

# BioPolis - Inventory and analysis of national public policies that stimulate research in biotechnology, its exploitation and commercialisation by industry in Europe in the period 2002–2005

National Report of Belgium

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## Table of contents

|  |           |
|--|-----------|
| <b>Summary</b> .....   | <b>4</b>  |
| <b>1. Introduction and background</b> .....  | <b>10</b> |
| 1.1 General introduction to Belgium .....  | 10        |
| 1.2 Characteristics of the national science, technology and innovation system .....                  | 12        |
| 1.2.1 Federal government .....   | 12        |
| 1.2.2 Flanders .....   | 15        |
| 1.2.3 Walloon Region and the French Community .....  | 20        |
| 1.2.4 The Brussels Capital Region.....   | 24        |
| 1.3 National support and framework conditions for biotechnology .....                                | 27        |
| 1.3.1 Support for biotechnology at the federal level.....  | 27        |
| 1.3.2 Support for biotechnology in Flanders .....  | 28        |
| 1.3.3 Support for biotechnology in Wallonia.....   | 29        |
| 1.3.4 Support for biotechnology in the Brussels Capital Region.....                                  | 31        |
| 1.4 Framework conditions .....   | 32        |
| 1.5 General introduction to main biotech research actors.....  | 34        |
| 1.5.1 Main biotech research actors at the federal level.....   | 34        |
| 1.5.2 Main biotech research actors in Flanders.....  | 35        |
| 1.5.3 Main biotech research actors in Wallonia.....  | 36        |
| 1.5.4 Main biotech research actors in the Brussels Capital Region.....                               | 37        |
| <b>2. Funding of biotechnology R&amp;D, transfer and commercialisation</b> .....                     | <b>39</b> |
| 2.1 Introduction.....  | 39        |
| 2.2 Non-policy-directed funding of biotechnology research .....                                      | 40        |
| 2.2.1 Federal government .....   | 40        |
| 2.2.2 Flanders .....   | 42        |
| 2.2.3 Wallonia .....   | 46        |
| 2.2.4 The Brussels Capital Region.....   | 49        |
| 2.3 Policy-directed funding of biotechnology research and commercialisation.....                     | 50        |
| 2.3.1 The federal level .....  | 50        |
| 2.3.2 Flanders .....   | 50        |
| 2.3.3 Wallonia .....   | 52        |
| 2.3.4 The Brussels Capital Region.....   | 62        |
| 2.4 Charities .....  | 66        |
| 2.5 Participation in the 6th Framework Programme and the use of development funds                    | 66        |
| <b>3. Performance of the national biotechnology innovation system</b> .....                          | <b>68</b> |
| 3.1 Performance in creating a knowledge base and supporting the availability of human resources..... | 68        |
| 3.2 Performance in knowledge transmission and application.....                                       | 71        |
| 3.3 Industrial development.....  | 72        |
| 3.4 Market conditions .....  | 73        |

|                |   |            |
|----------------|---|------------|
| <b>4.</b>      | <b>Conclusions</b> .....  | <b>75</b>  |
| 4.1            | Introduction.....   | 75         |
| 4.2            | Public funding of biotechnology through policy instruments.....     | 75         |
| 4.2.1          | Belgium.....  | 75         |
| 4.2.2          | Federal government .....  | 77         |
| 4.2.3          | Flanders.....   | 78         |
| 4.2.4          | Wallonia.....   | 80         |
| 4.2.5          | Brussels Capital Region.....  | 84         |
| 4.3            | Specific features of the instruments.....                           | 86         |
| 4.3.1          | Federal government .....  | 86         |
| 4.3.2          | Flanders.....   | 86         |
| 4.3.3          | Wallonia.....   | 87         |
|                | Brussels Capital Region.....  | 89         |
| 4.4            | Policy goals.....   | 91         |
| 4.4.1          | Federal government .....  | 91         |
| 4.4.2          | Flanders.....   | 91         |
| 4.4.3          | Wallonia.....   | 93         |
| 4.4.4          | Brussels Capital Region.....  | 96         |
| 4.5            | Biotech application areas .....                                     | 98         |
| 4.5.1          | Federal government .....  | 99         |
| 4.5.2          | Flanders.....   | 99         |
| 4.5.3          | Wallonia.....   | 99         |
| 4.5.4          | Brussels Capital Region.....  | 102        |
| 4.6            | Stimulation of biotech activities through the instruments .....     | 104        |
| 4.6.1          | Federal government .....  | 104        |
| 4.6.2          | Flanders.....   | 104        |
| 4.6.3          | Wallonia.....   | 105        |
| 4.6.4          | Brussels Capital Region.....  | 108        |
| 4.7            | Dynamics: comparison with 1994-1998 .....                           | 110        |
| <b>5.</b>      | <b>Future developments</b> .....                                    | <b>114</b> |
| 5.1            | Federal government .....  | 114        |
| 5.2            | Flemish Government.....   | 114        |
| 5.3            | Walloon government and the government of the French Community ..... | 115        |
| 5.4            | Government of the Brussels Capital Region.....                      | 115        |
| <b>Annex 1</b> | <b>List of tables</b> .....   | <b>116</b> |
| <b>Annex 2</b> | <b>List of charts</b> .....   | <b>119</b> |
| <b>Annex 3</b> | <b>List of contact persons</b> .....                                | <b>120</b> |
| <b>Annex 4</b> | <b>References</b> .....   | <b>122</b> |
| <b>Annex 5</b> | <b>Performance</b> .....  | <b>127</b> |
| <b>Annex 6</b> | <b>Abbreviations</b> .....  | <b>137</b> |

## Summary

Belgium has a relatively small, but very open economy. It has a high standard of living with an almost 20% higher GDP per capita than the EU25 average. Belgium is highly dependent on trade, and the services sector is the main contributor (almost 50%) to the Gross Value Added. Since the 1990s, Belgium has increased its investments in R&D. In 1994, Belgium had a gross expenditure on R&D (GERD) of 1.69% of GDP, and in 2003 Belgium reached its highest investment in R&D with a GERD of 2.33% of GDP. The business sector finances almost two-thirds of the total R&D investments, and the main branches investing in R&D are electronics, chemicals, and drugs and medicines. An important characteristic of the private R&D investments is that a dozen large firms account for 66% of the investments and 70% of the business R&D expenditure is controlled by subsidiaries of foreign firms.

With approximately 140 companies active in biotechnology in 2002, Belgium holds a middle position in the EU ranking. The number of companies has increased significantly since the mid-1990s (Carrez, 2004). Approximately 70 to 100 companies of the 140 are dedicated biotechnology companies; most of them are small- and medium-sized enterprises (SMEs) and a few are large firms (Carrez, 2004; BioPolis). Almost half of the Belgian biotechnology companies are active in health-care applications, while 20% work in the agro-food sector, 20% provide services and tools and 10% are active in the industrial biotechnology sector (Carrez, 2004).

Belgium is a federal state, consisting of three communities (Flemish-, French- and German-speaking) and three regions (Flemish, Walloon and Brussels-Capital). The communities correspond to population groups and are responsible for issues such as language, culture and education. The communities are also responsible for education and fundamental research at universities and applied research at higher education institutes. The regions correspond to a territorial concept and are responsible for issues such as innovation, economic development, spatial planning, technological development, environment and agriculture. The regions are also responsible for applied and industrial research, technology development and the promotion of innovation. The federal government is responsible for issues of national importance, such as defence, fiscal policy, social security and justice. The federal government funds almost 30% of public R&D investments, while Flanders covers 48%, Wallonia 21% and the Brussels Capital Region 1%.

The main objectives and aims of the federal government are to reach the 3% GERD/GDP ratio by 2010, to stimulate innovation and business creation, as well as simplify administration and introduce tax measures that stimulate R&D and innovation. The federal government is not allowed to set any priorities for fields of research and innovation, but biotechnology research receives support in the form of finance for federal scientific research institutes, and benefits from a centralised collection of micro-organisms and inter-university research groups in the fields of life sciences, exact and applied sciences and human sciences. Another initiative is the establishment of an interdisciplinary platform for industrial biotechnology. This does not include funding for

research projects but brings together actors and disciplines in the field of industrial biotechnology in order to stimulate the adoption of industrial biotechnology.

The general science, technology and innovation policy of the Flemish government aims to strengthen fundamental research and industry-oriented basic research, and simultaneously stimulate technological innovation in Flemish enterprises. The set of policy instruments available follows these objectives and includes instruments that support excellent scientific research and support valorisation, business R&D investments and commercialisation, as well as a combination of these. Since the beginning of this century, the Flemish government has been focusing on creating a horizontal innovation policy, without setting any priorities for research fields. This is a different approach than in the 1990s, when biotechnology was considered one of the main priorities. A direct result of this approach in the mid-1990s was the establishment of the Flanders Interuniversity Institute for Biotechnology (VIB). This virtual research institute unites several research groups from Flemish universities, and its primary objective is to conduct world-class basic biotechnology research, while its secondary objective is to valorise the research and transfer it to industry through patenting, licensing and the creation of new enterprises. The main biotechnology-specific policy instrument is responsible for the establishment and support of VIB. Because the Flemish government has chosen to create a horizontal innovation policy, only a limited number of instruments are considered in this study. However, this does not mean that biotechnology R&D is only marginally funded in Flanders; the many generic instruments available are an important means of financing biotechnology R&D. Despite this focus on a horizontal approach, the minister responsible for these matters has recently initiated a life sciences platform, bringing the different actors together in order to develop a long-term strategic vision for the life sciences industry in Flanders.

Contrary to the Flemish approach, the Walloon government considers biotechnology to be one of the four important domains for the development of the Walloon economy. This approach is part of a major initiative to stimulate the Walloon economy. Both the Contract for the Future of Wallonia and the Marshall Plan for Wallonia acknowledge science, technology and innovation as fundamental economic drivers and aim to increase investments in excellent research and research collaborations, as well as stimulate innovation in enterprises and in the creation of new businesses. There are a few initiatives dedicated to biotechnology, such as the establishment of centres of excellence funded by EU Structural Funds (Biovallée and GIGA) and the mobilising programmes Waléo 1 and 2. However, the Walloon government has implemented many generic instruments – for universities and public research organisations, as well as industry – through which biotechnology R&D is also funded. Because biotechnology is a priority, these generic instruments are also included in this study. Unfortunately, it proved a highly difficult task to collect information on the extent to which biotechnology is funded by these instruments. The government of the French Community aims to stimulate excellent research at universities and higher education institutes and does not select specific technology or research fields. It provides basic funding to universities, as well as funding through response mode systems. This non-policy-directed funding is included in this

report, although it proved very difficult to define the budgets allocated to biotechnology research.

The Brussels Capital Region has not developed or adopted an explicit innovation policy. Science, technology and innovation are part of the policy framework for regional economy and employment. The government of the Brussels Capital Region funds both scientific research (which also receives funding from the French-speaking and Dutch-speaking communities, who provide basic finance to the universities) and industrial applied research. In addition, the Contract for the Economy and Employment includes several measures aimed at improving the operating environment for enterprises and providing them with services in order to stimulate innovation. An important characteristic of the policy for research and development is the concentration of the means available in three domains, including life sciences. Nevertheless, biotechnology is mainly supported through generic instruments, including support for applied research and development projects in enterprises, as well as support for strategic and fundamental research at universities.

Biotechnology research in Belgium is mainly conducted in the universities. These universities operate at a regional level, and all regions have excellent and acknowledged research groups. In addition, biotechnology research is also conducted at some federal scientific institutes and several regional research institutes. These institutes have often been assigned specific research tasks by the government. Other important research organisations are the centres of excellence and poles of excellence (or competitive poles). Both Wallonia and Flanders have several of these project clusters, including ones which are relevant for biotechnology research.

With regard to its performance in creating a knowledge base in biotechnology, Belgium has a relatively good track record. In the period 1994-2004, Belgium slightly increased its biotechnology publication output and performed at a higher level than the EU25 average; it even attained the same level as the USA. However, if this number of biotechnology publications is seen in relation to public spending on biotechnology R&D, Belgium performed below the EU25 average. Its share of biotechnology publications in relation to the total number of publications it produced also decreased over the ten years. Belgium used to outperform both the USA and EU25 in number of citations per biotechnology publication, but reached the same level in the period covered by this study. In terms of number of graduates in life sciences per million capita, Belgium was overtaken by the EU25 and USA. Considering the availability of human resources, it did not quite perform to capacity.

The main research fields are human health biotechnology and generic biotechnology, followed at a far distance by plant biotechnology. This is similar to USA and EU25 statistics. An important growth category is food biotechnology, followed by industrial biotechnology. However, the marked increase in these areas originates at a low level and has therefore not changed the overall picture.

With regard to the transmission and application of knowledge, Belgium performed above the EU25 average and at the same level as the USA in the ten years covered by this study. This is related to the number of biotechnology patents per million capita and per biotechnology publication. Belgium increased its patent output by 20% between the mid-1990s and the end of the century. This number dropped again between 2001 and 2003, but the index figures for Belgium were still twice as high as EU25 figures. Despite this relatively good performance in patenting, Belgium did less well in terms of the number of biotechnology start-ups, lagging seriously behind the EU25 average and the USA.

Belgium's long history in biotechnology is still evident in the total number of biotechnology firms per million capita; this figure is higher than the figures for the USA and the EU25. However, the biotechnology industry in Belgium does seem to have some growth and development problems. There were only two initial public offerings between 2002 and 2005, and the amount of venture capital available per million capita was also lower than in the USA; in 2002, it was even below the EU25 average. Important indicators of the extent to which the biotechnology industry is developing are the number of field trials and the number of biomedicines approved. Although human health biotechnology is the most important field, between 1995 and 2002 no biomedicines were approved by the Belgian authorities, whereas several biomedicines were approved during the same period in the EU15 and especially in the USA. In terms of field trials, Belgium's performance showed marked improvement, with twice as many per million capita than in the EU15; it nevertheless lagged far behind the USA.

With regard to public funding of biotechnology during the period 2002-2005, the available data show a decrease between 2002 and 2003, but an increase since 2003, marginally exceeding the 2002 level. It is important to note that budgets of several instruments dealing with biotechnology are lacking. In addition, generic policy-directed instruments in Flanders are not included because Flanders has a horizontal innovation policy. For Wallonia, the amount spent on biotechnology-related research fields is included, but this potentially comprises more than just biotechnology. Despite these reservations, the available data show that over 80% of public funding is available for research activities at both public research organisations and enterprises. Non-policy-directed funding covers the main part of the budget. The biotechnology-specific instruments are also important contributors, but this is mainly due to two main initiatives, VIB in Flanders and the mobilising programmes Waléo 1 and 2 in Wallonia. The support for commercialisation continues to lag behind, but an important reason for that could be the absence of accurate figures. Flanders, Wallonia and the Brussels Capital Region have implemented several, mainly generic, instruments to support commercialisation, and in most cases the data for biotechnology support were not known.

Biotechnology funding is available for both public research organisations (PROs) and enterprises. In many cases, the instruments target either PROs or enterprises, but there are also several instruments targeting both parties in order to stimulate collaboration and knowledge transfer. In Wallonia and the Brussels Capital Region, universities often receive full funding, and they do not have to provide co-funding unless they collaborate with industry, in which case industry needs to co-fund the research. Enterprises always

have to contribute their own funds, but the percentage of co-funding differs for large firms and SMEs.

The policy goals covered by the policy-directed instruments in the various regions are consistent with the policy objectives and aims as formulated in the overall policy plans. The sets of policy-directed instruments stimulate and support both scientific and fundamental research and knowledge transfer, valorisation and commercialisation by industry. Some policy instruments cover only one, perhaps two policy goals, but many instruments cover several policy goals. It is interesting to note that only recently a handful of initiatives were set up in Wallonia to support business creation, since this policy goal is considered highly important for the strengthening of the Walloon economy. None of the regions has instruments explicitly stimulating the adoption of biotechnology for new industrial applications. There are, however, several instruments that support and stimulate enterprises in launching innovative research projects. Another policy goal that is only marginally covered is the social acceptance of biotechnology and biosafety issues. Biosafety and risk assessment issues are mainly covered by government research institutes at federal and regional levels. Social acceptance of biotechnology and biosafety is one of the themes of VIB, but policy-directed instruments that support these policy goals exist neither in Wallonia nor in Brussels. Nevertheless, both Wallonia and Brussels have either a department or organisations that initiate public campaigns and other activities to promote science, technology and innovation (including biotechnology) to the public.

The main application area of public funding of biotechnology is human health biotechnology. This is consistent with Belgium's performance in biotechnology, which also concentrates on this area. However, many instruments are generic and do not target any specific technology or application field, and are therefore open to all biotechnology fields.

The average annual public funding available for biotechnology remained reasonably stable between the periods of 1994-1998 and 2002-2005. The federal funding available dropped by almost 19%, but the funding in Flanders increased by 143%. In Wallonia, the average annual funding decreased slightly, by 4%. Again, it should be noted that not all data were available and that the generic instruments in Flanders are not included. With regard to the coverage of policy goals, this profile did not change at all between both periods. In both periods, all application areas were covered by the policy instruments. However, between 2002-2005, animal, environmental and industrial biotechnology, as well as ethical, social and legal aspects of biotechnology, were only supported through non-policy-directed instruments. In 1994-1998, industrial biotechnology received the largest share of funding through policy-directed instruments, followed by human health. In 2002-2005, human health biotechnology received the largest budgets, followed by plant biotechnology.

As for future developments, the federal government will institute tax deduction measures in order to stimulate innovation. The Flemish government will further develop its horizontal innovation policy by presenting an innovation policy plan. At the same time,

two biotechnology-specific initiatives will be launched. The Life Sciences Platform will continue its discussions about the future development of the Flemish biotechnology industry (a new programme for Applied Biomedical Research was launched in May 2006). In Wallonia, as a follow-up to the Marshall Plan, new competitiveness poles are to be selected, including one in the life sciences area. In the Brussels Capital Region, the government will continue concentrating its activities in the three main sectors, including biotechnology. In addition, it will launch new initiatives to stimulate business creation through the Spin-Off Programme.

# 1. Introduction and background

## 1.1 General introduction to Belgium

With a population of a little over 10 million, Belgium is one of the smaller European countries. Belgium's gross domestic product at market prices (GDP) accounted for 295 265M EUR in 2005, which resulted in a higher level of GDP per head than the EU25 average<sup>1</sup> (EUROSTAT, 2005a). Belgium has a very open economy with imports accounting for 81% and exports accounting for 87% of the GDP (National Bank of Belgium, 2005). Belgium is highly dependent on trade (54% of GDP). Agriculture contributes the least to the Gross Value Added (GVA at basic prices) with 1.55%, while the total industry (excluding construction) accounts for 23% of the total GVA. The services sector, however, is the main contributor: almost 50% of the total GVA is based on services<sup>2</sup> (EUROSTAT, 2005b).

Since the 1990s, Belgium has increased its investments in R&D. In 1994, Belgium had a gross expenditure on R&D (GERD) of 1.69% of GDP; this was below the EU as a whole with 1.9% (EU=15). In 2003, Belgium reached its highest investment in R&D with a GERD of 2.33% of GDP. This was 0.34 percentage points more than the EU as a whole with 1.99% (EUROSTAT, 2005c). The business sector financed the most important share of the total R&D expenditures with 64.3% in 2001 (EUROSTAT, 2005c). This was higher than the EU as a whole with 55.99% (EU=15). The government financed 21.4% of the total R&D expenditures in 2001 (EUROSTAT, 2005d). The breakdown by sector indicates that the manufacturing industry still accounted for the major share of R&D activities (82.8% in 2001). The three main branches were electrical equipment and electronics (19.7%), industrial and other chemicals (15.9%), and drugs and medicines (20.8%) (European TrendChart on Innovation, 2005). In 2001, large firms (over 250 employees) accounted for 66% of the total Belgian R&D investments, and these business R&D efforts were mainly concentrated around a dozen larger firms (European TrendChart on Innovation, 2005). Most of these were foreign-owned firms: over 70% of business R&D expenditure was controlled by subsidiaries of foreign-owned firms (Spithoven and Tierlinck, 2005).

Belgium is a federal state, consisting of three communities (Flemish-, French- and German-speaking) and three regions (Flemish, Walloon and Brussels-Capital)<sup>3</sup>. The communities correspond to population groups and are responsible for person-related issues such as language, culture, and education. The regions correspond to a territorial

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<sup>1</sup> GDP per capita in PPS of 118 (EUR-25 = 100).

<sup>2</sup> 'Financial intermediation' accounts for 27.9% and 'Wholesale and retail trade, repair of motor vehicles, motorcycles and personal and household goods; hotels and restaurants; transport, storage and communication' accounts for 19.7%.

<sup>3</sup> The official names for the various communities and regions in their official languages are: Vlaanderen (Flanders), Vlaams Gemeenschap (Flemish Community), Vlaams Gewest (Flemish Region); Wallonie (Wallonia), Région wallonne (Walloon Region), Communauté française (French-speaking Community); Région de Bruxelles-Capital or Brussels Hoofdstedelijk Gewest (Brussels Capital Region); Deutschsprachigen Gemeinschaft (German-speaking Community). For practical reasons, in this report the English translations will be used.

concept and are responsible for issues such as innovation, economic development, spatial planning, technological development, environment and agriculture (the latter since 2001). The federal government is responsible for issues of national importance, such as defence, fiscal policy, social security and justice. Each of the seven entities (the federal state, the three communities and the three regions) has its own government and parliament. In Flanders, the Flemish Region and the Flemish Community are integrated into one government.

The responsibilities in the science, technology and innovation system are also spread over the different levels. The communities are responsible for education and fundamental research at universities, and applied research at higher education institutes. The regions are responsible for applied and industrial research, technology development and the promotion of innovation.

With approximately 140 companies active in biotechnology in 2002, Belgium holds a middle position in the EU ranking. The number of companies has increased significantly since the mid-1990s (Carrez, 2004). Approximately 70 to 100 companies of the 140 are dedicated biotechnology companies; most of them are small- and medium-sized enterprises (SMEs) and a few are large firms (Carrez, 2004; BioPolis).<sup>4</sup> Almost half of the Belgian biotechnology companies are active in health-care applications, while 20% works in the agri-food sector, 20 % provides services and tools, and 10% is active in the industrial biotechnology sector (Carrez, 2004).

Biotechnology research groups were already established in Flanders in the 1970s, in particular at the Universiteit Gent (University of Ghent) and the Katholieke Universiteit Leuven (Catholic University of Leuven). Flemish research groups have traditionally operated in both human health and agricultural biotechnology. The first Flemish biotechnology companies started in the early 1980s and were mainly university spin-offs. Today, **Flanders** counts approximately 45 dedicated biotechnology companies and a similar number of diversified biotechnology companies, mainly operating in the area of human health. Most companies are located in Ghent, Mechelen and Leuven (FlandersBio, 2006).

**Wallonia** has the largest share of Belgian biotechnology companies with approximately 50 biotech firms. Most of these firms develop biotechnology services and tools, and health-care applications. The Walloon biotechnology sector is carried by seven university centres and related science and technology parks (Carrez, 2004).

**The Brussels Capital Region** is home to approximately 24 biotechnology companies, also mainly active in health-care applications. Several of these companies are spin-offs from universities in the region.<sup>5</sup>

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<sup>4</sup> Carrez (2004) estimates the number of dedicated biotechnology companies in Belgium at 100, while Ernst & Young (2004) estimates this number at 70 companies. BioPolis uses the Ernst & Young figures to calculate performances (Chapter 3). Differences in counting can have different reasons. An important one is related to the definitions used of biotechnology and of dedicated biotechnology companies.

<sup>5</sup> <http://www.biotechinbrussels.com/index.php?id=10>, accessed 13 February 2006.

## **1.2 Characteristics of the national science, technology and innovation system**

The federalised structure of Belgium results in a large number of public authorities and agencies at both federal and regional levels. Therefore, when discussing the Belgian science, technology and innovation system, attention should be paid to authorities and policies at both federal and regional levels. This report will discuss the issues according to these different levels, i.e. the federal government, Flanders, Wallonia (including the French-speaking Community) and the Brussels Capital Region. Furthermore, this report will not include information about the German-speaking Community, as it has not developed a science and technology policy by virtue of the fact that it does not host institutions involved in research activities.

### **1.2.1 Federal government**

#### ***Main characteristics***

Each governmental entity in Belgium has its responsibilities regarding science and technology. The federal government supports research and development according to the following action lines (Belgian Federal Science Policy Office - BESLPO, 2005):

- Federal scientific institutions;
- Space research in an international context;
- Participation in international research organizations;
- Specific research programmes of national importance;
- Technological attraction poles: supporting collaboration between universities, federal scientific research institutes and collective research centres;
- Interuniversity attraction poles: supporting collaboration among Belgian universities;
- Collective research centres
- Research fellowships;
- Information and communication infrastructures, databases;
- Fiscal measures;
- Intellectual property policy;
- Promotion of science policy;
- Science education and promotion for the larger public.

Although in absolute numbers the federal budgets for research and development have risen between 1990 and 2004, the federal share of the Belgian public budget has decreased from 43.8% to 29.5%. In 2004, the federal budget for research and development amounted to 505.3M EUR (BELSPO, 2006a). The indicative federal budgets for research and development in 2005 amounted to 457.5M EUR. In its policy declaration in July 2003, the federal government proposed several actions that could potentially impact innovation in Belgium. These actions include (Federal Government, 2003):

- Reaching the three per cent GERD/GDP ratio by 2010 by developing a road map together with the regional and community governments and employers' organisations;
- Zero-interest loans for start-ups;

- Measures in favour of administrative simplification;
- Reform of competition policy.

In May 2004, the federal government announced the creation of a 'High Level Group 3%', composed of industrialists, scientists and members of research organisations. This committee's mission is to work on the issues confronting Belgium in order to reach the Lisbon and Barcelona objectives.<sup>6</sup> In the policy declaration of October 2004, the actions of the 2003 declaration were repeated and, in addition, a new measure to reduce researchers' salary taxes in scientific institutions and public research institutes was introduced (Federal Policy Declaration, 2004). In April 2005, the group presented its final report 'Research, Technology and Innovation in Belgium: the Missing Links'.<sup>7</sup>

In April 2005, the federal government announced the creation of an 'Innovation Fund', which was to invest in venture capital for innovative Belgian enterprises. The federal government made an initial investment of 150M EUR and the regions and communities were to invest additional funds in order to form a total fund of 500M EUR.<sup>8</sup>

In the policy declaration of October 2005, the federal government earmarked the stimulation of innovation and creativity as a means of generating economic growth. Since October 2005, the new tax measure to reduce researchers' salary taxes has also been extended to companies. They can deduct 50% of researchers' salary taxes as long as they collaborate with a research centre acknowledged by the government. The policy declaration also announced that in 2006 the tax measure would extend to young innovative SMEs that spend more than 15% of their expenditures on R&D. An amount of 10M EUR was made available for this measure.<sup>9</sup> In addition, from January 2006, companies were given the opportunity to grant a tax-free month's salary to a maximum of 10% of their employees who develop and implement an innovative idea (Federal Policy Declaration, 2005). Other fiscal measures provided tax deductions for risk capital and investments (BELSPO, 2006b).

### ***Main policy-making actors***

The Federal Minister for the Economy, Energy, Foreign Trade and Scientific Policy is responsible for developing and coordinating the general orientation of the federal science policy. Other ministers of the federal government are responsible for research and development in their own policy domains.

At the administrative level, the Belgian Federal Science Policy Office (BELSPO) is responsible for coordinating science policy at a federal level, for the design and implementation of research programmes and networks, for the management of Belgium's participation in European and international organisations and the supervision of the federal scientific institutions. It also prepares and implements a number of research programmes and measures and is responsible for scientific collections and cultural and

<sup>6</sup> [http://trendchart.cordis.lu/tc\\_country\\_list.cfm?ID=2](http://trendchart.cordis.lu/tc_country_list.cfm?ID=2), accessed 4 November 2005

<sup>7</sup> Information from Ms. Sormann (Belgian, Federal Science Policy Office), February 2006

<sup>8</sup> [http://trendchart.cordis.lu/tc\\_policy\\_information\\_fiche.cfm?ID=3087](http://trendchart.cordis.lu/tc_policy_information_fiche.cfm?ID=3087), accessed 4 November 2005

<sup>9</sup> <http://www.marcverwilghen.be>, accessed 12 October 2005

scientific promotional activities via the federal scientific institutes. There is no federal coordination of all federal and regional science, technology and innovation policies; each level has its own responsibilities and coordination mechanisms.

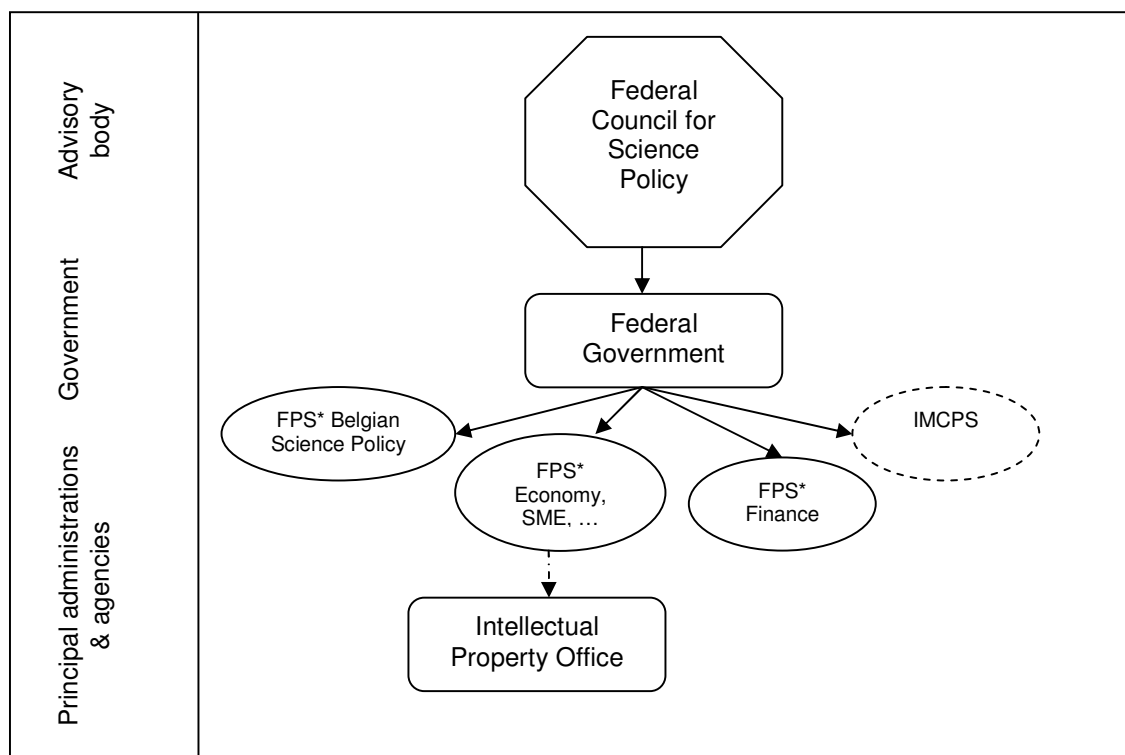
The Federal Public Service Economy, SMEs, Self-employed and Energy is responsible for supervising the collective research centres and the regulation of intellectual property rights. It has also created a department that is dedicated to following the economic impact of biotechnology (Federal Public Service Economy, SME, Self-employed and Energy, 2004). The Federal Public Service Finance is responsible for all matters concerning fiscal measures aimed at stimulating scientific research or innovation.

The Inter-Ministerial Conference for Science Policy (IMCPS) was created in order to coordinate policy matters among various ministries. It coordinates the preparation and execution of government decisions regarding federal science policy matters. Action can only be taken following mutual agreement by two or more ministerial departments.

The Federal Council for Science Policy (CFPS-FRWB) is an advisory body of the federal government for preparing science policy. Its members are representatives of academic, scientific and socio-economic circles and reflect the federal structure.

The structure of the federal innovation governance system is shown in Figure 1.1.

Figure 1.1 Organisational chart of the innovation governance system at federal level



\* FPS: Federal Public Service

Based on European TrendChart on Innovation, 2005

### ***Main research actors***

The Belgian Federal Science Policy Office manages 11 federal scientific institutes, which are linked to the ministries. In addition, there are five other federal scientific institutes managed by the ministries. The federal scientific institutes cover many different research domains and activities and include museums, libraries, observatories, health institutes and research institutes. In 2004, the federal government spent 74.2M EUR on these institutes (BELSPO, 2006a).

In collaboration with the regions, the federal government initiated collective research centres 'Centra De Groote' in 1948. These 11 collective research centres were founded by Belgian enterprise federations and aimed to conduct applied research and technology development relevant for companies in specific sectors: each centre is dedicated to a specific sector. In 2002, the federal government spent 4.4M EUR on the collective research centres (BESLPO, 2005).

## **1.2.2 Flanders**

### ***Main characteristics***

In Flanders, the governments of the Flemish Community and Flemish Region have merged into one Flemish government. Accordingly, Flanders has one single governmental organization and one single policy for science, technology and innovation. Since 1993, the Flemish budgets for research and development have increased significantly, from 358.7M EUR in 1993 to 820.7M EUR in 2004 (Belgian Federal Science Policy Office, 2006a). This increase was starker in Flanders than in Belgium as a whole and this resulted in a Flemish share of 47.9% of the total national budget in 2004. More than 50% of the Flemish budget was spent on funds for universities, and almost 20% of the budget was used to finance three large research institutions: VITO, IMEC and VIB. Another 20% was available for R&D and innovation in Flemish enterprises (BELSPO, 2005).

In March 2003, the Flemish government initiated the Innovation Pact, based on a comprehensive stakeholder debate. The Innovation Pact determines how the objective of reaching the 3% GERD-GDP norm can be reached by actions undertaken by the government itself, Flemish companies and the research community. The Flemish government has promised to raise budgets by 60M EUR annually. The Flemish science and technology policies for 2000-2004 included the following strategic objectives (Vanderpoorten and Van Mechelen, 2000):

- Strengthening fundamental research at universities;
- Strengthening technological basic research for industry, the non-profit sector and government;
- Increasing technological innovation in Flemish enterprises;
- Strengthening the collective information and communication infrastructure;
- Promoting and educating science and technology for the larger public;
- Improving the process of policy preparation and implementation.

For the period 2004-2009, the science and technology policies are integrated with the policies for economy, entrepreneurship, innovation and foreign trade. The Flemish

government aims to develop Flanders into a knowledge-intensive, entrepreneurial and international region, which is very attractive for investment. Science and innovation is considered essential in reaching these objectives. Regarding science and innovation, the Flemish government focuses on the following lines of action (Moerman, 2004):

- Creating an integrated and horizontal innovation policy;
- Increasing the public budgets for science, technology and innovation and maintaining the balance in providing support for different actors;
- Increasing attention for non-technological aspects of innovation;
- Strengthening fundamental research at universities and strategic basic research at research institutes and higher education institutes;
- More focus on strategic domains and sectors;
- Increasing the numbers of researchers and improving research careers;
- Promoting science, technology and innovation for the larger public;
- Strengthening research infrastructure and equipment;
- Strengthening centres of excellence;
- Improving technology transfer and valorisation;
- Improving the preparation and implementation of innovation policy;
- Stimulating international collaboration.

In 2005, the Flemish government underlined the importance of technology transfer and valorisation, and announced several additional measures to support industrial research and the availability of financial capital for start-ups and SMEs (Moerman, 2005a). In April 2005, the Flemish government approved the establishment of the Vlaams Innovatiefonds (Flemish Innovation Fund VINNOF). The government invested 75M EUR in this fund in order to finance business plans and start-ups of young, innovative companies.

The Policy Letter 2006: Science and Innovation emphasised knowledge transfer to SMEs as the main priority for the coming years and an SME Action Plan was announced for 2006. The policy letter also announced the preparation of an Innovation Policy Plan, which presented a horizontal innovation policy in Flanders. The Innovation Policy Plan was approved by the government. The Innovation Policy Plan outlined nine priorities (Moerman, 2005b):

- Stimulating creativity, entrepreneurships and innovation in all sectors;
- Promoting Flanders as an internationally attractive knowledge region;
- Increasing investments in innovation;
- Creating an innovative environment;
- An innovating government will act as a good example;
- Increasing the number of researchers employed;
- Focusing on innovative hotspots;
- Innovation is a lever for sustainable development;
- Improving innovation in health care.

The Innovation Policy Plan is mainly a plan; concrete measures have not been formulated nor have specific financial means been attached to this plan.

In addition to some new measures to support technology transfer, valorisation and company start-ups, the Flanders government announced for 2005 and 2006 new measures to attract top-level foreign researchers and Belgian researchers working abroad, and to strengthen the research infrastructure. According to the Policy Plan 2004-2009 and the Policy Letter 2006, public investments in science, technology and innovation will need to increase by 255M EUR in 2009 compared to 2004. In 2005, the Flemish government invested an additional 55M EUR in research and development. In 2006, this was projected to be 50M EUR. The Flemish government aims to balance investments in strategic basic research, applied research, fundamental research and knowledge diffusion.

### ***Main policy-making actors***

In Flanders, the Vice-Minister-President and Minister for Economy, Entrepreneurship, Science, Innovation and Foreign Trade are responsible for the Flemish science, technology and innovation policy. The Minister of Education is responsible for the universities and almost all other departments have some small sector-specific science, technology and innovation expenses incorporated into their budgets.

At an administrative level, the Administratie voor Wetenschap en Innovatie (Science and Innovation Administration AWI)<sup>10</sup> is responsible for the horizontal coordination of science and technology policies with other Flemish institutions and with supranational and international institutions. It is also responsible for the coordination and diffusion/distribution of scientific information. In addition, it is responsible for the management contracts with the large research institutes.

The Instituut voor de Aanmoediging van Innovatie door Wetenschap en Technologie in Vlaanderen ( Institute for the promotion of Innovation by Science and Technology in Flanders IWT) is the policy implementation institution in Flanders. It supports and stimulates industrial research and technology transfer in the Flemish industry as a one-stop shop.

The Fonds voor Wetenschappelijk Onderzoek – Vlaanderen (Research Foundation - Flanders FWO) implements policy with regard to basic research at the universities.

