a demand-responsive transport service via autonomous and connected vehicles that guarantee user safety

Outline: The purpose of the partnership is to assess the road safety issues associated with autonomous vehicle traffic on open roads as part of an experimental demand-responsive transport service. This work is based on a scientific protocol and, in its final phase, leads to recommendations.

Mobility



PARTNERSHIP WITH LHOIST

### Using lime milk to counter the effects of road surface "bleeding" during hot spells

Outline: Institut Carnot Clim'adapt supports Lhoist in assessing the environmental impact of lime milk used to counter the effects of road surface "bleeding" during hot spells. As the main beneficiaries of this new technique, France's departmental councils seek to ensure that it has no harmful effects on the environment.

Transport  
infrastructure



PARTNERSHIP WITH GROUPE SALINS

### Scientific sponsorship agreement on environmental and engineering sciences applied to the adaptation of low-lying coastal areas to global change

Outline: By recruiting PhD students, the basic objective is to develop international research around Cerema in the fields of environmental and engineering sciences applied to the adaptation of low-lying coastal areas to global change.

Sea  
& coast



PARTNERSHIP WITH THE SEINE-MARITIME DEPARTMENT

### Definition of an experimental protocol for measuring construction site noise

Outline: Noise pollution is one of the main annoyances for residents during construction work. The Département de la Seine-Maritime turned to Cerema to establish a protocol for measuring noise levels during roadworks in urban environments. Innovative acoustic indicators were used to characterise the perceived noise nuisance.

Environment  
& risk

# A STRATEGIC DIRECTION COMMITTEE FOCUSED ON THE SOCIO-ECONOMIC WORLD

## MISSIONS OF THE CLIM'ADAPT SDC

To ensure that Clim'adapt is properly positioned on society's challenges and expectations, Institut Carnot has established a strategic direction committee (SDC) whose composition is wide open to the social-economic world.

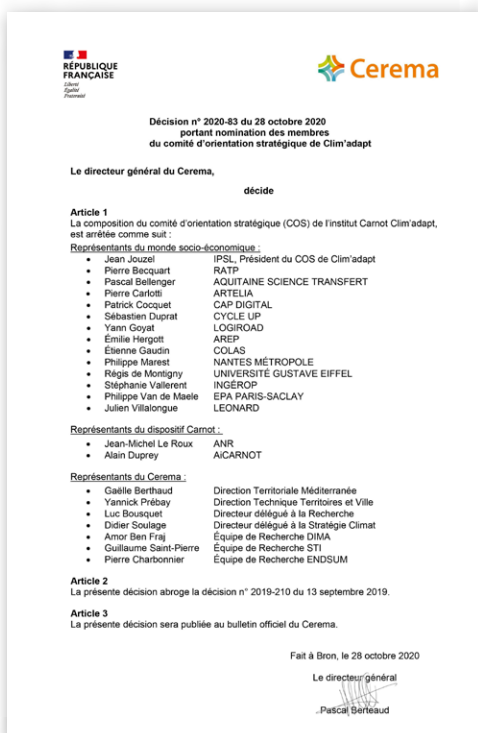
Chaired by internationally recognised climatologist Jean Jouzel, this committee's missions are to:

- give an opinion on the Clim'adapt's strategy and choices in terms of how its funding is used;
- express anticipated or actual needs and expectations;
- suggest opportunities for markets, possible partnerships and enhancing the offer;
- assess the scientific resourcing projects;
- propose medium- and long-term guidelines, in particular ahead of Clim'adapt 2 (post 2023);
- act as ambassadors for Clim'adapt.

The Institut Carnot Clim'adapt SDC held its first meeting (via videoconference) on 23 November 2020.

In his introduction, Cerema's Director General Pascal Berteaud recalled that Institut Carnot Clim'adapt was central to Cerema's strategy. The establishment's goal was to be able to work concurrently with the French State, regional authorities and businesses. He also underscored the SDC's importance for guiding the action of Institut Carnot Clim'adapt.

All those present agreed on the importance of partnership research for Cerema.



**Jean Jouzel**

Climatologist and Chairman of the Institut Carnot Clim'adapt SDC

*"I am delighted to be involved in Clim'adapt's Strategic Direction Committee. Since our meeting last autumn, the change in our climate, its unmistakable consequences, the measures to be taken to attenuate it, and the ambition to at last pursue the path to carbon neutrality by 2050 already displayed by more than 130 countries have given matters a significant push. How we actually adapt to now unavoidable global warming and to its impacts – already devastating in certain regions of the globe – is a topic less to the fore. And yet, it is just as important. Projects like Clim'adapt give substance to the issue of the adaptation to global warming by regions and infrastructures."*

## CALL FOR SCIENTIFIC RESOURCING PROJECTS 2021: 3 WINNERS SELECTED BY THE SDC

Scientific resourcing is one of the three uses of the funding received by Institut Carnot Clim'adapt, the two others are professional development, and integration in the Carnot system.

