30

In France, gross domestic expenditure on research and development (GERD) in biotechnology stood at €2.3bn in 2008. This activity is conducted primarily in companies of fewer than 50 employees. Pharmacy is the research sector that attracts more than 80% of R&D expenditure in biotechnology.

In 2008, in France, 1,100 firms reported conducting at least part of their research and development in biotechnology (*Table 01*). These companies employ over 210,000 people and spend €2.3bn on research. In general, they were smaller than most companies engaged in R&D activities (200 employees compared to 260) and dedicated nearly 72% of their R&D expenditure to biotechnology. Companies specialising in biotechnology devote almost all of their expenses (99%) to biotechnology.

En 2008, expenditure on biotechnology constituted about 9% of business expenditure on research and development (*Graph 02*). The proportion of biotechnology R&D remained stable from 2006 after nearly doubling over the period 2000-2006, rising from 5% to 9%.
The share of firms investing in biotechnology among all firms conducting R&D was 9% in 2008. Since 2000, this share has changed little and remains around 10%.

In 2008, the pharmaceutical industry attracted 81% of R&D in biotechnology although it represents only 23% of companies conducting R&D in biotechnology (*Graph 03*). Conversely, professional, scientific and technical activities, which attract more companies active in biotechnology (27%), represent only 5% of biotechnology R&D.
The two sectors that relate to the agri-food sector (agriculture, forestry, fishing and manufacturing of food, beverages and tobacco products) account for 16% of companies active in biotechnology, but only 6% of expenditure. As for the chemical industry, it comprises 12% of companies active in biotechnology and 4% of biotechnology R&D.

In France, biotechnology research is conducted mainly in small companies. In 2008, 61% of specialist biotech companies and 53% of companies active in biotechnology employed fewer than 20 employees (*Graph 04*). By comparison, the share of firms with fewer than 20 employees among companies conducting R&D is around 42%.
In companies with fewer than 50 employees, the differences are quite pronounced. Thus, 79% of specialist biotech companies employ fewer than 50 employees as against 61% for all firms conducting R&D. For companies active in biotechnology, this proportion rises to 72%.
The intensity of R&D is therefore significantly higher in companies active in biotechnology: €36,000 per employee against €20,000 for all companies in R&D.

National data are drawn from the survey on resources devoted to R&D in companies enterprises, conducted annually among 11,000 businesses. Since 2000, the survey has asked companies about the share (%) of domestic expenditure in R&D devoted to biotechnology.
*The **research sector** is the sector of economic activity benefiting from R&D and is organised here into 32 categories based on the NAF – the revised French classification of economic activities).*
*The **"Professional, scientific and technical services"** research sector consists primarily of research and development and engineering services.*
*According to the OECD definition, **biotechnology** is "the application of science and technology to living organisms as well as parts, products and models thereof, in order to alter living or non-living materials for the production of knowledge, goods and services".*

***Specialist Biotech companies** are companies that spend more than 75% of their R&D on biotechnology research.*
***Companies active in biotechnology** are companies dedicating a significant part of their R&D expenditure to biotechnological research.*

***Gross domestic expenditure on research and development** (GERD) refers to R&D conducted on national territory (home, overseas departments and overseas communities) irrespective of the funding source.*

Source: MESR-DGESIP/DGRI-SIES
Scope: All of France.