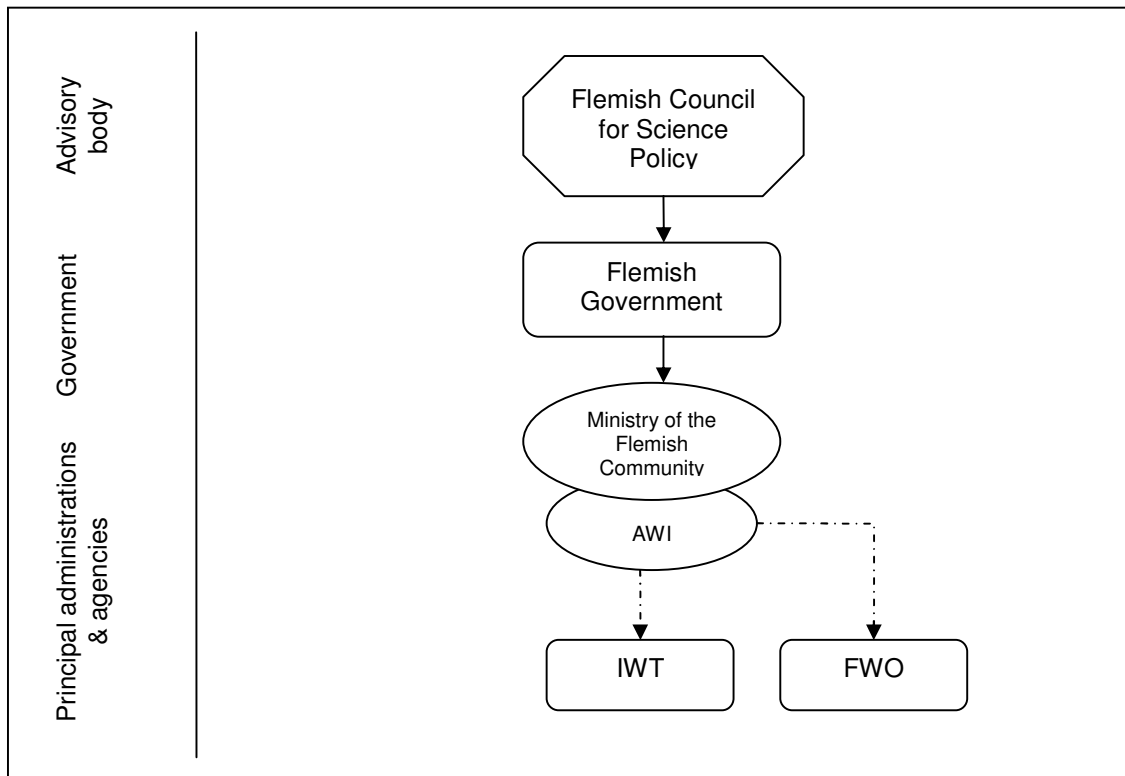
The Vlaamse Raad voor Wetenschapsbeleid (Flemish Science Policy Council VRWB) is the advisory body of the Flemish government and the Flemish parliament for science and technology policies.

Figure 1.2 shows an overview of the Flemish innovation governance system.

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<sup>10</sup> Since April 2006 this is called Departement Economie, Wetenschap en Innovatie (Department Economy, Science and Innovation)

Figure 1.2 Organisational chart of the innovation governance system in Flanders



Based on European TrendChart on Innovation 2005

### ***Main research actors***

Flanders and the Dutch-speaking Community have six university centres: the Universiteit Antwerpen (University of Antwerp UA), Universiteit Gent (University of Ghent RUG), Universiteit Hasselt (University of Hasselt), Katholieke Universiteit Leuven (Catholic University of Leuven KULeuven), Katholieke Universiteit Brussel (Catholic University of Brussels, no natural sciences) and Vrije Universiteit Brussel (Free University of Brussels VUB). These universities provide education to almost 73 000 students. The universities receive funding from six different public sources: structural funding for salaries and the Bijzonder Onderzoeksfond (Special Research Fund BOF) for fundamental research, both directly from the ministry; support from the funding agencies FWO-Flanders (fundamental and basic research) and IWT (industrial research), including support for strategic basic research from the SBO programme; and support for specific themes selected by the government. In addition, the universities can collect funding from other federal, international or private sources. In 2004, the Flemish government donated 586.8M EUR as a basic funding ('werkingsmiddelen') and 218.3M EUR from the various fundamental research programmes and funds (BOF, FWO, IWT and SBO) (Debackere and Veugelers, 2005).

The Flemish government has established four research institutes that perform excellent research and provide services to the industry. These institutes receive funding from the government, but a large part of their budgets is financed by services and research

activities for enterprises. The research institutes conduct fundamental, strategic and applied industrial research in the following fields: micro-electronics (IMEC), energy, environment, basic and new materials (VITO), broadband technology (IBBT) and biotechnology (VIB). The four centres have been established with specific aims: VIB focuses on basic research and valorisation, IMEC and IBBT focus on industrial research and VITO can be considered a policy-oriented institute. In 2005, the Flemish government funded IMEC, VITO and VIB with 98.4M EUR (Vervliet, 2005). IBBT was set up in 2004 and the Flemish government donated 17M EUR in 2005 (Vervliet, 2005).

In addition to these four large research institutes, there are seven government scientific research institutes:<sup>11</sup> the Centrum voor Bevolkings en Gezinsstudies (Centre for Population and Family Studies CBGS), the Instituut voor het Archeologisch Patrimonium van de Vlaamse Gemeenschap (Institute for the Archaeological Heritage of the Flemish Community IAP), the Instituut voor Natuur- en Bosonderzoek (Research Institute for Nature and Forest INBO), the Koninklijk Museum voor Schone Kunsten Antwerpen (Royal Museum of Fine Arts-Antwerp KMSKA), the Instituut voor Landbouw- en Visserijonderzoek (Institute for Agriculture and Fisheries Research ILVO), the Vlaams Instituut voor de Zee (Flanders Marine Institute VLIZ) and the Centrum voor Landbouweconomie (Centre for Agricultural Economy CLE). In 2006, the research branch of this last centre was integrated into ILVO, while the administrative branch was transferred to the Flemish governmental department for agriculture and fisheries. Another research institute is the Prins Leopold Instituut voor Tropische Geneeskunde (Prince Leopold Institute of Tropical Medicine). The latter specialises in health problems related to the specific ecological and socio-economic conditions of developing countries, more specifically in tropical microbiology and tropical human and veterinary medicine. The Onderzoekscentrum voor Sierteelt (Research Centre for Ornamental Plants) is jointly financed by government and industry, and it studies and develops plants with new characteristics, such as pest and disease resistance.

A recent initiative by the Flemish government is the development of ‘Vlaamse Excellentiepolen’. These clusters of excellence bring together actors and expertise in specific economic sectors. The following clusters started in 2003 and 2004: Flanders’ Drive, the Vlaams Instituut voor Logistiek (Flanders Institute for Logistics VIL), Flanders’ Mechatronics Technology Centre (FMTC), IncGEO, Flanders District of Creativity (Flanders DC) and the Interdisciplinary institute for BroadBand Technology (IBBT). This last cluster was set up as one of the four research institutes, as mentioned before. More clusters have been approved and are in their start-up phase: Flanders Material Center (FLAMAC, launched February 2006), Milieu- en Energietechnologie Innovatieplatform (Environmental and Energy Technology Innovation Platform MIP, launched February 2006), and Flanders’ FOOD (launched April 2006).<sup>12</sup>

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<sup>11</sup> <http://awi.vlaanderen.be/links/index.php?id=166>, accessed 14 February 2006.

<sup>12</sup> <http://awi.vlaanderen.be/documenten/Bijlage%201%20>

<Een%20beleidskader%20voor%20steun%20aan%20grote%20kenniscentra%20tbv%20innovatie.pdf>;  
[http://www.iwt.be/opdrachten\\_vr/innovatiest\\_vr/exellentie/exellentiepolen.html](http://www.iwt.be/opdrachten_vr/innovatiest_vr/exellentie/exellentiepolen.html), both accessed 21 December 2005.

### 1.2.3 Walloon Region and the French Community

#### *Main characteristics*

In **Wallonia**, the government (the Walloon government and the government of the French Community) considers research and development to be one of the priorities in reforming the Walloon economy. At the end of the 1990s, two major initiatives were started in order to define necessary actions for the future development of Wallonia. First, the Walloon government created a *Contrat d'Avenir pour la Wallonie* (Contract for the Future of Wallonia) in which the general policy for Wallonia was proposed. In 2002, this contract was renewed, including 20 actions for the period 2002-2004. These priorities included the strengthening of research and development activities in order to increase the application of research results by 15% in three years' time, and the stimulation of the creation of new enterprises by 15% and the development of existing companies. In 2005, a new contract for the future was created and this latest version has six overall objectives, of which 'continual knowledge development' is a relevant one for innovation. This objective is quantified in terms of spending 3% of GDP on R&D, in line with the Barcelona objective. Moreover, the contract also proposes further measures for implementation. Broad Strategic Cross-Cutting Plans are defined in order to integrate and coordinate the various departments' priority actions. In August 2005, the Walloon government pledged financial commitments in the newly adopted 'Les actions prioritaires pour l'Avenir wallon' (Priority Actions for the Future of Wallonia, also called the 'Marshall Plan for Wallonia'), which was a follow-up to the Contract for the Future and the Strategic Cross-Cutting Plans. This follow-up plan includes five lines of action (Walloon Government, 2005):

- Creating Pôles d'excellence: collaboration between enterprises, education institutes, public and private research organisations, working on collective, innovative projects;
- Stimulating the creation and development of enterprises and stimulating the creation of economic activities;
- Decreasing the fiscal pressure on enterprises;
- Stimulating research and innovation:
  - financing basic research doctorates
  - introducing programmes of excellence
  - intensifying mobility programmes
  - supporting start-ups and spin-offs
  - improving technology transfer
  - improving the policy preparation and implementation
- Developing competencies for employment.

From 2006 to 2009, the plan will make available an additional budget of 270M EUR for research (European TrendChart on Innovation, 2005).

Second, from 1998 to 2001 the strategic programme Prométhée had to improve the knowledge of the Walloon innovation potential, stimulate partnerships and synergies, and reform and improve the roles of the various innovation actors. As a result, 40 key technologies were defined, which could be used for defining funding and research strategies. Another result was the development of technological clusters of enterprises in these key technologies. Prométhée II (launched in 2002) was established as a follow-up

with the aim of improving the knowledge potential of basic research in Wallonia, introducing strategic tools for preparing and implementing an innovation policy and extending the technological clusters to include technology transfer and valorisation (BELSPO, 2005).

Since the mid 1990s, the Walloon government increased its budget for science, technology and innovation from 65M EUR in 1995 to 184.3M EUR in 2002. However, this budget decreased again to 139.7M EUR in 2004. The indicative budget for 2005 amounted to 176.6M EUR. The Walloon share in the total Belgian budget amounted to 8.2% in 2002, coming from 4.7% in 1990 (BELSPO, 2006a). More than 50% of the public budget was intended for universities and research institutes, and enterprises received one-third of the public budget (BELSPO, 2005).

The two main objectives of the science, technology and innovation policies of the **French Community** are to finance fundamental research at universities and secure excellent education of researchers. The budgets are distributed according to a bottom-up principle, although the following priorities have been defined:

- Stimulating interuniversity collaboration;
- Enhancing international mobility of researchers and the return of Belgian researchers;
- Integrating the research in the European Research Area.

The public budgets gradually increased from 200M EUR in 1998 to 228.8M EUR in 2004. This increase was less than the increase for Belgium as a whole, and the share of the French Community in the total Belgian public budget for science, technology and innovation decreased from 19.6% in 1990 to 13.4% in 2005 (BELSPO, 2006a).

#### ***Main policy-making actors***

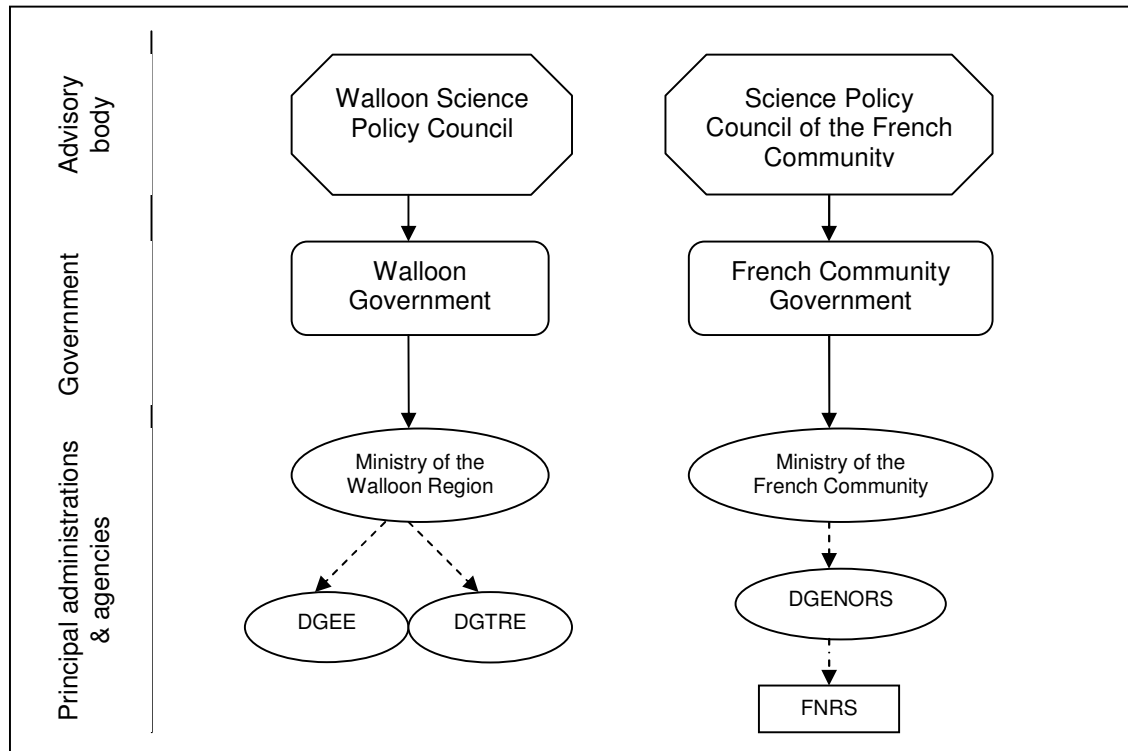
The Minister for Research, New Technologies and Foreign Affairs and the Minister of Economy, Employment and Foreign Trade are both in charge of innovation in the **Walloon Region**. At the administrative level, the Direction générale des Technologies, de la Recherche et de l'Énergie (Directorate General for Technology, Research and Energy DGTRE) is responsible for the preparation and implementation of the technology policy. It develops projects, runs programmes, and finances R&D and innovation in enterprises, research centres and universities in Wallonia. The Direction Générale de l'Économie et de l'Emploi (Directorate General for Economy and Employment DGEE) implements some measures that concern more entrepreneurial or organisational aspects of innovation, such as partnership clusters.

The Minister of Higher Education and Scientific Research is responsible for higher education and scientific research in the **French Community**. At the time this report was written, this minister was also the Minister for Research, New Technologies and Foreign Affairs. At an administrative level, the Direction Générale de l'Enseignement Non Obligatoire et de la Recherche (Directorate General for Non-Obligatory Education and Scientific Research DGENORS) is responsible for financing the universities and higher education institutions, including the Fonds de la Recherche Scientifique (National Fund for Scientific Research FNRS).

Both the Walloon Region and the French Community have installed the Conseil Wallon de Politique Scientifique (Walloon Council for Science Policy CPS). It advises the Walloon government during the preparation and evaluation of the region's science policy.

Figure 1.3 gives an overview of the innovation governance system in Wallonia.

Figure 1.3 Organisational chart of the innovation governance system in Wallonia



Based on European TrendChart on Innovation 2005

### **Main research actors**

The **French Community** finances nine universities: Université catholique de Louvain-la-Neuve (Catholic University of Louvain UCL), Université Libre de Bruxelles (Free University of Brussels ULB), Université Liège (University of Liège UL), Université de Namur (University of Namur FUNDP), Université de Mons-Hainaut (University of Mons-Hainaut), Facultés universitaires Saint-Louis (only socio-economic studies), Facultés universitaires catholiques de Mons (only socio-economic studies), Faculté Universitaire des Sciences Agronomiques de Gembloux (FUSAGx) and Faculté Polytechnique de Mons. These universities provide education to 62 000 students. The universities receive funding from the French Community from four different sources: basic funding, funding from the Fonds de la Recherche Scientifique (National Fund for Scientific Research FNRS), support from the Les Actions de Recherche Concertés (Concerted Research Actions ARC) and support from the Fonds Spéciaux pour la Recherche (Special Research Fund FSR). In addition, the universities can collect funding from other federal, international or private sources. In 2002, the French Community

donated 126.36M EUR as a basic funding and 86.96M EUR from the three other sources (Belgian Federal Science Policy Office, 2005). The Walloon government donates funding to these universities as well. This funding mainly consists of funding for research projects and specific research teams.

The total donation by the Walloon Region for universities and research centres amounted to 95.128M EUR in 2002, of which 34.609M EUR originated from the European Structural Funds (BESLPO, 2005).

In addition to the universities, Wallonia has four types of research centres, which are financed on a project basis (BELSPO, 2005). The first type concerns collective research centres. Ten of these national research centres are situated in Wallonia, and the **Walloon Region** supports projects in these centres that are relevant to the Walloon economy. In 2002, the Walloon government donated 5.3M EUR to these collective research centres.

A second type of research centre is the 'private centre', which conducts research, development and tests for the following sectors: industry (CEPESI), textile chemicals and environment (CELABOR), water (CEBEDEAU), material assembly and testing (CEWAC), textile (CRECIT) and fishery and recycling of energy (CERER). These centres are funded by contract research and services to industry, regional funding and European subsidies.

The third type of research centre concerns the Institut Scientifique de Service Public (Scientific Institute for the Public Service ISSeP). This institute is directly controlled by the region and conducts applied, industrial research in the fields of environment, natural resources and industrial safety. In 2002, this centre received subsidies worth 10.7M EUR.

The fourth type of research centre is the Objective 1 research centre. These centres are financed by the Objective 1 funds from the European Structural Funds. Objective 1 research centres can be found in biotechnology (Biovallée), chemicals (CERTECH), telecommunications (MULTITEL, NTIC, CETIC), new material and polymers (Materia Nova), technology of solid materials (CTITP), ceramics (INISMA), biopolymers for food (Agro-food Valley / NATISS) and aeronautics (CENAERO). These centres conduct applied research and receive 50% of their funds from the European Structural Funds and 50% from the Walloon government (Belgian Federal Science Policy Office, 2005). The Objective 2 funds have supported three other research centres, including one in genomics research (GIGA).

Wallonia also has R&D clusters and competence clusters. The Walloon government initiated several actions to establish these clusters. In 2001, the first five pilot clusters were initiated in the following sectors: automotive, aeronautics, wood, energy and biotechnologies, and agro-food. In 2003, three new clusters were established in the fields of space, clinical research and ceramics. These economic clusters bring together enterprises in the field and if needed also research centres. The clusters aim to stimulate cooperation between the various parties in the cluster at various levels. Another cluster initiative was also developed in 2001 through the Technology Cluster programme. This

type of cluster aims to promote the development of sustainable and active partnerships between the industry and the scientific community in technology fields identified as key to Wallonia. Since its inception in 2001, ten clusters have been established in the fields of integrated and secure management of electronic documents, multimedia, industrial applications of software engineering, friction stir welding, rapid prototyping, mechatronics, recycling of refractors, digital signal processing, nutrition, and application of ICT in the graphics industry (European TrendChart on Innovation, 2004 and 2005). The support for these clusters includes funding for the management group of the clusters.

In addition to these clusters, the Walloon government announced in December 2005 the establishment of five Pôles de compétitivité (competitiveness clusters) in the fields of aerospace, life sciences, agro industry, transport and logistics, and mechanical engineering. This initiative has been designed as a supplement to the above-mentioned support given to the other clusters and is part of the latest Contract for the Future of Wallonia. The competitiveness clusters bring together enterprises, universities, research centres, training centres etc. in order to develop and work with a common vision of economic and technological development of the field and to carry out collaborative projects. The Pôles de compétitivité resemble main clusters in the five key areas, in which the various clusters can take part. The first four were selected in July 2006 with some 20 projects. Some clusters took the initiative for the new poles. The Walloon government pledged support for the first 20 projects in the four Pôles de compétitivité for the amount of 69M EUR.<sup>13</sup>

#### **1.2.4 The Brussels Capital Region**

##### ***Main characteristics***

The Brussels Capital Region has not developed or adopted an explicit innovation policy. Attention to research, development and commercialisation is part of the policy framework for the regional economy and employment. In 2004-2005, the government of the Brussels Capital Region designed a Contrat pour l'Economie et l'Emploi 2005-2010 (Contract for the Economy and Employment for the period 2005-2010), which needs to replace the Plan Régional de Développement (Regional Development Plan) of 2002. This contract has the following objectives:

- Improving employment and access to jobs,
- Modernising and restructuring of the economy of Brussels, and
- More efficient and effective public instruments.

The second objective mainly includes priorities for improving the operating environment for enterprises, improving the infrastructure, adapting the fiscal regime, as well as the selection of three key sectors for more focused support and stimulation. The Contract for the Economy and Employment is mainly a plan; concrete actions will be developed and implemented during the time frame of the plan (Brussels Capital Region, 2005).

In June 2005, the government of the Brussels Capital Region decided to initiate some actions to implement the Contract for the Economy and Employment. First of all, it was decided to make an inventory of all organisations and structures that provide information,

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<sup>13</sup> [http://clusters.wallonie.be/xml/index\\_en.html](http://clusters.wallonie.be/xml/index_en.html), accessed 21 July 2006.

advice and support to Brussels' enterprises. Second, a new programme, MISTRAL, was announced that aims to support SMEs by analysing their product portfolio, developing an innovation strategy and providing coaching expertise during the project. Third, the Agence Bruxellois pour l'Enterprise (Brussels Enterprise Agency) was to receive extra means to enforce and improve its activities and services to enterprises. Fourth, the government announced several initiatives to attract enterprises to the region and to keep them there. A special agency for economic residences was to be set up, as well as an incubator facility for foreign enterprises. Fifth, the set of instruments available to provide economic support were to be analysed for their efficiency and effectiveness. Finally, the most important innovative economic sectors were to be analysed and with a subsequent selection of three sectors (Cerexhe, 2005a).

The Minister for Employment, Economy, Scientific Research and Urgent Medical Support and Firefighting is responsible for the scientific research policy of the region. Embedded in the Contract for the Economy and Employment is a distinction between three lines of priorities for research and development (Cerexhe, 2005b):

- Creating synergies: synergy between industrial and pre-competitive research and development; synergy between fundamental and applied research through synergy between the policies of the region and communities; synergy between policies for the economy and scientific research as well as health policies;
- Concentration of means available: selection of three innovative sectors, including life sciences, new information and communication technologies and the environment; support for university interfaces; creation of incubators;
- Necessity for excellence: creating centres of excellence, improving the mobility of researchers and supporting fundamental research.

In comparison with the other governmental entities, the Brussels Capital Region only invests small amounts in science, technology and innovation; its share in the total Belgian budget amounted to only 1% in 2002. The budget remained rather stable during the 1990s, but it doubled from 8.8M EUR in 2000 to 16.5M EUR in 2002 and 18.8M EUR in 2004. The indicative budget for 2005 amounted to 21.2M EUR (BELSPO, 2006a).

### ***Main policy-making actors***

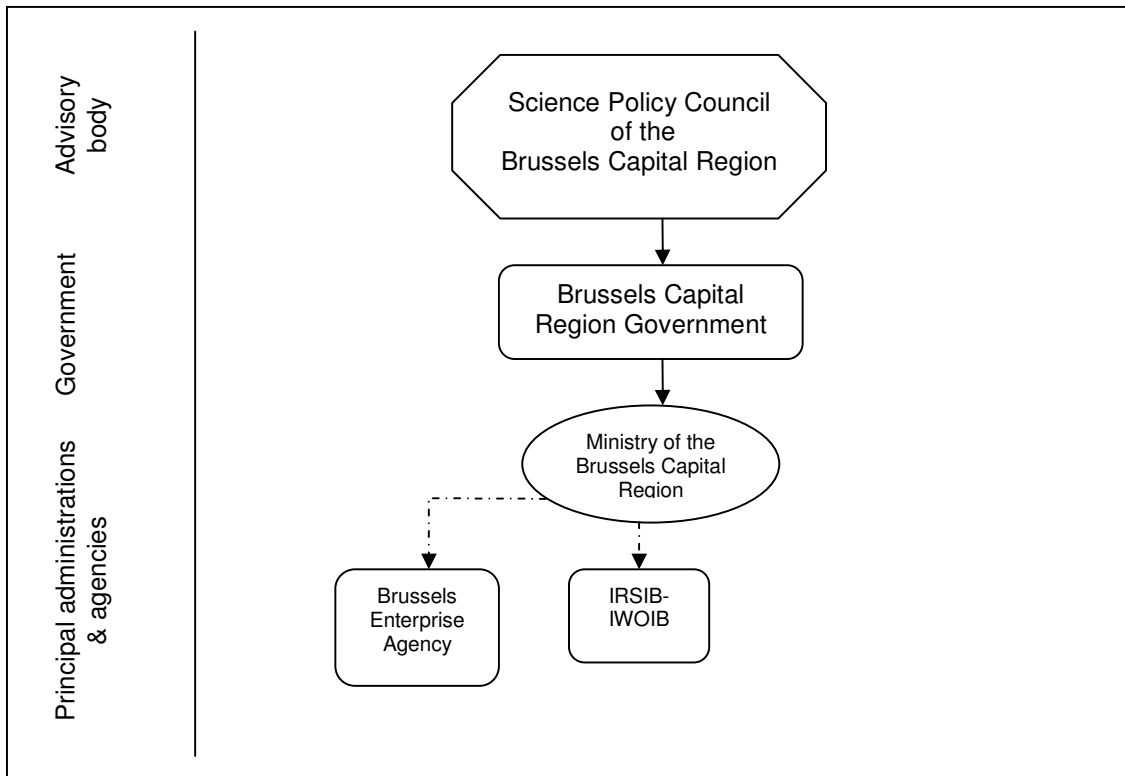
Until July 2004, innovation policy was the responsibility of the Minister-President of the Brussels-Capital Region. Now, the Minister for Employment, Economy, Scientific Research and Urgent Medical Support and Firefighting deals with innovation matters.

At an administrative level, the Institut d'encouragement de la Recherche Scientifique et de l'Innovation de Bruxelles (Institute for the Encouragement of Support of Scientific Research and Innovation of Brussels IRSIB - IWOIB) is responsible for scientific research and technological innovation programmes and funding. The Agence Bruxelloise pour l'Enterprise (Brussels Enterprise Agency ABE - BAO) integrates the support and services for Brussels' companies.

The Conseil de la Politique scientifique de la Région de Bruxelles-Capitale (Science Policy Council of the Brussels Capital Region) assists the minister in formulating concrete and effective regional policy on science.

Figure 1.4 shows the structure of the innovation governance system in Brussels Capital Region.

Figure 1.4 Organizational chart of the innovation governance system in the Brussels-Capital Region



Based on European TrendChart on Innovation 2005

### ***Main research actors***

The Brussels Capital Region hosts three universities belonging to the Flemish and French Communities: the French-speaking and Dutch-speaking Free University of Brussels (ULB and VUB) and the French-speaking Catholic University of Louvain (UCL). The activities of these universities are described in more detail in the sections about Flanders and Wallonia.

Research at the universities located in Brussels is supported by various programmes that aim to support promising young researchers and future-oriented research themes. In 2005, the Brussels Capital Region spent 7.6M EUR (40% of the total budget) on programmes supporting research in universities, public research institutes and higher education institutes.<sup>14</sup>

<sup>14</sup> Information from Mrs. C. Cociamont-May, IWOIB, February 2006.

### **1.3 National support and framework conditions for biotechnology**

#### **1.3.1 Support for biotechnology at the federal level**

The federal science, technology and innovation policy does not prioritise specific technologies or research areas (except for national priorities such as space research). Hence, there is no special policy focus on biotechnology. The main reason is that the federal government is not allowed to initiate technology and science domain-specific support programmes, other than for national priorities such as sustainable development, social cohesion, information society and space research. The federal government can initiate science and technology support programmes, as long as they are not dedicated to specific domains. Specific domains, such as biotechnology, can only be supported through regional programmes.

Nevertheless, the Belgian Federal Science Policy Office finances two research initiatives that have linkages with biotechnology research and development. One programme is the Belgian Co-ordinated Collections of Micro-organisms (BCCM). This is a consortium of four complementary research-based culture collections. The consortium aims to share the biological material of its collections, related information, as well as its expertise and know-how in the field of fundamental and applied biology, mainly to partners and clients in the scientific and industrial communities. Another programme is the Interuniversity Attraction Poles. This programme aims to provide support for teams of excellence in basic research belonging to the different universities and scientific research institutes in the different regions. The aim is to form networks comprised of the different research teams. The programme explicitly aims to stimulate scientific cooperation between the various universities and research institutes. In 2002, the fifth phase of the project started, in which 36 networks and 261 research teams were set up and funded. The research spans a wide variety of research fields in the life sciences, exact and applied sciences and the human sciences. In the life sciences field, 15 research networks were funded.

A third programme, the Sustainable Production and Consumption Patterns 2 programme, does not prioritise biotechnological research, although one of the themes has been supported and biosafety-related research projects can be funded here.

In January 2005, the Belgian Minister for Economy, Energy, Foreign Trade and Science Policy launched the 'Belgian Interdisciplinary Platform for Industrial Biotechnology' (BIPIB) as a means of bringing together all actors and disciplines in the field of industrial biotechnology.<sup>15</sup> BIPIB mainly focuses on the following domains:

- The replacement of the conventional, non-biological processes by bio-processes in industrial production processes, with the aim of rendering the process more sustainable, or for the production of (new) materials with a high added value (e.g. medicines, fine chemicals, food additives);
- The production of bulk and other materials (bio-energy, polymers,) starting from renewable resources (biomass and waste).

The domains are represented in three working groups, one on 'Biomass', one on 'Bioprocesses and bio-products', and one on 'Bio-energy'.

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<sup>15</sup> Based on information provided by Ms. Bosschaerts from BELSPO, February 2006.

BIPIB has to develop a long-term strategy, covering not only research and development aspects, but also an adequate and coherent regulatory environment, as well as the integration of this technology in the industry and society. In addition, BIPIB has to ensure that its activities are linked with similar activities in other countries and with European initiatives in the same field. The three working groups prepare recommendations concerning these issues for each of the domains. BIPIB unites all stakeholders (industry, universities and research institutes, representatives of environmental and consumer associations and the authorities), throughout the different research disciplines, as well as the whole production chain. In November 2005, BIPIB formulated a set of recommendations for the promotion of industrial biotechnology. One of the main recommendations was to establish a specific research programme for industrial biotechnology, organised by the regional governments (BIPIB, 2005).

### **1.3.2 Support for biotechnology in Flanders**

In the 1990s, the Flemish government prioritised biotechnology as one main research and innovation domains of Flanders. The Vlaams Actieprogramma Biotechnologie (Flanders Action Programme in Biotechnology VLAB) started in 1990 and lasted until 1998. It supported collaboration between and among universities, research institutes and enterprises with an annual budget of 4M EUR. In 1994, the Flemish Minister for Economy, SMEs, Science Policy, Energy and External Affairs developed the Technology Policy 2002, in which biotechnology was acknowledged as one of three key technology domains. The establishment of the Vlaams Interuniversitair Instituut voor Biotechnologie (Flanders Interuniversity Institute for Biotechnology VIB) and the Biotech Fonds Vlaanderen (Biotech Fund Flanders BFF) in the mid-1990s was the direct result of this policy. However, since the beginning of the new century, the government's policy has been to not prioritise specific technologies or research areas anymore in order to prevent ad-hoc initiatives and an unbalanced focus on specific domains. In the more recent policy documents (Policy Plan 2000-2004, Policy Plan 2004-2009, Policy Letter 2005-2006, Policy Letter 2006), the Flemish government opted for a horizontal science, technology and innovation policy, open to any scientific or technological domain.

The main investment in biotechnology by the Flemish government, based on the priority for biotechnology in the 1990s, is the establishment of the Flanders Interuniversity Institute for Biotechnology. It is one of the four large research institutes set up by the government to stimulate high quality research relevant to the industry. In Section 2.3.2, more details about VIB will be provided. Another biotechnology-related initiative was the establishment of the Biotech Fonds Vlaanderen (Biotech Fund Flanders) in 1994. The fund, which is sponsored by the Flemish government, has 24.6M EUR at its disposal for commitments to both Flemish companies and foreign companies that intend to start life sciences activities in Flanders. The fund is managed by GIMV, the Gewestelijke Investeringsmaatschappij Vlaanderen (Regional Investment Company of Flanders). GIMV used to be a governmental investment organisation, but since the mid-1990s the Flemish government has gradually withdrawn itself.

Despite the more recent horizontal approach to science, technology and innovation policies, in practice there are some technology-specific support initiatives, also related to biotechnology research and innovation. The Administratie Wetenschap en Innovatie (Science and Innovation Administration AWI)<sup>16</sup> is responsible for several initiatives to support the research infrastructure in Flanders. One of these initiatives is their investment of 3M EUR for a second biotechnology incubator.<sup>17</sup> In order to strengthen the competitiveness of specific sectors by stimulating innovation, the Flemish government also finances excellentiepolen (clusters of excellence). These clusters of excellence bring together industry and research organisations in specific economic sectors. One of these clusters is the Milieu- en Energietechnologie Innovatieplatform (Environmental and Energy Technology Innovation Platform MIP), including a working group on industrial biotechnology and biofuels<sup>18</sup>. This cluster was established in 2005, but research activities started in 2006.

Although the Flemish government continues the horizontal approach in all policy documents and declarations, the Vice-Minister-President of the Flemish government and the Flemish Minister of Economy, Entrepreneurship, Science, Innovation and Foreign Trade declared in a speech at the first Annual Biotech Convention in June 2005 that the Flemish government 'is dedicated to seeing Flanders become one of the top five regions in the world for biotech research and development by 2010.'<sup>19</sup> In that speech, the Minister announced the setting up of a life sciences round table, in which various biotechnology actors come together to make an inventory of the various problems in the life sciences sector. In November 2005, this round table was set up as the Life Sciences Platform. This platform aims to develop a long-term strategic vision for the life sciences industry in Flanders and to formulate recommendations. In the first phase (December 2005-May 2006), the life sciences industry prepared a SWOT analysis, including recommendations for further development. In the second phase (June 2006-May 2007) the various public authorities, the industry and other relevant stakeholders planned to discuss the recommendations for implementation (Witboek Life Science Industrie Vlaanderen, 2006).

### 1.3.3 Support for biotechnology in Wallonia

The **Walloon government** considers biotechnology and life sciences to be one of the four important domains for the development of the Walloon economy (Simonet, 2005 and DGTRE, 2005). Hence, the Walloon government has initiated several programmes and instruments to support biotechnology research and innovation. Some of these initiatives are biotechnology-specific, others are open to all sorts of technologies, but biotechnology is one of the priorities. This section will give a short introduction to these initiatives; more detailed information will be available in Section 2.3.3.

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<sup>16</sup> Since April 2006 this is called Department Economy, Science and Innovation (EWI)

<sup>17</sup> [http://awi.vlaanderen.be/onderzoek\\_en\\_ontwikkeling/index.php?id=38](http://awi.vlaanderen.be/onderzoek_en_ontwikkeling/index.php?id=38), accessed 13 February 2006.

<sup>18</sup> <http://www.mipvlaanderen.be/public/page.asp?id=2>, accessed 13 February 2006.

<sup>19</sup> Innovation: Key to Economic Growth, Speech by Mrs. Fientje Moerman, Vice Minister-President of the Flemish Government and Flemish Minister for Economy, Enterprise, Science, Innovation and Foreign Trade, on the occasion of Knowledge for Growth: the First Annual Biotech Convention, June 3, 2005.

Supported by the Objective 1 funds of the European Structural Funds, the Walloon government created new research centres in the mid-1990s. One of these centres is dedicated to biotechnology, Biovallée. Another centre is Agro-food Valley / NATISS, which focuses on bio-polymers for foods. These centres perform strategic basic and applied research and are expected to transfer it to the industry (Federaal Wetenschapsbeleid, 2005). Objective 2 funds have made the creation of a new centre of excellence in biotechnology possible. In 2002, the Groupe Interdisciplinaire de Génoprotéomique Appliqué (Interdisciplinary Applied Genoproteomics Group GIGA) started. GIGA performs high-quality research, but also integrates service facilities, a business area for biotechnology companies and a biotechnology training centre.<sup>20</sup> The Walloon government has also initiated other actions to support clusters and competence poles. In 2001, the Walloon government launched five economic clusters, one of which was dedicated to energy and biotechnologies. In 2003, three new clusters were established, one of which focused on clinical research. Another cluster initiative was also developed in 2001 through the Technology Cluster programme. Since the launch in 2001, ten clusters have been established, one of which was dedicated to nutrition (European TrendChart on Innovation, 2004 and 2005).

In addition to these clusters, the Walloon government announced in December 2005 the establishment of five Pôles de compétitivité in the fields of aerospace, life sciences, agro-industry, transport and logistics, and mechanical engineering. The competitiveness clusters resemble main clusters in five key areas, in which the various clusters mentioned before can take part. The first four were selected in July 2006 with some 20 projects, of which one was the life sciences cluster, comprising five projects.<sup>21</sup>

Research and development in strategic domains is also supported by mobilising programmes. These programmes encourage collaboration among and between research organisations and industry. A dedicated biotechnology programme was established in 1998 (Bioval). In 2002, the programme Waléo 1 was introduced, followed by Waléo 2, which is dedicated to medical service technologies. The mobilising programmes Réseaux 1 and 2 were set up to support research projects of Walloon promoters taking part in European Networks of Excellence selected by the European Commission. In Réseaux 1 and 2, the projects relate to one of the five priority technological fields: genomics and biotechnology for health; nanotechnology, materials and production processes; aeronautics and space; food safety and health risks.

Another programme is the FIRST programme introduced by the Walloon government in 1989. FIRST stands for Formation et d'Impulsion de la Recherche Scientifique et Technologique (Training and Promotion of Scientific and Technological Research) and aims to promote exchanges between the scientific and industrial communities and to create the conditions in which a structured cooperation can develop between the different actors in the research field, enabling them to mutually benefit from an exchange of scientific and technological know-how, from the sharing of experience and the use of sophisticated equipment. The programme was developed as a mechanism for both

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<sup>20</sup> [http://www.giga.ulg.ac.be/download/Gigapresspack\\_09\\_2005.pdf](http://www.giga.ulg.ac.be/download/Gigapresspack_09_2005.pdf), accessed 13 February 2006.