This resourcing is intended to **maintain the establishment's scientific excellence, accredited by the Carnot certification, and anticipate the demands of markets and industry.** Scientific resourcing actions may concern pre-competitive research, often incremental. They may also be carried out on issues that arise very early on, leading to a possible scientific or technological breakthrough and a longer horizon, but always with an application potential that is economically viable.

In 2020, Institut Carnot Clim'adapt issued an internal call for scientific resourcing projects.

The goal was to allow the winners to finance projects. Candidate projects were notably expected to:

- assist socio-economic players in adapting regions to the effects of climate change, or helping to mitigate the causes;
- contribute to the economic, social and ecological development of region;
- help make Cerema a key R&D player for companies within its fields of expertise.

### 13 PROJECTS RECEIVED IN RESPONSE TO THE CALL

13 projects were received; those members of the SDC who do not work for Cerema were asked to assess them according to a multi-criteria schedule: clarity and appropriateness of the project in relation to the call and the economic and social stakes, scientific quality (context, objectives, etc.), innovative nature, risk, strategy, implementation, etc.

## 3 PROJECTS SELECTED

The share of the funding received by Institut Carnot Clim'adapt and allocated to scientific resourcing served to select and financially support the following three projects:



### JeunEpi

Overview: Physical and digital modeling of the shallow-water swell and its impact on protective structures



### EcoNav

Overview: Optimised river traffic management intended to simultaneously reduce fuel consumption, the volume of water used at locks, and the time spent waiting at these locks



### MACH+

Overview: New remediation solution based on intelligent, ecological rehydration – by rainwater – of the foundations of homes exposed to the effects of drought and clay shrinkage and swelling

# COMMITMENT FOR COMPANIES

With its Institut Carnot Clim'adapt certification, Cerema delivers services for private companies to the value of €12 million, or one third of the establishment's own revenues (source: [Cerema's 2021-2023 strategic project](#)).

Within its six fields of activity, it represents a national, unbiased guarantor via its work for supporting regulations and standardisations, making recommendations, proposing good practices and, where applicable, labelling and certification.

Cerema also acts as a complementary partner to private companies to better meet often complex local, national and international needs. Its expertise is sought within consortia in response to calls for projects and tenders, particular in terms of innovation, given the establishment's specific know-how. Cerema also increasingly supports French companies overseas with a view to promoting and disseminating French expertise.

Via Institut Carnot Clim'adapt, Cerema consolidates its partnership research activities geared towards the socio-economic world. Clim'adapt effectively transmits Cerema's research and innovation to companies of all sizes – startups, SMEs, large corporations, and construction industry majors who are the establishment's historic partners.

**Industrial players turn to Cerema from different perspectives.** In fact, with its impact on the climate and, more generally, the environment, industry acts on two levels:

- the production process is often a large consumer of non-renewable resources, while emitting greenhouse gases and other effluents;
- the products manufactured, once implemented, can play a positive role in terms of attenuation and adaptation; accordingly, industrial investments increasingly favour these products.

Thanks to Cerema's diverse expertise and the regional coverage of its sites, it can interact with industrial companies on both levels: reducing the former, and increasing the latter.

Moreover, like any other human activity, industrial activity may also be under threat from climate change. Here too, Cerema's expertise proves to be precious.

Cerema generates around **€33m** a year in own revenues, **€5m** of which are contractual revenues eligible for Carnot funding.



## CEREMALAB, A FACILITY DEDICATED TO INNOVATIVE SMEs AND STARTUPS

In conjunction with Institut Carnot Clim'adapt, in October 2020 Cerema launched the CeremaLab, a facility specifically intended to help innovative SMEs and startups push forward their projects and increase their impact on regions.



Through this lab, Cerema undertakes to offer its expertise, R&D, technological platforms and testing capacities to regional projects.

The goal is to provide them with concrete support so that they can enhance, validate or accelerate the development of products and services consistent with Cerema's fields of activity, with a view to improving and controlling R&D costs in line with the constraints faced by developing companies.