01 Characteristics of biotechnology R&D activity in companies

All of France

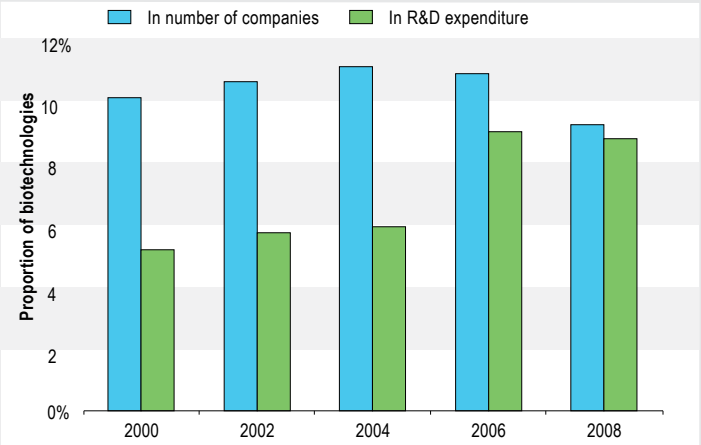
Year 2008	Companies with an in-house R&D activity: Total companies	Companies conducting R&D - or active - in biotechnology *	Companies specialising in biotechnology **
Number of companies	**11,575**	**1,067**	**676**
Total			
Total	3,200,733	401,460	46,303
Average (per company)	277	376	69
GERD			
Total (in €k)	25,768,414	3,812,447	2,018,517
Average (per company in €k	2 226	3,572	2,987
Average R&D intensity** (in €k)	20	36	41
GERD dedicated to biotechnologies			
Total (in €k)	2,256,316	2,256,316	2,010,236
Average (per company in €k	195	2,114	2,975
Proportion of individual GERD dedicated to biotechnologies (%)	7%	72%	99%

* Companies dedicating more than 0% of their GERD to biotechnologies.
** Companies dedicating more than 75% of their GERD to biotechnologies.
(1) Ratio average (GERD/numbers).
(2) Ratio average (GERD in biotechnologies/total GERD).

Source: MESR-DGESIP/DGRI-SIES.

02 Trends in share of biotechnologies in R&D activities

All of France

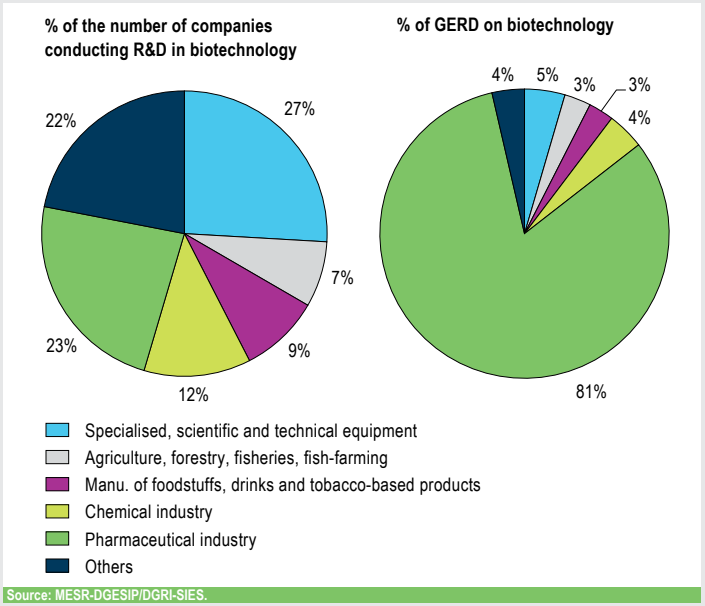


Interpretation: in 2008, companies performing biotechnology research represented 9% of all companies performing R&D. Their internal R&D expenditure on biotechnology represents 9% of company GERD

Source: MESR-DGESIP/DGRI-SIES.

03 Breakdown by research sector benefitting from business-funded biotechnology R&D in 2008

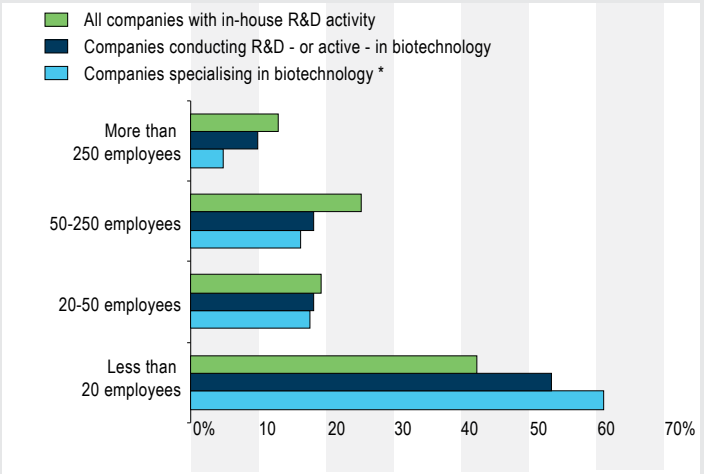
All of France



Source: MESR-DGESIP/DGRI-SIES.