<sup>21</sup> [http://clusters.wallonie.be/xml/index\\_en.html](http://clusters.wallonie.be/xml/index_en.html), accessed 21 July 2006.

strengthening university-industry cooperation and encouraging the transfer and exploitation of research results in favour of the Walloon economy. A number of sub-schemes have been developed including FIRST Spin-off, FIRST Enterprise, FIRST Enterprise International, FIRST PhD, FIRST Higher Education, FIRST Europe and First DEI. The FIRST programme is a generic research programme without any technological priorities.

In addition to these programmes, the Walloon government also provides continuous support measures for enterprises (Les Subvention aux Entreprises; Les Avances Récupérables) and SMEs in particular (Les Aides aux PME). It is a broad set of measures including support for hiring consultancy services, for hiring scientists and engineers for R&D projects, for feasibility studies, for acquiring intellectual property rights and licenses, as well as for industrial basic and applied research projects.

In 2003, the Walloon government decided to invest 12.5M EUR in a five-year programme to support excellent university research in the field of immunology therapies at the Institut d'Immunologie Médicale (Institute of Medical Immunology). The Université Libre de Bruxelles and GlaxoSmithKline Biologicals participated in this programme as well (DGTRE, 2005). This ad-hoc investment was followed-up in the Programmes d'Excellence in 2005.

The **government of the French Community** provides support for universities, research institutes and higher education institutes. This support includes a basic donation to the organisations, as well as funding through response mode systems. French Community government funding is open to all technology fields, including biotechnology, but biotechnology is not given any priority. The non-policy-directed funding provided by the French Community government is described in Section 2. 2.3.

#### **1.3.4 Support for biotechnology in the Brussels Capital Region**

Based on the presence of a relatively large number of university hospitals, the government of the Brussels Capital Region considers life sciences and biotechnology as one of the three main domains.<sup>22</sup> Research and innovation in biotechnology are supported and stimulated by mainly generic instruments. These generic programmes include support for applied research and development projects at enterprises and for support of strategic and fundamental research at universities and higher education institutes. In 1998, the regional impulse programme CELLO was launched in order to combine the expertise of three universities of the Region (Université libre de Bruxelles, the Vrije Universiteit Brussel and the Université catholique de Louvain-La-Neuve) in the field of cancer cell therapy. This programme led to the establishment of a spin-off, BruCells. Another biotechnology-related regional impulse programme in bioinformatics was launched in 2002 (BELSPO, 2005). Brussels has several science and technology parks, one of which is related to biotechnology. The Agence Bruxelloise pour l'Entreprise (Brussels Enterprise Agency) considers biotechnology to be one of its priority areas and has a dedicated unit to support biotech companies.

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<sup>22</sup> Beleid inzake wetenschappelijk onderzoek, Minister Benoît Cerexhe, [www.cerexhe.irisnet.be/site/polmin/index\\_html/polmin/polrech/nl](http://www.cerexhe.irisnet.be/site/polmin/index_html/polmin/polrech/nl), accessed 19 October 2005.

## 1.4 Framework conditions

### *Regulation*

Regulation for biotechnology is the responsibility of several authorities at both the federal and regional levels. At the federal level, the responsible departments are the Federal Public Service Employment, Labour and Social Dialogue and the Federal Public Service Health, Food Chain Safety and Environment. The Flemish administrative department is the Administratie voor Milieu, Natuur, Land en Waterbeheer (Administration for Management of Environment, Nature, Land and Water ANIMAL)<sup>23</sup>. In Wallonia, the Direction Générale des Ressources naturelles et de l'environnement (Directorate General for Natural Resources and the Environment DGRNE) is responsible for biosafety regulations. The responsible organization in the Brussels Capital Region is the Institut Bruxellois pour la gestion de l'Environnement (Brussels Institute for Management of the Environment IBGE-BIM). The various federal and regional departments have set up one single scientific evaluation system for biosafety issues. The system consists of two entities: the Biosafety Council, which is embedded in the Service of Biosafety and Biotechnology (SBB). The Council advises the various authorities about the safety of activities with genetically modified organisms and pathogens for human health and the environment. SBB supports the council by performing risk assessments and evaluations of applications for contained use and deliberate release. All information regarding biosafety and regulation is accessible through a dedicated website: <http://www.biosafety.be/>. The European directives on biosafety issues are implemented and translated into both federal and regional regulations.

Belgium belongs to the few countries in the world which have a permissive policy on human embryonic stem cell research. Already in 2003, a law on research with embryos was implemented. Through this law, reproductive cloning is forbidden, but creating new embryos for research purposes (therapeutic cloning) is allowed providing the research cannot be carried out using remaining embryos. The law states clearly under what conditions therapeutic cloning is allowed.<sup>24</sup>

As is the case in many other European countries, the implementation of the EU directive on the patentability of biotechnology inventions (98/44/EC) has been delayed by lengthy parliamentary debate. In September 2004, Belgium was already convicted by the European Court of Justice for failing to implement the directive in a timely fashion. On 23 May 2005, Belgium did implement the EU directive in its modified Patent Act.<sup>25</sup> The Belgian patent system is the responsibility of the federal government, operated through its Federal Office for Intellectual Property Rights, part of the Federal Public Service Economy, SMEs, Self-employed and Energy. This office provides services related to administering intellectual property rights, including provision of information and access to sources of technical and strategic information contained in patents, as well as awareness-raising activities in the field of intellectual property rights. The Federal Public

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<sup>23</sup> Since April 2006, this is called Department Agriculture and Fishery

<sup>24</sup> <http://www.ejustice.just.fgov.be/cgi/article.pl>, accessed 14 February 2006.

<sup>25</sup> <http://www.ipfrontline.com/depts/article.asp?id=7756&deptid=6>, accessed 4 January 2006.

Service Finance supports the acquisition of patents by an increased rate of tax deduction for R&D investments.

### ***Availability of financial capital***

At a regional level, Belgium has several (public and private) investment companies and public initiatives to provide (access to) financing for start-ups and innovative enterprises. Nevertheless, the High Level Group 3% considers Belgian availability of risk capital as limited and problematic. According to this advisory council, there is a structural lack of funds, and the funds that are available are considerably fragmented and inadequate. Investors are not interested in investments in the range of 3M EUR and there are only a few, if any, local investors willing to invest relatively large amounts in the successful international application of local intellectual capital (BELSPO, 2005b).

### ***Public attitude to biotechnology***

The public attitude of Belgians to science and technology and in particular biotechnology has been studied in the Eurobarometer (no. 58.0; Gaskell et al., 2003 and no 64.3; Gaskell et al., 2006), by the Department of Sociology at the Free University of Brussels (Claeys et al., 2004) and also in the Special Eurobarometer report 'Social Values, Science and Technology' (no. 225, 2005). The Special Eurobarometer report 'Risk Issues' (no. 238, 2006) studied the European perception of risk related to food safety.

In general, Belgians are modestly optimistic about the impact of science and technology on the quality of life (74% believes science and technology will have a positive effect; the EU average is 77%). Only 46% (EU average is 58%) believes that future generations will have a better quality of life (Special Eurobarometer no. 225, 2005). The somewhat modest opinion regarding the positive effects of science and technology are also reflected in the fact that 61% of Belgians believes that we have the right to exploit nature for the sake of human well-being, while 86% believes that we have the duty to protect nature, even if this limits human progress. Important to note here is that human well-being is defined here as happiness and welfare, while human progress is defined as science, technology and innovation. This line of thinking also extends to biotechnology. The Special Eurobarometer report (no. 225, 2005) states that 57% of Belgians believes that biotechnology can have and genetic engineering will have a positive effect on our way of life in the next 20 years. This is below the EU average of 65%. Nevertheless, the Eurobarometer report of 2003 shows Belgium to be one of the European countries with an optimistic attitude towards biotechnology. Only Spain, Sweden, Italy and Portugal were more optimistic (Gaskell et al., 2003). In 2005, this index for optimism even improved for Belgium, although in several other countries this improvement in optimism for biotechnology was stronger (Gaskell et al., 2006).

The studies show that Belgians, like their counterparts in other European countries, differentiate between the various application areas of biotechnology. Belgians believe that biotechnology will certainly contribute to improvements in the field of human health, but many also think that genetic knowledge will harm privacy, peace and the taste of food. The Eurobarometer also shows that Belgians do not support biotechnology in food (Gaskell et al., 2003). The support for GM food decreased even further in 2005 (Gaskell

et al., 2006). The Special Eurobarometer report on Risk Issues (no. 238, 2006) shows that 53% of Belgians is worried about GMOs in their food and drinks. The Special Eurobarometer report (no. 225, 2005) also shows that 60% of Belgians does not accept meat farming; i.e. growing meat from cell culture, and that 40% will not accept the use of genetically modified crops to increase the variety of regionally grown food. On the other hand, 41% of Belgians supports the development of genetically modified bacteria that could clean up the environment after environmental catastrophes, providing it is highly regulated and controlled. The Eurobarometer of 2006 also shows Belgium as displaying substantial support for industrial biotechnology applications, providing there are strict regulations (Gaskell et al., 2006).

Claeys et al. (2004) also show that Belgians differentiate between the various applications in highly specific ways. They clearly make a distinction between the different organisms (plants, animals and humans) and between the objective of the application (whether it is for health purposes or not). For example, Belgians do accept genetic interventions in humans for health reasons, but reject genetic interventions on animals and humans for non-health purposes. This is also confirmed by the Special Eurobarometer (no. 225, 2005), which states that 67% of Belgians is against the cloning of human beings so that couples can have a baby even when one partner has a genetic disorder. On the other hand, 50% of Belgians approves the cloning of human stem cells for therapeutic purposes and only 16% is against a database containing the population's genetic data in order to study the genetic causes of diseases (no. 225, 2005). The latest Eurobarometer (2006) confirms considerable support for embryonic stem cell research, but again providing there is strict regulation (Gaskell et al. 2006).

The Eurobarometer of 2003 also tested Belgian's knowledge of biology and genetics. The level of this knowledge of biotechnology is slightly below the European average: four countries have lower scores. Together with Portugal, Spain, Greece, Austria and Ireland, Belgium population is among the lowest percentile regarding engagement (Gaskell et al. 2003).

## **1.5 General introduction to main biotech research actors**

### **1.5.1 Main biotech research actors at the federal level**

Some of the federal scientific institutes work in research fields related to biotechnology, although none of these institutes is dedicated to biotechnology research. The Royal Belgian Institute for Natural Sciences is dedicated to biology, and more specifically to zoology, palaeontology, anthropology, prehistory, as well as mineralogy and sedimentology. This institute cooperates closely with the Royal Museum for Central Africa in molecular research in animal sciences. In 2007, a joint molecular laboratory will be set up, initiated by the federal government and financed with 1M EUR for four years. The Veterinary and Agrochemical Research Centre (VAR) focuses on research related to epidemic and transferable diseases in animals, infectious diseases, waste materials and contaminants of genetically modified organisms, and epidemiology. The Scientific Institute for Public Health (WIV) has departments in microbiology, pharma-bromatology, epidemiology and toxicology, and a separate department called the Pasteur Institute. The

Pasteur Institute focuses on research in the fields of immunology, bacteriology, mycobacteriology and molecular microbiology. The research at the National Botanic Garden of Belgium includes mainly classical herbarium studies.

The Belgian Federal Science Policy Office is an associated partner in the ERA-NET for Industrial Biotechnology and will cooperate with the other partners in order to create a European Research Area in this field.<sup>26</sup>

None of the collective research centres (Centra De Grootte) is dedicated to biotechnology.

### **1.5.2 Main biotech research actors in Flanders**

Except for the Katholieke Universiteit Brussel (Catholic University of Brussels), all Flemish universities are active in biotechnology research. Four universities (RUG, KULeuven, UA and VUB) have research departments participating in VIB, the Flanders Interuniversity Institute for Biotechnology. The Universiteit Gent (University of Ghent) is specifically well-known for its molecular biology with an emphasis on biomedical and plant genetic research. The Instituut voor Plantenbiotechnologie voor Ontwikkelingslanden (Institute of Plant Biotechnology for Developing Countries IPBO) was also set up by the University of Ghent. The Katholieke Universiteit Leuven (Catholic University of Louvain) has a strong focus on medicine and is active in human genetics, neurodegeneration, cellular biology, cardiovascular biology, gene therapy, cellular signalling and developmental biology. The university hospital at the University of Leuven has a dedicated research Centre for Human Heredity. Biotechnology research at the Vrije Universiteit Brussel (Free University of Brussels VUB) is centred on human genetics, microbiology, immunology, parasitology and structural biology. Its research centre of Industrial Microbiology, Fermentation Technology and Downstream Processing (IMDO)<sup>27</sup> is active in industrial food biotechnology, environmental biotechnology and bioprocessing. The Universiteit Antwerpen (University of Antwerp) is mainly active in the fields of molecular and cellular biology, cell communication, neurogenetics and psychiatric genetics. The Universiteit Hasselt (University of Hasselt) focuses its research on the mechanisms of autoimmune diseases (BIOMED) (PriceWaterhouseCoopers & VIB).

VIB, the Vlaams Interuniversitair Instituut voor Biotechnologie (Flanders Interuniversity Institute for Biotechnology), is dedicated to biotechnology research and will be described in more detail in Section 2.3.2. The main biotechnology focus at the Vlaams Instituut voor Technologisch Onderzoek (Flemish Institute for Technological Research VITO) is on human health and the environment, and more specifically ecotoxicology, physiology and biochemistry (PriceWaterhouseCoopers & VIB). IMEC and VIB have set up a joint laboratory dedicated to biosensors and bionanotechnology (Flanders Foreign Investment Company).

In the other government scientific research institutes, some research is carried out related to biotechnology topics. Relevant research institutes are the Instituut voor Natuur- en

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<sup>26</sup> Information provided by Ms. Bosschaerts from BELSPO.

<sup>27</sup>New name: Research Group Industrial Microbiology and Food Biotechnology

Bosonderzoek (Research Institute for Nature and Forest INBO), the Instituut voor Landbouw- en Visserijonderzoek (Institute for Agriculture and Fisheries Research ILVO), and the Centrum voor Landbouwonderzoek (Centre for Agricultural Economy CLE). The research branch of this last centre was integrated into ILVO, while the administrative branch was transferred to the Flemish governmental department for agriculture and fisheries. The Prins Leopold Instituut voor Tropische Geneeskunde (Prince Leopold Institute of Tropical Medicine) specialises in health problems related to the specific ecological and socio-economic conditions of developing countries, more specifically in tropical microbiology and tropical human and veterinary medicine. The Onderzoekscentrum voor Siertleelt (Research Centre for Ornamental Plants) is jointly financed by government and industry, and studies and develops plants with new characteristics such as pest and disease resistance.

The Milieu- en Energietechnologie Innovatieplatform (Environmental and Energy Technology Innovation Platform MIP) is one of the clusters of excellence in Flanders that prioritises biotechnology research, with a specific emphasis on industrial biotechnology research and development. The platform was prepared in 2005 and launched in February 2006.

### **1.5.3 Main biotech research actors in Wallonia**

Regarding biotechnology research, several clusters<sup>28</sup> in Wallonia operate in this field of research (DGTRE, 2005a). The Liège cluster concentrates around the Université Liège (University of Liège) and focuses on genomics research. The Université Liège has several research centres, such as CART (Centre for Analysis of Residues in Traces), CEIB (Interfaculty Centre of Biomaterials), CRPP (Centre de Recherche sur les Protéines Prion), CIP (Centre for Protein Engineering) and CRGB (Research Centre for the Management of Bioindustries). The GIGA (Groupe Interdisciplinaire de Génoprotéomique Appliqué /Interdisciplinary Applied Genoproteomics Group, an Objective 2 research centre) initiative at the Université Liège integrates 1) the Centre of Biomedical Integrative Genoproteomics (CBIG, cancer and inflammation), 2) six technological facilities in bioinformatics, genomics, proteomics, transcriptomics, transgenics, and protein production, 3) laboratories and offices for biomedical businesses, and 4) a training centre in biotechnology dedicated to continuing education for career development. For the period 2003-2006, the total budget amounted to 56M EUR, provided by local, Wallonia and European authorities. The Université Liège also collaborates with the University of Aachen (Germany), Universiteit Hasselt (University of Hasselt) and the University of Maastricht (The Netherlands) in the ALMA-GRID project, 50% of which is financed by the European INTERREG III funds (total budget is 2M EUR). The ALMA-GRID will be a virtual laboratory environment offering research infrastructure in the fields of genomics, proteomics and bioinformatics.<sup>29</sup>

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<sup>28</sup> Not to be confused with the Pôles de compétitivité and other clusters, which are set up by programmes and initiatives of the Walloon Government. These pôles and clusters are networks of enterprises, universities, research centres, etc. and develop joint research projects as part of a larger set of joint activities.

<sup>29</sup> <http://www.alma-emr.nl/almagrid.html>; accessed 21 December 2005.

The Gosselies (Charleroi) cluster combines the life sciences research conducted at the l'Institut de biologie et de médecine moléculaires (Institute of Molecular Biology and Medicine IBMM) and the Institut d'Immunologie Médicale (Institute of Medical Immunology IMI). Both institutes are part of the Université Libre de Bruxelles (ULB). IBMM closely operates with the non-profit organization Biovallée. Biovallée was founded in 2001 at the initiative of the Université Libre de Bruxelles, the Université Mons and Igretec. Biovallée develops applied research projects and provides services (genomics, proteomics, animal and vegetable transgenesis) to academic laboratories and private companies.

The Gembloux-Namur cluster is situated around the Université de Namur (University of Namur) and the Faculté Universitaire des Sciences Agronomiques de Gembloux. The Université de Namur aims to create close links between the faculties of medicine and science and the computer sciences institute, and specialises in PCR and DNA research (microarray techniques). The Agricultural University of Gembloux is dedicated to agriculture, food and forestry sciences and collaborates with the Université Liège in the Centre Wallon de Biologie Industrielle (CWBI), which is dedicated to industrial biotechnology.

The Louvain-la Neuve cluster is the domain of the Université catholique de Louvain-la-Neuve (UCL), based in Louvain-la Neuve and in Brussels (biomedical campus). The Institut des Sciences de la Vie (ISV) is based in Louvain-la Neuve and combines 24 research groups, active in molecular and cellular biology. The Christian de Duve Institute of Cellular Pathology (ICP) is active in many fields, including biochemistry and cellular biology, genetics and development, immunology, virology and molecular haematology, as well as cancer immunology and genetics. ICP also accommodates the Belgian branch of the Ludwig Institute for Cancer Research, which is also active in the field of cancer immunology and genetics.

In addition to these various groups of research actors in Wallonia, research is also carried out by means of joint activities by the various clusters and competitiveness poles initiated and supported by the government. The various research actors mentioned before participate in these poles and clusters.

#### **1.5.4 Main biotech research actors in the Brussels Capital Region**

In Brussels, the ULB has five teaching hospitals and its Faculty of Medicine is involved in molecular biology, cancer research, immunology, pharmaceutical research and public health. The Center for Research and Education in Food and Chemical Industry (CERIA) houses seven institutes, three of which are active in research and education in biochemistry, microbiology, food technology and bioprocessing. The Institut Meurice belongs to the Haute Ecole Lucia de Brouckère and is in charge of education of Master Industrial Engineers in chemistry or biochemistry. It specialises in applied research in the fields of applied microbiology, beer production, food technology, enzyme and chemical catalysis and industrial processes. The Institut Meurice completes the fundamental research developed by the Institut de Recherches Microbiologiques Jean-Marie Wiame. This institute specialises in classical genetic, physiological studies of bacteria and yeast,

and three-dimensional characterization of proteins and enzymes. In 1983, a technological transfer interface belonging to the Institut Meurice was created. This Unit of Biotechnology is involved in five engineering domains: protein purification, bioengineering and micro-organism propagation, environmental engineering, process computer-based design and drying of biomaterials.

It is estimated that 2 670 life sciences researchers are employed in the Brussels Capital Region and that 11 220 students study life sciences there.<sup>30</sup>

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<sup>30</sup> <http://www.biotechnibrussels.be/index.php?id=11>, accessed 4 January 2006.

## **2. Funding of biotechnology R&D, transfer and commercialisation**

### **2.1 Introduction**

This report reviews the funding of biotechnology research and commercialisation. In the report, we make a distinction between policy-directed funding and non-policy-directed funding of biotechnology.

Policy-directed funding includes funding directed by explicit policy decisions about specific instruments, such as R&D programmes, programmes encouraging collaboration, industrial research grants, support for centres of excellence, support for commercialisation of research, support for start-ups, programmes encouraging mobility of researchers, programmes with open calls, etc. This policy-directed funding can include biotechnology-specific policy instruments and generic policy instruments. Biotechnology-specific policy instruments are instruments that have been specifically set up to stimulate biotechnology. Generic policy instruments are instruments that are not dedicated to a specific technology, but which in principle stimulate all technologies, including biotechnology. The BioPolis project only considers those generic instruments that make a reference to (the stimulation of) biotechnology activities in the policy of the funding organisation running the programme or that of the ministry/government department itself.

Non-policy-directed funding of research is linked to structural government support for scientific education, research and research infrastructure. This type of funding is mainly given through block grants to universities and (government) research institutes and the open-call system of research councils. Research councils, research institutes and government research institutes develop their own programmes through which biotechnology may be supported.

In this chapter, funding of biotechnology research through policy- and non-policy-directed instruments, and of biotechnology commercialisation through policy-directed instruments are presented. Data were collected through desk research (publications, documents, websites of national and regional public funding organisations and/or governmental departments), a survey conducted by representatives of funding organisations that manage the generic and biotech-specific programmes, interviews with representatives of organisations that are involved in non-policy-directed and policy-directed funding. The sources of the data (including websites of the funding organisations and their programmes) and the names of contact persons that participated in the survey and/or who were interviewed can be found in Annex 3 (List of contact persons) and Annex 4 (References). Section 2.2 presents the non-policy-directed funding and Section 2.3 the policy-directed funding. Charities also play an important role in the funding of biotechnology research in some countries; they will be addressed in Section 2.4. The final section provides a short overview of European funding of biotechnology research in Belgium through the 6<sup>th</sup> Framework Programme.

## 2.2 Non-policy-directed funding of biotechnology research

This section presents an overview of funding organisations that provide non-directed funding of biotechnology research and the budget they spend on biotechnology, discussed in line with the federal and regional levels.

### 2.2.1 Federal government

#### *Federal Scientific Institutes*

The federal scientific institutes receive funding from three main sources. First, they receive basic funding from the federal government, to be used for personnel costs and general costs.<sup>31</sup> Second, the institutes also obtain their own income from the sale of museum tickets, the museum shop, organising lectures, as well as from project funding from the federal government and charities (mainly the National Lottery). Third, they receive project funding from non-federal governments, such as the Flemish government and the European Commission.

Most of the federal scientific institutes have a long history, and it is history that made them official federal institutes. Two of the federal scientific institutes have an explicit task or assignment given by the federal government, which is relevant for biotechnology research. The Veterinary & Agrochemical Research Centre acts as the federal centre for epidemiological research with animals and humans, food safety research and for research in infectious diseases. The annual basic funding amounts to approximately 7.1M EUR, 90% of which is used for biotechnological research. In addition, research is also financed by project funding from the federal government, the European Commission, the French Community and the Walloon government. Between 2002-2005, this project funding amounted to approximately 5M EUR.<sup>32</sup>

The Scientific Institute for Public Health is the federal research centre for public health issues, such as the surveillance of transferable and non-transferable diseases, checking and controlling federal product norms (medicines, vaccines, food), risk assessments (e.g. of GMOs), managing a collection of micro-organisms, and issues related to health and environment. The Pasteur Institute is part of the Scientific Institute for Public Health.

#### *Belgian Co-ordinated Collections of Micro-organisms (BCCM)*

The Belgian Federal Science Policy Office (BELSPO) finances the Belgian Co-ordinated Collections of Micro-organisms as a support for the research and development activities of the life sciences and the biotechnology sector. This consortium of four culture collections supports the R&D activities of the biotechnology sector by providing pure and well-authenticated biological material, which often constitutes the basis for biotechnology research projects. BCCM aims to share the biological material of its collections, related information, as well as its experience and know-how in the field of

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<sup>31</sup> Although the institutes receive basic funding for personnel costs, most of the personnel of these institutes are financed by the Federal Science Policy separately. Hence, the personnel costs financed by the basic funding are only a small part of the total personnel costs.

<sup>32</sup> Information provided by Ms. E. Teurlinckx from the Veterinary & Agrochemical Research Centre, June 2006.

fundamental and applied (micro)biology for the benefit of its partners and clients in the academic and industrial communities. The services provided are: 1) distribution of biological material; 2) public, safe and patent deposits; 3) information provision; 4) molecular fingerprinting of proprietary production strains; 5) contract research and training. The programme started in 1983 in cycles of five years each. The sixth cycle is presently active, which started 1 January 2004. In the period 2002-2005, the total programme budget was 12.53M EUR. BCCM is in principle a generic instrument in the sense that the collections of micro-organisms can be used for biotechnology and non-biotechnology research. However, the federal government finances BCCM as a support for research activities related to biotechnology and life sciences. Therefore, the total budget for the period 2002-2005 is considered a biotechnology-dedicated budget.<sup>33</sup>

### ***Interuniversity Attraction Poles***

The Interuniversity Attraction Poles programme funded by the Belgian Federal Science Policy Office aims to give impetus to the formation of interuniversity networks of excellence in basic research. The programme's objectives are:

- To promote long-term, structured collaboration among university research teams from both of Belgium's linguistic communities and teams belonging to the federal scientific institutions;
- To foster complementarity and interdisciplinarity among these teams;
- To enable young teams to benefit from the environment of excellence provided by a network and its international renown and influence;
- To facilitate the insertion of Belgian research teams into European and international networks;
- To give teams that are already recognised within the international scientific community additional human and material resources for building sufficient critical mass.

The programme started in 1987 in five-year phases. The fifth phase ran from 2002 until 2006 with a total budget of 112M EUR. The research fields explicitly stimulated in this fifth phase were: life sciences, exact and applied sciences, and human sciences. In the fifth phase of the project, 36 networks and 261 research teams were set up and funded. In the life sciences field 15 research networks were funded. The total budget for the period 2002-2005 amounted to 89.31M EUR, 30.65M EUR of which was granted to biotechnology-related research networks. Most of the life sciences research networks were in health biotechnology (28.47M EUR) and to a lesser extent in plant biotechnology (2.18M EUR).<sup>34</sup>

### ***Sustainable Production and Consumption Patterns 2 programme***

A third programme, the Sustainable Production and Consumption Patterns 2 programme, does not prioritise biotechnological research, although one of the themes is agro-food, thereby enabling the funding of biosafety-related research projects. The programme ran from 2001 until 2005 and was a follow-up to the first programme that ended in 2001. One of the four themes was agro-food, which includes the tracking and tracing of GMOs and

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<sup>33</sup> Information provided by Ms. M. Bosschaerts from BELSPO, February 2006.

<sup>34</sup> Information provided by Ms. V. Feys from BELSPO, May 2006.

other biosafety issues. During the time frame of the programme, 54 projects were set up, including one project on detecting and tracing GMOs in food products. The total budget for the programme was 21.9M EUR. The budget allocated to biotechnology-related research is not known.<sup>35</sup>

Table 2.1 gives an overview of the federal non-policy-directed funding of biotechnology

Table 2.1 Non-policy-directed funding of biotechnology research at the federal level (in M EUR)

| <b>Funding organisation</b>            | <b>Public research institutions / Response mode programmes</b> | <b>Period</b> | <b>Funds</b> |
|--|--|---------------|--------------|
| BELSPO – Federal Scientific Institutes | Veterinary & Agrochemical Research Centre                      | 2002-2005     | 25.55M EUR   |
| BELSPO – Federal Scientific Institutes | Scientific Institute for Public Health                         | n.a.          | n.a.         |
| BELSPO                                 | Belgian Co-ordinated Collections of Micro-organisms            | 2002-2005     | 12.53M EUR   |
| BELSPO                                 | Interuniversity Attraction Poles                               | 2002-2005     | 30.65M EUR   |
| BELSPO                                 | Sustainable Production and Consumption Patterns 2              | 2001-2005     | n.a.         |

Source: BioPolis Research

Key: n.a. = not available

### 2.2.2 Flanders

#### *Fonds voor Wetenschappelijke Onderzoek-Vlaanderen (Research Foundation – Flanders FWO)*

The Fonds voor Wetenschappelijk Onderzoek-Vlaanderen (Research Foundation - Flanders FWO) provides response mode funding for fundamental scientific research at Flemish universities. The foundation receives its funding from the Flemish government, but also from the federal government, charities and donations. FWO provides funding for research in the following ways:

- Support for individual researchers through research scholarships;
- Support for research projects and research groups;
- Support for scientific contacts and collaborations, both national and international;
- Support for participating in international research projects;
- Granting scientific prizes to excellent scientists.

The total amount of funding available increased gradually from 116.34M EUR in 2000 to 134.8M EUR in 2005. In the period 2002-2005, the total amount of funding available

<sup>35</sup> <http://www.belspo.be/belspo/fedra/prog.asp?l=nl&COD=CP>, accessed 2 August 2006.

amounted to approximately 510M EUR. Almost 75% of this amount came from the Flemish government, almost 10% from the federal government and approximately 15% came from the National Lottery and donations (FWO, 2006). The applications for funding are evaluated by scientific committees, structured in line with main scientific research areas: biological sciences, exact sciences, cultural and language sciences, behavioural and social sciences, medical sciences and applied sciences. Biotechnology research is not defined as a separate category. In the period 2002-2005, FWO funded biotechnology-related research projects for the amount of 95.2M EUR. In addition, in the same period FWO funded research scholarships (mandates) in biotechnology-related research. In 2002, 364 research scholarships were active; in 2003 365; in 2004 393; and in 2005 403 research scholarships. The research scholarships are granted for one to eight years.<sup>36</sup>

#### ***Bijzonder Onderzoeksfonds (Special Research Fund BOF)***

Another research fund is the Bijzonder Onderzoeksfonds (Special Research Fund BOF). Every university in Flanders receives funding from this source and they can decide for themselves in what type of research to invest. The funds from BOF are provided to the universities according to several output criteria, such as number of graduates and publications. In 2005, 97.5M EUR was granted through BOF. BOF is not included in Table 2.2 because the funding is provided to the universities directly, based on output criteria, without any application process. The universities can organise an internal application process, but this type of funding is not included in this study.

#### ***Fonds voor Industrieel Onderzoek (Industrial Research Fund IOF)***

The Fonds voor Industrieel Onderzoek (Industrial Research Fund) was established in 2004 by the government to stimulate and support collaborations between universities and industry. The fund rose from 2M EUR in 2004 to 10M EUR in 2005 (Moerman, 2005c). The fund allows universities to develop their own policies regarding collaborations with the industry and industry-oriented research. The funds available are divided over the universities according to their output performance in research collaborations and industry-oriented research activities. IOF is not included in Table 2.2 because the funding is provided to the universities directly, without any application process. The universities can organise an internal application process, but this type of funding is not included in this study.

#### ***Instituut voor de Aanmoediging van Innovatie door Wetenschap en Technologie in Vlaanderen ((The Institute for the promotion of Innovation by Science and Technology in Flanders IWT)***

The Instituut voor de Aanmoediging van Innovatie door Wetenschap en Technologie in Vlaanderen (Institute for the promotion of Innovation by Science and Technology in Flanders IWT) manages several programmes, but also provides funding through a response mode programme (Permanent 'Open Loket'). Through this programme both companies and researchers receive funding. In the period 2002-2005, IWT financed 65.8M EUR, of which 59.8M was granted to companies and 6M to researchers.

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<sup>36</sup> Information provided by the office of FWO-Flanders, July 2006.

### ***Research institutes***

There are three research institutes that carry out a specific task or assignment for the Flemish government with some link to biotechnology issues. The Instituut voor Natuur en Bosonderzoek (Research Institute for Nature and Forest INBO) is active in biodiversity and environmental research and monitors the environmental situation in Belgium. In 2006, the first year of the combined institutes in INBO, the total donation to INBO amounted to 10.56M EUR (Vervliet, 2006).<sup>37</sup> The budget available for biotechnology is not known. The Instituut voor Landbouw- en Visserijonderzoek (Institute for Agricultural and Fisheries Research ILVO) performs research and provides services in the research areas of seeds and plants, farming and fishery, feed, food safety, agricultural technology and quality control. In 2006, the first year of the combined institutes in ILVO, the total donation to ILVO amounted to 13.96M EUR (Vervliet, 2006).<sup>38</sup> The budget available for biotechnology research is not known. The third institute is the Prins Leopold Instituut voor tropische Geneeskunde (Prince Leopold Institute of Tropical Medicine). This institute has a framework agreement with the Directorate-General for Development Cooperation for a special programme for capacity building in developing countries. In addition, the institute functions as a reference centre for tropical diseases and HIV/AIDS by order of the Ministries of Public Health and Social Affairs. The institute also provides post-university education and training in tropical medicine. It receives a basic annual donation from the Ministry of Education of approximately 8.5M EUR (Vervliet 2005 and 2006; Institute of Tropical Medicine Antwerp, 2004 and 2005). The budget available for biotechnology is not known.

### ***Participatie Maatschappij Vlaanderen (Participation Company Flanders PMV)***

Established in 1995, PMV is a public investment company in Flanders. PMV invests in projects that are of strategic importance for the region and for which private capital is not available. In addition, PMV facilitates private investments in high-risk investments. PMV manages several funds, including VINNOF, the Vlaams Innovatiefonds (Flemish Innovation Fund), which provides risk capital to small companies. VINNOF started in 2005 and the initial amount available in this fund was 75M EUR. PMV also manages the shares of the Biotech Fonds Vlaanderen (Biotech Fund Flanders). This initiative is described in Section 2.3.2. The Gewestelijke Investeringsmaatschappij Vlaanderen (Regional Investment Company of Flanders GIMV) was established in 1980 as the regional public investment company for Flanders. However, GIMV increasingly privatised with a stock exchange quotation in 1997 and public investments and participations have been transferred to PMV. GIMV is responsible for the investment decisions and policy in the Biotech Fonds Vlaanderen (Biotech Fund Flanders).

As mentioned in Section 1.3.2, since 2000 the Flemish government has developed and implemented horizontal policies to support science, technology and innovation. This implies that the initiatives related to biotechnology belong to the category of non-policy-directed instruments. Two biotechnology-related non-policy-directed initiatives were active during the period 2002-2005.

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<sup>37</sup> This amount includes the budgets for research and development and for scientific and technological services.

<sup>38</sup> Ibid.

### ***VIB Bio-incubator***

In 2003, the Flemish government decided to make a one-time grant of 3M EUR to the Vlaams Interuniversitair Instituut voor Biotechnologie (Flanders Interuniversity Institute for Biotechnology VIB) to set up a second bio-incubator. The first bio-incubator was established by VIB in 2000, but more incubator facilities are needed for the growing number of young biotechnology companies.<sup>39</sup> The governmental grant covered 50% of the total establishment costs and was financed by the Financieringsfonds voor Schuldafbouw en Eenmalige Investeringsuitgaven (Financing Fund for Debt Reduction and One-Off Investment Expenses FFEU) (Policy Letter 2003-2004).

### ***Environmental and Energy Technology Innovation Platform***

Another generic instrument is the establishment of the Milieu- en Energietechnologie Innovatieplatform (Environmental and Energy Technology Innovation Platform MIP), which aims to set up and support networks and projects in order to support and stimulate the valorisation of expertise in the Flemish environmental and energy sector. Biotechnology-related research and development is also included in this excellence pole. MIP started in 2005, but the first research budgets were only available in 2006 and therefore this initiative is not included in the overview. The total budget for MIP in the period 2005-2008 will be 7M EUR, of which 0.7M EUR will be allocated to biotechnology research.<sup>40</sup>

Table 2.2 gives an overview of Flemish non-policy-directed funding for biotechnology.

Table 2.2 Non-policy-directed funding of biotechnology research in Flanders

| <b>Funding organisation</b>   | <b>Public research institutions / Response mode programmes</b> | <b>Period</b> | <b>Funds</b> |
|---|--|---------------|--------------|
| The Research Foundation – Flanders - FWO  |  | 2002-2005     | 95.2M EUR    |
| Institute for the promotion of Innovation by Science and Technology in Flanders - IWT | Permanent ‘Open Locket’ – for companies                        | 2002-2005     | 59.8M EUR    |
|   | Permanent ‘Open Locket’ – for researchers                      | 2002-2005     | 6M EUR       |
| Government scientific research institutes   | Research Institute for Nature and Forest                       | n.a.          | n.a.         |
|   | Institute for Agricultural and Fisheries Research              | n.a.          | n.a.         |
| Public research institute   | Prince Leopold Institute of Tropical                           | n.a.          | n.a.         |

<sup>39</sup> [http://awi.vlaanderen.be/onderzoek\\_en\\_ontwikkeling/index.php?id=38](http://awi.vlaanderen.be/onderzoek_en_ontwikkeling/index.php?id=38).

<sup>40</sup> Information provided by Mr. G. Wouters, Managing Director of MIP, May 2006.

| <b>Funding organisation</b>                 | <b>Public research institutions / Response mode programmes</b> | <b>Period</b> | <b>Funds</b> |
|---|--|---------------|--------------|
|   | Medicine   |               |              |
| Flemish government                          | Participation Company Flanders (PMV)                           | n.a.          | n.a.         |
| Science and Innovation Administration (AWI) | VIB Bio-incubator  | 2003          | 3M EUR       |

Source : BioPolis Research

Key: n.a. = not available

### **2.2.3 Wallonia**

The Walloon government considers biotechnology one of the main priorities for the development of the Walloon economy. Therefore, all policy initiatives by the Walloon government (more specifically DGTRE, the department responsible for technology and innovation) that could support biotechnology are considered to be policy-directed initiatives. An exception is the funding for the Centre wallon de Recherches agronomiques (Walloon Agricultural Research Centre), funded by the Direction générale de l'Agriculture (Directorate-General for Agriculture) of the Walloon government. However, the government of the French Community (more specifically DGENORS, the department responsible for higher education and scientific research) supports scientific research in all domains, without any priorities for biotechnology. Therefore, all relevant initiatives managed by the government of the French Community are considered as non-policy-directed. DGENORS donates approximately 95M EUR to scientific research annually (Martin, 2004).