**CeremaLab fits in with the objective of Institut Carnot Clim'adapt to step up interactions for bilateral partnership research with small companies.**



### SOME KEY EVENTS IN 2020-2021

- **OCTOBER 2020: official launch of the CeremaLab facility by Pascal Berteaud, Director General of Cerema, at the Meet'Up Greentech 2020 event.** Right from the onset, CeremaLab joined the Greentech Innovation network of incubators, overseen by the French Ministry of Ecological Transition.
- **JANUARY 2021: CeremaLab enters into its first contract with startup Altaroad**, a company that offers IoT solutions to "make the road smart", thanks to sensors and traffic analysis algorithms. CeremaLab's added value is embodied both in its technical metrology service and its ability to support a technological startup in the instrumentation of a traffic route.
- **MARCH-JUNE 2021: CeremaLab's first call for projects on the subject of the resilience of regions and their infrastructures.** Out of 118 applications received from startups and SMEs, 12 finalists were short-listed to pitch before the jury, which went on to designate **5 winners: Cool Roof, Cuirassier, TechnoCarbon, Vialytics et vorteX.io.**



Non-winning finalists that develop projects considered particularly promising join the newly created CeremaLab ecosystem.

# INSTITUT CARNOT CLIM'ADAPT, MEMBER OF THE CARNOT NETWORK

## THE CARNOT CERTIFICATION LABEL

Carnot institutes are public research structures, certified by the French ministry in charge of research, and committed to **developing and conducting their partnership research activity in favour of the innovation of companies – from SMEs to major groups** – and socio-economic players. The Carnot system is overseen by the French National Research Agency.



The 35,000 research professionals working for Carnot institutes, i.e. **20% of the human resources in French public research**, carry out **55% of the R&D contracts outsourced by companies** to public research.

The Carnot institutes provide a broad range of skills in response to the R&I needs of companies in most business sectors. In order to draw on their complementarities and leverage synergies for the benefit of their economic partners, they are organised as an **operational network spearheaded by AiCarnot** (Association of Carnot institutes). By keeping in permanent contact with companies, they can understand and **anticipate R&I responses for the various sectors** via pro-active scientific resourcing focused on the need.

The Carnot institutes adopt an **approach to continuously improve the professionalism of their partnership relations**. This approach extends from the first contact to the negotiation and set-up of the project, the supply of deliverables and the gathering of feedback.



## KEY FIGURES

**39** Carnot institutes covering all sectors of economic activity

Target for R&D sales of **€1 billion** with companies in 2030

A label that spans **15** years



## DID YOU KNOW?

Called on to improve steam engines (*Reflections on the motive power of heat and on machines fitted to develop that power*), **Nicolas Léonard Sadi Carnot** (1796-1832) established the second law of thermodynamics which governs the operation of the machines we use on a daily basis (combustion engines in cars, refrigerators, heat pumps, etc.).



## THE CARNOT CHARTER

The Carnot Charter sets out all of the values shared by Carnot institutes for quality partnership research. **Each Carnot institute undertakes to adhere to the terms of this charter:**

- **continuous improvement approach** to carry out research projects with the level of professionalism that meets the expectations of companies and socio-economic partners;
- **definition of a clear research strategy** that integrates the expectations of socio-economic players and the potential technological advances;
- **strong governance** for the benefit of the partnership activity;
- **systematic response to partner requests**, by guiding them, if necessary, towards another research structure;
- **respect for the Charter of good practices in terms of intellectual property** and transfer of the knowledge and technologies of Carnot institutes;
- **promotion of the Carnot label**, synonymous with quality, professionalism, openness and consideration of the expectations of socio-economic partners;
- **network functioning** to propose an integrated, multidisciplinary offer;
- integration, in the assessment of researchers and laboratories, of their **involvement in partnership research projects** for the benefit of the socio-economic world;
- development of **strong and lasting relations with academic research**, conducive to the renewal of scientific and technological skills;
- development of **its international openness** with a view to extending and consolidating its scientific base.



**Alain Duprey**

Director General of AiCarnot

*"For the past 15 years, the Carnot institutes have become all-important players for public-private collaboration and the transfer of science and technology for the innovation of companies. Their outstanding results and their unfailing commitment to support French industrialists place them at the forefront of the industrial recovery."*