04 Distribution of companies per number of employees in 2008

All of France



* Companies dedicating more than 75% of their GERD to biotechnologies.

Source: MESR-DGESIP/DGRI-SIES.

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In 2008, over half of businesses with an internal R&D activity devoted some of their research spending to software, new materials or nanotechnology The three fields do not receive equal investment from all research sectors.

In 2008, in France, over half of businesses with an internal R&D activity devoted some of their research spending to software, new materials or nanotechnology (*Table 01*). These companies employ over 2.1 million employees. Companies active in at least one of these three areas of research have more employees on average (350 employees) than all companies with an R&D activity (290 employees).

Software development accounts for €4bn and is the primary field in terms of R&D expenditure. New materials represent an R&D expenditure of €1.6bn against just over €0.5bn euros for nanotechnologies. Nanotechnology research still concerns relatively few companies: in 2008, slightly over 3% of firms carrying out R&D on the French territory were active in this field. In companies specialising in the field of nanotechnology, this proportion is less than 1%. In contrast, software development mobilises a large number of companies: 37% of enterprises with internal R&D activity invested in this area in 2008. Research into new materials involves one company in five.

Software development research is carried out in small firms (*Graph 02*). In 2008, 54% of companies in software development employed fewer than 20 employees as against 44% for companies active in nanotechnology and 28% for those who are active in new materials. Regarding the proportion of businesses with fewer than 50 employees, the differences are equally clear: nearly three-quarters of firms active in software development have fewer than 50 employees while this proportion drops to 59% for companies active in nanotechnology and 47% for those who are active in new materials.

The three fields do not receive equal investment from all research sectors. In 2008, nanotechnology research mainly focused on research into "components, circuit boards, computers and peripheral equipment. At €0.4bn, the industry attracts 68% of the amount invested in nanotechnology (*Graph 03*). Software development and the field of new materials are much less specialised. For the former, the first four sectors comprised 57% of R&D in this field. The order descends as follows: "computer operations and information services" (€0.8bn), "publishing, broadcasting and distribution" and "manufacturing of communications equipment", each accounting for €0.5 billion, and finally "manufacture of instruments and measuring devices" (€0.4bn). As for the second, the first four research branches engaged in R&D in this area represent 45% of expenditure across all sectors.

*The **research sector** is the sector of economic activity recipient of R&D, described here in 32 posts based on the revised classification of French activities in 2 (Rev.2 NAF).*
*In this revised classification of French activities, **computer services** are divided into two parts: the first concerns computer operations and information services and the other refers to components, circuit boards, computers and peripheral equipment.*

*A **research area** is a cross-cutting research activity which can be conducted across several research sectors. When a company invests in R&D, the investments it makes may incorporate several areas of research. In this case, investments are counted in each research area concerned.*

***Software Development:** mainly refers to computer simulations for research.*

***New materials:** new materials for the market or for the company.*

***Nanotechnologies:** all technologies for manipulating, studying or using very small structures and systems (less than 100 nanometers).*

***Gross domestic expenditure on research and development (GERD)** refers to R&D performed on national territory (home, overseas departments and overseas communities) whatever the source of funds.*

Source: MESR-DGESIP/DGRI-SIES.
Scope: All of France.