#### ***Fonds national de la recherche scientifique (The National Fund for Scientific Research - FNRS)***

The Fonds national de la recherche scientifique (National Fund for Scientific Research FNRS) is the regional research council of the French Community. FNRS provides funding through research mandates for individual researchers, for research projects, for international mobility of researchers, for visits to international conferences and through scientific prizes. There are also funds associated with FNRS, including the Institut Interuniversitaire des Sciences Nucléaires (IISN), Fonds de la Recherche Scientifique Médicale (FRSM), Fonds de la Recherche Fondamentale Collective d'initiative des chercheurs (FRFC), Fonds pour la formation à la Recherche dans l'Industrie et dans l'Agriculture (FRIA). FNRS and its associated funds are financed by the government of the French Community, the federal government, as well as by the National Lottery and the regional charity activity Télèvie. In 2004, FNRS's total budget amounted to 94.53M EUR. In 2005, 1 419 researchers were active through a research mandate of FNRS and 636 research projects were funded, of which 224 projects were funded through the Télèvie initiative. In addition, 1 224 activities in international and national research

collaboration (mobility of researchers, congress visits, etc.) received funding from FNRS.<sup>41</sup> The funding granted to biotechnology-related research is not known.

***Fonds Spéciaux pour la Recherche (Special Research Fund)***

Another fund is the Fonds Spéciaux pour la Recherche (Special Research Fund) (started in 1985), which is similar to the Flemish BOF fund. The funding is provided to the universities directly on the basis of output criteria, and the universities invest it in research. The fund includes almost 12M EUR and is managed by DGENORS. Again, this type of fund is not included in Table 2.3, as no response mode application process has been organised.

***Action de recherche concertées (Concerted Research Actions - ARC)***

The Action de recherche concertées (Concerted Research Actions programme ARC) was set up in 2000 and aims to support centres of excellence within and between universities. The centres of excellence need to integrate fundamental and applied research and valorisation initiatives. The centres receive support for five years. The total budget available is 11.5M EUR (Martin, 2004). The budget allocated to biotechnology is not known.

***Les programmes de recherche fondamentale collective (Collective fundamental research programmes)***

The collective fundamental research programmes are chosen by the ministries and are set up for at least one year. These programmes are open to both universities and other research organisations and higher education institutes. Approximately 2M EUR is available for 20 to 30 programmes (Martin, 2004). It is not known to what extent these programmes are related to biotechnology.

***Centres de génétique humaine (Centres for human genetics)***

The government of the French Community supports the activities of four centres for human genetics with an annual subsidy, which amounted to 0.73M EUR in 2005 (Martin, 2004; Budget de la Communauté française, 2005 Initial). These four centres are the Centre de Génétique at the Université Libre de Bruxelles, the Centre de Génétique Humaine at the Université catholique de Louvain, the Centre de Génétique de Liège at the Université de Liège, and the Institut de Pathologie et de Génétique in Lovreval.

***Support for various activities***

The government of the French Community provides support for several other activities, such as the realisation of scientific publications (0.20M EUR in 2005), the organisation of scientific conferences (0.14M EUR in 2005), knowledge diffusion activities (0.13M EUR in 2005), scientific associations (0.18M EUR in 2005), prizes and scholarships, international scientific collaborations (0.05M EUR in 2005) and the participation in international (European) research programmes (Martin, 2004; Budget de la Communauté française, 2005 Initial).

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<sup>41</sup> <http://www1.fnrs.be/>, accessed 24 July 2006.

### ***Governmental research organisation***

A governmental research organisation is the Centre wallon de Recherches agronomiques (Walloon Agricultural Research Centre CRA-W). This institute performs agricultural research and has a biotechnology department for molecular biological research in the areas of plant improvement in agriculture and fruit and vegetable horticulture, of plant pathology and soil microbiology (CRA-W, 2004). The annual basic funding from the Walloon government amounts to 4.5M EUR (Directorate-General for Agriculture, 2006). It is not known, which part of this amount of funding is available for the biotechnology department.

### ***Société Régionale d'Investissement de Wallonie (Regional Investment Company of Wallonia SRIW)***

SRIW was established in 1978 and is responsible for long-term investments in companies in Wallonia. The Walloon Region owns 98.6% of the shares of SRIW, and 1.4% is owned by Dexia Bank. Of the net book value, 9.42% is invested in new technologies, including biotechnology.<sup>42</sup>

### ***Société Wallonne de Financement et de Garantie des Petites et Moyennes Entreprises (Walloon Company for Financing and Guarantees for SMEs SOWALFIN)***

SOWALFIN was established in 2002 and is the regional public company which provides co-funding, guarantees and risk capital to SMEs in Wallonia. SOWALFIN is owned by the Walloon Region, SRIW and the Walloon Export Agency, AWEX. It is not known to what extent investments are made in biotechnology companies.

Table 2.3 gives an overview of the non-policy-directed funding in Wallonia

Table 2.3 Non-policy-directed funding of biotechnology research in Wallonia

| <b>Funding organisation</b>               | <b>Public research institutions / Response Mode programmes</b> | <b>Period</b> | <b>Funds</b> |
|---|--|---------------|--------------|
| Ministry of the French Community: DGENORS | National Fund for Scientific Research (FNRS)                   | n.a.          | n.a.         |
|   | Associated funds: IISN, FRSM, FRFC, FRIA                       | n.a.          | n.a.         |
|   | Concerted Research Actions (ARC)                               | n.a.          | n.a.         |
|   | Collective fundamental research programmes                     | n.a.          | n.a.         |
|   | Centres for human genetics                                     | 2005          | 0.73M EUR    |

<sup>42</sup> <http://www.sriw.be/nl/wallet/sectors.html>, accessed 15 August 2006

| <b>Funding organisation</b>                             | <b>Public research institutions / Response Mode programmes</b>   | <b>Period</b> | <b>Funds</b> |
|---|--|---------------|--------------|
|   | Support for various activities                                   | n.a.          | n.a.         |
| Walloon government: Directorate-General for Agriculture | Walloon Agricultural Research Centre CRA-W                       | n.a.          | n.a.         |
| Government of the Walloon Region                        | Regional Investment Company of Wallonia ( SRIW)                  | n.a.          | n.a.         |
|   | Walloon Company for Financing and Guarantees for SMEs (SOWALFIN) | n.a.          | n.a.         |

Source: BioPolis Research

Key: n.a. = not available

#### **2.2.4 The Brussels Capital Region**

The government of the Brussels Capital Region considers life sciences one of the three main priorities in supporting and financing research, development and exploitation. Therefore, all programmes are considered as policy-directed funding and included in section 2.3.4 There are no specific governmental research institutes in the Brussels Capital Region; biotechnology-related research is performed by university institutes and academic hospitals. In addition, the region does not have its own research council. Nevertheless, there are two public investment organisations, the Société Régionale d'Investissement de Bruxelles (Brussels Regional Investment Company SRIB/GIMB) and the Société de Développement pour la Région de Bruxelles-Capitale (Brussels Regional Development Agency SDRB/GOMB). In addition, there is the Agence Bruxelloise pour l'Entreprise (Brussels Enterprise Agency ABE/BAO), which advises and coaches start-ups, enterprises and foreign investors about development projects.

##### ***Société Régionale d'Investissement de Bruxelles (Brussels Regional Investment Company SRIB/GIMB)***

This public investment company was established in 1984 and provides financial support to SMEs. This support is available for all SMEs in all industries. The SRIB participates in approximately 100 SMEs, three of which are active in biotechnology.<sup>43</sup>

##### ***Société de Développement pour la Région de Bruxelles-Capitale (Brussels Regional Development Agency SDRB/GOMB)***

SDRB was established in 1974 and one of its tasks is to provide infrastructural support to enterprises in the region. SDRB manages 25 industry estates, four research parks and several enterprise buildings / incubators. One business and innovation centre is the Erasmus European & Innovation Centre (EEIC), which was established in 1992. EEIC is located near the Erasmus Hospital and the main domains are biotechnology, chemical

<sup>43</sup> [http://www.gimb.be/pages/NL/2\\_1.asp?C=12](http://www.gimb.be/pages/NL/2_1.asp?C=12), accessed 7 August 2006.

engineering and micro-electronics. In 2002, the region spent 0.997M EUR on EEIC (BELSPO, 2005). Several biotechnology spin-offs were created through EEIC. A biotechnology dedicated incubator is Eurobiotec, which provides technical support to Belgian and foreign biotechnology start-ups and spin-offs.

***Agence Bruxelloise pour l'Entreprise (Brussels Enterprise Agency ABE/BAO)***

The ABE provides advice for start-ups, enterprises and foreign investors about many issues, including regulations, availability of subsidies, financial capital, intellectual property, environmental issues, etc. The ABE has acknowledged six different sectors, one of which is dedicated to biotechnology.

Table 2.4 Non-policy-directed funding of biotechnology research in the Brussels Capital Region

| <b>Funding organisation</b>               | <b>Public research institutions / Response mode programmes</b> | <b>Period</b> | <b>Funds</b> |
|---|--|---------------|--------------|
| Government of the Brussels Capital Region | Brussels Regional Investment Company (GIMB-SRIB)               | n.a.          | n.a.         |
|   | Brussels Regional Development Agency (GOMB-SDRB)               | n.a.          | n.a.         |
|   | Brussels Enterprise Agency (BAO-ABE)                           | n.a.          | n.a.         |

Source : BioPolis Research  
Key: n.a. = not available

**2.3 Policy-directed funding of biotechnology research and commercialisation**

**2.3.1 The federal level**

As the federal government does not prioritise certain technology domains (except for domains of national importance, to which biotechnology does not belong), there are no policy-directed funding initiatives that are relevant for biotechnology research and commercialisation.

**2.3.2 Flanders**

***Overview of available policy-directed instruments supporting biotechnology research***

Since the beginning of this century, the Flemish government has adopted a more horizontal science, technology and innovation policy. This means that no generic instruments are included in this overview, although there is a broad set of generic instruments through which biotechnology-related research is also funded. These generic instruments are managed by the Administratie Wetenschap en Innovatie (Science and Innovation Administration AWI) and the Instituut voor Aanmoediging van Innovatie door Wetenschap en Technologie in Vlaanderen (Institute for the promotion of Innovation by

Science and Technology in Flanders IWT). The non-policy-directed initiatives in the period 2002-2005, which are relevant for biotechnology, are described in Section 2.2.2.

In the mid-1990s, the Flemish government considered biotechnology to be one of its main priorities in supporting research and innovation. During that period, the Flemish government generated two initiatives, which were still operational in the period 2002-2005. These initiatives are described here in more detail.

***Gewestelijke Investeringsmaatschappij Vlaanderen (Regional Investment Company of Flanders GIMV) / Participatie Maatschappij Vlaanderen (Participation Company Flanders - PMV) – Biotech Fonds Vlaanderen (Biotech Fund Flanders - BFF)***

In late 1994, the Regional Investment Company of Flanders established the Biotech Fonds Vlaanderen (Biotech Fund Flanders). In 2000, the fund had a total accumulated capital of 24.6M EUR.<sup>44</sup> The fund aims to finance the development of biotechnological products and services by existing Flemish biotechnology companies and foreign companies. In 2005, the Flemish government decided to extend the investment phase and the return term of BFF to the end of 2009 and the end of 2014 respectively. About 50% of the initial amount is still available for investments (Moerman, 2005c). The Participation Company Flanders manages the shares of the Biotech Fund Flanders, while the Regional Investment Company of Flanders is responsible for the investment decisions and policy.

***Vice-Minister-President and Minister for Economy, Entrepreneurship, Science, Innovation and Foreign Trade – Vlaams Interuniversitair Instituut voor Biotechnologie (Flanders Interuniversity Institute for Biotechnology VIB)***

In 1995, the Flemish government decided to set up a virtual interuniversity institute for biotechnology, the Vlaams Interuniversitair Instituut voor Biotechnologie (Flemish Interuniversity Institute for Biotechnology - VIB). It is the Flemish government's main investment in biotechnology research and development. VIB is a joint venture by four Flemish universities, bringing together nine research groups from these universities into one virtual institute. VIB brings together 850 scientists and technicians. The three main objectives are:

- Strategic basic research: the main task of VIB is developing new knowledge in biotechnology (approximately 89.55M EUR in 2002-2005);
- Technology transfer: VIB has a proactive technology transfer policy. Scientific output is protected through patents, which are licensed to national and foreign companies. Scientific discoveries can also be developed into technology platforms, which can result in spin-offs (approximately 13.5M EUR in 2002-2005);
- Scientific information for the public: VIB develops several initiatives to inform the public about biotechnology (approximately 2.33M EUR in 2002-2005).

VIB was established in 2005, but its operations started in 1996. VIB has five-year framework agreements with the Flemish government. VIB was evaluated after the first five years and in 2006 the Flemish government re-evaluated VIB's operations and output.

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<sup>44</sup> [http://www.flandersbio.be/files/Fact\\_Sheets/Funding.pdf](http://www.flandersbio.be/files/Fact_Sheets/Funding.pdf), accessed 7 August 2006.

The Flemish government makes annual donations to VIB. In the period 2002-2005, this funding amounted to 116.3M EUR.<sup>45</sup> Approximately 35-40% of VIB's activities is financed by this governmental donation; the other 60% is financed by funding from competitive programmes, contracts with the industry and income from valorisation activities. VIB's total income in 2005 was almost 47.5M EUR (VIB, 2006). In 2004, VIB was one of the initiators in the setting up of FlandersBio, a cluster of Flemish biotechnology companies, research institutes, providers of financial capital and service providers. In 2005, VIB started an international PhD programme in order to attract more young foreign researchers.

Table 2.5 provides an overview of the Flemish policy-directed funding promoting biotechnology.

Table 2.5 Flemish public policy-directed biotechnology-stimulating instruments in the period 2002-2005 (in M EUR)

| <b>Instrument</b> | <b>Funding organisation</b>   | <b>Budget</b> | <b>% of total</b> | <b>Use of DF/SF</b> |
|-------------------|---|---------------|-------------------|---------------------|
| <i>Specific</i>   | Regional Investment Company of Flanders (GIMV) – Biotech Fund Flanders (BFF)                                    | 24.6          | 17.5%             | -                   |
|                   | Vice-Minister-President and Minister for Economy, Entrepreneurship, Science, Innovation and Foreign Trade - VIB | 116.3         | 82.5%             | -                   |
| <b>Total</b>      |   | 140.9         | 100%              |                     |

Source: BioPolis Research

### 2.3.3 Wallonia

#### *Overview of available policy-directed instruments to support biotechnology research and innovation*

As mentioned in Sections 1.2.3 and Section 1.3.3, policy-directed funding for biotechnology is provided by the Direction Générale des Technologies, de la Recherche et de l'Energie (Directorate General of Technology, Research and Energy - DGTRE) of the Ministry of the Walloon Region. Biotechnology is considered to be one of the main priorities in the development of Wallonia. DGTRE provides support through programmes for research at universities and research centres, as well as support for enterprises, with some dedicated instruments for SMEs. DGTRE also manages the EU Structural Funds. In addition, DGTRE organises activities for diffusion of science and technology to the public, supports project leaders in administrative issues, initiates actions to support the valorisation activities at research centres, and supports and guides enterprises in their search and application for funding. The following funding programmes are in place:

<sup>45</sup> Information provided by Mr. J. De Backer from VIB, February 2006.

- ✓ For universities and research centres, the following programmes were in place in the period 2002-2005:
  - Les Programmes FIRST (FIRST Programmes),
  - Les Programmes Recherche d'Initiative (Research Initiatives Programmes),
  - Les Programmes Mobilisateurs (Mobilising Programmes),
  - Les Programmes d'Excellence (Excellence Programmes),
  - Les Programmes des Centres des Recherche (Programmes of the Research Centres),
  - Venture Capital for University Spin-offs.
  
- ✓ For enterprises, the following programmes and initiatives were set up in the period 2002-2005 :
  - Les Aides aux PME (Support for SMEs): various schemes, including preactivity grants,
  - Les Subventions aux Entreprises (Subsidies for Enterprises),
  - Les Avances Récupérables (Reimbursable Loans),
  - Fonds d'Investissement en Recherche et Développement, (Fund for the industrialisation and commercialisation of the results of research, financed by the region FIRD)
  - Aides à la Promotion de l'Emploi (Recruitment subsidy for unemployed persons APE).
  
- ✓ Support for specific development zones, partly funded by EU Structural Funds and Development Funds.
  
- ✓ Various initiatives to create and support clusters in Wallonia.

***Les Programmes FIRST (FIRST Programmes)***

The Programmes FIRST (FIRST Programme) was introduced by the Walloon government in 1989. FIRST stands for Formation et d'Impulsion de la Recherche Scientifique et Technologique (Training and Promotion of Scientific and Technological Research) and aims to promote exchanges between the scientific and industrial communities and create the conditions in which a structured cooperation can develop between the different actors in the research field, enabling them to benefit from an exchange of scientific and technological know-how, share experience and the use of equipment. The programme was developed as a mechanism for both strengthening university-industry cooperation and encouraging the transfer and exploitation of research results in favour of the Walloon economy. The FIRST programme is a generic research programme without any technological priorities. A number of sub-schemes have been developed, including FIRST Hautes Ecoles (Higher Education), FIRST Spin-off, FIRST Europe, FIRST Enterprise, FIRST DEI, FIRST Post-Doc and FIRST Spin-out.

FIRST Hautes Ecoles (FIRST Higher Education) supports research in the framework of a research collaboration between a higher education institute and an enterprise in Wallonia. The research must have commercial potential. In the period 2002-2005, 37 applications

were granted with a budget of approximately 4.3M EUR.<sup>46</sup> In 2005, 12% of the budget was allocated to research projects in the 'Life Sciences and Agrofood' domain (Technologies du vivant et agroalimentaires) and 12% to 'Human Health' (Santé humaine) (DGTRE, 2003, 2004, 2005b, 2006).<sup>47</sup>

FIRST Spin-off aims to stimulate university researchers to study and further develop the opportunities and conditions for commercial exploitation of their research results, including a possible spin-off. In the period 2002-2005, 50 applications were granted with a budget of approximately 6.9M EUR.<sup>48</sup> In 2005, 35% of the budget was allocated to applications in the 'Life Sciences and Agrofood' domain and 7% to 'Human Health'. Since 1999, 90 applications have been granted in total, which resulted in the creation of 28 spin-offs, ten of which in biotechnology (DGTRE, 2003, 2004, 2005b, 2006).

FIRST Europe supports researchers with an additional training period in a research organisation in another EU member state. After that training period, the knowledge acquired will be applied for the benefit of an enterprise, which is located in the Structural Fund zones of Wallonia. In the period 2002-2004, 111 mandates were granted with a total budget of 10.6M EUR. In 2005, no projects were granted through FIRST Europe. In 2003, 17% of the budget was allocated to 'Life Sciences and Agrofood' and 17% to 'Human Health'. In 2004, approximately 20% of the budget was granted to applications in the 'Life Science and Agrofood' domain and about 17% to 'Human Health' (DGTRE, 2003, 2004, 2005b, 2006).

FIRST Enterprise supports an enterprise in hiring a young researcher from a research organisation. The researcher works on pre-competitive research projects for the company, while continuing to work part of his/her time within the research organisation. FIRST Enterprise aims to stimulate knowledge and technology transfer between research organisations and industry. In the period 2002-2005, 80 applications were granted with a total budget of 6.9M EUR. In the period 2003-2005, 31 grants were allocated to 'Life Sciences and Agrofood' for a total amount of 2.48M EUR (DGTRE, 2003, 2004, 2005b, 2006).

In 2004, DGTRE started the FIRST PhD Enterprise International (DEI), which aims to stimulate researchers gaining experience at foreign research organisations. In 2005, 27 mandates were granted with a total amount of 2.8M EUR. Of this budget 9% was allocated to 'Life Sciences and Agrofood' and 13% to 'Human Health' (DGTRE, 2006).

During 2005 a new FIRST scheme was introduced, FIRST Spin-out. This scheme supports feasibility studies of new technologies developed at an existing company with the intention to create a spin-out. In 2005, one project was funded for the amount of 0.15M EUR (DGTRE, 2006).

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<sup>46</sup> Calculation for 2002 -2005 estimated on the basis of annual figures for 2002, 2003, 2004.

<sup>47</sup> For the year 2004, these figures were given in the annual report. For the years 2002 and 2003, the figures for specific domains are estimates, based on the number of dossiers finalised in these domains. In 2002, another definition of the domains was used: the 'Biotechnology – Agro-alimentaire' domain is considered to be similar to 'Technologies du vivant et agroalimentaires'; the 'Chimie-Médical-Pharmaceutique' domain is considered to be similar to 'Santé humaine'.

<sup>48</sup> Calculation for 2002-2005 estimated on the basis of annual figures for 2002, 2003, 2004.

At the end of 2005, DGTRE launched a new FIRST programme, FIRST Post-Doc. This programme supports post-doc projects of young researchers in enterprises. The first mandates will be funded in 2006 (DGTRE, 2006).

In 2002 and 2003, extra grants were given to FIRST projects that had previously started but which needed more time and a supplementary budget to become finalised. In 2002, these extra grants amounted to 2.5M EUR, 31% of which was allocated to 'Life Sciences and Agrofood' and 8% to 'Human Health'. In 2003, these extra grants amounted to 2.27M EUR (DGTRE, 2003 and 2004).

#### ***Les Programmes Recherche d'Initiative (Research Initiatives Programmes)***

In 2000, the first and second calls for Recherche d'Initiative were announced. In 2001, the third and the fourth calls were announced for this programme and in 2002 the fifth. The programme aims to reinforce scientific excellence at research organisations and to stimulate valorisation of this research to existing or newly created enterprises in Wallonia. The programme is open to all research domains and focuses on interdisciplinary research collaborations within and between research organisations. In 2002, the fifth call resulted in 17 projects granted with a total budget of 13.8M EUR, seven of which were in the 'Life Sciences and Agrofood' domain with a total budget of 5.65M EUR (DGTRE, 2003).

#### ***Les Programmes Mobilisateurs (Mobilising Programmes)***

Les Programmes Mobilisateurs (Mobilising Programmes) are launched periodically by the Walloon government in order to stimulate concentration of R&D in strategic areas for the development of Wallonia. Both universities and enterprises can participate, but in some programmes only public research organisations can participate. In this section the programmes relevant for biotechnology in the period 2002-2005 are discussed.

In 2002, the Waléo 1 programme was launched with the aim of stimulating interdisciplinary and multi-sector research collaborations in the field of human health and to reinforce the already existing competencies of the Walloon industry in the human health sector, in particular health biotechnology. It is a specific programme designed to stimulate biotechnology R&D. Only public research organisations can apply for funding. In 2002, 14 projects were selected with a total budget of 17.34M EUR (DGTRE, 2003).<sup>49</sup>

Another mobilising programme launched in 2002 is the Nanotechnologies programme with a total budget of 13.1M EUR. This programme is not dedicated to biotechnology, but of the seven projects granted, one is related to the 'Life Sciences and Agrofood' domain (1.86M EUR) and two are in the 'Human Health' domain (3.84M EUR) (DGTRE, 2003).

In 2003, the Réseaux 1 programme was launched. The Réseaux 1 programme aims to support Walloon promoters taking part in European Networks of Excellence selected by the European Commission. This support consists of financing research projects that are

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<sup>49</sup> Information provided by Mr. F. Quertain from DGTRE, July 2006.

proposed by these promoters and that are likely to have a positive impact on the economic and social development of the Walloon Region and on the creation of sustainable jobs. In this call, the projects relate to one of the four priority technological fields: genomic and biotechnology for health; nanotechnology, materials and production processes; aeronautics and space; food safety and health risks. The programme is not specifically intended for the promotion of biotechnology R&D and is open to public research organisations only. Twelve projects were selected with a total budget of 26.44M EUR, 11.8M EUR of which was dedicated to biotechnology (DGTRE, 2004).<sup>50</sup>

In 2004, the Réseaux 2 programme was launched as a follow-up to the Réseaux 1 programme. Réseaux 2 has the same objectives as Réseaux 1, but the technology domain 'nanotechnology, materials and production processes' was replaced by 'technologies for the information society'. The total budget amounted to 20.7M EUR for ten projects, 16.04M EUR of which was granted to biotechnology-related projects (DGTRE, 2005b).<sup>51</sup>

The second Waléo programme was launched in 2004 and was given concrete form in 2005. Waléo 2 had the same objectives as Waléo 1 in 2002 and again this programme was dedicated to health biotechnology R&D. The total budget for this programme was 31.08M EUR.<sup>52</sup>

#### ***Programmes d'Excellence (Excellence Programmes)***

In December 2003, the Walloon government decided to allocate 12.5M EUR for five years for the creation of a university excellence programme in immunology therapies at the Institut d'Immunologie Médicale (Institute of Medical Immunology). This initiative was a partnership with the Université Libre de Bruxelles and GlaxoSmithKlineBiologicals (DGTRE, 2005b). This funding was extended to the Excellence Programmes in 2005. This programme aims to support strategic basic research and valorisation of the research results to the industry. The funding is granted for five years to university groups that show excellent scientific capabilities and valorisation capacities. The funding needs to be co-funded by other programme funding and the participation of industry. In 2005, six excellence programmes were granted, including one for the Institute of Medical Immunology. Another excellence programme that might be related to biotechnology to some extent is Biocoat, Biomimetic Nano-Coatings on Square Meters (DGTRE, 2006).

#### ***Les Programmes des Centres de Recherche (Programmes of the Research Centres)***

The research centres in the Objective 1 and 2 zones, as well as the collective research centres (De Groote) and associated research centres, receive funding from several sources, including support for installing technological advisors (Guidance technologique), for collective research projects, support from EUREKA, as well as from the mobilising programmes. This support is brought together in Les Programmes des Centres de Recherche (Programmes of the Research Centres). In the period 2002-2005, the centres received 16.51M EUR for installing technological advisors, 7.46M EUR for

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<sup>50</sup> Information provided by Mr. F. Quertain from DGTRE, July 2006.

<sup>51</sup> Ibid.

<sup>52</sup> Ibid..

collective research projects and 3.3M EUR for EUREKA projects. In 2004, Biovallée only received 0.22M EUR for one technological advisor.

### ***Venture Capital for University Spin-offs***

In 2003, the Walloon government mandated SOWALFIN to establish and manage a system to promote the commercialisation of research results from universities in the form of spin-offs. SOWALFIN received 8M EUR for this fund, which is provided by SOWALFIN and the local subsidiary investment companies. The idea is that they participate in pre-seed capital funds in partnership with the universities in order to stimulate collaboration between universities and investment companies.

### ***Les Aides aux PME (Support for SMEs )***

DGTRE has installed several mechanisms to support SMEs in Wallonia. These measures include:

- Etudes Technico-Economique (Technical-marketing studies): subsidy for technical-economic studies carried out for SMEs in order to evaluate the chances of success of a new product, process or service;
- Responsable Innovation Technologique (Technological Innovation Manager RIT): support for SMEs to hire a specialised innovation manager in order to undertake R&D projects in the company;
- Responsable Innovation Technologique Europe (Technical Innovation Manager – RIT Europe): support for SMEs to become involved in R&D collaboration projects with one or more SMEs from at least one other EU member state;
- Transfert de Technologie (Technology Transfer): a subsidy in order to reduce the risks related to the acquisition of new technology through licensing or purchasing a right to exploit a patent. The grant covers the costs of preparatory studies and consultancy services;
- Etude sectorielle (Sectoral studies): subsidy for SME to study interesting niches and opportunities in its industrial sector;
- Etude de faisabilité au titre de Support Technique (Feasibility study for Technical Support): subsidy to purchase external expertise and advice through technical services such as patent studies and tests in order to explore opportunities for R&D projects;
- Etude de faisabilité de logiciel innovant (Feasibility study for innovative software): subsidy for feasibility study for the development of innovative software;
- Les Bourses de Préactivité (Preactivity Grants): a subsidy for individuals who want to develop a project for the creation of a new firm, based on innovative ideas;
- Dépôt de brevet (Subsidy for Patent Registration) and Extension de brevet (Extension of Patent): a subsidy for SMEs to protect the intellectual property rights of an innovation project. The SME can receive a subsidy for the application phase as well as for the first filing of the patent and extensions to other territories.

In the period 2002-2005, DGTRE approved 383 applications for a total amount of 17.5M EUR (DGTRE 2003, 2004, 2005b, 2006). The division of the budget over the various measures was as follows:

| <b>Measure</b>  | <b>Budget</b>    |
|---|------------------|
| Technical-marketing studies                             | 0.69M EUR        |
| Technological Innovation Manager + RIT Europe           | 6.07M EUR        |
| Technology transfer                                     | 0                |
| Sectoral studies  | 0                |
| Feasibility study for technical support                 | 5.16M EUR        |
| Feasibility study for innovative software               | 3.43M EUR        |
| Preactivity grants                                      | 2.16M EUR        |
| Subsidy for patent registration and extension of patent | 0.02M EUR        |
| <i>Total</i>  | <i>17.5M EUR</i> |

Source: BioPolis Research

In the period 2002-2005, 1.71M EUR was granted to projects in the ‘Life Sciences and Agrofood’ domain and 1.87M EUR to projects in the ‘Human Health’ domain. This excludes the preactivity grants, the division of which into technology domains is not known (DGTRE, 2003, 2004, 2005b, 2006).

#### ***Les Subventions aux Entreprises (Subsidies for Enterprises)***

This instrument supports the basic industrial R&D programmes of enterprises, which have good prospects for the medium-to-long-term development of the Walloon economy. The programme is open to all companies, but SMEs can receive a higher percentage of the costs reimbursed by the government. In the period 2002-2005, 68 applications were granted with a total budget of 24.26M EUR. In 2003-2005, 3.14M EUR was allocated to the ‘Life Sciences and Agrofood’ domain and 0.99M EUR to ‘Human Health’. The figures for 2002 are not available (DGTRE, 2003, 2004, 2005b, 2006).

#### ***Les Avances Récupérables (Reimbursable Loans)***

Through Les Avances Récupérables (Reimbursable Loans programme), the Walloon government supports applied industrial R&D projects with the aim of developing new knowledge and intellectual property rights, which may result in the development of new products and services. The loans can be used for prototyping and demonstration projects

and is only to be reimbursed if the project results in commercialisation. In the period 2002-2005, 306 applications for loans were granted with a total budget of 186.46M EUR. In 2003-2005, 13.32M EUR of this amount was granted to projects in the 'Life Sciences and Agrofood' domain and 33.58M EUR was granted to the 'Human Health' domain (DGTRE, 2003, 2004, 2005b, 2006).

***Fonds d'Investissement en Recherche et Développement (Fund for the industrialisation and commercialisation of the results of research financed by the region FIRD)***

DGTRE manages and co-finances FIRD, which provides equity and loans to enterprises who want to exploit the results of research co-financed by the Walloon government. In the period 2002-2005, FIRD invested 19.8M EUR. It is not known which part was granted to biotechnology-related activities (DGTRE, 2003, 2004, 2005b, 2006).

***Aides à la Promotion de l'Emploi (Recruitment subsidy for unemployed persons APE)***

The Direction Générale de l'Economie et de l'Emploi (Directorate General for Economy and Employment DGEE) provides a subsidy to SMEs that hire unemployed persons for a product development project. The scheme was introduced in 2003 and replaced the former AR123 measure. The total budget and the budget related to biotechnology are not known.

***Support for specific development zones, partly funded by EU Structural Funds***

DGTRE manages the programmes based on the EU Structural Funds (EU Regional Development Fund). In the period 2000-2006, the following programmes were in place:

- Phasing out Objective 1 (Province de Hainaut),
- Objective 2 urban (Bassin Meuse-Vesdre),
- Objective 3.

Funded by the Objective 1 funds of the European Structural Funds, the Walloon government created new research centres in the mid-1990s. One of these centres, Biovallée, is dedicated to biotechnology. Biovallée started in 2001/2002 and was funded with 14.87M EUR (Leblud, 2001). Another centre is Agrofood Valley / NATISS, which focuses on bio-polymers for foods. These centres perform strategic basic and applied research and are expected to transfer their knowledge to the industry (Belgian Federal Science Policy Office, 2005). A new centre of excellence in biotechnology was created from Objective 2 funds. In 2002, the Groupe Interdisciplinaire de Génoprotéomique Appliqué (Interdisciplinary Applied Genoproteomics Group GIGA) was established. GIGA performs high-quality research but also integrates service facilities, a business area for biotechnology companies and a biotechnology training centre. GIGA had a total budget of approximately 57M EUR for the period 2002-2006, 11.8M EUR of which was financed by the Walloon Region and Objective 2 funds.<sup>53</sup>

Enterprises that are located in Objective 1 and Objective 2 areas can receive extra funding through the RETECH programme. In the period 2002-2005, 32.6M EUR was

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<sup>53</sup> [http://www.giga.ulg.ac.be/download/Gigapresspack\\_09\\_2005.pdf](http://www.giga.ulg.ac.be/download/Gigapresspack_09_2005.pdf), accessed 13 February 2006

granted through this scheme. In 2002-2005, 3.95M EUR of this budget was allocated to 'Life Sciences and Agrofood' and 0.65M EUR to 'Human Health' (DGTRE 2003, 2004, 2005b, 2006). Enterprises can also receive extra funding for preparing and presenting projects within the EUREKA and Sixth Framework Programme through the Partenariat Transnational programme. In 2004, one project was financed in the 'Life Sciences and Agrofood' domain with a budget of 12 700 EUR. In 2005, one project was financed in the 'Human Health' domain for 12 400 EUR. SMEs in Objective 1 and Objective 2 areas can receive special reimbursable loans through the Stimule measure. In 2004 and 2005, no loans were granted in the 'Life Sciences and Agrofood' domain, but in 2004 one loan of 41 900 EUR was granted in the 'Human Health' domain.

### ***Various initiatives to create and support clusters in Wallonia***

The Walloon government (DGTRE and DGEE together) initiated several actions to establish clusters. In 2001, the first five pilot clusters were initiated in the following sectors: automotive, aeronautics, wood, energy and biotechnologies, and agrofood. In 2003, three new clusters were established in the fields of space, clinical research and ceramics. These economic clusters bring together enterprises in the field and, if needed, also research centres. The clusters aim to stimulate cooperation between the various parties in the cluster at various levels. Another cluster initiative was developed in 2001 through the Technology Cluster programme (Grappes Technologiques). This type of cluster aims to promote the development of sustainable and active partnerships between the industry and the scientific community in technology fields identified as key to Wallonia. Since its inception in 2001, ten clusters have been established in the fields of integrated and secure management of electronic documents, multimedia, industrial applications of software engineering, friction stir welding, rapid prototyping, mechatronics, recycling of refractors, digital signal processing, nutrition, and application of ICT to the graphics industry (European TrendChart on Innovation, 2004 and 2005). The support for these clusters includes funding for the management group of the clusters.

In addition to these clusters, the Walloon government announced in December 2005 the establishment of five competitiveness poles in the fields of aerospace, life sciences, agro-industry, transport and logistics and mechanical engineering. This initiative has been designed as a supplement to the above-mentioned support given to the clusters and is part of the latest Contract d'Avenir of Wallonia. The competitiveness poles bring together enterprises, universities, research centres, training centres, etc. in order to develop and work with a common vision of economic and technological development in the field and to carry out collaborative projects. The competitiveness poles resemble main clusters in five key areas, in which the various clusters can take part. The five key areas are aerospace, life sciences, agro-industry, transport and logistics, and mechanical engineering. The first four poles (Aeronautics and Space Pole, Agro-industry Pole, Life Sciences Pole, Transport and Logistics Pole) were selected in July 2006 with some 20 projects. Some clusters took the initiative for the new poles. The Walloon government will support the first 20 projects in the four competitiveness poles with 69M EUR.<sup>54</sup> The Life Sciences Pole is called BioWin.<sup>55</sup>

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<sup>54</sup> [http://clusters.wallonie.be/xml/index\\_en.html](http://clusters.wallonie.be/xml/index_en.html), accessed 21 July 2006.

<sup>55</sup> [www.biowin.org](http://www.biowin.org), accessed 8 August 2006.

Table 2.6 gives an overview of the policy-directed funding available for biotechnology research and development in Wallonia in the period 2002-2005.

Table 2.6 Walloon public policy-directed biotechnology-stimulating instruments during the period 2002-2005 (in M EUR)

| <b>Instrument</b> | <b>Funding organisation</b>                                  | <b>Budget</b>       | <b>% of total</b> | <b>Use of DF/SF</b> |
|-------------------|--|---------------------|-------------------|---------------------|
| <i>Specific</i>   | DGTRE – Mobilising programmes Waléo 1 and 2                  | 48.42               | 26.21%            | -                   |
|                   | DGTRE – Support for specific development zones:<br>Biovallée | 14.87               | 8.05%             | √                   |
|                   | GIGA   | 11.8                | 6.38%             |                     |
| <i>Generic</i>    | DGTRE - FIRST Programme                                      | 10.99 <sup>56</sup> | 5.95%             | √                   |
|                   | DGTRE - Research initiatives programmes                      | 5.65 <sup>57</sup>  | 3.06%             | -                   |
|                   | DGTRE - Mobilising programmes: Réseaux 1 and 2               | 27.84               | 15.07%            | -                   |
|                   | Nanotechnology   | 5.71 <sup>58</sup>  | 3.09%             |                     |
|                   | DGTRE – Excellence programmes                                | n.a.                |                   | -                   |
|                   | DGTRE – Programmes of the research centres                   | 0.22 <sup>59</sup>  | 0.12%             | -                   |
|                   | Walloon Region – Venture capital for university spin-offs    | n.a.                | n.a.              | -                   |
|                   | DGTRE - Support for SMEs: various schemes                    | 3.57 <sup>60</sup>  | 1.93%             | -                   |
|                   | DGTRE - Subsidies for enterprises                            | 4.13 <sup>61</sup>  | 2.24%             | -                   |
|                   | DGTRE - Reimbursable loans                                   | 46.9 <sup>62</sup>  | 25.4%             | -                   |
|                   | DGEE – Recruitment subsidy for unemployed persons            | n.a.                | n.a.              | -                   |

<sup>56</sup> All funding granted to projects in the 'Life Sciences and Agrofood' domain and 'Human Health' for the years 2002-2005. In 2002, this excludes the funding for FIRST Enterprise. The total budgets for the FIRST Higher Education and Spin-off in 2005 are based on the figures for 2002, 2003 and 2004.

<sup>57</sup> All funding granted to projects in the 'Life Sciences and Agrofood' domain in 2002.