## 15 YEARS OF R&D FOR THE INNOVATION OF COMPANIES

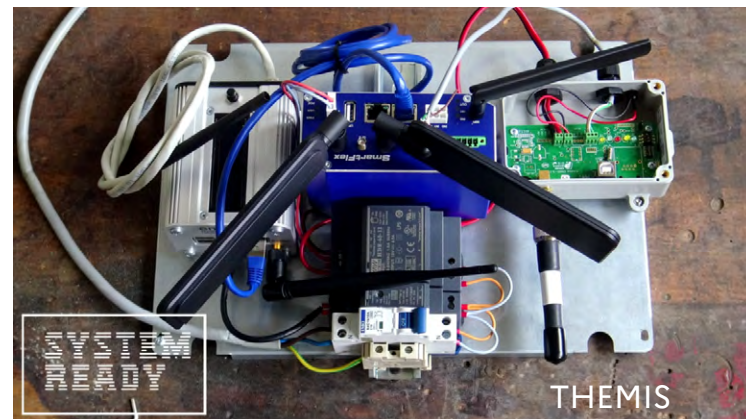
**Facilitating access to R&D for all companies so that they can stay competitive in an increasingly fast-changing world: herein lies the essence of Carnot's mission, undertaken since 2006.**



The network of Carnot institutes has racked up 15 years of research to promote the innovation of companies and the competitiveness of the French economy.

Today, this network accounts for 55% of the Research & Development outsourced by companies to public research, i.e. more than 10,200 R&D contracts a year. These partnerships have prompted major innovations for the benefit of companies of all sizes and operating in very diverse sectors.

The Carnot network celebrated this 15<sup>th</sup> anniversary with the online release, during Les Rendez-vous Carnot 2020, of a virtual showroom of 28 demonstrators... including THEMIS, "the genesis of a Building Operating System" (BOS), for Institut Carnot Clim'adapt!





# CEREMA'S SCIENTIFIC EXCELLENCE FOR THE BENEFIT OF THE FRENCH ECONOMY AND ITS ADAPTATION TO THE EFFECTS OF CLIMATE CHANGE

BILATERAL CONTRACT RESEARCH FOR:



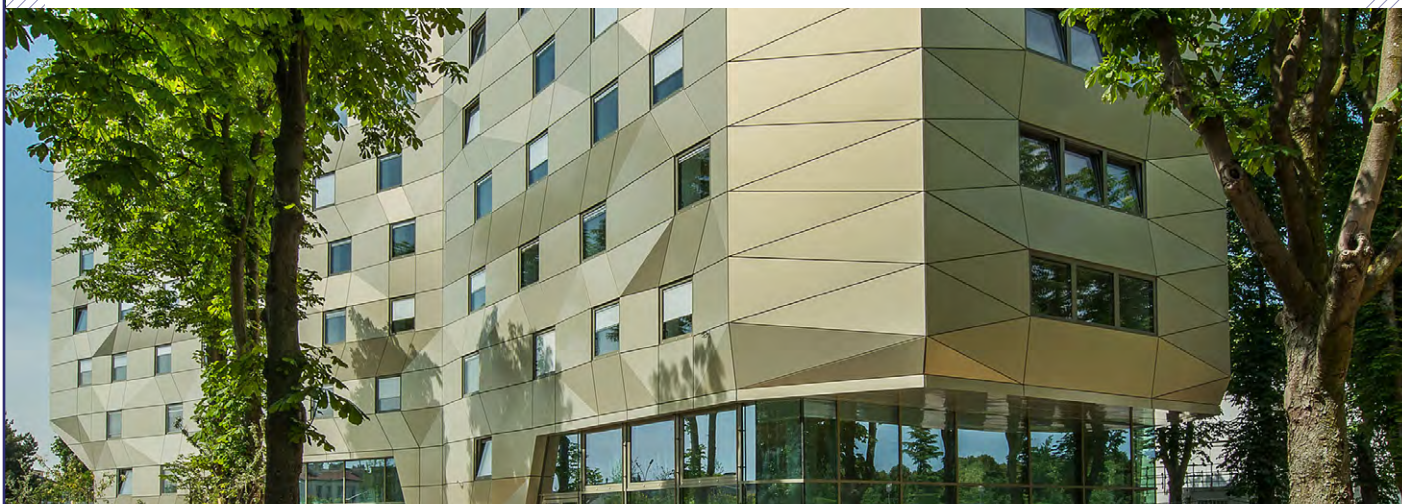
**LOCAL AUTHORITIES**

From municipalities to regions



**BUSINESSES**

From startups to multinationals



## CLIMATE CHANGE: ADAPTATION TO ITS EFFECTS, ATTENUATING ITS CAUSES

Circular economy

TRANSITION

Sobriety

FULL-SCALE TESTING

NATURE IN CITIES

Acceptability

Biodiversity

Building, neighbourhood, town and networks

Performance and durability

Natural hazards

Urban hydrology

Prototype

RESILIENCE

FOLLOW US!



@CarnotClimAdapt



@Clim'adapt

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**Do you have any questions or needs? Would you like to work with us?**  
By all means share your scientific challenges with us – we will be delighted to examine them with you.

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