01 Characteristics of company R&D activity in three research areas in 2008

All of France

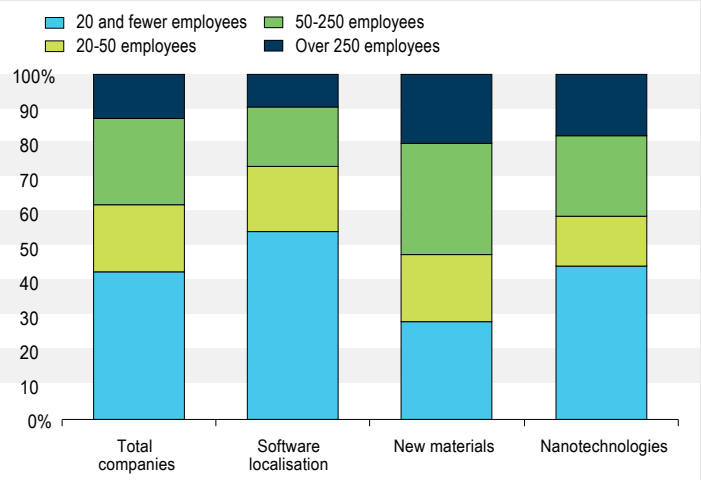
	Companies with an in-house R&D activity in:							
		• Software localisation		• New materials		• Nanotechnologies		Companies active * in one of the three areas
	Total companies	Active companies *	Specialist companies **	Active companies *	Specialist companies **	Active companies *	Specialist companies **	
Number of companies	**11,575**	**4,289**	**2,625**	**2,318**	**980**	**382**	**65**	**6,120**
Workforce at 31/12/2008								
Total	3,200,733	1,579,527	194,539	1,301,755	165,084	109,436	5,459	2,148,608
Average (per company)	277	368	74	562	168	286	85	351
GERD								
Total (in €k)	25,768,414	9,490,830	2,699,990	7,012,781	780,587	2,526,482	212,983	13,390,992
Average (per company)	2,226	2,213	1,029	3,025	797	6,609	3,300	2,188
GERD devoted to R&D								
Total (in €k)	6,190,587	4,039,501	2,648,862	1,606,744	747,725	544,342	199,887	***
Average (per company)	535	942	1,009	693	763	1,424	3,097	***

* Companies active in a research area refers to those who devote more than 0% of their GERD to this research.
** Companies specialising in a research area refers to those who devote more than 75% of their GERD to this research.
*** R&D investments can apply to several fields. The expenditure associated with these three areas is not equal to the sum of GERD devoted to each area.

Source: MESR-DGESIP/DGRI-SIES.

02 Breakdown of companies active* in a research field by workforce numbers in 2008

All of France

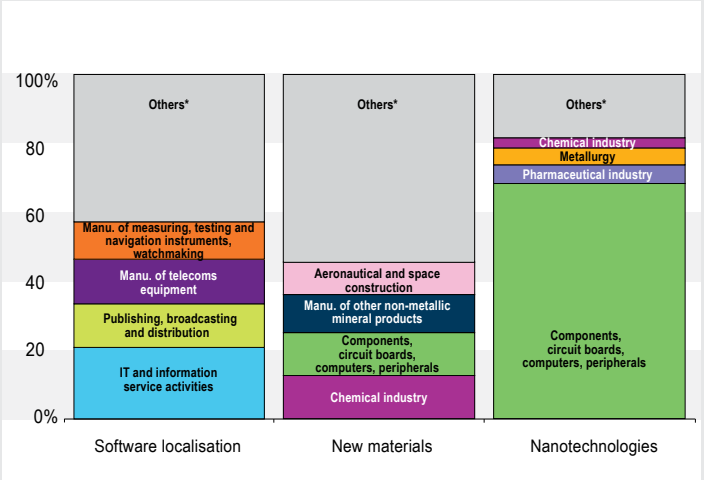


* Companies active in a research area are those who devote more than 0% of their GERD to this research.
Interpretation: 55% of companies active in software development employ fewer than 20 employees.

Source: MESR-DGESIP/DGRI-SIES.

03 R&D expenses of companies in the three areas divided into research sectors in 2008

All of France



* Others: expenditure is detailed according to a classification dividing the sector into 32 branches. The first four branches in terms of R&D expenditure are represented for each of the fields.
Interpretation: In 2008, 20% of the investments carried out in software development are conducted in the research area of computer operations and information services.

Source: MESR-DGESIP/DGRI-SIES.

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In 2008, environment-related R & D expenditure can be valued at €4.1bn. One tenth of R & D conducted in the country is therefore, directly or indirectly, devoted to issues related to the environment.
Until the early 2000s, it was the government that carried the bulk of the expense. In 2008, contributions from companies reached 40%.

Environment-related R&D lies at the crossroads of multiple domains from a cross-cutting perspective, as a large number of actions can have a positive effect on the environment without defining the protection of the environment as a primary objective. It therefore also encompasses research on natural resource management, rational use of energy, renewable materials, biodiversity etc. On a more general level, the environment concerns virtually all research areas.
However, the European system of measuring environmental R & D, used for international comparisons, refers to a reduced number of activities. The data presented here are therefore not comparable to those obtained following the European methodology for detailing environmental spending.
In France, companies report the share of their business devoted to environmental protection. Their assessment of the environmental component in their R & D activity can be subjective and cover areas larger than those generally identified under environmental expenditure.
For the public sector, evaluation of expenditure includes three areas of research on specific targets (see *descriptive* table in appendix on page 84).
In 2008, environment-related public and private sector R&D can be valued at €4.1bn.