<sup>58</sup> All funding granted to projects in the 'Life Sciences and Agrofood' domain and 'Human Health'

<sup>59</sup> Funding for Biovallée in 2004.

<sup>60</sup> All funding granted to projects in the 'Life Sciences and Agrofood' domain and 'Human Health'.

<sup>61</sup> All funding granted to projects in the 'Life Sciences and Agrofood' domain and 'Human Health', years 2003, 2004, 2005.

<sup>62</sup> All funding granted to projects in the 'Life Sciences and Agrofood' domain and 'Human Health', years 2003, 2004, 2005.

| <b>Instrument</b> | <b>Funding organisation</b>   | <b>Budget</b>  | <b>% of total</b>       | <b>Use of DF/SF</b> |
|-------------------|---|--|-------------------------|---------------------|
|                   | DGTRE - Fund for the industrialisation and commercialisation of the results of research financed by the region - FIRD | n.a.   |                         | -                   |
|                   | DGTRE - EU Structural Funds<br>Zones:<br>RETECH<br>Partenariat Transnational<br>Stimule<br>Agrofood Valley            | 4.59 <sup>63</sup><br>0.025 <sup>64</sup><br>0.042 <sup>65</sup><br>n.a. | 2.48%<br>Nihil<br>Nihil | √                   |
|                   | Various initiatives to create and support clusters in Wallonia  | n.a.   |                         | -                   |
| <b>Total</b>      |   | ~ 184.76   | 100%                    |                     |

Source: BioPolis Research

Key: n.a.: not available

The grants provided for biotechnology-related projects are not known, but it is most likely that the applications in the 'Life sciences and Agrofood' domain will include many biotechnology-related activities. The 'Human Health' domain will probably also include biotechnology-related projects, but possibly to a lesser extent. In Table 2.6 the funding in both domains are included in order to give an indication of the support available.

In 2005, DGTRE and AWEX (Walloon Export Agency) published a report about biotechnology in Wallonia. This promotion document includes a table about the support of the Walloon Region for biotechnology applied research. According to this table, the total support in biotechnology applied research amounted to 94.6M EUR in the period 2002-2004, 30.8M EUR of which was granted to enterprises and 63.8M EUR to universities (DGTRE, 2005a).

#### **2.3.4 The Brussels Capital Region**

##### ***Overview of available policy-directed instruments to support biotechnology research***

In the Brussels Capital Region, the Institut d'encouragement de la Recherche Scientifique et de l'Innovation de Bruxelles (Institute for the Encouragement of Scientific Research and Innovation in Brussels IRSIB-IWOIB) is responsible for managing and implementing the science, technology and innovation policies. IRSIB provides support to both enterprises, universities and collective research centres. For universities and higher education institutes, the funding is available for both basic research and valorisation and technology transfer projects. In addition, IRSIB supports the promotion of research by organising and financing conferences, communication initiatives and thematic studies. IIRSIB also represents the region in federal and international committees and provides

<sup>63</sup> Funding in 2003 and 2005 available for the 'Life Sciences and Agrofood' domain and 'Human Health'

<sup>64</sup> Funding in 2004 available for the 'Life Sciences and Agrofood' domain and 'Human Health'

<sup>65</sup> Funding in 2004 available for the 'Human Health' domain

information about European Framework Programmes. Although biotechnology is selected as one of the three main priorities for the Brussels Capital Region, the instruments implemented by IRSIB are all generic.

***Projects for applied research at enterprises***

This instrument funds projects for basic industrial research (Recherche industrielle) , as well as projects for pre-competitive development (développement préconcurrentiel). Pre-competitive development projects can receive funds as well as reimbursable loans. In 2003 and 2004, 53 applied research projects were granted, 41 of which were SMEs. The total budget for these 53 projects amounted to 19.42M EUR. In 2004, two projects were related to biotechnology with a budget of 1.9M EUR (Ministry of the Brussels Capital Region, 2004; IWOIB, 2005).

***Feasibility studies, filing and extension of patents and support for individual inventors***

IRSIB supports technical feasibility studies (Etude de faisabilité technique) and filing and extension of patents for SMEs (Dépôt et maintien de brevets). In addition, support is also provided to individuals who invented new products, processes or services. In 2004, IRSIB did not provide funding through these schemes (IWOIB, 2005).

***Sectoral support***

IRSIB supports sectoral centres for collective research, such as the Collective Centres (De Groote). Since 2002, the Brussels Capital Region has chosen to re-focus its funding to issues specific to the companies in the region. Several sectoral knowledge and technology centres have been supported, including Brufotec, the Brussels Food Technology Center. None of these centres is related to biotechnology (IWOIB, 2005).

***Applied research and valorisation at universities and higher education institutes***

IRSIB supports research projects at universities and higher education institutes with mid- and long-term valorisation opportunities. For this purpose, academic interfaces have been established in order to stimulate technology transfer initiatives. Within this framework, IRSIB supports four interface cells (at Université Libre de Bruxelles, Vrije Universiteit Brussel, Université catholique de Louvain-la-Neuve, as well as InduTec, combining four higher education institutes). Biotechnology is one of InduTec's technology fields. In 2004, InduTec received 1.5M EUR (IWOIB, 2005).

In addition to these interface cells, IRSIB set up LINK in 1999. LINK aims to enforce the capacity of applied research at the universities by funding operating costs and covering the costs of intellectual property rights. Since 2002, universities can also receive funding for setting up projects in the European Framework Programmes (IWOIB, 2005).

IRSIB also financed projects which are focused on new themes with potential valorisation strategic to the region. In 2004, six projects were funded with a total budget of 3.45M EUR. One of these projects concerns bioinformatics with a budget of 0.38M EUR (IWOIB, 2005). Finally, IRSIB finances projects in the public interest, such as a project about combating tuberculosis in 2004 with a budget of 0.25M EUR (IWOIB, 2005).

### ***Research in Brussels***

This programme started in 1990 and supports basic research projects at universities in the region, performed by young foreign researchers (post-docs or senior). The projects need to suit the regional policy domains, such as town-building, fiscal measures, transport, public works, multicultural social integration, equal opportunities for everyone, environment, waste and water management, regional aspects of the economy, consumer protection, employability, regional councils and health issues in cities. In 2003 and 2004, the region funded 19 research projects with a budget of 0.65M EUR. In 2004, there were two biotechnology-related projects (Ministry of the Brussels Capital Region, 2004; IWOIB, 2005).

### ***Prospective Research for Brussels***

In 2002, IRSIB started the Prospective Research for Brussels programme in order to stimulate research in domains that are essential to the region. The research projects need to suit the policy domains of the region. For 2004, the domains' regional growth and employability, urban economy, public finance and social valorisation of scientific research were chosen. In 2003 and 2004, 53 projects were granted for a total budget of 5.77M EUR (Ministry of the Brussels Capital Region, 2004; IWOIB, 2005). None of these projects was related to biotechnology. In addition, in 2004 the region granted three research projects in the field of haematology and orthopaedics, uveitis and paediatrics with a budget of 58 000 EUR (IWOIB, 2005).

### ***MISTRAL***

In October 2005, the new MISTRAL programme was announced. This programme aims to support SMEs in Brussels by analysing their product portfolio and developing an innovation strategy. All SMEs in Brussels operate in urban industry, agro-food industry, health technologies and biotechnology, ICT sector and environment sector. The support is divided into three phases, 1) analysing the present product portfolio, 2) developing an innovation strategy, 3) coaching in strategy implementation. The SMEs can apply for support in all three phases, but they can choose separate phases as well. MISTRAL is supported by IRSIB and managed by the Agence Bruxelloise pour l'Enterprise (Brussels Enterprise Agency) and WTMC (the knowledge centre of the technical industry). The test phase of the programme was planned from October 2005 until the end of September 2006 and had a budget of 0.23M EUR. It is not known which part of this budget was spent on biotechnology<sup>66</sup> (Cerexhe, 2005a).

### ***Regional impulse programmes for research***

The Brussels Capital Region has initiated several regional impulse programmes to support priority research areas in the region. In 1998, CELLO was set up for three years, in order to bring together the knowledge and expertise of the Vrije Universiteit Brussel and the Université Libre de Bruxelles in cell therapy. CELLO led to the creation of a spin-off, BruCells. In 2002, another biotechnology-related programme was launched in bioinformatics, with a budget of 0.79M EUR in 2002 (Belgian Federal Science Policy Office, 2005).

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<sup>66</sup> <http://www.wtcm.be/defaultPage.php?id=806>, accessed 21 August 2006.

The Administration de l'Economie et de l'Emploi (Department of Economy and Employment) of the Ministry of the Brussels Capital Region provides support to SMEs as well, including subsidies for training, advisory services, feasibility studies, etc. In addition, they provide a subsidy to SMEs that hire unemployed persons for the purpose of expanding and transforming their business. This subsidy is rather similar to the one provided by the DGEE of the Walloon government. The budgets for these schemes and the relation with biotechnology is not known.

Table 2.7 provides an overview of the policy-directed funding available for biotechnology in Brussels Capital Region.

Table 2.7 Brussels' public policy-directed biotechnology-stimulating instruments in the period 2002-2005 (in M EUR)

| <b>Instrument</b> | <b>Funding organisation</b>   | <b>Budget</b>      | <b>% of total</b> | <b>Use of DF/SF</b> |
|-------------------|---|--------------------|-------------------|---------------------|
| <i>Generic</i>    | IRSIB - Projects for applied research at enterprises  | 1.9 <sup>67</sup>  | 61.89%            | -                   |
|                   | IRSIB - Feasibility studies, filing and extension of patents and support for individual inventors | 0                  |                   | -                   |
|                   | IRSIB - Sectoral support  | 0                  |                   | -                   |
|                   | IRSIB - Applied research and valorisation at universities and higher education institutes         | 0.38 <sup>68</sup> | 12.38%            | -                   |
|                   | IRSIB - Research in Brussels  | n.a.               |                   | -                   |
|                   | IRSIB – Prospective research in Brussels  | 0                  |                   | -                   |
|                   | IRSIB / ABE / WTMC - MISTRAL  | n.a.               |                   | -                   |
| <i>Specific</i>   | IRSIB – Regional impulse programme bioinformatics   | 0.79 <sup>69</sup> | 25.73%            | -                   |
| <b>Total</b>      |   | 3.07               | 100%              |                     |

Source: BioPolis Research  
Key: n.a. = not available

Personal information provided by IRSIB indicates that in 2005 the Brussels Capital Region had a budget of 19M EUR to support science, technology and innovation. Of this budget, 7.6M EUR was granted to universities and 8.7M EUR to enterprises. Concerning the funding for enterprises, 2.5M EUR was granted to biotechnology research and development.<sup>70</sup>

<sup>67</sup> 2004.

<sup>68</sup> 2004.

<sup>69</sup> 2002.

<sup>70</sup> Information provided by Mrs. C. May-Cocriamont from IWOIB, February 2006.

## 2.4 Charities

The main charity organisation in Belgium is the Loterie Nationale (Nationale Loterij, National Lottery). The National Lottery makes an annual donation of approximately 210M EUR to many different organisations, projects with a variety of purposes. The funding is directed at both the federal and the regional levels. The federal scientific institutes, as well as other associations, foundations and centres, such as the International Centre for Cancer Research, receive funding from the National Lottery. Each year, the regions receive 27.44% of the annual funding and the regions can decide how to spend this funding. In Flanders and Wallonia, both the research councils (FWO and FNRS) receive funding from this source. In 2004, 2.32% of the total funding was spent on scientific projects (National Lottery, 2005). It is not known to what extent biotechnology projects are funded through the National Lottery.

Wallonia also has another important charity initiative, Télévie. Télévie is an annual event, which aims to collect money in order to finance research in cancer and leukaemia in children and adults. In the period 2002-2005, 25.36M EUR was collected. FNRS manages the research projects funded by the Télévie funds.<sup>71</sup> It is not known to what extent biotechnology research is funded through Télévie.

## 2.5 Participation in the 6th Framework Programme and the use of development funds

Belgian researchers also participate in the biotechnology-related research projects in the 6th Framework Programme. In particular, Belgian researchers participate in thematic Priority 1 ('Life sciences, genomics and biotechnology for health'). With 61 persons or groups acting as a coordinator of a project in this thematic priority, Belgium belongs to the top-five European countries, following large countries such as Germany, France, United Kingdom and Italy. Belgium holds the ninth position with regard to the number of project participations. Belgians researchers, like their counterparts in other European countries, are not very active in research related to bionanotechnology. Only one person or group participated in a bionanotechnology research project, which resulted in a 14<sup>th</sup> position in the rankings. In thematic Priority 5 ('Food quality and safety'), Belgium's performance is significantly better. Belgium holds the seventh position with regard to the number of persons or groups that coordinates a research project, as well as the number of participations. Table 2.8 provides an overview.

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<sup>71</sup> <http://www.televie.be>, accessed 9 August 2006.

Table 2.8 Involvement of Belgium in biotechnology/life sciences programmes of the 6th Framework Programme

| <b>6th Framework Programme<sup>1</sup></b>              | <b>Participations as coordinator</b> | <b>Participations as member of the project team<sup>2</sup></b> |
|---|--------------------------------------|---|
| Thematic priority                                       |                                      |   |
| 1. Life sciences, genomics and biotechnology for health | 61 (8.14%)                           | 376 (4.4%)  |
| 2. Nanotechnologies, section bionanotechnology          | 0 (0%)                               | 1 (0.94%)   |
| 5. Food quality and safety                              | 5 (5.56%)                            | 70 (4.38 %)   |

Source: BioPolis Research

<sup>1</sup> First and second call, all types of projects.

<sup>2</sup> Persons/groups can participate in more projects, resulting in more participations.

Flanders, Wallonia and the Brussels Capital Region receive European Structural Funds. It is only known for Wallonia which policy instruments relevant for biotechnology are (partly) financed by EU Structural Funds. The EU Structural Funds have been used to set up research centres, including Biovallée and GIGA. In addition, enterprises located in the Objective 1 and 2 zones can receive extra funding from the EU Structural Funds for their research and development activities. The EU Structural Funds are also invested in the FIRST programme.

### **3. Performance of the national biotechnology innovation system<sup>72</sup>**

This chapter discusses the performance of the Belgian biotechnology system, specifically the Belgian biotechnology knowledge base, the performance in knowledge transmission and application, as well as the market conditions. We use data concerning scientific publications, citations, patents, graduates in life sciences, venture capital and biotechnology companies. A comparison is made between Belgium, EU25 and the USA. No distinction is made between the various Belgian regions and communities, as in this project, data are only collected at a national level.<sup>73</sup> For each area, data are shown of a number of different indicators for Belgium, USA and EU25. The EU25 values have been chosen as a reference in each indicator. The absolute figures used to calculate the values of the indicators and the sources for the data can be found in Annex 5. In principle, for each indicator data are presented for three periods. The periods chosen can vary considerably between the indicators; Table A.5.1 presents for each indicator the specific years for each period.

#### **3.1 Performance in creating a knowledge base and supporting the availability of human resources**

In the period 1994-2004, Belgium slightly increased its output of biotechnology publications per million capita (from index 160 in the period 1994-1996 to index 165 in the period 2002-2004 – see Figure 3.1). In the same time frame, the number of US publications dropped from index 208 in 1994-1996 to index 166 in 2002-2004. With this American decrease, the biotechnology publication output of Belgium reached the same output level as in the USA. Belgium generated a considerably higher publication output in biotechnology than the EU25 (index = 100), but if the number of biotechnology publications is seen in relation to public spending on biotechnology R&D, Belgium performed less well.

Although the number of biotechnology publications increased in the ten-year period, Belgium's share of biotechnology publications in relation to the total number of publications it produced diminished (from index 111 in 1994-1996 to index 104 in 2002-2004). It nevertheless exceeded the EU25 average. American figures were slightly higher. When considering the number of citations per biotechnology publication, Belgium registered a more solid performance than both the USA and EU25 in 1994-1998.<sup>74</sup>

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<sup>72</sup> For a detailed discussion on the strengths and limitations of science and technology indicators, see Moed, H.F., W. Glänzel and U. Schmoch. (eds), *Handbook of Quantitative Science and Technology Research: The Use of Publication and Patent Statistics in Studies of S&T Systems.*, Dordrecht: Kluwer Academic Publishers, 2004.

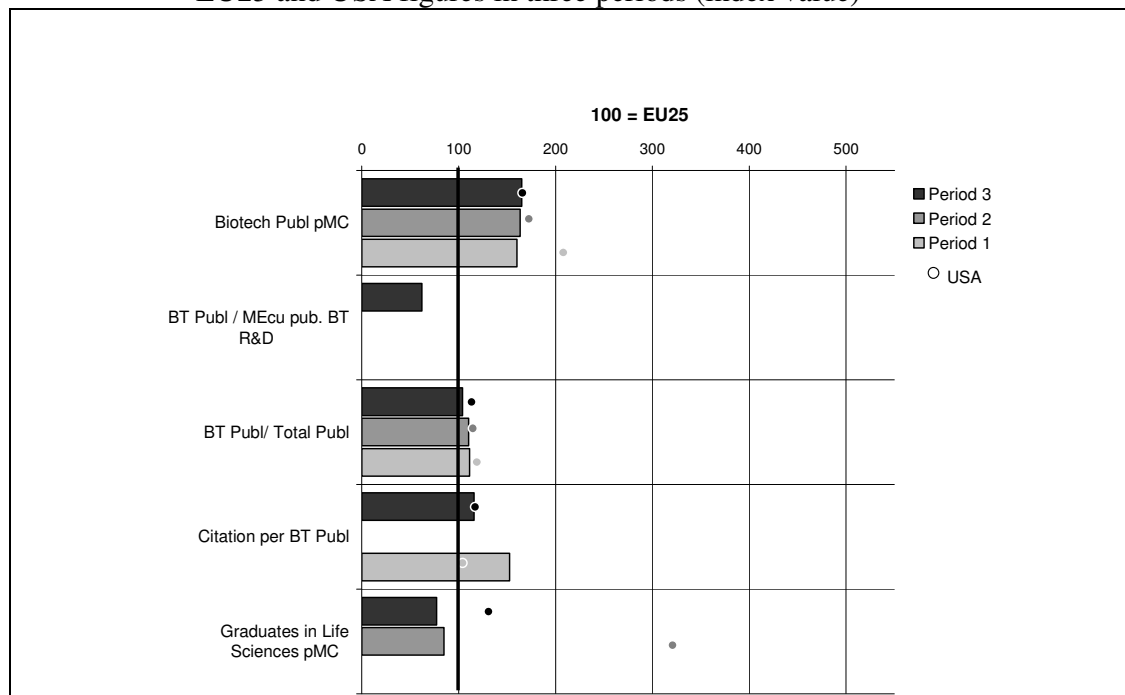
<sup>73</sup> In this national report, the notion of the structure of the Federal State of Belgium is taken into account. This means that attention is given to differences and similarities between the various Belgian regions and communities. However, for operational reasons, information about the performance of the Belgian biotechnology innovation system has been collected and analysed at an aggregate level.

<sup>74</sup> To calculate the citation rate first the publications for the period 1994-1996 (set 1) were searched and all the publications in 1994-1998 that cited any publications in set 1 (set 2). Citation rate has been calculated by (number of publications in set 2) / (number of publications in set 1). However, many of the articles in set 2 cited not only one article in set 1 and these duplicated citations are not taken into account in our

Belgium's citation output subsequently decreased and reached the same level as in the USA, while remaining above the EU25 average.

Regarding the number of graduates in life sciences per million capita in the ten-year period, Belgium's performance was below EU25 and American levels. The number of graduates decreased slightly from index 85 in 1998 to index 77 in 2002, while the figure for the USA dropped sharply from index 321 to index 131 in the same period.

Figure 3.1 Belgium biotechnology knowledge base indicators: comparison with EU25 and USA figures in three periods (index value)

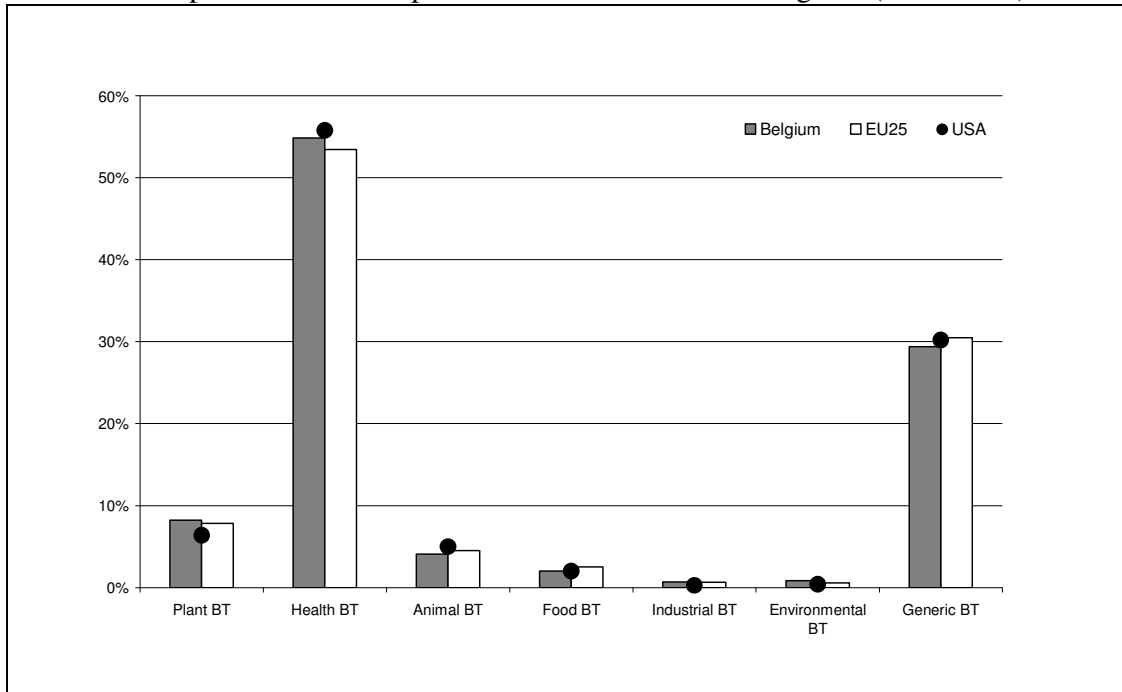


Source: BioPolis Research  
Data: Science Citation Index, OECD Education Database

Belgian biotechnology publications are especially numerous in the field of human health and generic biotechnology, followed at a significant distance by plant biotechnology. If we compare the figures for 1994-1996 and 2002-2004, we see that the picture barely changed. A comparison of both periods shows an increase from 55% to 57% in the share of human health biotechnology, whereas the share of generic biotechnology decreased from 29% to 23%. It is interesting to note that the distribution of biotechnology publications across various research fields in Belgium followed more or less the same distribution as in the USA and in EU25. Figures 3.2.1 and 3.2.2 show the various shares for Belgium, the USA and EU25 in the periods 1994-1996 and 2002-2004.

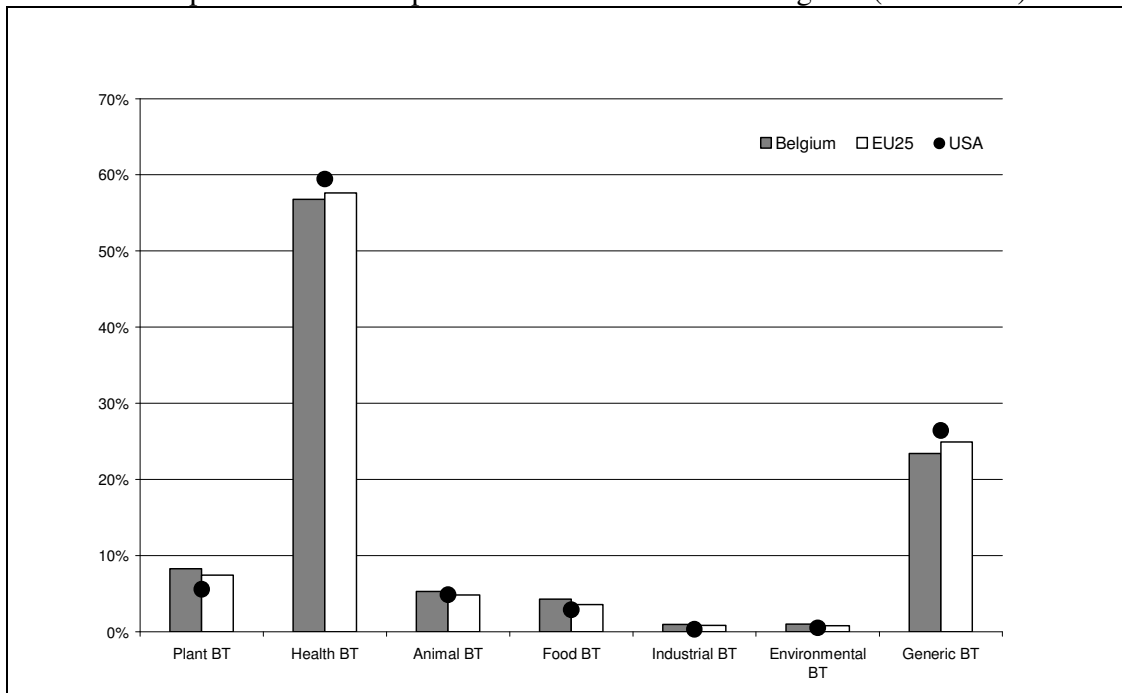
calculation. For example, if there are 2 articles in set 1 and they each has one citation but cited by the same article, there is only 1 article in set 2. The citation rate for the 2 articles in set 1 is 0.5 instead of 1. This depreciation is more obvious in countries with more publications such as USA and EU25 since the possibility to cite multiple articles in set 1 is large. Accordingly the citation rates of USA and EU25 are a bit underestimated.

Figure 3.2.1 Share of biotechnology subfields, as a percentage of total biotechnology publications: comparison with EU25 and USA figures (1994-1996)



Source: BioPolis Research  
Data: Science Citation Index

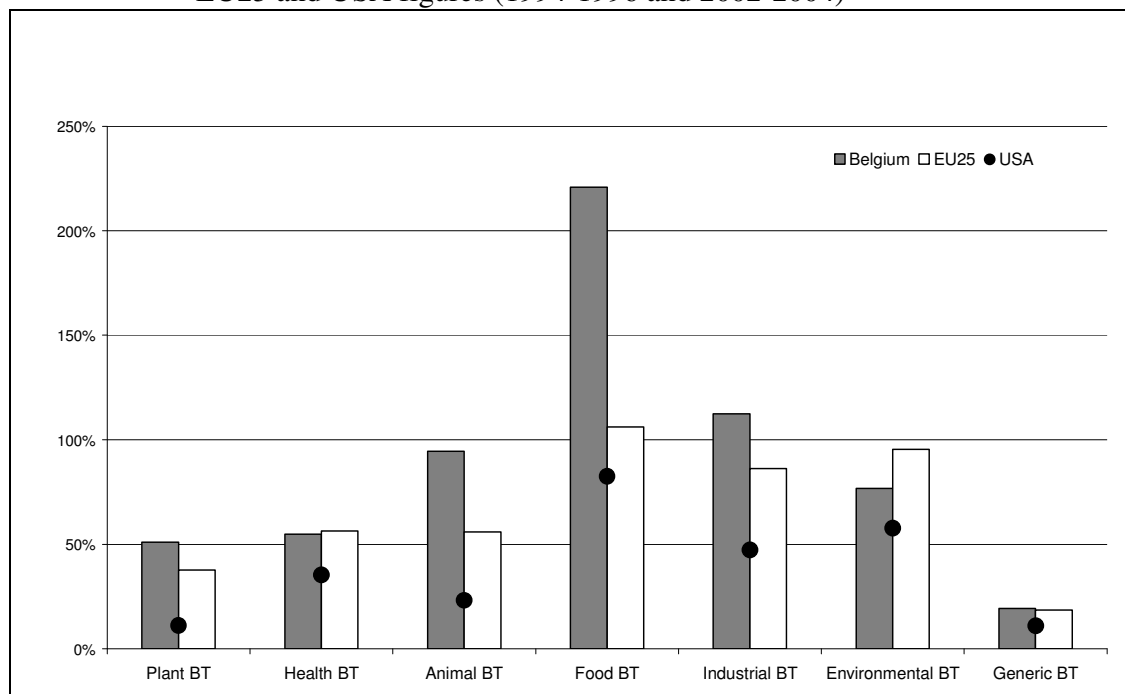
Figure 3.2.2 Share of biotechnology subfields, as a percentage of total biotechnology publications: comparison with EU25 and USA figures (2002-2004)



Source: BioPolis Research  
 Data: Science Citation Index

When considering the growth rate of biotechnology publications in the various subfields, food biotechnology publications in particular gained ground, far exceeding USA and EU25 levels (Figure 3.3). The number of food biotechnology publications increased by 221% between 1994-1996 and 2002-2004. Industrial biotechnology (+113%), animal biotechnology (+95%) and environmental biotechnology (+77%) also increased, again more markedly than in the USA and EU25. However, the noticeable increases in publication output in these subfields did not result in substantially larger shares in the total number of biotechnology publications. Human health biotechnology and generic biotechnology remained the largest subfields.

Figure 3.3 Growth rates of biotechnology subfield publications: comparison with EU25 and USA figures (1994-1996 and 2002-2004)



Source: BioPolis Research  
 Data: Science Citation Index

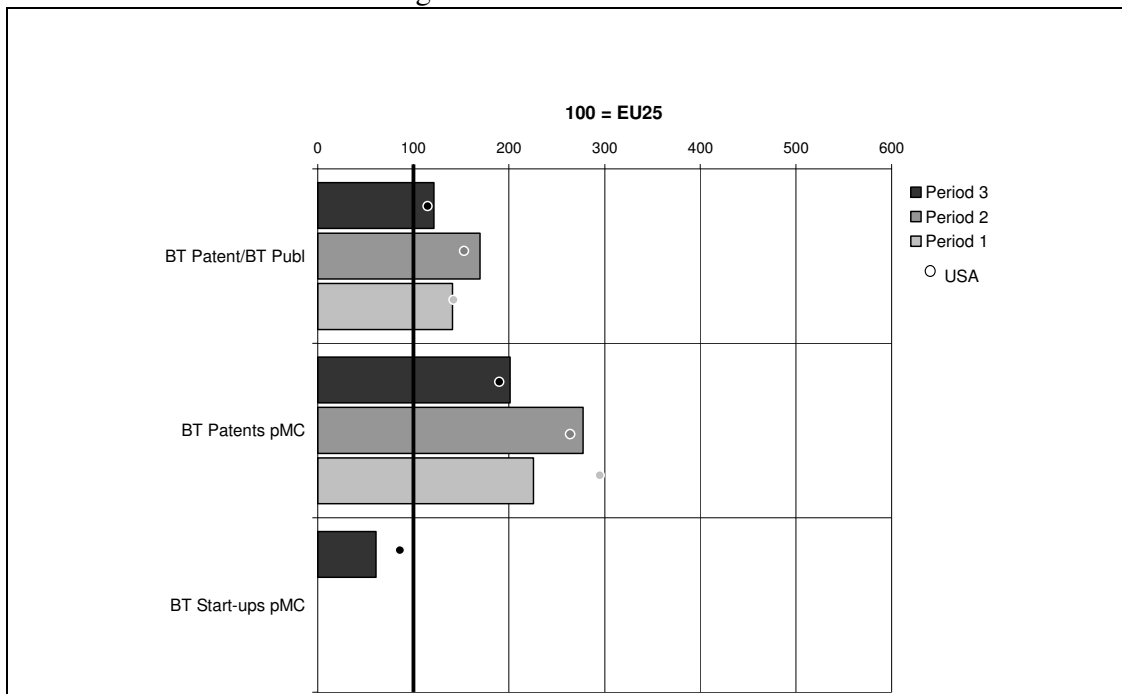
### 3.2 Performance in knowledge transmission and application

Belgium generally follows the American trend when taking into account the number of patents per publications. Both the United States and Belgium increased this number between 1994-1996 and 1998-2000; Belgium by 20% and the USA by 7.7%. However, both countries saw this index figure drop between the 1998-2000 and 2001-2003; in both cases, the index figure decreased by more than 20%. Nevertheless, Belgium and the USA still performed better than the EU25. For Belgium, a similar trend is noticeable when considering the number of patents per million capita. Again, the index figure for the

number of patents per million capita increased by 23% between 1994-1996 and 1998-2000, and dropped by almost 28% between 1998-2000 and 2001-2003. In the USA, the number of patents per million capita increased dramatically over these periods, by more than 35%. The Belgian (and American) index figures remained twice as high as those for the EU25.

Concerning the number of new biotechnology companies, Belgium lagged behind both American and EU25 figures in the period 2001-2003. Figure 3.4 summarises the results in biotechnology knowledge transmission and application for Belgium, the USA and EU25.

Figure 3.4 Performance indicators for biotechnology knowledge transmission and applications in Belgium over three periods (index value): comparison with EU25 and USA figures



Source: BioPolis Research

Data: Database of European Patents (Host Questel Orbit, EPPATENT), Database of International Patent Applications (WOPATENT), EuropaBio

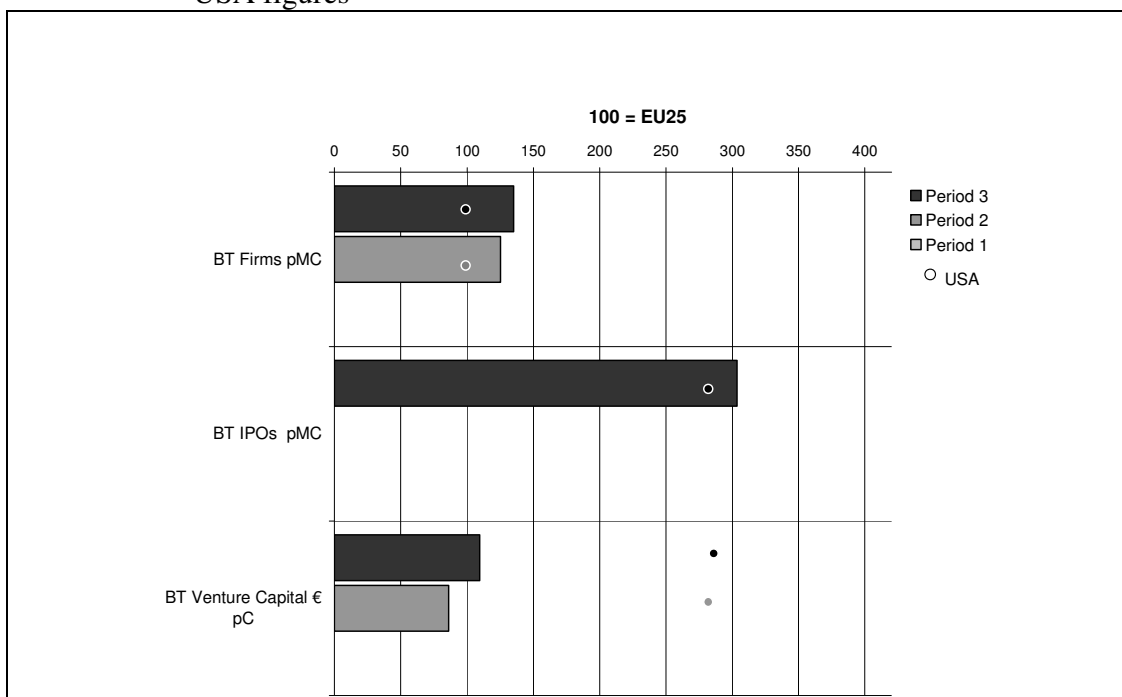
### 3.3 Industrial development

Although Belgium has performed less well than the USA and EU25 with regard to the start-up of new biotechnology companies, it is still profiting from a long history in biotechnology. With an index figure of 125 in 2001 and 135 in the 2003, Belgium has more biotechnology firms per million capita than the USA and EU25.

In the period 2002-2005, there were two Belgian biotechnology companies listed on the stock exchange (Initial Public Offering - IPO). One Belgian company entered the

Euronext stock exchange in Brussels in 2002, but it had already been listed on the European branch of NASDAQ since 1996. Belgium's relatively weaker position in firm creation is also reflected in the amount of venture capital per capita available for biotechnology companies. The index figures for Belgium were more than 2.5 times lower than the figures for the USA in both 2002 and 2004. In 2002, Belgium even trailed EU25 figures. However, in 2004, the amount of venture capital available for biotechnology increased by almost 27%, resulting in an index figure slightly higher than the one for the EU25.

Figure 3.5 Performance indicators for biotechnology industrial development in Belgium over three periods (index value): comparison with EU25 and USA figures



Source: BioPolis Research

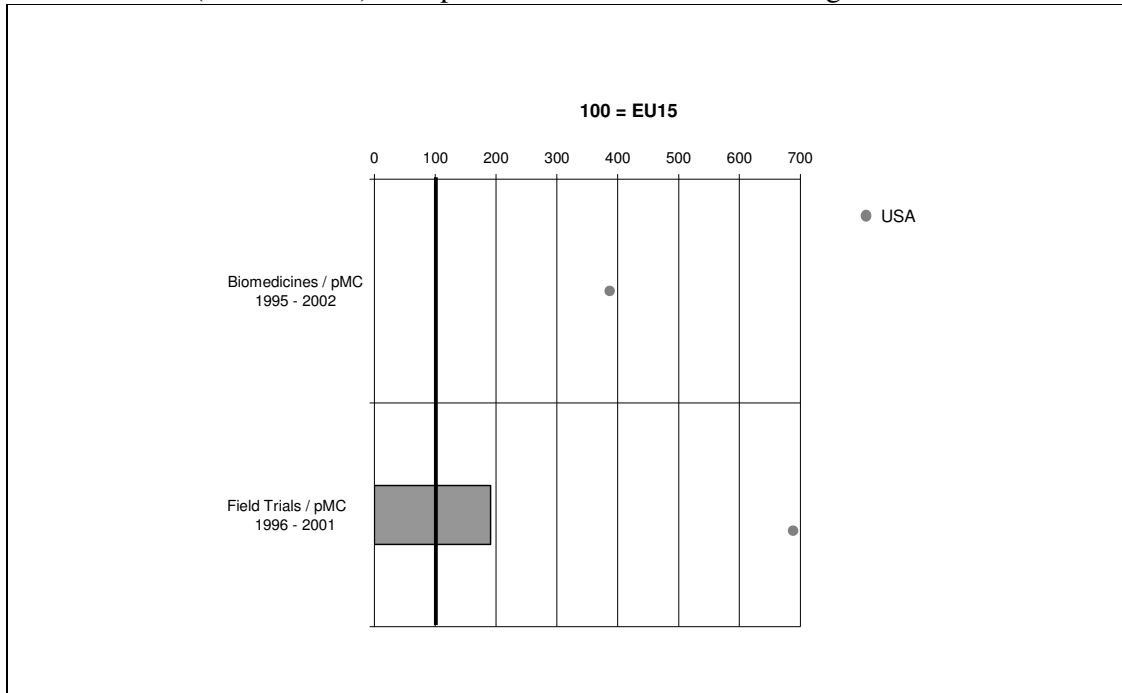
Data: Ernst & Young Beyond Borders (2002, 2003, 2004, 2005, 2006), Websites of the London Stock Exchange, the Frankfurt Stock Exchange, Euronext, NASDAQ, Burrill & Company

### 3.4 Market conditions

Industrial development is influenced by market conditions. The market conditions in biotechnology are expressed in two main ways: by the number of field trials approved and conducted in the country and by the number of biomedicines approved in the country. The picture for Belgium shows a sharp distinction between two main application areas, namely human health and agrofood. Although health biotechnology has the largest share of biotechnology research output (publications), the exploitation of research in terms of new biomedicines still lags far behind. As Figure 3.6 illustrates, no biomedicines were approved by the Belgian authorities in the period 1995-2002, whereas in the EU15 and especially in the USA, several biomedicines were approved in the same period. In terms

of field trials, Belgium performed significantly better. In the period 1996-2001, it had almost twice as many field trials approved per million capita than the EU15, though it still lagged far behind the USA.

Figure 3.6 Performance indicators for biotechnology market conditions in Belgium (index values): comparison with EU25 and USA figures



Source: BioPolis Research

Data: Benchmarking of public biotechnology policy 2005, Biotechnology Innovation Scoreboard 2002

## **4. Conclusions**

### **4.1 Introduction**

In this chapter, conclusions are drawn about the availability and characteristics of the generic and biotechnology-specific instruments through which the various governments in Belgium have funded biotechnology research, technology transfer and commercialisation. A comparison will also be made with the period 1994-1998.

### **4.2 Public funding of biotechnology through policy instruments**

#### **4.2.1 Belgium**

A complete overview of all non-policy-directed and policy-directed funding for biotechnology available in Belgium is presented in Table 4.1. Sections 4.2.2 to 4.2.5 present the details of this public funding at the various governmental levels in Belgium.

An important remark regarding Table 4.1 is that, unfortunately, the biotechnology budgets for several instruments are absent. In addition, generic policy-directed instruments in Flanders are not included, because since 2000, the Flemish government has implemented a horizontal innovation policy without any priorities for specific technology domains. For Wallonia the amounts included are allocated to the 'Life Sciences and Agrofood' domains and 'Human Health'. Although this includes more than biotechnology research only, at least these figures give a reasonable indication of the budgets available for biotechnology, as biotechnology is an important priority for the government of the Walloon Region. Finally, for the Brussels Capital Region only limited data were available for one or two years.

Despite these remarks, the table shows that over 90% of the budget available is allocated to research activities. The level of funding available in 2002 and 2005 is almost the same, but 2003 and 2004 show a decline in the expenditures on biotechnology. The non-policy-directed funding for research covers the main part of the budget and it would even be higher if the correct budgets for the non-policy-directed instruments in Wallonia, as well as for the federal research institutes, had been included. The biotechnology-specific instruments are also important sources, although these figures are mainly provided by two large biotechnology initiatives, VIB in Flanders and the mobilising programmes Waléo 1 and 2 in Wallonia. Support for commercialisation remains below expectation, but an important reason might be the absence of accurate figures. Flanders, Wallonia and the Brussels Capital Region have implemented several instruments to support commercialisation by stimulating valorisation activities at public research organisations, providing risk capital to start-ups, offering non-financial support activities to small companies, setting up university-industry collaborations and interfaces, etc. These initiatives are mainly generic instruments and in most cases the support available for biotechnology commercialisation is not known.

The 'Others' category includes instruments that support and stimulate social acceptance of biotechnology and biosafety and risk assessment issues (policy goals 8 and 10).

Biosafety and risk assessment are issues covered by the governmental research institutes at the federal and regional levels. Unfortunately, it is not known which part of these research institutes' budgets has been allocated to these issues. Regarding the policy-directed instruments, only VIB in Flanders dedicates a small part of its budget to public communication and education.

Table 4.1 Belgian public funding of biotechnology, by non-directed, generic and specific instruments, in the period 2002-2005 (in M EUR)

|  | 2002   | 2003   | 2004   | 2005   | Total  |
|--|--------|--------|--------|--------|--------|
| <b>RESEARCH</b>                          |        |        |        |        |        |
| <i>Non-policy-directed</i>               | 58.09  | 57.53  | 53.5   | 61.36  | 230.48 |
| <i>Policy-directed, Generic</i>          | 12.35  | 12.73  | 19.67  | 0.86   | 45.61  |
| <i>Policy-directed, Biotech-specific</i> | 68.81  | 24.71  | 25.49  | 57.35  | 176.36 |
| Total                                    | 139.25 | 94.97  | 98.66  | 119.57 | 452.45 |
| <b>COMMERCIALISATION</b>                 |        |        |        |        |        |
| <i>Non-policy directed</i>               | n.a.   | n.a.   | 3      | n.a.   | 3      |
| <i>Policy-directed, Generic</i>          | 1.92   | 16.77  | 20.11  | 27.53  | 66.33  |
| <i>Policy-directed, Biotech-specific</i> | 3.22   | 3.32   | 3.42   | 3.53   | 38.09  |
| Total                                    | 5.14   | 20.09  | 26.53  | 31.06  | 107.42 |
| <b>OTHERS</b>                            |        |        |        |        |        |
| <i>Non-policy-directed</i>               | n.a.   | n.a.   | n.a.   | n.a.   | n.a.   |
| <i>Policy-directed, Generic</i>          | n.a.   | n.a.   | n.a.   | n.a.   | n.a.   |
| <i>Policy-directed, Biotech-specific</i> | 0.56   | 0.57   | 0.59   | 0.61   | 2.33   |
| Total                                    | 0.56   | 0.57   | 0.59   | 0.61   | 2.33   |
| <b>GRAND TOTALS</b>                      | 144.95 | 115.63 | 125.78 | 151.24 | 562.2  |

Source: BioPolis Research

#### 4.2.2 Federal government

Table 4.2 presents the funding for biotechnology by the federal government. Support for biotechnology at the federal level is provided through non-policy-directed measures only. The figures provided cover only a part of the total non-policy-directed funding available for biotechnology research. There were no data available for the Scientific Institute for Public Health and for the Sustainable Production and Consumption Patterns 2 programme. The data available show stable support for biotechnology research over the years 2002-2005.

Table 4.2 Federal public funding of biotechnology, by non-directed, generic and specific instruments, in the period 2002-2005 (in M EUR)

|   | 2002  | 2003  | 2004  | 2005  | Total |
|---|-------|-------|-------|-------|-------|
| <b>RESEARCH</b>                                     |       |       |       |       |       |
| <i>Non-policy-directed</i>                          |       |       |       |       |       |
| Federal scientific institutes                       | 6.39  | 6.39  | 6.93  | 6.93  | 25.55 |
| Belgian Co-ordinated Collections of Micro-organisms | 2.23  | 2.23  | 4.04  | 4.04  | 12.53 |
| Interuniversity attraction poles                    | 7.66  | 7.66  | 7.66  | 7.66  | 30.65 |
| Sustainable production and consumption patterns 2   | n.a.  | n.a.  | n.a.  | n.a.  | n.a.  |
| Total   | 16.28 | 16.28 | 18.09 | 18.09 | 68.73 |
| <i>Policy-directed, Generic</i>                     | n.a.  | n.a.  | n.a.  | n.a.  | n.a.  |
| <i>Policy-directed, Biotech-specific</i>            | n.a.  | n.a.  | n.a.  | n.a.  | n.a.  |
| <i>Total Research</i>                               | 16.28 | 16.28 | 18.09 | 18.09 | 68.73 |
| <b>COMMERCIALISATION</b>                            |       |       |       |       |       |
| <i>Non-policy-directed</i>                          | n.a.  | n.a.  | n.a.  | n.a.  | n.a.  |
| <i>Policy-directed, Generic</i>                     | n.a.  | n.a.  | n.a.  | n.a.  | n.a.  |
| <i>Policy-directed, Biotech-specific</i>            | n.a.  | n.a.  | n.a.  | n.a.  | n.a.  |
| <i>Total commercialisation</i>                      | n.a.  | n.a.  | n.a.  | n.a.  | n.a.  |
| <b>OTHERS</b>                                       |       |       |       |       |       |
| <i>Non-policy-directed</i>                          | n.a.  | n.a.  | n.a.  | n.a.  | n.a.  |

|  | 2002        | 2003        | 2004        | 2005        | Total       |
|--|-------------|-------------|-------------|-------------|-------------|
| <i>Policy-directed, Generic</i>          | n.a.        | n.a.        | n.a.        | n.a.        | n.a.        |
| <i>Policy-directed, Biotech-specific</i> | n.a.        | n.a.        | n.a.        | n.a.        | n.a.        |
| <i>Total others</i>                      | <i>n.a.</i> | <i>n.a.</i> | <i>n.a.</i> | <i>n.a.</i> | <i>n.a.</i> |
| <b>GRAND TOTALS</b>                      | 16.28       | 16.28       | 18.09       | 18.09       | 68.73       |

Source: BioPolis Research

Key: n.a. = not available

### 4.2.3 Flanders

Table 4.3 presents the generic and biotechnology specific policy-directed instruments for the Flemish government. The non-policy-directed funding for biotechnology remained considerably stable between 2002-2005, although a slight decline was discernible in 2004. The figures do not include all non-policy-directed funding available for biotechnology research. Hence, the basic funding for the governmental research institutes is missing, as well as the amount of funding related to the scholarships granted by the FWO.

Regarding the policy-directed funding, there are two biotechnology-specific instruments: VIB, which focuses mainly on research, and the Biotech Fonds Vlaanderen (Biotech Fund Flanders), which is related to commercialisation. Nevertheless, one of the VIB's tasks is to organise and support valorisation of the research performed in VIB, and this part of the budget is included under 'commercialisation'. The budget allocated to education and public communication activities is included in the 'Others' category. Approximately 11M EUR of the total budget for VIB cannot be allocated to one of the categories and is excluded from the total amounts in the table. The budget available for the Biotech Fund Flanders is the cumulated fund available by 2000. Since 1994, several investments and participations took place, and about 50% of the initial amount is still available. In Table 4.3 the full budget is included as the total figure.

The table certainly does not provide a complete picture of all the Flemish funding granted to biotechnology research and development. The Flemish government has implemented several generic instruments, which are used to fund biotechnology as well. For example, the budget for VIB concerns only the basic funding provided by the government. In addition, VIB receives funding from other governmental programmes as well, but these programmes are generic ones. Because the Flemish government does not prioritise technology domains anymore (since 2000), all generic instruments implemented since then are not included in this study. Nevertheless, these generic instruments are important financiers of biotechnology research. For example, IWT manages the Strategic Basic Research programme. Through this programme, biotechnology research and development at universities was funded with a total amount of 38M EUR in the period 2002-2004. In addition, IWT funds scholarships, also in life sciences, for a total amount of 14M EUR annually.

Table 4.3 Flemish public funding of biotechnology, by non-directed, generic and specific instruments, in the period 2002-2005 (in M EUR)

|  | 2002         | 2003         | 2004        | 2005         | Total         |
|--|--------------|--------------|-------------|--------------|---------------|
| <b>RESEARCH</b>  |              |              |             |              |               |
| <i>Non-policy-directed</i>   |              |              |             |              |               |
| The Research Foundation – Flanders (FWO)   | 22.81        | 23.95        | 23.21       | 25.24        | 95.21         |
| Institute for the promotion of Innovation by Science and Technology (IWT) – Permanent ‘Open Loket’ for enterprises and researchers | 19           | 17.3         | 12.2        | 17.3         | 65.8          |
| Government scientific research institutes  | n.a.         | n.a.         | n.a.        | n.a.         | n.a.          |
| Public research institutes   | n.a.         | n.a.         | n.a.        | n.a.         | n.a.          |
| Total  | 41.81        | 41.25        | 35.41       | 42.54        | 161           |
| <i>Policy-directed, Generic</i>  | n.a.         | n.a.         | n.a.        | n.a.         | n.a.          |
| <i>Policy-directed, Biotech-specific</i>   |              |              |             |              |               |
| Flanders Interuniversity Institute for Biotechnology – VIB   | 24.01        | 24.71        | 25.49       | 26.27        | 100.48        |
| <i>Total Research</i>  | <i>65.82</i> | <i>65.96</i> | <i>60.9</i> | <i>68.81</i> | <i>261.48</i> |
| <b>COMMERCIALISATION</b>   |              |              |             |              |               |
| <i>Non-policy-directed</i>   |              |              |             |              |               |
| VIB Incubator  | n.a.         | n.a.         | 3           | n.a.         | 3             |
| Participation Company Flanders (PMV)   | n.a.         | n.a.         | n.a.        | n.a.         | n.a.          |
| <i>Policy-directed, Generic</i>  | n.a.         | n.a.         | n.a.        | n.a.         | n.a.          |
| <i>Policy-directed, Biotech-specific</i>   |              |              |             |              |               |
| Flanders Interuniversity Institute for Biotechnology – VIB   | 3.22         | 3.32         | 3.42        | 3.53         | 13.49         |

|  | 2002        | 2003        | 2004        | 2005        | Total        |
|--|-------------|-------------|-------------|-------------|--------------|
| Biotech Fund Flanders                                      | n.a.        | n.a.        | n.a.        | n.a.        | 24.6         |
| <i>Total Commercialisation</i>                             | <i>3.22</i> | <i>3.32</i> | <i>6.42</i> | <i>3.53</i> | <i>41.09</i> |
| <b>OTHERS</b>  |             |             |             |             |              |
| <i>Non-policy-directed</i>                                 | n.a.        | n.a.        | n.a.        | n.a.        | n.a.         |
| <i>Policy-directed, Generic</i>                            | n.a.        | n.a.        | n.a.        | n.a.        | n.a.         |
| <i>Policy-directed, Biotech-specific</i>                   |             |             |             |             |              |
| Flanders Interuniversity Institute for Biotechnology – VIB | 0.56        | 0.57        | 0.59        | 0.61        | 2.33         |
| <i>Total others</i>  | <i>0.56</i> | <i>0.57</i> | <i>0.59</i> | <i>0.61</i> | <i>2.33</i>  |
| <b>GRAND TOTALS</b>  | 69.59       | 69.85       | 67.91       | 72.95       | 304.91       |

Source: BioPolis Research

Key: n.a. = not available

#### 4.2.4 Wallonia

Table 4.4 presents an overview of the non-policy-directed, generic and biotechnology-specific funding available in Wallonia. This includes the funding available by the Walloon government and the government of the French Community. Unfortunately, there are no data available concerning the non-policy-directed instruments. However, as is the case with Flanders, significant funding will most likely become available for biotechnology research through these types of instruments, especially through FNRS. Wallonia has a significant number of generic instruments, and it is not known exactly to what extent biotechnology is financed through these instruments. Nevertheless, the annual reports of DGTRE distinguish between the ‘Human Health’ and ‘Life Sciences and Agrofood’ domains, and the data for these domains are included in Table 4.4 as they provide a good indication of the budget available for biotechnology.

Concerning biotechnology-specific instruments, the mobilising programme Waléo and the establishment of research centres such as Biovallée and GIGA seem to be important initiatives in support of biotechnology; these dedicated instruments are responsible for 40% of the total budget available through policy-directed instruments. As far as the generic instruments are concerned, most of them provide a relatively small amount of funding to biotechnology, but large sums are granted through reimbursable loans and the mobilising programmes.

The total amount of funding available for biotechnology varies over the years, with higher amounts available in 2002 and 2005, whereas less was granted in 2003 and 2004. However, this is mainly due to the mobilising programmes Waléo 1 and 2. They are

substantial biotechnology-specific instruments, and their grants in 2002 and 2005 were responsible for the increase in funds in those years.

For several policy-directed programmes the total biotechnology-related budget is attributed to the 'Research' category. However, these programmes (e.g. FIRST programmes) do not only support research activities but also aim to stimulate valorisation and commercialisation. Unfortunately, the budgets for the various policy goals are not known and therefore for each programme the budget is allocated to the primary category. Several programmes also target enterprises and support industrial research. These programmes are included in the 'Commercialisation' category.

Table 4.4 Walloon public funding of biotechnology, by non-directed, generic and specific instruments, in the period 2002-2005 (in M EUR)

|  | 2002 | 2003 | 2004 | 2005 | Total |
|--|------|------|------|------|-------|
| <b>RESEARCH</b>  |      |      |      |      |       |
| <i>Non-policy-directed</i>                                 |      |      |      |      |       |
| Fonds national de la recherche (FNRS) and associated funds | n.a. | n.a. | n.a. | n.a. | n.a.  |
| Action de recherche concertées (ARC)                       | n.a. | n.a. | n.a. | n.a. | n.a.  |
| Les programmes de recherche fondamentale collective        | n.a. | n.a. | n.a. | n.a. | n.a.  |
| Centres de génétique humaine                               | n.a. | n.a. | n.a. | 0.73 | 0.73  |
| Support for various activities                             | n.a. | n.a. | n.a. | n.a. | n.a.  |
| Governmental research organisation                         | n.a. | n.a. | n.a. | n.a. | n.a.  |
| Total  | n.a. | n.a. | n.a. | 0.73 | 0.73  |
| <i>Policy-directed, Generic</i>                            |      |      |      |      |       |
| FIRST Higher Education                                     | 0.50 | 0.34 | 0.21 | 0.24 | 1.29  |
| FIRST Europe   | 0.49 | 0.59 | 2.82 | n.a. | 3.9   |
| FIRST Doctorant Enterprise International                   | n.a. | n.a. | n.a. | 0.62 | 0.62  |
| Research initiatives programmes                            | 5.65 | n.a. | n.a. | n.a. | 5.65  |

|  | 2002         | 2003         | 2004         | 2005         | Total         |
|--|--------------|--------------|--------------|--------------|---------------|
| Mobilising programmes – Réseaux + nanotechnologies               | 5.71         | 11.80        | 16.04        | n.a.         | 33.55         |
| Excellence programmes  | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |
| Programmes of research centres                                   | n.a.         | n.a.         | 0.22         | n.a.         | 0.22          |
| Support for specific development zones: Agrofood Valley          | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |
| Initiatives to create and support clusters                       | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |
| Total  | 12.35        | 12.73        | 19.29        | 0.86         | 45.23         |
| <i>Policy-directed, Biotech-specific</i>                         |              |              |              |              |               |
| Mobilising Programmes - WALEO                                    | 17.34        | n.a.         | n.a.         | 31.08        | 48.42         |
| Support for specific development zones: Biovallée and GIGA       | 26.67        | n.a.         | n.a.         | n.a.         | 26.67         |
| Total  | 44.01        | n.a.         | n.a.         | 31.08        | 75.09         |
| <i>Total research</i>  | <i>56.36</i> | <i>12.73</i> | <i>19.29</i> | <i>32.67</i> | <i>121.05</i> |
| <b>COMMERCIALISATION</b>   |              |              |              |              |               |
| <i>Non-policy-directed</i>                                       |              |              |              |              |               |
| Regional Investment Company of Wallonia (SRIW)                   | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |
| Walloon Company for Financing and Guarantees for SMEs (SOWALFIN) | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |
| <i>Policy-directed, Generic</i>                                  |              |              |              |              |               |
| FIRST Spin-off   | 0.44         | 0.57         | 0.37         | 0.84         | 2.22          |
| FIRST Enterprise   | n.a.         | 1.17         | 0.88         | 0.91         | 2.96          |
| FIRST Spin-out   | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |
| FIRST Post-Doc   | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |

|   | <b>2002</b>  | <b>2003</b>  | <b>2004</b>  | <b>2005</b>  | <b>Total</b>  |
|---|--------------|--------------|--------------|--------------|---------------|
| Support for SMEs  | 1.48         | 0.71         | 0.82         | 0.56         | 3.57          |
| Subsidies for enterprises   | n.a.         | 1.12         | 2.05         | 0.96         | 4.13          |
| Reimbursable loans  | n.a.         | 9.45         | 14.04        | 23.41        | 46.9          |
| Fund for the industrialisation and commercialisation of the results of research finances by the region - FIRD | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |
| Recruitment subsidy for unemployed persons (Aides à la Promotion de l'Emploi – APE)                           | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |
| Venture capital for university spin-offs  | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |
| Support for specific development zones: RETECH, Partenariat Transnational, Stimule                            | n.a.         | 3.75         | 0.05         | 0.85         | 4.65          |
| <b>Total</b>  | <b>1.92</b>  | <b>16.77</b> | <b>18.21</b> | <b>27.53</b> | <b>64.43</b>  |
| <i>Policy-directed, Biotech-specific</i>  | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |
| <i>Total Commercialisation</i>  | <i>1.92</i>  | <i>16.77</i> | <i>18.21</i> | <i>27.53</i> | <i>64.43</i>  |
| <b>OTHERS</b>   |              |              |              |              |               |
| <i>Non-policy-directed</i>  | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |
| <i>Policy-directed, Generic</i>   | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |
| <i>Policy-directed, Biotech-specific</i>  | n.a.         | n.a.         | n.a.         | n.a.         | n.a.          |
| <b>GRAND TOTALS</b>   | <b>58.28</b> | <b>29.5</b>  | <b>37.5</b>  | <b>60.2</b>  | <b>185.48</b> |

Source: BioPolis Research

Key: n.a. = not available

#### 4.2.5 Brussels Capital Region

Table 4.5 gives an overview of the biotechnology funding available in the period 2002-2005. It includes non-policy-directed as well as generic and biotechnology-specific funding.

The overview shows that only a relatively small amount of funding is available for biotechnology research and development and commercialisation. This amount could be higher, but due to substantial amount of instruments the data are not available for the period 2002-2005. As a result, some biotechnology projects are being funded which are not included in Table 4.5. For example, the interface cell InduTec acknowledges biotechnology as one of its main areas, but it is not known to what extend biotechnology activities are financed. In addition, two biotechnology projects are funded through Research in Brussels, but again the amount of funding is not available. Nevertheless, the amount of funding available for biotechnology will remain limited compared with the other regions and the federal level. The total budget of the region to support science, technology and innovation amounted to 19M EUR in 2005, 2.5M EUR of which was granted to biotechnology R&D in enterprises. This equals approximately 13% of the total funding available, which shows that biotechnology's share of the total funds available is anything but limited. This share could increase in the future, as the government aims to concentrate the funding even further into three domains, including life sciences.

Table 4.5 Brussels' public funding of biotechnology, by non-directed, generic and specific instruments, in the period 2002-2005 (in M EUR)

|   | 2002 | 2003 | 2004 | 2005 | Total |
|---|------|------|------|------|-------|
| <b>RESEARCH</b>   |      |      |      |      |       |
| <i>Non-policy-directed</i>  | n.a. | n.a. | n.a. | n.a. | n.a.  |
| <i>Policy-directed, Generic</i>   |      |      |      |      |       |
| Sectoral support  | n.a. | n.a. | n.a. | n.a. | n.a.  |
| Applied research and valorisation at universities and higher education institutes – LINK, thematic projects, public interest projects | n.a. | n.a. | 0.38 | n.a. | 0.38  |
| Research in Brussels  | n.a. | n.a. | n.a. | n.a. | n.a.  |
| Prospective Research for Brussels   | n.a. | n.a. | n.a. | n.a. | n.a.  |
| Total   | n.a. | n.a. | 0.38 | n.a. | 0.38  |
| <i>Policy-directed, Biotech-specific</i>  |      |      |      |      |       |
| Regional impulse programmes for   | 0.79 | n.a. | n.a. | n.a. | 0.79  |

|   | 2002        | 2003        | 2004        | 2005        | Total       |
|---|-------------|-------------|-------------|-------------|-------------|
| research - bioinformatics   |             |             |             |             |             |
| <i>Total research</i>   | <i>0.79</i> | <i>n.a.</i> | <i>0.38</i> | <i>n.a.</i> | <i>1.17</i> |
| <b>COMMERCIALISATION</b>  |             |             |             |             |             |
| <i>Non-policy-directed</i>  |             |             |             |             |             |
| Brussels Regional Investment Company (GIMB-SRIB)  | n.a.        | n.a.        | n.a.        | n.a.        | n.a.        |
| Brussels Regional Development Agency (GOMB-DSRB)  | n.a.        | n.a.        | n.a.        | n.a.        | n.a.        |
| Brussels Enterprise Agency (BAO-ABE)  | n.a.        | n.a.        | n.a.        | n.a.        | n.a.        |
| Total   | n.a.        | n.a.        | n.a.        | n.a.        | n.a.        |
| <i>Policy-directed, Generic</i>   |             |             |             |             |             |
| Projects for applied research at enterprises  | n.a.        | n.a.        | 1.9         | n.a.        | 1.9         |
| Feasibility studies, filing and extension of patents, support for individual inventors                    | n.a.        | n.a.        | n.a.        | n.a.        | n.a.        |
| Applied research and valorisation at universities and higher education institutes – university interfaces | n.a.        | n.a.        | n.a.        | n.a.        | n.a.        |
| MISTRAL   | n.a.        | n.a.        | n.a.        | n.a.        | n.a.        |
| Total   | n.a.        | n.a.        | 1.9         | n.a.        | 1.9         |
| <i>Policy-directed, Biotech-specific</i>  |             |             |             |             |             |
| <i>Total Commercialisation</i>  | <i>n.a.</i> | <i>n.a.</i> | <i>1.9</i>  | <i>n.a.</i> | <i>1.9</i>  |
| <b>OTHERS</b>   |             |             |             |             |             |
| <i>Non-policy-directed</i>  | n.a.        | n.a.        | n.a.        | n.a.        | n.a.        |
| <i>Policy-directed, Generic</i>   | n.a.        | n.a.        | n.a.        | n.a.        | n.a.        |

|  | 2002 | 2003 | 2004 | 2005 | Total |
|--|------|------|------|------|-------|
| <i>Policy-directed, Biotech-specific</i> | n.a. | n.a. | n.a. | n.a. | n.a.  |
| <b>GRAND TOTALS</b>                      | 0.79 | n.a. | 2.28 | n.a. | 3.07  |

Source: BioPolis Research

Key: n.a. = not available

### 4.3 Specific features of the instruments

The features of the instruments, such as the participants and the financial contribution required by the participants, will be described for the policy-directed (generic and biotechnology specific) instruments only.

#### 4.3.1 Federal government

The federal government does not prioritise technology fields and has not implemented policy-directed instruments. Therefore, the features of these instruments will not be described in this section.

#### 4.3.2 Flanders

Table 4.6 provides information about the recipients of grants and the proportion of the grants provided by the Flemish government. The Biotech Fonds Vlaanderen (Biotech Fund Flanders) is an investment fund for providing start-up and growth capital to new companies and foreign companies that want to start activities in Flanders. In most cases, the regional investment organisation GIMV will be one of the investors in the company.

Table 4.6 Participants/recipients and co-financing requirements of policy-directed programmes that funded biotech activities in the period 2002-2005 in Flanders

| Instrument      | Funding agency                                       | Participants / Recipients |      |     | Financial contribution required |                    |
|-----------------|--|---------------------------|------|-----|---------------------------------|--------------------|
|                 |  | PROs                      | SMEs | LFs | Recipients                      | Public authorities |
| <i>Generic</i>  |  |                           |      |     |                                 |                    |
| <i>Specific</i> | Regional Investment Company Flanders / Participation |                           | √    | √   | √                               |                    |

| Instrument | Funding agency   | Participants / Recipients |      |     | Financial contribution required |                    |
|------------|--|---------------------------|------|-----|---------------------------------|--------------------|
|            |  | PROs                      | SMEs | LFs | Recipients                      | Public authorities |
|            | Company Flanders (GIMV / PMV) – Biotech Fund Flanders      |                           |      |     |                                 |                    |
|            | Flanders Interuniversity Institute for Biotechnology – VIB | √                         |      |     | √                               |                    |

Source: BioPolis Research

Key: PROs: Public Research Organisations; SMEs: Small Medium Enterprises, LFs: Large Firms

### 4.3.3 Wallonia

Table 4.7 shows more details about the participants of the various programmes and the extent to which co-funding is required by the project partners. This overview only describes the policy-directed funding. Most programmes target public research organisations, including universities and higher education institutes and also research centres that are linked to higher education institutes. There are also programmes that target enterprises only, in most cases both SMEs and large firms. Funding for enterprises is provided with a maximum of 50% to 80% of the costs. Large firms receive 50% and SMEs receive more, up to 80%. 100% public funding is only granted to universities and higher education institutes, but this funding can be limited for them as well, if they participate in programmes that stimulate collaboration with the industry, the establishment of clusters, etc. In such cases, the private sector is expected to provide co-funding. Some schemes of the FIRST Programme target both public research organisations and firms. In this case, enterprises receive part of the funding (50% or more) and public research organisations receive a fixed amount to cover their operating costs.

Table 4.7 Participants/recipients and co-financing requirements of policy-directed programmes that funded biotech activities in the period 2002-2005 in Wallonia

| Instrument     | Funding agency                                     | Participants / Recipients |      |     | Financial contribution required <sup>75</sup> |                    |
|----------------|--|---------------------------|------|-----|---|--------------------|
|                |  | PROs                      | SMEs | LFs | Recipients                                    | Public authorities |
| <i>Generic</i> | FIRST Higher Education                             | √                         |      |     |   |                    |
|                | FIRST Europe                                       | √                         | √    | √   |   |                    |
|                | FIRST Enterprise                                   | √                         | √    | √   | √   |                    |
|                | FIRST Doctorant Enterprise International           | √                         |      |     | √   |                    |
|                | FIRST Post-Doc                                     | √                         |      |     | √   |                    |
|                | FIRST Spin-off                                     | √                         |      |     |   |                    |
|                | FIRST Spin-out                                     |                           | √    | √   | √   |                    |
|                | Research initiatives programmes                    | √                         |      |     | √   |                    |
|                | Mobilising programmes – Réseaux + Nanotechnologies | √                         |      |     | √   |                    |
|                | Excellence programmes                              | √                         |      |     | √   |                    |
|                | Programmes of research centres                     | √                         |      |     | √   |                    |
|                | Venture capital for university spin-offs           | √                         | √    |     | √   |                    |
|                | Support for SMEs                                   |                           | √    |     | √   |                    |
|                | Subsidies for enterprises                          |                           | √    | √   | √   |                    |

<sup>75</sup> The amount of co-funding required by the recipients of the funding varies according to the type of recipient. In many cases, universities do not have to provide co-funding, but public research institutes do have to, as well as industry. In addition, SMEs are required to provide less co-funding than large firms. If recipients are located in Development Zones, the amount of co-funding required could be lower as well.

| Instrument | Funding agency  | Participants / Recipients |      |     | Financial contribution required <sup>75</sup> |                    |
|------------|---|---------------------------|------|-----|---|--------------------|
|            |   | PROs                      | SMEs | LFs | Recipients                                    | Public authorities |
|            | Reimbursable loans  |                           | √    | √   | √   |                    |
|            | Recruitment subsidy for unemployed persons  |                           | √    |     | √   |                    |
|            | Support for specific development zones  | √                         | √    | √   | √   |                    |
|            | Initiatives to create and support clusters  | √                         | √    | √   | √   |                    |
|            | Fund for the industrialisation and commercialisation of the results of research finances by the region - FIRD |                           | √    | √   | √   |                    |
| Specific   | Mobilising programmes - Waléo   | √                         |      |     | √   |                    |
|            | Support for specific development zones: Biovallée and GIGA  | √                         |      |     | √   |                    |

Source: BioPolis Research

Key: PROs: Public Research Organisations; SMEs: Small- and Medium-sized Enterprises, LFs: Large Firms

### Brussels Capital Region

Table 4.8 provides an overview for the Brussels Capital Region of the type of participants targeted by the programmes and the extent to which co-funding is required by the projects partners. The table describes the policy-directed instruments only. Programmes target public research organisations or companies, but not both. The sectoral support is available for knowledge centres of the industry. Academic projects receive 100% funding, while enterprises need to co-fund 25% to 75% of the project costs.

Table 4.8 Participants/recipients and co-financing requirements of policy-directed programmes that funded biotech activities in the Brussels Capital Region in the period 2002-2005

| Instrument      | Funding agency  | Participants / Recipients |      |     | Financial contribution required |                    |
|-----------------|---|---------------------------|------|-----|---------------------------------|--------------------|
|                 |   | PROs                      | SMEs | LFs | Recipients                      | Public authorities |
| <i>Generic</i>  | Projects for applied research at enterprises  |                           | √    | √   | √                               |                    |
|                 | Feasibility studies, filing and extension of patents and support for individual inventors |                           | √    |     | √                               |                    |
|                 | Sectoral support  |                           | √    | √   |                                 |                    |
|                 | Applied research and valorisation at universities and higher education institutes         | √                         |      |     |                                 |                    |
|                 | Research in Brussels  | √                         |      |     |                                 |                    |
|                 | Prospective Research for Brussels   | √                         |      |     |                                 |                    |
|                 | MISTRAL   |                           | √    |     |                                 |                    |
| <i>Specific</i> | Regional impulse programme - bioinformatics   | √                         |      |     |                                 |                    |

Source: BioPolis Research

Key: PROs: Public Research Organisations; SMEs: Small- and Medium-sized Enterprises, LFs: Large Firms

## **4.4 Policy goals**

The policy goals covered by the instruments will be described for the policy-directed (generic and biotechnology specific) instruments only.

### **4.4.1 Federal government**

There are no policy-directed instruments for biotechnology research, development and commercialisation available at the federal level. Therefore, this section will not present the policy goals covered at the federal level.

### **4.4.2 Flanders**

Table 4.9 presents the policy goals covered by the policy-directed instruments, which are relevant for biotechnology, available in Flanders. The funding available per policy goal is also included.

Almost 70% of the funding available is dedicated to high-level biotechnology research, which is the primary objective of the Vlaams Interuniversitair Instituut voor Biotechnologie (Flanders Interuniversity Institute for Biotechnology). Although VIB spends almost 12% of its budget in stimulating firm creation and business investment in R&D, the Biotech Fonds Vlaanderen (Biotech Fund Flanders) is the main instrument to support firm creation, explicitly in biotechnology. The coverage of the policy goals show that the Flemish government aims to stimulate and promote both high-level fundamental research and technology transfer and valorisation to the industry. This is consistent with the policy objectives as formulated in the recent policy declarations and policy letters.

Table 4.9 Coverage of policy goals and funding, by Flemish policy-directed instruments, in the period 2002-2005 (in M EUR)

|  | Policy goals |   |   |   |   |   |       |      |      |      |
|--|--------------|---|---|---|---|---|-------|------|------|------|
|  | 1            | 2 | 3 | 4 | 5 | 6 | 7     | 8    | 9    | 10   |
| <i>Specific</i>  |              |   |   |   |   |   |       |      |      |      |
| Regional Investment Company Flanders / Participation Company Flanders (GIMV / PMV) – Biotech Fund Flanders (BFF) |              |   |   |   |   |   | 24.6  |      |      |      |
| Flemish Interuniversity Institute for Biotechnology - VIB <sup>76</sup>  | 100.48       |   | √ | √ | √ |   | 6.75  | 1.16 | 6.75 | 1.16 |
| <b>GRAND TOTALS</b>  | 100.48       |   | √ | √ | √ |   | 31.35 | 1.16 | 6.75 | 1.16 |

Source: BioPolis Research

Key:

√ = Policy goal is covered, but budget is not available

1 = High level of biotechnology research

2 = High level of industry-oriented (and applied) research

3 = Knowledge flow and collaboration among scientific disciplines

4 = Availability of human resources

5 = Transmission of knowledge from academia to industry and its application to industrial resources

6 = The adoption of biotechnology for new industrial applications

7 = Firm creation

8 = Social acceptance of biotechnology

9 = Business investment in R&D

10 = Biosafety, risk assessment

<sup>76</sup> Of the total budget, 11.6% is directed at policy goals 7 and 9, and 2% to policy goals 8 and 10. In this table, the combined budget for the policy goals 7 and 9 and 8 and 10 are divided equally among the separate policy goals. Policy goal 4 is also covered by this instrument, but the budget allocated to this policy goal is not known.

#### 4.4.3 Wallonia

Table 4.10 provides an overview of the policy goals covered by policy-directed instruments and the amount of funding attached to these policy goals. Unfortunately, there are almost no data available about the division of total budgets across the various policy goals. The overview shows that many instruments aim to stimulate industry-oriented research (also industrial research) and technology transfer. Fundamental research and collaboration among scientific disciplines as well as the creation of new companies are covered to a lesser extent. There are no programmes available to promote the adoption of biotechnology for new industrial applications nor for improving the social acceptance of biotechnology or studying biosafety issues. Nevertheless, DGTRE has a special unit that initiates campaigns and other activities to promote science, technology and innovation to the public. Several science centres were set up, co-financed by the EU Structural Funds, special projects for school children were initiated, and special exhibitions were set up (DGTRE, 2006). Support for applied and industrial-oriented research and technology transfer is often combined in one instrument and sometimes combined with collaboration among scientific disciplines.

The focus on industry-oriented research and technology transfer is consistent with the policy objectives mentioned in the policy plans of the various Contracts for the Future. However, creation of new enterprises is an important objective as well in these plans, and only a few instruments, which have been created in the very recent past, promote this objective. The support for high-level fundamental research has recently received renewed attention by the Walloon government when creating the excellence programmes and the new poles of excellence. Fundamental scientific research is originally not DGTRE's main priority, as higher education and scientific research is the responsibility of the government of the French Community.