Research spending on the environment has long depended mainly on public administration. Its share of expenditure peaked in 2000 at over 81%. The gap between private and public has gradually diminished, and since 2004, companies have accounted for nearly 40% of expenditure (*Graph 01*).

In the business sector, at €1.6bn, the environment represented 6.4% of total GERD in 2008. Five research areas account for 72% of environment-related R&D expenditure while they contribute to 35% of Business-funded GERD. The primary research sector, the automotive industry, ranked first in volume of environment-related R&D with €793m and 2nd in the share of business-funded GERD devoted to the environment (18%) after the "energy" sector (22%) (*Graph 02*). Companies active in the "management of water and waste" and "production and distribution of gas and electricity" dedicated €90m and €64m to the environment, 83% and 23% respectively of their research expenditure.

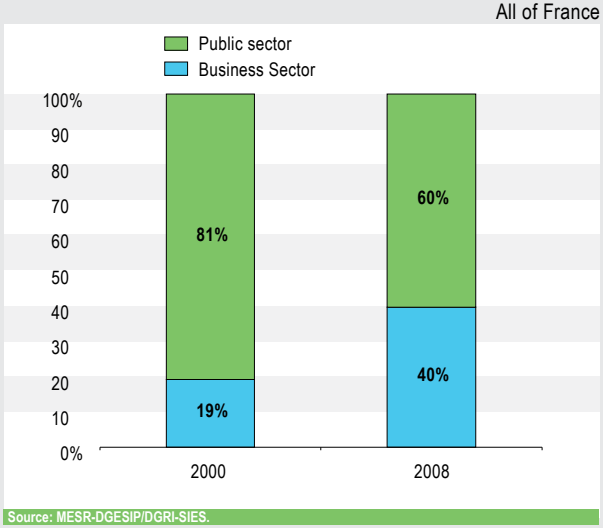
In 2008, the government spent €2.5bn on R & D environment. The environment absorbs 43% of this expenditure (€1bn) with first place going to academic research into the natural environment. The "energy" (€929 million) and "transport equipment industries" (€480 million) goals arise primarily from organisations like EPIC and EPST *(Graph 03)*.

17% of MIRES research budget credits were devoted to the environment in 2010. The share of budget allocations for the different "environment" goals is €2.6 billion *(Graph 04)*.

Company sector: *data resulting from the annual survey of companies conducting R & D on national territory.*
Public Sector: *data drawn from the survey on the distribution of socio-economic objectives of the budget for research and the MIRES survey results on R&D expenditurs and public sector resources.*
European methodology *excludes for example: water management, R&D in the fields of energy, the fight against climate change.*
Socio-economic goals *refer to R&D purposes and measures the total effort committed to specific goals in public research. They are grouped in a classification which allows for international comparisons.*
Taking account of the cross-cutting nature *of the environment operates differently within the business and public sector:*
- Companies: the survey asks companies about their share (%) of domestic R&D expenditure devoted to protecting the environment.
- Public sector: the survey on the breakdown of the budget by socio-economic goals forecasting a level of commitment enables the establishment of a utilisation percentage of credits devoted to the environment. This percentage is applied to the amount of GERD following the R&D annual survey.