Table 4.10 Coverage of policy goals and funding, by Walloon policy-directed instruments, in the period 2002-2005 (in M EUR)

|  | Policy goals |   |   |   |   |   |   |   |   |    |
|--|--------------|---|---|---|---|---|---|---|---|----|
|  | 1            | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| <i>Specific</i>  |              |   |   |   |   |   |   |   |   |    |
| DGTRE – Mobilising programmes Waléo 1 and 2                          |              | √ | √ |   | √ |   |   |   |   |    |
| DGTRE – Support for specific development zones:<br>Biovallée<br>GIGA | √            | √ |   | √ | √ |   |   |   |   |    |

|   | <b>Policy goals</b> |          |          |          |          |          |          |          |          |           |
|---|---------------------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
|   | <b>1</b>            | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b> | <b>10</b> |
| Total   | √                   | √        | √        | √        | √        |          |          |          |          |           |
| <i>Generic</i>  |                     |          |          |          |          |          |          |          |          |           |
| DGTRE – FIRST<br>– Higher<br>Education                            |                     | √        |          |          | √        |          |          |          |          |           |
| DGTRE – FIRST<br>Spin-off   |                     |          |          |          |          |          | √        |          |          |           |
| DGTRE – FIRST<br>Europe   |                     | √        |          |          | √        |          |          |          |          |           |
| DGTRE – FIRST<br>Enterprise                                       |                     | √        |          |          | √        |          |          |          |          |           |
| DGTRE – FIRST<br>Doctorant<br>Enterprise<br>International         |                     | √        |          |          | √        |          |          |          |          |           |
| DGTRE - FIRST<br>Spin-out   |                     |          |          |          |          |          | √        |          |          |           |
| DGTRE – FIRST<br>Post-Docs  |                     | √        |          |          | √        |          |          |          |          |           |
| Research<br>initiatives<br>programmes                             | √                   |          | √        |          | √        |          |          |          |          |           |
| Mobilising<br>programmes –<br>Nanotechnologies<br>+ Réseaux 1 & 2 |                     | √        | √        |          | √        |          |          |          |          |           |
| Excellence<br>programmes  | √                   |          |          |          | √        |          |          |          |          |           |

|  | Policy goals |   |   |   |   |   |   |   |                    |    |
|--|--------------|---|---|---|---|---|---|---|--------------------|----|
|  | 1            | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9                  | 10 |
| Programmes of the research centres   |              | √ | √ |   | √ |   |   |   |                    |    |
| Venture capital for university spin-offs   |              |   |   |   |   |   | √ |   |                    |    |
| Support for SMEs   |              |   |   |   |   |   | √ |   | 3.57 <sup>77</sup> |    |
| Subsidies for enterprises  |              |   |   |   |   |   |   |   | 4.13 <sup>78</sup> |    |
| Reimbursable loans   |              |   |   |   |   |   |   |   | 46.9 <sup>79</sup> |    |
| Recruitment subsidy for unemployed persons   |              |   |   |   |   |   |   |   | √                  |    |
| Fund for the industrialisation and commercialisation of the results of research financed by the regions (FIRD) |              |   |   |   |   |   |   |   | √                  |    |
| Support for specific development zones   | √            | √ | √ | √ | √ |   |   |   | 4.66 <sup>80</sup> |    |

<sup>77</sup> 'Life Sciences and Agrofood' and 'Human Health'.

<sup>78</sup> Years 2003-2005, 'Life Sciences and Agrofood' and 'Human Health'.

<sup>79</sup> Ibid.

|  | Policy goals |   |   |   |   |   |   |   |       |    |
|--|--------------|---|---|---|---|---|---|---|-------|----|
|  | 1            | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9     | 10 |
| Various initiatives to create and support clusters in Wallonia | √            | √ | √ |   | √ |   |   |   |       |    |
| Total  | √            | √ | √ | √ | √ |   | √ |   | 59.26 |    |
| <b>GRAND TOTALS</b>  | √            | √ | √ | √ | √ |   | √ |   | 59.26 |    |

Source: BioPolis Research

Key:

√ = Policy goal is covered, but budget is not available

1 = High level of biotechnology research

2 = High level of industry-oriented (and applied) research

3 = Knowledge flow and collaboration among scientific disciplines

4 = Availability of human resources

5 = Transmission of knowledge from academia to industry and its application to industrial resources

6 = The adoption of biotechnology for new industrial applications

7 = Firm creation

8 = Social acceptance of biotechnology

9 = Business investment in R&D

10 = Biosafety, risk assessment

#### 4.4.4 Brussels Capital Region

Table 4.11 provides an overview of the policy goals covered by the policy-directed instruments available in Brussels and the division of the budgets over these policy goals. Unfortunately, there are almost no data available about the budgets for biotechnology nor about the division of funds across policy goals.

The support available for enterprises is mainly focused on the stimulation of R&D investments and activities by enterprises. On the other hand, the main programmes available for universities support high-level basic research and scientific collaboration. Valorisation and technology transfer by universities is also promoted by regional impulse programmes, as well as by the university interfaces and LINK. The availability of human resources is stimulated by the Research in Brussels programme, but the Brussels Capital Region has established BRAINS as well. BRAINS is the Brussels Relocation and Interfacing Network for Scientists, a mobility centre for research and development in the region. The centre provides services such as organising scientific events, providing information about mobility, coordinating supply and demand, etc. None of the instruments promote social acceptability of biotechnology. Nevertheless, BIRDS, the

<sup>80</sup> Funding in 2003, 2004 and 2005 available for the ‘ Life Sciences and Agrofood’ and ‘ Human Health’ domains.

International Research Development and Scientific Association, aims to promote scientific research by providing services, facilities and equipment.

The support for both the knowledge base and the technology transfer and application of knowledge is consistent with the policy objectives of the government of the Brussels Capital Region. The actions following the Contract for the Economy and Employment mainly concern improving the operating environment for enterprises and stimulating innovation in enterprises. The policy for scientific research acknowledges the necessity for excellence in fundamental research, as well as creating synergies between fundamental and applied and industry-oriented research.

Table 4.11 Coverage of policy goals and funding, by policy-directed instruments, in the Brussels Capital Region in the period 2002-2005 (in M EUR)

|   | Policy goals |   |   |   |   |   |   |   |   |    |
|---|--------------|---|---|---|---|---|---|---|---|----|
|   | 1            | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| <i>Specific</i>   |              |   |   |   |   |   |   |   |   |    |
| IWOIB-Regional impulse programme - bioinformatics   | √            |   | √ |   | √ |   |   |   |   |    |
| <i>Generic</i>  |              |   |   |   |   |   |   |   |   |    |
| IWOIB – Projects for applied research at enterprises  |              |   |   |   |   |   |   |   | √ |    |
| IWOIB – Feasibility studies, filing and extension of patents and support for individual researchers |              |   |   |   |   |   |   |   | √ |    |
| IWOIB – Sectoral support  |              | √ |   |   |   |   |   |   | √ |    |

|   | Policy goals |      |   |   |   |   |   |   |   |    |
|---|--------------|------|---|---|---|---|---|---|---|----|
|   | 1            | 2    | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| IWOIB – Applied research and valorisation at universities and higher education institutes |              | 0.38 |   |   | √ |   |   |   |   |    |
| IWOIB – Research in Brussels  | √            |      |   | √ |   |   |   |   |   |    |
| IWOIB – Prospective Research in Brussels  | √            |      |   |   |   |   |   |   |   |    |
| IWOIB – MISTRAL   |              |      |   |   |   |   |   |   | √ |    |
| Total   | √            | 0.38 |   | √ | √ |   |   |   | √ |    |
| <b>GRAND TOTALS</b>   | √            | 0.38 |   | √ | √ |   |   |   | √ |    |

Source: BioPolis Research

Key:

√ = Policy goal is covered, but budget is not available

1 = High level of biotechnology research

2 = High level of industry-oriented (and applied) research

3 = Knowledge flow and collaboration among scientific disciplines

4 = Availability of human resources

5 = Transmission of knowledge from academia to industry and its application to industrial resources

6 = The adoption of biotechnology for new industrial applications

7 = Firm creation

8 = Social acceptance of biotechnology

9 = Business investment in R&D

10 = Biosafety, risk assessment

#### 4.5 Biotech application areas

The biotechnology research application areas covered by the instruments will be described for the policy-directed (generic and biotechnology-specific) instruments only.

#### 4.5.1 Federal government

There are no policy-directed instruments for biotechnology research, development and commercialisation available at the federal level. Therefore, this section will not present the biotechnology application areas covered at the federal level.

#### 4.5.2 Flanders

Table 4.12 shows the application areas covered by the Flemish policy-directed instruments in the period 2002-2005. Health biotechnology appears to be the dominant application area, with about 60% of the funds available. This is highly consistent with Belgium's performance as described in Chapter 3, as Belgian biotechnology publications are especially prevalent in the field of human health biotechnology and generic biotechnology, followed by plant biotechnology.

Table 4.12 Coverage of biotech application areas and funding, by policy-directed instruments, in Flanders in the period 2002-2005 (in M EUR)

|  | Biotechnology application areas |   |   |       |   |   |   |   |      |
|--|---------------------------------|---|---|-------|---|---|---|---|------|
|  | 1                               | 2 | 3 | 4     | 5 | 6 | 7 | 8 | 9    |
| <i>Specific</i>  |                                 |   |   |       |   |   |   |   |      |
| Biotech Fund<br>Flanders   |                                 |   |   |       |   |   |   |   | 24.6 |
| Flemish<br>Interuniversity<br>Institute for<br>Biotechnology - VIB | 29.07                           |   |   | 87.23 |   |   |   |   |      |
| <b>GRAND TOTALS</b>  | 29.07                           |   |   | 87.23 |   |   |   |   | 24.6 |

Source: BioPolis Research

1 = Plant biotechnology

2 = Animal biotechnology

3 = Environment biotechnology

4 = Health biotechnology

5 = Food biotechnology

6 = Industrial biotechnology

7 = Basic biotechnology

8 = Ethical, legal, social aspects of biotechnology

9 = General (includes instruments that target all biotechnology areas)

#### 4.5.3 Wallonia

Table 4.13 provides an overview of the biotechnology application areas covered by the policy-directed instruments in Wallonia in the period 2002-2005. The overview shows that the majority biotechnology funding is available for health biotechnology. However,

this includes the programmes the budget division of which into application areas is known. For most programmes this is not known. Moreover, most programmes are generic and do not support a specific application area. For these programmes, the budgets are added to the ‘general’ column and usually include funding provided to the ‘Life Sciences and Agrofood’ and ‘Human Health’ domains. Again, the dominance of human health biotechnology and generic biotechnology is consistent with the number of publications in these areas.

Table 4.13 Coverage of biotech application areas and funding, by policy-directed instruments, in Wallonia in the period 2002-2005 (in M EUR)

|   | Biotechnology application areas |   |   |       |   |   |   |   |                     |
|---|---------------------------------|---|---|-------|---|---|---|---|---------------------|
|   | 1                               | 2 | 3 | 4     | 5 | 6 | 7 | 8 | 9                   |
| <i>Specific</i>                         |                                 |   |   |       |   |   |   |   |                     |
| Mobilising programmes Waléo 1 and 2     |                                 |   |   | 48.42 |   |   |   |   |                     |
| Support for specific development zones: |                                 |   |   |       |   |   |   |   |                     |
| Biovallée                               |                                 |   |   |       |   |   |   |   | 14.87               |
| GIGA                                    |                                 |   |   | 11.8  |   |   |   |   |                     |
| Total                                   |                                 |   |   | 60.22 |   |   |   |   | 14.87               |
| <i>Generic</i>                          |                                 |   |   |       |   |   |   |   |                     |
| FIRST programmes                        |                                 |   |   |       |   |   |   |   | 10.99 <sup>81</sup> |
| Research initiatives programmes         |                                 |   |   |       |   |   |   |   | 5.65 <sup>82</sup>  |
| Mobilising                              |                                 |   |   |       |   |   |   |   |                     |

<sup>81</sup> Funding in the ‘Life Sciences and Agrofood’ and ‘Human Health’ domains.

<sup>82</sup> Funding in the ‘Life Sciences and Agrofood’ domain in 2002.

|  | Biotechnology application areas |   |   |       |      |   |   |   |                    |
|--|---------------------------------|---|---|-------|------|---|---|---|--------------------|
|  | 1                               | 2 | 3 | 4     | 5    | 6 | 7 | 8 | 9                  |
| programmes Réseaux 1 and 2 Nanotechnologies  |                                 |   |   | 11.94 | 15.9 |   |   |   | 5.71 <sup>83</sup> |
| Excellence programmes  |                                 |   |   | √     |      | √ |   |   |                    |
| Programmes of the research centres   |                                 |   |   |       |      |   |   |   | 0.22 <sup>84</sup> |
| Venture capital for university spin-offs   |                                 |   |   |       |      |   |   |   | √                  |
| Support for SMEs   |                                 |   |   |       |      |   |   |   | 3.57 <sup>85</sup> |
| Subsidies for enterprises  |                                 |   |   |       |      |   |   |   | 4.13 <sup>86</sup> |
| Reimbursable loans   |                                 |   |   |       |      |   |   |   | 46.9 <sup>87</sup> |
| Recruitment subsidy for unemployed persons   |                                 |   |   |       |      |   |   |   | √                  |
| Fund for the industrialisation and commercialisation of the results of research financed by the region |                                 |   |   |       |      |   |   |   | √                  |

<sup>83</sup> Funding in the 'Life Sciences and Agrofood' and 'Human Health' domains.

<sup>84</sup> Funding for Biovallée in 2004.

<sup>85</sup> Funding in the 'Life Sciences and Agrofood' and 'Human Health' domains.

<sup>86</sup> Funding in the 'Life Sciences and Agrofood' and 'Human Health' domains in 2003-2005.

<sup>87</sup> Ibid.

|  | <b>Biotechnology application areas</b> |          |          |          |          |          |          |          |                    |
|--|--|----------|----------|----------|----------|----------|----------|----------|--------------------|
|  | <b>1</b>                               | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b>           |
| (FIRD)                                 |  |          |          |          |          |          |          |          |                    |
| Support for specific development zones |  |          |          |          |          |          |          |          | 4.66 <sup>88</sup> |
| Total                                  |  |          |          | 11.94    | 15.9     |          |          |          | 81.83              |
| <b>GRAND TOTAL</b>                     |  |          |          | 72.16    | 15.9     |          |          |          | 96.7               |

Source: BioPolis Research

Key:

√ = Biotechnology area is covered, but budget is not available

1 = Plant biotechnology

2 = Animal biotechnology

3 = Environment biotechnology

4 = Health biotechnology

5 = Food biotechnology

6 = Industrial biotechnology

7 = Basic biotechnology

8 = Ethical, legal, social aspects of biotechnology

9 = General (includes instruments that target all biotechnology areas)

#### 4.5.4 Brussels Capital Region

The application areas covered by the policy-directed instruments in Brussels are presented in Table 4.14. The table shows that, again, most of the budget is allocated to health biotechnology. Nevertheless, the budget spent on biotechnology is not known for several programmes, let alone the division into application areas. The focus on health biotechnology is not surprising because the main research actors in biotechnology are active in health biotechnology (including academic hospitals). Industrial biotechnology is another important application area, with InduTec as an instrument that offers, among others, services and products relevant for industrial biotechnology.

<sup>88</sup> Funding in the 'Life Sciences and Agrofood' and 'Human Health' domains in 2003-2005.

Table 4.14 Coverage of biotech application areas and funding, by policy-directed instruments, in the Brussels Capital Region in the period 2002-2005 (in M EUR)

|   | Biotechnology application areas |   |   |                   |   |   |                    |   |   |
|---|---------------------------------|---|---|-------------------|---|---|--------------------|---|---|
|   | 1                               | 2 | 3 | 4                 | 5 | 6 | 7                  | 8 | 9 |
| <i>Specific</i>   |                                 |   |   |                   |   |   |                    |   |   |
| Regional impulse programme - bioinformatics   |                                 |   |   |                   |   |   | 0.79 <sup>89</sup> |   |   |
| Total   |                                 |   |   |                   |   |   | 0.79               |   |   |
| <i>Generic</i>  |                                 |   |   |                   |   |   |                    |   |   |
| Projects for applied research at enterprises  |                                 |   |   | 1.9 <sup>90</sup> |   |   |                    |   |   |
| Feasibility studies, filing and extension of patents and support for individual inventors |                                 |   |   |                   |   |   |                    |   | √ |
| Sectoral support  |                                 |   |   |                   |   |   |                    |   | √ |
| Applied research and valorisation at universities and higher education institutes         |                                 |   | √ |                   |   | √ | 0.38 <sup>91</sup> |   |   |
| Research in Brussels  |                                 |   |   | √                 |   |   |                    |   |   |

<sup>89</sup> 2002

<sup>90</sup> 2004

<sup>91</sup> 2004

|                                  | Biotechnology application areas |   |   |     |   |   |      |   |   |
|----------------------------------|---------------------------------|---|---|-----|---|---|------|---|---|
|                                  | 1                               | 2 | 3 | 4   | 5 | 6 | 7    | 8 | 9 |
| Prospective Research in Brussels |                                 |   |   |     |   |   |      |   | √ |
| MISTRAL                          |                                 |   |   |     |   |   |      |   | √ |
| Total                            |                                 |   | √ | 1.9 |   | √ | 0.38 |   | √ |
| <b>GRAND TOTALS</b>              |                                 |   | √ | 1.9 |   | √ | 1.17 |   | √ |

Source: BioPolis Research

Key: √ = Biotechnology area is covered, but budget is not available

1 = Plant biotechnology

2 = Animal biotechnology

3 = Environment biotechnology

4 = Health biotechnology

5 = Food biotechnology

6 = Industrial biotechnology

7 = Basic biotechnology

8 = Ethical, legal, social aspects of biotechnology

9 = General (includes instruments that target all biotechnology areas)

## 4.6 Stimulation of biotech activities through the instruments

The biotechnology activities covered by the instruments will be described for the policy-directed (generic and biotechnology specific) instruments only.

### 4.6.1 Federal government

There are no policy-directed instruments for biotechnology research, development and commercialisation available at the federal level. Therefore, this section will not present the biotechnology activities covered at the federal level.

### 4.6.2 Flanders

The biotechnology activities covered by the policy-directed instruments in Flanders are presented in Table 4.15. Biotech Fonds Vlaanderen (Biotech Fund Flanders) was established to provide financial support for start-ups. VIB, on the other hand, was set up to provide more activities, including research, technology transfer and public discourse activities. Unfortunately, the division of the total budget of 116.3M EUR into these activities is not known. Nevertheless, when taking into account the policy goals covered, almost 80% of the budget is allocated to research activities, while almost 12% is spent on technology transfer activities and stimulating the creation of new businesses. VIB spends approximately 2% on socio-economic activities.

Table 4.15 Coverage and funding of biotech activities, by policy-directed instruments, in Flanders in the period 2002-2005 (in M EUR)

|   | Biotechnology activities |   |   |   |   |    |    |      |    |    |    |
|---|--------------------------|---|---|---|---|----|----|------|----|----|----|
|   | 1                        | 2 | 3 | 5 | 6 | 10 | 12 | 13   | 14 | 15 | 19 |
| <i>Specific</i>   |                          |   |   |   |   |    |    |      |    |    |    |
| Biotech Fund Flanders                                     |                          |   |   |   |   |    |    | 24.6 |    |    |    |
| Flemish Interuniversity Institute for Biotechnology (VIB) | √                        | √ | √ | √ | √ | √  | √  |      | √  | √  | √  |
| <b>GRAND TOTALS</b>                                       | √                        | √ | √ | √ | √ | √  | √  | 24.6 | √  | √  | √  |

Source: BioPolis Research

Key:

√ = Biotechnology activity is covered, but budget is not available

1 = Basic research

2 = Applied research

3 = Centres of excellence

4 = Research network

5 = Mobility of researchers and disciplines

6 = Biotechnology training

7 = Mobility of researchers between academia and industry

8 = Collaborative research between industry and public research organisations

9 = Set up research institute / centre of industrial interest

10 = Technology transfer office

11 = Science and technology park

12 = Protection of IPR in public research organisations

13 = Financial support for start-ups

14 = Non-financial support for start-ups

15 = Creation of incubators

16 = Awareness of biotech by companies not yet active

17 = Grants for industrial research

18 = Other incentives for business investment

19 = Support for public discourse activities

#### 4.6.3 Wallonia

Table 4.16 presents an overview of the biotechnology activities covered by the policy-directed instruments in Wallonia in the period 2002-2005. The overview shows that the policy-directed instruments mainly support activities related to applied research, research collaborations between public research organisations and industry, valorisation of research results and the transfer of expertise and knowledge to the industry. Instruments allocated to public research organisations also support strategic research and valorisation to the industry. In addition, enterprises and especially SMEs are stimulated and supported in their R&D and commercialisation activities. This focus on industry-oriented research, technology transfer and valorisation is not surprising because the policy-directed instruments are all implemented and installed by DGTRE, which is responsible for

research, development and innovation in the Walloon Region. Higher education and scientific research activities at public research organisations are mainly the responsibility of the government of the French Community and these concern non-policy-directed instruments.

Table 4.16 Coverage and funding of biotechnology activities, by policy-directed instruments, in Wallonia in the period 2002-2005 (in MEUR)

|  | Biotechnology activities |   |   |   |   |   |   |    |    |    |    |    |
|--|--------------------------|---|---|---|---|---|---|----|----|----|----|----|
|  | 1                        | 2 | 4 | 5 | 7 | 8 | 9 | 10 | 12 | 14 | 17 | 18 |
| <i>Specific</i>  |                          |   |   |   |   |   |   |    |    |    |    |    |
| Mobilising programmes Waléo 1 and 2                          |                          | √ |   | √ | √ | √ |   |    |    |    |    |    |
| Support for specific development zones:<br>Biovallée<br>GIGA |                          | √ | √ |   |   | √ |   | √  |    |    |    |    |
| Total  |                          | √ | √ |   |   | √ |   | √  |    |    |    |    |
| <i>Generic</i>   |                          |   |   |   |   |   |   |    |    |    |    |    |
| FIRST programme  |                          |   |   |   | √ | √ |   |    |    | √  |    |    |
| Research initiatives programmes                              | √                        |   |   | √ |   |   |   | √  |    |    |    |    |
| Mobilising programmes Réseaux 1 and 2<br>Nanotechnologies    |                          | √ |   | √ | √ | √ |   |    |    |    |    |    |
| Excellence programmes  | √                        |   |   |   |   | √ |   |    |    |    |    |    |
| Programmes of the research centres                           |                          | √ |   |   |   | √ |   | √  | √  |    |    |    |

|  | Biotechnology activities |   |   |   |   |   |   |    |    |    |                    |    |
|--|--------------------------|---|---|---|---|---|---|----|----|----|--------------------|----|
|  | 1                        | 2 | 4 | 5 | 7 | 8 | 9 | 10 | 12 | 14 | 17                 | 18 |
| Venture capital for university spin-offs   |                          |   |   |   |   |   |   |    | √  |    |                    |    |
| Support for SMEs   |                          |   |   |   |   |   |   |    |    | √  | √                  | √  |
| Subsidies for enterprises  |                          |   |   |   |   |   |   |    |    |    | 4.13 <sup>92</sup> |    |
| Reimbursable loans   |                          |   |   |   |   |   |   |    |    |    | 46.9 <sup>93</sup> |    |
| Fund for the industrialisation and commercialisation of the results of research financed by the region |                          |   |   |   |   |   |   |    |    |    |                    | √  |
| Recruitment subsidy for unemployed persons   |                          |   |   |   |   |   |   |    |    |    |                    | √  |
| Support for specific development zones   |                          |   |   |   |   |   | √ |    |    |    | √                  | √  |
| Total  | √                        | √ | √ | √ | √ | √ | √ | √  | √  | √  | 50.22              | √  |
| <b>GRAND TOTALS</b>  | √                        | √ | √ | √ | √ | √ | √ | √  | √  | √  | 50.22              | √  |

Source: BioPolis Research

Key:

√ = Biotechnology activity is covered, but budget is not available

1 = Basic research

2 = Applied research

3 = Centres of excellence

4 = Research network

5 = Mobility of researchers and disciplines

6 = Biotechnology training

7 = Mobility of researchers between academia and industry

8 = Collaborative research between industry and public research organisations

9 = Set up research institute / centre of industrial interest

10 = Technology transfer office

<sup>92</sup> Funding in the 'Life Sciences and Agrofood' and 'Human Health' domains in 2003-2005.

<sup>93</sup> Funding in the 'Life Sciences and Agrofood' and 'Human Health' domains in 2003-2005.

- 11 = Science and technology park
- 12 = Protection of IPR in public research organisations
- 13 = Financial support for start-ups
- 14 = Non-financial support for start-ups
- 15 = Creation of incubators
- 16 = Awareness of biotech by companies not yet active
- 17 = Grants for industrial research
- 18 = Other incentives for business investment
- 19 = Support for public discourse activities

#### 4.6.4 Brussels Capital Region

An overview of the biotechnology activities covered by the policy-directed instruments in the Brussels Capital Region is provided in Table 4.17. The table shows that policy-directed instruments in Brussels support basic research, applied and industrial research, as well as valorisation activities. Instruments targeting public research organisations focus first of all on basic research and mobility of researchers, but also on applied research and valorisation. Instruments for enterprises provide grants for industrial research, as well as non-financial support and other incentives to support and promote R&D investments in these enterprises. Research collaboration between public research organisations and industry is also supported, mainly through the regional impulse programmes and sectoral support.

Table 4.17 Coverage and funding of biotechnology activities, by policy-directed instruments, in the Brussels Capital Region in the period 2002-2005 (in M EUR)

|  | Biotechnology activities |   |   |   |   |   |    |    |    |    |                   |    |
|--|--------------------------|---|---|---|---|---|----|----|----|----|-------------------|----|
|  | 1                        | 2 | 4 | 5 | 8 | 9 | 10 | 12 | 13 | 14 | 17                | 18 |
| <i>Specific</i>  |                          |   |   |   |   |   |    |    |    |    |                   |    |
| Regional impulse programme - bioinformatics                      | √                        |   | √ |   | √ |   |    | √  |    |    |                   |    |
| <i>Generic</i>   |                          |   |   |   |   |   |    |    |    |    |                   |    |
| Projects for applied research at enterprises                     |                          |   |   |   |   |   |    |    |    |    | 1.9 <sup>94</sup> |    |
| Feasibility studies, filing and extension of patents and support |                          |   |   |   |   |   |    |    | √  | √  |                   |    |

<sup>94</sup> 2004

|   | Biotechnology activities |   |   |   |   |   |    |    |    |    |     |    |
|---|--------------------------|---|---|---|---|---|----|----|----|----|-----|----|
|   | 1                        | 2 | 4 | 5 | 8 | 9 | 10 | 12 | 13 | 14 | 17  | 18 |
| for individual inventors  |                          |   |   |   |   |   |    |    |    |    |     |    |
| Sectoral support  |                          | √ |   |   | √ | √ |    |    |    |    | √   |    |
| Applied research and valorisation at universities and higher education institutes |                          | √ |   |   |   |   | √  | √  |    |    |     |    |
| Research in Brussels  | √                        |   |   | √ |   |   |    |    |    |    |     |    |
| Prospective Research in Brussels  | √                        |   |   |   |   |   |    |    |    |    |     |    |
| MISTRAL   |                          |   |   |   |   |   |    |    |    | √  |     | √  |
| Total   | √                        | √ | √ | √ | √ | √ | √  | √  | √  | √  | 1.9 | √  |
| <b>GRAND TOTALS</b>   | √                        | √ | √ | √ | √ | √ | √  | √  | √  | √  | 1.9 | √  |

Source: BioPolis Research

Key:

√= Biotechnology activity is covered, but budget is not available

1 = Basic research

2 = Applied research

3 = Centres of excellence

4 = Research network

5 = Mobility of researchers and disciplines

6 = Biotechnology training

7 = Mobility of researchers between academia and industry

8 = Collaborative research between industry and public research organisations

9 = Set up research institute / centre of industrial interest

10 = Technology transfer office

11 = Science and technology park

12 = Protection of IPR in public research organisations

13 = Financial support for start-ups

14 = Non-financial support for start-ups

15 = Creation of incubators

16 = Awareness of biotech by companies not yet active

17 = Grants for industrial research

18 = Other incentives for business investment

19 = Support for public discourse activities

#### 4.7 Dynamics: comparison with 1994-1998

In 1998/1999, an inventory was prepared of the funding available for biotechnology research in Belgium. This inventory covered the period 1994-1998.<sup>95</sup> In this section, the current period of study (2002-2005) will be compared with the inventory period. First, the average total funding per annum will be compared (Table 4.18) and secondly, the presence of policy instruments for specific policy goals (Table 4.19). As the inventory for the period 1994-1998 only covers research funding (and the present study also commercialisation), the comparison will concern biotechnology research funding only.

The comparison in Table 4.18 shows that the average total funding per annum for biotechnology research increased substantially over the years. The funding at the federal level decreased by almost 19%, but at the same time the funding in Flanders increased by 14%. The funding in Wallonia decreased slightly by 4%.

Important to note here is that for both periods not all data for all instruments were available. In addition, the decision on what to include as a non-policy-directed or as a policy-directed instrument differs between both periods. This resulted, for example, in not including the generic policy-directed instruments in Flanders because biotechnology is not considered a priority by the Flemish government in the current period of study. Finally, as mentioned in Section 4.2, several instruments target both research and commercialisation, and in many cases the division of the budget into the policy goals was not known.

Table 4.18 Comparison of biotechnology research funding, by non-policy-directed and policy-directed instruments, in the periods 1994-1998 and 2002-2005

| <b>Funding</b>          | <b>Average total funding per annum for biotechnology research in 1994-1998 (M ECU)*</b> | <b>Average total funding per annum for biotechnology research in 2002-2005 (M EUR)**</b> |
|-------------------------|---|--|
| Federal                 | 21.2  | 17.18  |
| Flanders                | 57.36   | 65.37  |
| Wallonia                | 31.6  | 30.26  |
| Brussels Capital Region | -   | 0.29   |
| <b>Total</b>            | <b>110.16</b>   | <b>113.1</b>   |

Source: BioPolis Research

Key:

- : not present

<sup>95</sup> Benedictus, J.N. and C.M. Enzing, 'National Report of Belgium', in *European Commission (2000) Inventory of public biotechnology R&D programmes in Europe – Volume 2 – National Reports: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Luxembourg*: Office for Official Publications of the European Communities, 1999.

\*Average annual funding is based on the total biotechnology budget per instrument in the period 1994-1998 divided by five years. This does not take into account that some instruments may have only existed for two years in that period.

\*\*Average annual funding is based on the total biotechnology budget per instrument in the period 2002-2005 divided by four years. This does not take into account that some instruments may have only existed for two years in that period.

Table 4.19 compares the policy areas and goals covered by the instruments for the two periods. The policy areas covered by the instruments remain the same for both periods. In both periods, collaboration among public research organisations and between academia and industry, as well as technology transfer initiatives received considerable policy attention in both periods. Table 4.19 presents an overview for Belgium as a whole. Of course, there are different focal points for policy goals in the different regions. More details about the coverage of policy goals in the regions can be found in Section 4.4.

The situations in Flanders, on the one hand, and Wallonia and Brussels, on the other hand, are difficult to compare because Flanders does not prioritise biotechnology anymore and therefore only two policy-directed instruments are included. Wallonia and Brussels do prioritise biotechnology and, therefore, several (mainly generic) instruments are available. In Flanders the support is primarily focused on high-level biotechnology research through the establishment of VIB. In addition, technology transfer and firm creation are considered important targets as well. In Wallonia, most support is allocated to industrial and applied research, knowledge and technology transfer, as well as the stimulation of business investments in R&D. Fundamental biotechnology research is targeted as well, but to a lesser extent than applied research. Important to note here is that this does not include the non-policy-directed support from the French Community, which is responsible for education and scientific research at universities and higher education institutes. In Brussels, on the one hand, support is available for basic research and applied research at universities, and, on the other hand, instruments dedicated to enterprises supporting applied research as well as business investments in R&D.

Initiatives to monitor and improve the social acceptance of biotechnology are only present in Flanders through VIB. Wallonia and Brussels do not have such instruments, although DGTRE in Wallonia has a special department for promoting scientific research and development to the public, and Brussels has a dedicated association for this same purpose. Biosafety and risk assessment issues are mainly covered by the governmental research institutes at federal and regional levels (non-policy-directed).

Table 4.19 Presence of policy-directed instruments for specific policy goals in the periods 1994-1998 and 2002-2005

| Presence of instruments                                  |  |           |     |           |   |
|--|--|-----------|-----|-----------|---|
| Policy areas   | Policy goals   | 1994-1998 |     | 2002-2005 |   |
|  |  | G*        | S** | G         | S |
| <b>1. Creation of knowledge base and human resources</b> | 1. To promote high level of biotechnology basic research   | √         | √   | √         | √ |
|  | 2. To promote high level of industry-oriented (and applied) research   | √         | √   | √         | √ |
|  | 3. To support knowledge flow and collaboration among scientific disciplines  | √         | √   | √         | √ |
|  | 4. To assure availability of human resources   |           | √   |           | √ |
| <b>2. Knowledge transmission and application</b>         | 5. To facilitate transmission of knowledge from academia to the industry and its application for industrial purposes | √         | √   | √         | √ |
|  | 6. To stimulate the adoption of biotechnology for new industrial applications  |           |     |           |   |
|  | 7. To assist firm creation   | √         | √   | √         | √ |
| <b>3. Market</b>   | 8. To monitor and improve the social acceptance of biotechnology   |           | √   |           | √ |
| <b>4. Industrial development</b>                         | 9. To encourage business investment in R&D   | √         | √   | √         | √ |

Source: BioPolis Research

When comparing the two periods for the biotechnology areas covered by the non-policy- and policy-directed instruments, it appears that in both periods all areas were explicitly stimulated. Animal, environmental and industrial biotechnology, as well as ethical, social and legal aspects of biotechnology, were only supported through non-policy-directed instruments in the period 2002-2005.

In the period 1994-1998, the industrial biotechnology (the combination of the two types, cell factory and for paper, food, *etc.*) and human/veterinary biotechnology domains received the lion's share of support through policy-directed instruments, with an estimated budget of 41 and 29.5M ECU respectively. Animal, plant and environmental biotechnology received the least, 11.5M ECU each. In the period 2002-2005, human health biotechnology again received the largest estimated sum through policy-directed instruments, and it increased by 445% to 161M EUR. On the other hand, no budget was allocated to industrial biotechnology, but the newly created food biotechnology domain received approximately 16M EUR. The second largest domain was plant biotechnology, with an estimated budget of 29M EUR, an increase of 153% compared to the previous period. In 2002-2005, animal, environmental and basic biotechnology, as well as ethical, legal and social aspects of biotechnology did not receive any funding through policy-directed instruments.

In addition to the policy-directed instruments that explicitly target certain biotechnology domains (one or more), there are also policy-directed instruments open to all areas. In the period 1994-1998, the estimated budgets provided through these types of instruments

amounted to 124M ECU. In the period 2002-2005, this slightly decreased to approximately 121M EUR.

Important to note here is that in both periods, data were not available for all instruments. In addition, the decision of what to include as a non-policy-directed or as a policy-directed instrument differs between both periods. This resulted, for example, in not including the generic policy-directed instruments in Flanders because biotechnology is not considered a priority by the Flemish government in the current period of study. On the other hand, the influence on the coverage of biotechnology areas could be limited, as generic instruments often do not prioritise a specific biotechnology area.

## **5. Future developments**

### **5.1 Federal government**

In the policy declaration of October 2005, the federal government announced investments in research and development and innovation and creativity. One of the concrete measures announced was the extension of the new tax deduction of researchers' salaries to enterprises in October 2005. The tax measure will be extended to include young innovative SMEs, which spend more than 15% of their budget on R&D. An amount of 10M EUR will be available for this measure.<sup>96</sup> In addition, companies will be allowed to grant a tax-free month's salary to a maximum of 10% of their employees who develop and implement an innovative idea (Federal policy declaration, 2005).

### **5.2 Flemish Government**

According to the 2004-2009 policy plan and the 2006 Policy Letter, public investments in science, technology and innovation will need to be increased by 255M EUR in 2009 in comparison with 2004. In 2006, the Flemish Government will invest an additional 50M EUR in research and development.

The 2006 Policy Letter on Science and Innovation emphasises knowledge transfer to SMEs as the main priority for the coming years, and an SME Action Plan is announced for 2006. The policy letter also announces the preparation of an Innovation Policy Plan to present a horizontal innovation policy in Flanders. The Innovation Policy Plan is already approved by the government, and has nine priorities (Moerman, 2005b):

- Stimulating creativity, entrepreneurs and innovation in all sectors;
- Promoting Flanders as an internationally attractive knowledge region;
- Increasing investments in innovation;
- Creating an innovative environment;
- An innovating government will act as a good example;
- Increasing the number of researchers employed;
- Focusing on innovative hotspots;
- Innovation is a lever for sustainable development;
- Improving innovation in health care.

The Innovation Policy Plan is essentially a plan; concrete measures have not yet been formulated nor have specific financial means been determined.

In the framework of the competence poles, a new pole is being launched in 2006, Flanders Food. One of the themes of Flanders Food is functional foods, and this is related to biotechnology research.

In November 2005, the Life Sciences Platform was set up. This platform aims to develop a long-term strategic vision for the life sciences industry in Flanders and to formulate

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<sup>96</sup> <http://www.marcverwilghen.be>, accessed 12 October 2005.

recommendations. In the first phase (December 2005-May 2006), the life sciences industry will prepare a SWOT analysis including recommendations for further development. In the second phase (June 2006-May 2007), the various public authorities, industry and other relevant stakeholders plan to discuss the recommendations for implementation (Witboek Life Science Industrie Vlaanderen, 2006).

In May 2006, a new programme for Applied Biomedical Research (Toegepast Biomedisch Onderzoek – TBM) was launched. The programme supports biomedical research with a strong focus on acquiring insight into the basis of human diseases and health. In 2006, 5M EUR will be donated to the programme. All non-profit research organisations can participate. The programme is managed by IWT.<sup>97</sup>

### **5.3 Walloon government and the government of the French Community**

Based on the ‘Marshall Plan for Wallonia’, the Walloon government announced in December 2005 the establishment of five competitiveness poles in the fields of aerospace, life sciences, agro-industry, transport, and logistics and mechanical engineering. The competitiveness poles resemble main clusters in the five key areas, in which clusters previously set up can take part. The first four poles were selected in July 2006 (with 20 projects), one of which is the life sciences pole (BioWin) which includes five projects.<sup>98</sup>

### **5.4 Government of the Brussels Capital Region**

The Contrat pour l’Economie et l’Emploi (Contract for the Economy & Employment) is still active; the policy declaration of October 2005 stated the intention of continuing activities (initiated in 2005) in 2006. Regarding the concentration of support for the three main sectors (including life sciences), the policy declaration announced more clustering initiatives in the three sectors and the financing of start-ups through Brustart.<sup>99</sup>

The Minister for Scientific Research launched a new programme in Brussels in 2006 called Spin-off. This programme supports the translation of fundamental research into concrete applications in new companies (start-ups) in the Brussels Capital Region. It targets both academic spin-offs and industrial spin-offs. The budget for this programme is not known. Academic spin-off projects receive 100% funding, industrial spin-off projects receive 75%.<sup>100</sup>

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<sup>97</sup> ‘Minister Moerman lanceert nieuw programma voor Toegepast Biomedisch Onderzoek (TBM)’, <http://www.awi-vlaanderen.be/nieuws/index.php?id=175>, accessed 11 May 2006.

<sup>98</sup> [http://clusters.wallonie.be/xml/index\\_en.html](http://clusters.wallonie.be/xml/index_en.html), accessed 21 July 2006.

<sup>99</sup> Policy declaration of the Government of the Brussels Capital Region, 19 October 2005.

<sup>100</sup> [http://www.irsib.irisnet.be/soib\\_nl.htm](http://www.irsib.irisnet.be/soib_nl.htm), accessed 14 August 2006.

## **Annex 1 List of tables**

| <i>No.</i> | <i>Title</i>   | <i>Page</i> |
|------------|--|-------------|
| Table 2.1  | Non-policy-directed funding of biotechnology research at the federal level (in M EUR)  | 42          |
| Table 2.2  | Non-policy-directed funding of biotechnology research in Flanders  | 45          |
| Table 2.3  | Non-policy-directed funding of biotechnology research in Wallonia  | 48          |
| Table 2.4  | Non-policy-directed funding of biotechnology research in the Brussels Capital Region   | 50          |
| Table 2.5  | Flemish public policy-directed biotechnology-stimulating instruments in the period 2002-2005 (in M EUR)                        | 52          |
| Table 2.6  | Walloon public policy-directed biotechnology-stimulating instruments during the period 2002-2005 (in M EUR)                    | 61          |
| Table 2.7  | Brussels' public policy-directed biotechnology-stimulating instruments in the period 2002-2005 (in M EUR)                      | 65          |
| Table 2.8  | Involvement of Belgium in biotechnology/life sciences programmes of the 6th Framework Programme                                | 67          |
| Table 4.1  | Belgian public funding of biotechnology, by non-directed, generic and specific instruments, in the period 2002-2005 (in M EUR) | 76          |
| Table 4.2  | Federal public funding of biotechnology, by non-directed, generic and specific instruments, in the period 2002-2005 (in M EUR) | 77          |
| Table 4.3  | Flemish public funding of biotechnology, by non-directed, generic and specific instruments, in the period 2002-2005 (in M EUR) | 79          |
| Table 4.4  | Walloon public funding of biotechnology, by non-directed, generic and specific instruments, in the period 2002-2005 (in M EUR) | 81          |
| Table 4.5  | Brussels' public funding of biotechnology, by non-directed, generic and specific instruments, in the period 2002-2005          | 84          |

(in M EUR)

|            |   |     |
|------------|---|-----|
| Table 4.6  | Participants/recipients and co-financing requirements of policy-directed programmes that funded biotech activities in the period 2002-2005 in Flanders                    | 86  |
| Table 4.7  | Participants/recipients and co-financing requirements of policy-directed programmes that funded biotech activities in the period 2002-2005 in Wallonia                    | 88  |
| Table 4.8  | Participants/recipients and co-financing requirements of policy-directed programmes that funded biotech activities in the Brussels Capital Region in the period 2002-2005 | 90  |
| Table 4.9  | Coverage of policy goals and funding, by Flemish policy-directed instruments, in the period 2002-2005 (in M EUR)  | 92  |
| Table 4.10 | Coverage of policy goals and funding, by Walloon policy-directed instruments, in the period 2002-2005 (in M EUR)  | 93  |
| Table 4.11 | Coverage of policy goals and funding, by policy-directed instruments, in the Brussels Capital Region in the period 2002-2005 (in M EUR)                                   | 97  |
| Table 4.12 | Coverage of biotech application areas and funding, by policy-directed instruments, in Flanders in the period 2002-2005 (in M EUR)   | 99  |
| Table 4.13 | Coverage of biotech application areas and funding, by policy-directed instruments, in Wallonia in the period 2002-2005 (in M EUR)   | 100 |
| Table 4.14 | Coverage of biotech application areas and funding, by policy-directed instruments, in the Brussels Capital Region in the period 2002-2005 (in M EUR)                      | 103 |
| Table 4.15 | Coverage and funding of biotech activities, by policy-directed instruments, in Flanders in the period 2002-2005 (in M EUR)  | 105 |
| Table 4.16 | Coverage and funding of biotechnology activities, by policy-directed instruments, in Wallonia in the period 2002-2005 (in M EUR)  | 106 |
| Table 4.17 | Coverage and funding of biotechnology activities, by policy-directed instruments, in the Brussels Capital Region in the period 2002-2005 (in M EUR)                       | 108 |

|            |  |     |
|------------|--|-----|
| Table 4.18 | Comparison of biotechnology research funding, by non-policy-directed and policy-directed instruments, in the periods 1994-1998 and 2002-2005 | 110 |
| Table 4.19 | Presence of policy-directed instruments for specific policy goals in the periods 1994-1998 and 2002-2005                                     | 112 |

## **Annex 2 List of charts**

| <i>No.</i>   | <i>Figure</i>  | <i>Page</i> |
|--------------|--|-------------|
| Figure 1.1   | Organisational chart of the innovation governance system at federal level  | 14          |
| Figure 1.2   | Organisational chart of the innovation governance system in Flanders   | 18          |
| Figure 1.3   | Organisational chart of the innovation governance system in Wallonia   | 21          |
| Figure 1.4   | Organisational chart of the innovation governance system in the Brussels-Capital Region  | 26          |
| Figure 3.1   | Belgium biotechnology knowledge base indicators: comparison with EU25 and USA figures in three periods (index value)   | 69          |
| Figure 3.2.1 | Share of biotechnology subfields, as a percentage of total biotechnology publications: comparison with EU25 and USA figures (1994-1996)                            | 70          |
| Figure 3.2.2 | Share of biotechnology subfields, as a percentage of total biotechnology publications: comparison with EU25 and USA figures (2002-2004)                            | 70          |
| Figure 3.3   | Growth rates of biotechnology subfield publications: comparison with EU25 and USA figures (1994-1996 and 2002-2004)  | 71          |
| Figure 3.4   | Performance indicators for biotechnology knowledge transmission and applications in Belgium over three periods (index value): comparison with EU25 and USA figures | 72          |
| Figure 3.5   | Performance indicators for biotechnology industrial development in Belgium over three periods (index value): comparison with EU25 and USA figures                  | 73          |
| Figure 3.6   | Performance indicators for biotechnology market conditions in Belgium (index values): comparison with EU25 and USA figures   | 74          |

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## Annex 5 Performance

### Introduction

This Annex includes the data that was used to develop the indicators discussed in Chapter 3. Chapter 3 describes four sets of indicators used to measure the performance of the national biotechnology system of innovation, in terms of:

1. Creating a knowledge base and supporting the availability of human resources: Charts 3.1, 3.2.1, 3.2.2 and 3.3
2. Knowledge transmission and application: Chart 3.4
3. Industrial development: Chart 3.5
4. Market conditions: Chart 3.6

The indicators aim to capture trends in performance and compare the national situation with that of a reference region. To present trends in performance, most indicators are provided for three or two different time periods, depending on data availability. To avoid capturing erratic trends, each time period includes several years, again depending on data availability. Information on which years have been captured for each period and comments concerning the index used can be found in the last two columns of Table A5.1.

Table A5.1. Performance indicators, charts, comments and time periods

|        | <b>Indicator</b>                                   | <b>Chart</b> | <b>Comments</b>   | <b>Time periods</b>  |
|--------|--|--------------|---|--|
| Ind. 1 | Biotech publications per million capita (pMC)      | 3.1          | Index: Reference Region EU25 =100<br>and US data for comparison                         | (1) 1994-1996,<br>(2) 1998-2000,<br>(3) 2002-2004          |
| Ind. 2 | Biotech publications per BT public R&D expenditure | 3.1          | Only for those countries included in the inventory<br>Index: Reference Region EU25 =100 | BT Pub. 2002-2004 / Total Pub. Expenditure 1994-1998 M Ecu |
| Ind. 3 | BT patents / BT publications                       | 3.4          | Index: Reference Region EU25 =100<br>and US data for comparison                         | (1) 1994-1996<br>(2) 1998-2000<br>(3) 2001-2003            |
| Ind. 4 | BT publications / Total pub.                       | 3.1          | Index: Reference Region EU25 =100<br>and US data for comparison                         | (1) 1994-1996<br>(2) 1998-2000<br>(3) 2002-2004            |
| Ind. 5 | Citations to BT publications                       | 3.1          | Index: Reference Region EU25 =100<br>and US data for comparison<br>Small country effect | (1) 1994-1998<br>(3) 2000-2004                             |
| Ind. 6 | Graduates in life sciences pMC                     | 3.1          | Index: Reference Region EU17 =100<br>and US data for comparison                         | (2) 1998<br>(3) 2002                                       |
| Ind. 7 | BT publications in subfields, as % of              | 3.2.1        | Data in %<br>EU25 and US data for   | 1994-1996  |

|         | <b>Indicator</b>                            | <b>Chart</b>                              | <b>Comments</b>  | <b>Time periods</b>   |
|---------|---|---|--|---|
|         | total BT publications                       | 3.2.2                                     | comparison   | 2002-2004   |
| Ind. 8  | Growth rate of BT publications in subfields | 3.3                                       | EU25 and US data for comparison<br>Small field effect  | Growth rate between 1994-96 (period 1) and 2002-04 (period 3) |
| Ind. 9  | Biotech patent applications pMC             | 3.4                                       | EU25 and US data for comparison  | (1) 1994-1996<br>(2) 1998-2000<br>(3) 2001-2003               |
| Ind. 10 | Number of biotechnology companies pMC       | 3.5                                       | European (data available) and US data for comparison   | (2) 2001<br>(3) 2004  |
| Ind. 11 | Number of biotech start-ups pMC             | 3.4                                       | European (data available) and US data for comparison   | (3) 2001-2003<br>(only one period)                            |
| Ind. 12 | Number of biotech IPOs pMC                  | 3.5                                       | European (data available) and US data for comparison   | (3) 2002-2005   |
| Ind. 13 | Venture capital in € pC                     | 3.5                                       | European (data available) and US data for comparison   | (2) 2002<br>(3) 2004  |
| Ind. 14 | BT acceptance index                         | No Chart - Discussed in text of chapter 3 | Source: BT Policy Benchmarking 2005. The biotechnology acceptance index is a composite index and draws on questions Q.12, Q.13.1 and Q14.01 and Q14.09 of the Eurobarometer 58.0 | 2002  |
| Ind. 15 | Eurobarometer 225                           | No Chart - discussed in text of chapter 3 | See section 3.3 and sections 3.4.1, 3.4.2, and 3.4.3 of the Special Eurobarometer 225 <sup>101</sup>   | 2005  |
| Ind. 16 | Biomedicines                                | 3.6                                       | Source: BT Policy Benchmarking 2005<br>Index: Reference Region EU15 =100<br>US data for comparison   | 1995-2002   |
| Ind. 17 | Field trials                                | 3.6                                       | Source: Biotechnology Innovation Scoreboard 2002<br>Index: Reference Region EU15 =100<br>US data for comparison  | 1996-2001   |

<sup>101</sup>

[http://europa.eu.int/comm/public\\_opinion/archives/ebs/ebs\\_225\\_report\\_en.pdf](http://europa.eu.int/comm/public_opinion/archives/ebs/ebs_225_report_en.pdf)

The following methodological issues are related to some of the indicators:

- Indicator 3 (Patent BT / Publications BT) replaces the indicator *BT publications basic research/ BT publications applied research*. Results of the EPOHITE project have shown that the original indicator does not differ significantly in the case of old EU member states. This might be the result of methodological problems associated with the indicator, since the definition of basic and applied research is based on a journal classification made by SCI. The explanatory power of this indicator is therefore questionable.
- To calculate the citation rate first the publications for the period 1994-1996 (set 1) were searched and all the publications in 1994-1998 that cited any publications in set 1 (set 2). Citation rate has been calculated by (number of publications in set 2) / (number of publications in set 1). However, many of the articles in set 2 cited not only one article in set 1 and these duplicated citations are not taken into account in our calculation. For example, if there are 2 articles in set 1 and they each has one citation but cited by the same article, there is only 1 article in set 2. The citation rate for the 2 articles in set 1 is 0.5 instead of 1. This depreciation is more obvious in countries with more publications such as USA and EU25 since the possibility to cite multiple articles in set 1 is large. Accordingly the citation rates of USA and EU25 are a bit underestimated.
- The indicator 'Citations to BT publications' seems to have a 'small country effect' bias. Small countries show a relatively large citation rate. A possible explanation might be that, as far as number of publications is concerned, larger countries usually have a larger 'middle quality' share of research results (in terms of impact) while smaller countries usually have a 'low in number but good in quality' publications impact. This can be explained by the concentration of resources allocated to selected research groups in small countries. Small countries may concentrate resources in outstanding research units. Accordingly, fewer publications may have greater impact.
- The EU25=100 index is applicable in the indicator 'Graduates in life sciences pMC' since data was only available for 17 member states.
- For those countries starting from zero in period 1 (1994/1996), the growth rate of BT publications in subfields was set to 100% if the number of publications in period 3 (2002-2004) was larger than zero. On the other hand, if the country reduced the number of publications to zero in the period 2002-2004, the growth rate was -100%. Given that a relative growth rate was used, small fields tended to have relatively larger growth rates.
- To benchmark each country we chose EU25 (or EU15 if data was not fully available) as the reference region. In those cases where data for EU25 or EU15 were not available, the reference corresponds to the sum of national data available. Moreover, to ease the presentation of indicators with different scales in a given chart, an index value was used.

### Raw data for the Charts in Chapter 3

Raw data for Chart 3.1. BT publications per million capita (pMC): absolute and indexed values

|         | BT publications     |        |        | Population (million) |       |       |
|---------|---------------------|--------|--------|----------------------|-------|-------|
|         | 94-96               | 98-00  | 02-04  | 1996                 | 2000  | 2004  |
| EU25    | 97521               | 128716 | 145646 | 447                  | 451   | 457   |
| Belgium | 3542                | 4775   | 5468   | 10                   | 10    | 10    |
| USA     | 119802              | 135508 | 154402 | 264                  | 276   | 292   |
|         | BT publications/pMC |        |        | Index EU25=100       |       |       |
|         | 94-96               | 98-00  | 02-04  | 94-96                | 98-00 | 02-04 |
| EU25    | 218                 | 285    | 319    | 100                  | 100   | 100   |
| Belgium | 349                 | 466    | 526    | 160                  | 163   | 165   |
| USA     | 454                 | 492    | 529    | 208                  | 172   | 166   |

Source: BioPolis Research

Publication data: Science Citation Index (through online database vendor STN International)

Population data: EUROSTAT and OECD

Raw data for Chart 3.1. BT publications per BT public R&D expenditure

|         | BT publications | Non-policy-directed funding | Policy-directed funding |           | Total public spending on BT (Mecu) | BT publications/Mecu BT public expenditure | Index |
|---------|-----------------|-----------------------------|-------------------------|-----------|------------------------------------|--|-------|
|         |                 |                             | Biotech-specific        | Generic   |                                    |  |       |
|         | 2002-2004       | 1994-1998                   | 1994-1998               | 1994-1998 | 1994-1998                          | 2002-2004/ 1994-1998                       |       |
| EU25    | 145646          |                             |                         |           | n.a.                               |  |       |
| Belgium | 5468            | 176                         | 189                     | 185.5     | 551                                | 10   | 62    |
| USA     | 154402          |                             |                         |           | n.a.                               |  | n.a.  |

Source: BioPolis Research

Publication data: Science Citation Index (through online database vendor STN International)

BT public expenditures in research: Inventory Project, Table 3.4 Executive Summary

Raw data for Chart 3.1. BT publications, as share of total publications: absolute and indexed values

|         | BT publications         |        |        | Total publications |         |         |
|---------|-------------------------|--------|--------|--------------------|---------|---------|
|         | 94-96                   | 98-00  | 02-04  | 94-96              | 98-00   | 02-04   |
| EU25    | 97521                   | 128716 | 145646 | 860652             | 1024327 | 1117392 |
| Belgium | 3542                    | 4775   | 5293   | 28122              | 34490   | 40439   |
| USA     | 119802                  | 135508 | 154402 | 889506             | 941191  | 1045894 |
|         | Share of BT publication |        |        | Index EU25=100     |         |         |

|         | 94-96 | 98-00 | 02-04 | 94-96 | 98-00 | 02-04 |
|---------|-------|-------|-------|-------|-------|-------|
| EU25    | 11%   | 13%   | 13%   | 100   | 100   | 100   |
| Belgium | 13%   | 14%   | 14%   | 111   | 110   | 104   |
| USA     | 13%   | 14%   | 15%   | 119   | 115   | 113   |

Source: BioPolis research

Publication data: Science Citation Index (through online database vendor STN International)

Raw data for Chart 3.1. Citations to BT publications: absolute and indexed values

|         | Citations to BT publications |       | Index EU25=100 |       |
|---------|------------------------------|-------|----------------|-------|
|         | 94-98                        | 00-04 | 94-98          | 00-04 |
| EU25    | 6.14                         | 7.28  | 100            | 100   |
| Belgium | 9.37                         | 8.44  | 153            | 116   |
| USA     | 6.39                         | 8.54  | 104            | 117   |

Source: BioPolis Research

Citations data: Science Citation Index (through online database vendor STN International)

Raw data for Chart 3.1. Graduates in life sciences pMC: absolute and indexed

|         | Graduates in Life Sciences |       | Population (million) |      |
|---------|----------------------------|-------|----------------------|------|
|         | 1998 / 1999                | 2002  | 1998 / 1999          | 2002 |
| EU17    | 46859**                    | 81316 | 552**                | 431  |
| Belgium | 733*                       | 1499  | 10*                  | 10   |
| USA     | 75253*                     | 70950 | 276*                 | 288  |
|         | Graduates pMC              |       | Index EU17=100       |      |
|         | 1998 / 1999                | 2002  | 1998 / 1999          | 2002 |
| EU17    | 85**                       | 189   | 100                  | 100  |
| Belgium | 72*                        | 145   | 85                   | 77   |
| USA     | 273*                       | 246   | 299                  | 131  |

Index EU17=100 for 1998 is EU-16, because for Portugal no data available

\* data for 1998; \*\* data for 1999

Source: BioPolis Research

Graduates data OECD Education Database

Population source for US is the OECD

Raw data for Chart 3.2.1. BT publications in subfields, share of total number of BT publications for the period 1994-1996

|         | 1994-1996 |       |        |        |      |            |               |         |
|---------|-----------|-------|--------|--------|------|------------|---------------|---------|
|         | Total     | Plant | Health | Animal | Food | Industrial | Environmental | Generic |
| EU25    | 100%      | 8%    | 53%    | 5%     | 3%   | 1%         | 1%            | 30%     |
| Belgium | 100%      | 8%    | 55%    | 4%     | 2%   | 1%         | 1%            | 29%     |
| USA     | 100%      | 6%    | 56%    | 5%     | 2%   | 0%         | 0%            | 30%     |

Source: BioPolis Research

Publication data: Science Citation Index (through online database vendor STN International)

Raw data for Chart 3.2.2. BT publications in subfields, as share of total number of BT publications for the period 2002-2004

| 2002-2004 |       |       |        |        |      |            |               |         |
|-----------|-------|-------|--------|--------|------|------------|---------------|---------|
|           | Total | Plant | Health | Animal | Food | Industrial | Environmental | Generic |
| EU25      | 100%  | 7%    | 58%    | 5%     | 4%   | 1%         | 1%            | 25%     |
| Belgium   | 100%  | 8%    | 57%    | 5%     | 4%   | 1%         | 1%            | 23%     |
| USA       | 100%  | 6%    | 59%    | 5%     | 3%   | 0%         | 1%            | 26%     |

Source: BioPolis Research

Publication data: Science Citation Index (through online database vendor STN International)

Raw data for Chart 3.2.1 BT publications in subfields for the period 1994-1996

| 1994-1996 |        |       |        |        |      |            |               |         |
|-----------|--------|-------|--------|--------|------|------------|---------------|---------|
|           | Total  | Plant | Health | Animal | Food | Industrial | Environmental | Generic |
| EU25      | 97217  | 7629  | 51944  | 4375   | 2434 | 624        | 576           | 29635   |
| Belgium   | 3586   | 294   | 1967   | 146    | 72   | 24         | 30            | 1053    |
| USA       | 111686 | 7118  | 62274  | 5580   | 2230 | 296        | 459           | 33729   |

Source: BioPolis Research

Publication data: Science Citation Index (through online database vendor STN International)

Raw data for Chart 3.2.2. BT publications in subfields for the period 2002-2004

| 2002-2004 |        |       |        |        |      |            |               |         |
|-----------|--------|-------|--------|--------|------|------------|---------------|---------|
|           | Total  | Plant | Health | Animal | Food | Industrial | Environmental | Generic |
| EU25      | 140984 | 10494 | 81220  | 6821   | 5017 | 1162       | 1126          | 35144   |
| Belgium   | 5365   | 444   | 3046   | 284    | 231  | 51         | 53            | 1256    |
| USA       | 141680 | 7910  | 84234  | 6872   | 4070 | 436        | 724           | 37434   |

Source: BioPolis Research

Publication data: Science Citation Index (through online database vendor STN International)

Raw data for Chart 3.3. Growth rate of BT publications in subfields between 1994-96 and 2002-04

| 1994-1996/2002-2004 |       |        |        |      |            |               |         |
|---------------------|-------|--------|--------|------|------------|---------------|---------|
|                     | Plant | Health | Animal | Food | Industrial | Environmental | Generic |
| EU25                | 38%   | 56%    | 56%    | 106% | 86%        | 95%           | 19%     |
| Belgium             | 51%   | 55%    | 95%    | 221% | 113%       | 77%           | 19%     |
| USA                 | 11%   | 35%    | 23%    | 83%  | 47%        | 58%           | 11%     |

Source: BioPolis Research

Publication data: Science Citation Index (through online database vendor STN International)

Raw data for Chart 3.4. BT Patents pMC: absolute and indexed values

|         | BT patents     |       |       | Population (million) |       |       |
|---------|----------------|-------|-------|----------------------|-------|-------|
|         | 94-96          | 98-00 | 01-03 | 1996                 | 2000  | 2003  |
| EU25    | 4924           | 8921  | 10119 | 447                  | 451   | 455   |
| Belgium | 252            | 562   | 464   | 10                   | 10    | 10    |
| USA     | 8590           | 14396 | 12348 | 264                  | 276   | 292*  |
|         | BT patents/pMC |       |       | Index                |       |       |
|         | 94-96          | 98-00 | 01-03 | 94-96                | 98-00 | 01-03 |
| EU25    | 11             | 20    | 22    | 100                  | 100   | 100   |
| Belgium | 25             | 55    | 45    | 226                  | 278   | 201   |
| USA     | 33             | 52    | 42    | 295                  | 264   | 190   |

Source: BioPolis Research

Publication data: Science Citation Index (through online database vendor STN International)

Patent data: EPPATENT, WOPATENT (online database vendor Questel Orbit)

Raw data for Chart 3.4. BT Patents per BT publications: absolute and indexed values

|         | BT patents                  |       |       | BT publications |        |        |
|---------|-----------------------------|-------|-------|-----------------|--------|--------|
|         | 94-96                       | 98-00 | 01-03 | 94-96           | 98-00  | 01-03  |
| EU25    | 4924                        | 8921  | 10119 | 97521           | 128716 | 140219 |
| Belgium | 252                         | 562   | 464   | 3542            | 4775   | 5293   |
| USA     | 8590                        | 14396 | 12348 | 119802          | 135508 | 148853 |
|         | BT patents/ BT publications |       |       | Index EU25=100  |        |        |
|         | 94-96                       | 98-00 | 01-03 | 94-96           | 98-00  | 01-03  |
| EU25    | 0.05                        | 0.07  | 0.07  | 100             | 100    | 100    |
| Belgium | 0.07                        | 0.12  | 0.09  | 141             | 170    | 121    |
| USA     | 0.07                        | 0.11  | 0.08  | 142             | 153    | 115    |

Source: BioPolis Research

Publication data: Science Citation Index (through online database vendor STN International)

Patent data: EPPATENT, WOPATENT (online database vendor Questel Orbit)

Raw data for Chart 3.5. Number of BT companies pMC for the period 2001-2004: absolute and indexed values

|              | BT companies     |      |      |      | Population in T |        |        |        |
|--------------|------------------|------|------|------|-----------------|--------|--------|--------|
|              | 2001             | 2002 | 2003 | 2004 | 2001            | 2002   | 2003   | 2004   |
| Europe       | 1879             | 1878 | 1861 | 1815 | 452016          | 452641 | 454580 | 456863 |
| EU Available | 1643             | 1650 | 1782 | 1605 | 319337          | 319484 | 408602 | 322210 |
| Belgium      | 66               | 69   | 70   | 70   | 10236           | 10310  | 10356  | 10396  |
| USA          | 1457             | 1472 | 1473 | 1444 | 285102          | 287941 | 290789 | 291685 |
|              | BT companies pMC |      |      |      | Index           |        |        |        |
|              | 2001             | 2002 | 2003 | 2004 | 2001            | 2002   | 2003   | 2004   |
| Europe       |                  |      |      |      |                 |        |        |        |
| EU Available | 5                | 5    | 4    | 5    | 100             | 100    | 100    | 100    |

|         |      |      |      |      |     |     |     |     |
|---------|------|------|------|------|-----|-----|-----|-----|
| Belgium | 6.45 | 6.69 | 6.76 | 6.73 | 125 | 130 | 155 | 135 |
| USA     | 5.11 | 5.11 | 5.07 | 4.95 | 99  | 99  | 116 | 99  |

Note: EU Available is the result of the sum of available EU member states

Source: BioPolis Research

Biotech companies data: Ernst and Young 2002-2005, EuropaBio

Raw data for Chart 3.5. BT start-ups pMC for the period 2001-2003 and year 2003: absolute and indexed values

|   | BT start-ups         |           | Population in T      |       |
|---|----------------------|-----------|----------------------|-------|
|   | 2001-2003            | 2003      | 2003                 |       |
| Europe (EU 15 - Cyprus - Greece + Norway + Switzerland) | 523                  | 132       | 367051               |       |
| Belgium   | 9                    | 0         | 10356                |       |
| USA   | 355                  | 83        | 290789               |       |
|   | Biotech start-up/pMC | Index     | Biotech start-up/pMC | Index |
|   | 2001-2003            | 2001-2003 | 2003                 | 2003  |
| Europe (EU 15 - Cyprus - Greece + Norway + Switzerland) | 1.4                  | 100       | 0.36                 | 100   |
| Belgium   | 0.9                  | 61        | 0.00                 | 0     |
| USA   | 1.2                  | 86        | 0.29                 | 79    |

Source: BioPolis Research

Start-ups data: EuropaBio

Raw data for Chart 3.5. Number of BT IPO's pMC: absolute and indexed values

|              | BT IPO    | Population T |        |        |        |           |
|--------------|-----------|--------------|--------|--------|--------|-----------|
|              | 2002-2005 | 2002         | 2003   | 2004   | 2005   | 2002-2005 |
| EU Available | 29        | 452927       | 454869 | 457154 | 461593 | 456636    |
| Belgium      | 2         | 10310        | 10356  | 10396  | 10446  | 10377     |
| USA          | 52        | 287941       | 290789 | 291685 |        | 290138    |
|              | IPO /pMC  | Index        |        |        |        |           |
|              | 2002-2005 | 2002-2005    |        |        |        |           |
| EU Available | 0.00      | 100          |        |        |        |           |
| Belgium      | 0.00      | 303          |        |        |        |           |
| USA          | 0.00      | 282          |        |        |        |           |

Note: EU Available is the result of the sum of available EU member states

Source: BioPolis Research

IPO data: Ernst and Young 2002-2006, London Stock Exchange, Frankfurt Stock Exchange, Euronext, Nasdaq, Burril & Company

Raw data for Chart 3.5. Venture capital pC: absolute and indexed values

|              | Venture capital in biotechnology companies M€ |      |      | Population in T |        |        |
|--------------|---|------|------|-----------------|--------|--------|
|              | 2002  | 2003 | 2004 | 2002            | 2003   | 2004   |
| Europe       | 1100  | 920  | 2800 |                 |        |        |
| EU Available | 890   | 883  | 1111 | 315584          | 319663 | 325131 |
| Belgium      | 25  | 12   | 39   | 10310           | 10356  | 10396  |
| USA          | 2288  | 2498 | 2855 | 287941          | 290789 | 291685 |
|              | Venture capital in €/pC                       |      |      | Index           |        |        |
|              | 2002  | 2003 | 2004 | 2002            | 2003   | 2004   |
| Europe       |   |      |      |                 |        |        |
| EU Available | 2.8   | 2.8  | 3.4  | 100             | 100    | 100    |
| Belgium      | 2   | 1    | 4    | 86              | 42     | 109    |
| USA          | 8   | 9    | 10   | 282             | 311    | 286    |

Source: BioPolis Research

VC data: E&Y Beyond Borders 2002, 2003, 2004, 2005

Raw data for Chart 3.6. Number of Biomedicines pMC

|         | Biomedicines | Population (Million) | Biomedicines / pMC | Index     |
|---------|--------------|----------------------|--------------------|-----------|
|         | 1995-2002    | 2002                 |                    | 1995-2002 |
| EU15    | 39           | 378                  | 0.10               | 100       |
| Belgium | 0            | 10                   | 0.00               | 0         |
| USA     | 115          | 289                  | 0.40               | 387       |

Note: EU 15 is the result of the sum of the 15 old EU member states

Source: BioPolis Research

Number of medicines: Benchmarking of public biotechnology policy 2005

Raw data for Chart 3.6. Number of field trials pMC

|         | Field trials | Population in M | Field trials pMC | Index     |
|---------|--------------|-----------------|------------------|-----------|
|         | 1996-2001    | 2001            | 1996-2001        | 1996-2001 |
| EU15    | 1334         | 379             | 4                | 100       |
| Belgium | 69           | 10              | 7                | 191       |
| USA     | 6745         | 278             | 24               | 688       |

Note: EU 15 is the result of the sum of the 15 old EU member states

Source: BioPolis Research

Field trails: Biotechnology Innovation Scoreboard 2002

Raw data for biotechnology acceptance. Data are mentioned in the text of Chapter 3.

| <b>BT acceptance index 2002</b> |                      |                        |
|---------------------------------|----------------------|------------------------|
|                                 | <b>Index average</b> | <b>N (sample size)</b> |
| EU - 15*                        | 100.29               | 16828                  |
| Belgium                         | 100.59               | 1014                   |

\*Weighted Average according to the weight "W13" of the Eurobarometer 58.2, which considers population differences among countries and corrects for inconsistencies in the national samples

Source: BioPolis Research

BT acceptance index: Benchmarking of public biotechnology policy 2005

### References:

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Enzing, C.M. et al. (1999): Inventory of Public Biotechnology R&D Programmes in Europe, Luxembourg: Office for Official Publications of the European Communities.

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Reiss, T. et al. (2005) Benchmarking of public biotechnology policy 2005, European Commission Enterprise DG. [http://europa.eu.int/comm/enterprise/phabiocom/comp\\_biotech\\_comp.htm](http://europa.eu.int/comm/enterprise/phabiocom/comp_biotech_comp.htm), accessed 1/6/2005

### Websites:

|                          |   |
|--------------------------|---|
| London Stock Exchange    | <a href="http://www.londonstockexchange.com/">http://www.londonstockexchange.com/</a>       |
| Frankfurt Stock Exchange | <a href="http://deutsche-boerse.com/">http://deutsche-boerse.com/</a>                       |
| Euronext                 | <a href="http://www.euronext.com/">http://www.euronext.com/</a>                             |
| NASDAQ                   | <a href="http://www.nasdaq.com/">http://www.nasdaq.com/</a>                                 |
| Burrill & Company        | <a href="http://www.burrillandco.com/">http://www.burrillandco.com/</a>                     |
| EuropaBio                | <a href="http://www.europabio.org/">http://www.europabio.org/</a>                           |
| EUROSTAT                 | <a href="http://epp.eurostat.cec.eu.int/">http://epp.eurostat.cec.eu.int/</a>               |
| OECD Education Database  | <a href="http://www.oecd.org/">http://www.oecd.org/</a>                                     |
| OECD Statistics          | <a href="http://www.oecd.org/">http://www.oecd.org/</a>                                     |
| STN International        | <a href="http://www.stn-international.de/">http://www.stn-international.de/</a>             |
| Questel Orbit            | <a href="http://www.questel.orbit.com/index.htm">http://www.questel.orbit.com/index.htm</a> |

## **Annex 6    Abbreviations**

|             |   |
|-------------|---|
| ANIMAL      | Administration for Management of Environment, Nature, Land and Water          |
| ARC         | Concerted Research Actions  |
| AWEX        | Walloon Export Agency   |
| AWI         | Science and Innovation Administration   |
| BAO-ABE     | Brussels Enterprise Agency  |
| BCCM        | Belgian Co-ordinated Collections of Micro-organisms                           |
| BELSPO      | Belgian Federal Science Policy Office   |
| BFF         | Biotech Fund Flanders   |
| BIM         | Brussels Institute for Management of the Environment                          |
| BIPIB       | Belgian Interdisciplinary Platform for Industrial Biotechnology               |
| BOF         | Special Research Fund   |
| BT          | Biotechnology   |
| CART        | Centre for Analysis of Residues in Traces                                     |
| CBGS        | Centre for Population and Family Studies                                      |
| CBIG        | Centre of Biomedical Integrative Genoproteomics                               |
| CEIB        | Interfaculty Centre of Biomaterials   |
| CERIA       | Centre for Research and Education in Food and Chemical Industry               |
| CFPS-FRWB   | Federal Council for Science Policy  |
| CIP         | Centre for Protein Engineering  |
| CLE         | Centre for Agricultural Economy   |
| CPS         | Walloon Council for Science Policy  |
| CRA-W       | Walloon Agricultural Research Centre  |
| CRGB        | Research Centre for the Management of Bioindustries                           |
| CRPP        | Centre de Recherche sur les Protéines Prion                                   |
| CWBI        | Centre Wallon de Biologie Industrielle  |
| DGEE        | Directorate General for Economy and Employment                                |
| DGENORS     | Directorate General for Non-Obligatory Education and Scientific Research      |
| DGRNE       | Directorate General for Natural Resources and the Environment                 |
| DGTRE       | Directorate General for Technology, Research and Energy                       |
| FFEU        | Financing Fund for Debt Reduction and One-Off Investment Expenses             |
| FIRST       | Training and Promotion of Scientific and Technological Research               |
| FLAMAC      | Flanders Material Centre  |
| Flanders DC | Flanders District of Creativity   |
| FMTC        | Flanders' Mechatronics Technology Centre                                      |
| FNRS        | National Fund for Scientific Research   |
| FRFC        | Fonds de la Recherche Fondamentale Collective d'initiative des chercheurs     |
| FRIA        | Fonds pour la formation a la Recherche dans l'Industrie et dans l'Agriculture |
| FSRM        | Fonds de la Recherche Scientifique Médicale                                   |
| FUNDP       | University of Namur   |
| FUSAGx      | University of Gembloux  |
| FSR         | Special Research Fund   |
| FWO         | Research Foundation - Flanders  |

|           |  |
|-----------|--|
| GDP       | Gross Domestic Product   |
| GERD      | Gross Expenditure on R&D   |
| GIGA      | Interdisciplinary Applied Genoproteomics Group   |
| GIMB-SRIB | Brussels Regional Investment Company   |
| GIMV      | Regional Investment Company of Flanders  |
| GM / GMO  | Genetically Modified Organism  |
| GOMB-SDRB | Brussels Regional Development Agency   |
| GVA       | Gross Value Added  |
| IAP       | Institute for the Archaeological Heritage of the Flemish Community                                   |
| IBBT      | Interdisciplinary institute for BroadBand Technology   |
| IBMM      | Institute of Molecular Biology and Medicine  |
| ICP       | Christian de Duve Institute of Cellular Pathology  |
| ILVO      | Institute for Agriculture and Fisheries Research   |
| IMDO      | Research centre of Industrial Microbiology, Fermentation, Technology and Downstream Processing       |
| IMCPS     | Inter-Ministerial Conference for Science Policy  |
| IMI       | Institute of Medical Immunology  |
| INBO      | Research Institute for Nature and Forest   |
| IOF       | Industrial Research Fund   |
| IPBO      | Institute of Plant Biotechnology for Developing Countries  |
| IPO       | Initial Public Offering  |
| ISV       | Institute des Sciences de la Vie   |
| IWOIB     | Institute for the Encouragement of Support of Scientific Research and Innovation of Brussels (IRSIB) |
| IWT       | Institute for the promotion of Innovation by Science and Technology in Flanders                      |
| KMSKA     | Royal Museum of Fine Arts-Antwerpen  |
| KULeuven  | Catholic University of Leuven  |
| LF        | Large Firms  |
| MIP       | Environmental and Energy Technology Innovation Platform  |
| PMV       | Participation Company Flanders   |
| RUG       | University of Ghent  |
| SBB       | Service of Biosafety and Biotechnology   |
| SME(s)    | Small- and Medium-sized Enterprise(s)  |
| SOWALFIN  | Walloon Company for Financing and Guarantees for SMEs  |
| SRIW      | Regional Investment Company of Wallonia  |
| TBM       | Applied Biomedical Research  |
| UA        | University of Antwerp  |
| UCL       | Catholic University of Louvain   |
| UL        | University of Liège  |
| ULB       | Free University of Brussels (French-speaking)  |
| VAR       | Veterinary and Agrochemical Research Centre  |
| VIB       | Flanders Interuniversity Institute for Biotechnology   |
| VINNOF    | Flemish Innovation Fund  |
| VIL       | Flanders Institute for Logistics   |
| VITO      | Flemish Institute for Technological Research   |

|             |  |
|-------------|--|
| <b>VLAB</b> | Flemish Action Programme in Biotechnology    |
| <b>VLIZ</b> | Flanders Marine Institute                    |
| <b>VRWB</b> | Flemish Science Policy Council               |
| <b>VUB</b>  | Free University of Brussels (Dutch-speaking) |
| <b>WIV</b>  | Scientific Institute for Public Health       |

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