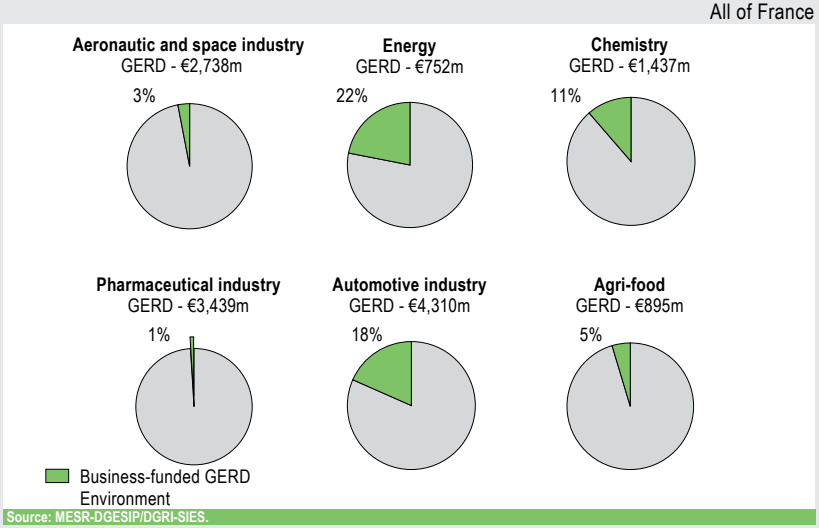
Source: MESR-DGESIP/DGRI-SIES.
Scope: All of France.

01 GERD devoted to the environment in 2000 and 2008 (%)



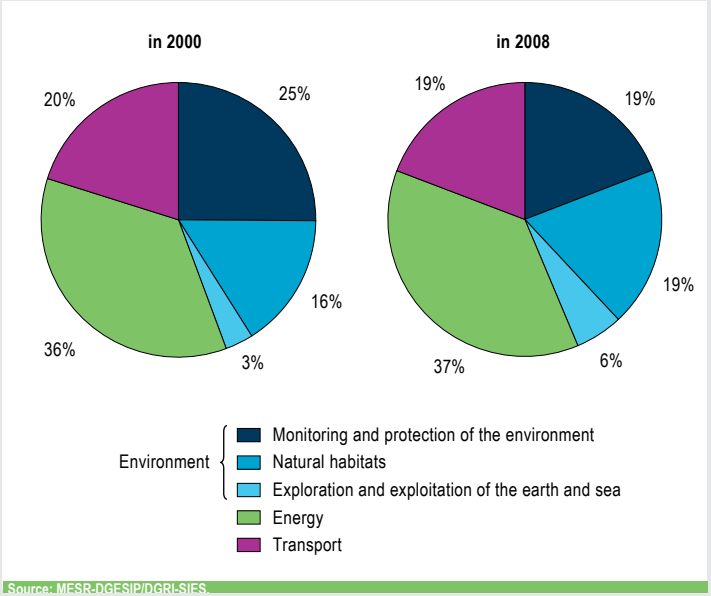
Source: MESR-DGESIP/DGRI-SIES.

02 Share of GERD devoted to environment in 6 areas of research in 2008



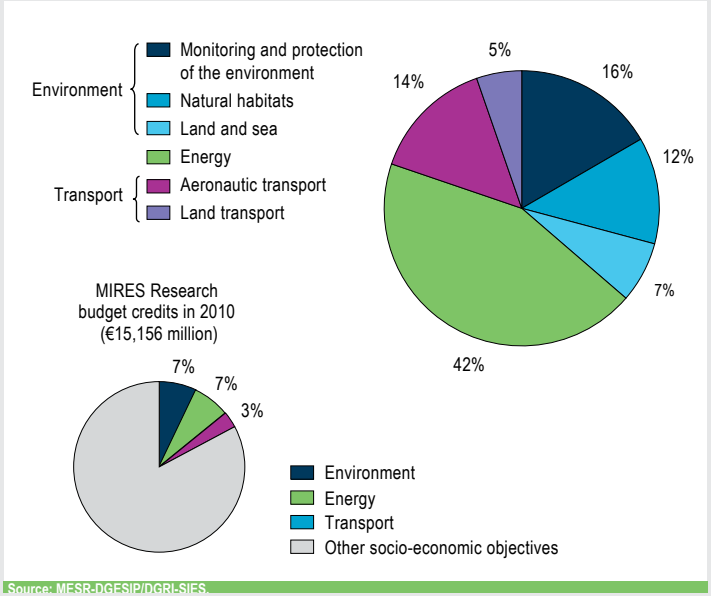
Source: MESR-DGESIP/DGRI-SIES.

03 Share of environmental R&D fields in the public sector (%)



Source: MESR-DGESIP/DGRI-SIES.

04 Budget credits 2010 - Breakdown by socio-economic objectives for environmental R&D (%)



Source: MESR-DGESIP/DGRI-SIES.